

STARVING IN THE SPORT OF KINGS: WEIGHT MANAGEMENT AND
COGNITIVE FUNCTION IN AUSTRALIAN JOCKEYS

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STUDENT DECLARATION

“I, Matt McGregor, declare that the PhD thesis entitled *Starving in the Sport of Kings: Weight Management and Cognitive Function in Australian Jockeys* is no more than 100,000 words in length, exclusive of tables, figures, appendices, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.”

Signature

Date

ABSTRACT

To maintain consistently low riding-weights, many jockeys engage in repetitive cycles of rapid, short-term weight loss, termed “wasting”. The physical and psychological effects of “wasting” are not well understood, although several recent studies suggest that, at least in the short-term, they may be numerous, and with any one of them having a potentially detrimental effect on both the health and riding performance of jockeys. The major aims of the research reported were to investigate the weight-management experiences of jockeys in Australia, and to examine a range of cognitive and other psychological effects of rapid weight loss in this professional athlete population. The methodological framework used to address these aims incorporated both quantitative and qualitative techniques. Survey results of Study 1 showed that 81% of jockeys have difficulty managing their weight, with respondents typically losing 1.7 kg (0.6 *S.D.*). The majority (62%) included at least six methods in their current weight-management regimens, with restriction of food (used by 88.1% of all jockeys) and fluid (78.6%), and sauna use (71.8%) the most popular. Most jockeys reported psychological difficulties accompanying weight loss, with 83.3% reporting mood swings, two thirds believing their decision-making was affected, and 48.8% having difficulty sustaining attention. In Study 2, seven jockeys and six industry stakeholders were interviewed regarding weight-management, with major themes emerging confirming that most jockeys struggle to consistently maintain weights within current racing regulations, and that dehydration tactics are necessary to achieve the mandated weight standards. Participants stated that adverse cognitive events, including attentional and memory dysfunction, are commonly associated with weight loss, however inter and intra-individual differences indicated that other factors may influence the relationship between weight status and processing in other cognitive domains. For example, some jockeys reported that the

arousal inducing environment of race meetings facilitates fast decision-making and psychomotor response times. In Study 3, a small number of purposefully selected jockeys completed a series of computer-based tests of cognitive function immediately before and after race-day competitions, and also on non race-days. The tests tracked jockeys' cognitive functions relative to changes in weight status and competitive conditions. Jockeys also engaged in in-depth interviews about weight management and its effects on their racing and personal lives. Most jockeys showed little insight into their cognitive functioning, but generally believed their cognitive performances were either unaffected or enhanced by their weight-management activities, especially on race-days. Four focused case studies illustrated that cognitive responses to weight fluctuations and competition were generally idiosyncratic, with variations within individuals across a range of cognitive functions and testing conditions. The exception to this finding was attentional processing speed, which appeared to be impaired in response to weight loss in most cases. Collectively, the results of the three studies indicate that the need for wasting, and the lack of safe and effective options to meet this need, continue to be pervasive and problematic facets of life for professional jockeys, in terms of their effects on psychological well-being and cognitive function.

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Producing a dissertation such as this was in many ways a very self-indulgent and self-absorbed pursuit. Only my name appears on the cover, yet many people have made substantial and invaluable contributions to the research process and its eventual end product, and I now acknowledge these contributions.

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CHAPTER 1

INTRODUCTION

The maintenance of low body weight is considered an important performance prerequisite for athletes in a number of sports, including wrestling, rowing, the martial arts, and weight lifting (Buskirk & Puhl, 1996; Walberg-Rankin, 2000). These athletes have purposefully lost weight, usually via some degree of dehydration, and often in the hours just prior to competition, to comply with the weight regulations of their sports. Such intentional and rapid weight loss is often referred to as cutting weight, or making weight, within sporting contexts (Walberg-Rankin, 2000).

During the past decade, several researchers have reported that athletes who cut weight consistently and rapidly may experience a variety of difficulties associated with their weight loss. These difficulties include physiological, emotional, cognitive, and social problems (Choma, Sforzo, & Keller, 1998; Landers, Arent, & Lutz, 2001; Walberg-Rankin, 2000). Such effects have also been noted in individuals in the general population dieting or experiencing substantial weight loss (Green, Rogers, Elliman, & Gatenby, 1994; Keys, Brozek, Henschel, Mickelson, & Taylor, 1950).

Due to the strict weight-handicapping system that is integral to Australian thoroughbred horse racing, jockeys constitute a group of athletes at extremely high risk of weight-related problems. In order to be able to compete for the bulk of rides, jockeys must be able to maintain their weight at around 52 kg (Moore, Timperio, Crawford, Burns, & Cameron-Smith, 2002), a figure much lower than would be expected for people in the general population of similar heights and ages (King & Mezey, 1987). Despite their usually diminutive stature, such low body weights are difficult to achieve for many jockeys, especially as they get older (Apted, 1988). Further, the competitive

season in Australian racing is virtually year round, ensuring that many jockeys get little respite from their weight-management activities (Moore et al., 2002).

A small number of descriptive studies have suggested that jockeys, both in Australia and other countries with prominent racing industries, engage in frequent and substantial episodes of weight loss and regain (Labadarios, Kotze, Momberg, & Kotze, 1993; Moore et al., 2002), but the full range of weight-management activities, and the timing of these activities, are still to be fully explored. Based on the evidence of experimental studies of wrestlers (Choma et al., 1998; Landers et al., 2001), these short-term weight loss cycles, known as *wasting* in the racing industry, may have detrimental effects on a jockey's ability to perform mental tasks, ride, and carry out other activities of daily life. To date, there have been no empirical studies investigating the physical, psychological or other effects of wasting in jockeys. Indeed, a recent report into the welfare of retired jockeys in Australia recommended that this gap in the knowledge base be rectified as a matter of priority (Speed, Seedsman, Morris, & Sullivan, 2001). According to this report, numerous jockeys, their spouses, and racing officials provided anecdotal evidence of significant adverse emotional and cognitive side effects associated with wasting.

The three studies that inform this thesis provided a unique opportunity to extend previous research efforts by exploring in detail the issue of weight management in Australian jockeys, and the practice of wasting and its effects on cognitive function in particular. To address these broad research questions, a variety of data were collected relating to both the scope of weight management in jockeys (e.g., the typical degree and frequency of weight loss, and the prevalence and timing of specific weight-loss methods), and the psychological consequences of their weight-loss activities.

Study 1 provided a broad description of the range of weight-management practices current Australian jockeys engage, the reasons they adopt specific practices, and of jockeys' subjective experiences of the direct consequences of their weight-management activities. Descriptive findings from a survey addressing these issues are presented in tabular form, and are discussed in Chapter 3 in relation to previous research on weight-regulated athletes.

Study 2 gathered qualitative data, via in-depth interviews, regarding the personal weight-management experiences of seven jockeys (five fully licensed, and two apprentices). In particular, the interviews focused on jockeys' perceptions of the consequences of their weight-management activities on their psychological functioning. The study also included the opinions of six racing-industry employees who work closely with current jockeys. Jockeys described their current weight status, weight-management regimens, and typical responses to weight loss. Both jockey and industry participants also speculated on potential changes to the Australian racing environment that may ease the burden of weight management for jockeys, such as increasing minimum-weight standards, and reducing the number and frequency of race meetings. The interview data were organized and analyzed using content analytic strategies, and recurrent themes and sub-themes to emerge during the analysis are presented and discussed in Chapter 4, with quotations illustrating the key findings.

Study 3 built on the information gathered in Studies 1 and 2, employing both quantitative and qualitative methods to explore jockey weight management in greater detail, and focused on the effects of wasting on specific cognitive functions in a small number of purposefully selected cases. The primary aim of this study was to collect multiple sources of data on the acute effects of wasting on specific aspects of cognition and performance relevant to jockeys, within the context of a number of illustrative

cases. Results are presented and discussed in Chapter 5 in the form of four case studies of weight management.

Please note that there is a change in the writing style used to report aspects of Study 3. Where previous and subsequent chapters were written in the third person, as is traditional in scientific writing (Van Maanen, 1988), Chapter 5 adopted a first person style in the method section, and the results and discussion sections describing each case. The reason for this change is that this chapter presents the personal weight-management stories of these jockeys, and first-person narrative devices invite the reader into the research more so than third person accounts, which can depersonalize and create distance between the reader and the material. The chapter maintained a realist style (Sparkes, 2002), however, where the jockeys' voices were foregrounded, and details about myself were absent, despite the occasional use of the personal pronoun, "I", to denote the author and researcher. Chapter 4 was written in the third person, despite dealing with similar qualitative material, because the commonalities in personal weight-management experiences were of prime importance in Study 2, whereas diversity and nuances were given more value in Study 3.

CHAPTER 2

LITERATURE REVIEW

The literature underpinning this thesis is reviewed in the present chapter, and is organised into several general sections. The first section provides background information on the Australian racing industry and jockeys, including an overview of the weight-related issues faced by professional jockeys in the context of the current Australian racing environment. In the second section, literature relating to weight management among jockeys and athletes in other weight-regulated sports is presented, covering both the extent of weight loss that these athletes experience, and the methods they use to achieve their weight targets. The third section examines the effects of weight loss on aspects of health and well-being important to athletes, with particular emphasis on psychological and cognitive function. The chapter concludes with a brief statement of the general purpose of the research undertaken and described in this thesis.

Racing in Australia

Thoroughbred horse-racing forms a significant part of the historic, cultural, and economic landscapes of Australia, as one of the oldest and largest industries in the country. Known as *the Sport of Kings*, horse-racing generates considerable interest in the community, and contributes substantially to both the financial and psychological well-being of many Australian citizens, through employment, taxation revenue raised from wagering, and opportunities for recreation and social interaction. Nicholson (2005), in his book documenting the legends and heroes of Australian horse racing, goes so far as to say that “the story of racing is the story of Australia.”

Thoroughbred horses arrived in Australia with the first fleet of British settlers in 1788, and the first official race meetings, organized by the military, were conducted soon after in 1810 (Hutchinson, 1999), predating competition in Australia’s national

sports of cricket and Australian Rules football. Prior to these races, informal “match races” around Sydney’s Hyde Park were common occurrences (Lemon, 1987). Racing steadily increased in popularity during the next 50 years as the gold rush gathered momentum, with the first running of the world renowned Melbourne Cup occurring in 1861 (Hutchinson, 1999). Such was the significance of this event for Australians that the race became a public holiday four years later (Cavanough, Kirkwood, & Meldrum, 2001).

From those humble beginnings, racing is now conducted by 391 race clubs across Australia. These clubs held 2745 individual race meetings in the 2004-2005 season, conducted at 364 race tracks spread throughout all seven states and territories in the country (Australian Racing Board, 2005). The growth of the Australian industry is such that it is now considered a world leader in horse-racing, despite the relatively small population of the country, comparing favourably with industries in Great Britain, Hong Kong, France, Japan and the United States. For example, Australia has the most race-courses of any nation, almost doubling the number of tracks of its nearest rival France (Australian Racing Board, 2005). Furthermore, Australia is behind only the USA and Japan in terms of total prize money awarded, with over \$340 million AUD in stakes winnings presented in 2004, and it ranks second in the number of races conducted per season (Australian Racing Board, 2005). Extensive breeding programs have also ensured that the Australian industry is highly regarded as a producer of quality race horses, accounting for approximately 14% of the foals born worldwide (Australian Racing Board, 2005).

Victoria: The Premier Racing State in Australia

Victoria is considered to be the home of thoroughbred horse racing in Australia. Of the 14 major race clubs in Australia, three are located in Melbourne, the capital city

of Victoria, and 68 smaller clubs are located in regional areas of the state (Australian Racing Board, 2005). As an example of the scope of the industry, the 2004/2005 Victorian Racing calendar consisted of 581 individual race meetings, representing approximately 23% of all races in Australia. The prize money on offer in the state accounts for 33% of the national total (Racing Victoria Limited, 2005a), with three of the top four races in Australia ranked by prize money being run at Victorian tracks. Each of these races is worth over \$1 million AUD to the winner, further underlining Victoria's position as the premier racing state in the country.

Horse racing in Victoria provides social and recreational opportunities for many Australians and international visitors, despite competing with other high profile national and international sports. For example, over 1.6 million people attended race meetings in Victoria in the 2003/4 racing season, enthusiastically wagering over \$2,300 million Australian dollars (Racing Victoria Limited, 2004a). In that season, more than 650 thousand people attended the industry's showpiece event, the Spring Racing Carnival (Racing Victoria Limited, 2004a), which is held in Victoria during October and November annually. Racing Victoria Limited (RVL), the sport's responsible authority in the state, boasts that, in addition to high attendances, the feature race the Melbourne Cup also attracts a world-wide television viewing audience of 700 million, with 2.6 million Australian viewers tuning in to watch "the race that stops a nation" (Racing Victoria Limited, 2004a). Annual independent sport surveys saw Australians vote the Melbourne Cup the most important sporting event in the country in two of the last three years (Sweeney Sports, 2005), ahead of other major national sporting events such as the Australian Rules football grand final and international cricket, in a further demonstration of the cultural significance of racing to the population.

In addition to its high profile with spectators, horse-racing is a significant contributor to Victoria's economic position. Racing industry data collected in 2004 estimated the gross economic benefit to Victoria of the Spring Carnival alone at nearly \$400 million AUD (Racing Victoria Limited, 2004a). This contribution puts it well ahead of all other annual international sporting events in the State, including the Australian Formula One Grand Prix and Australian Open tennis championships. Furthermore, the industry creates employment opportunities for thousands of Victorians, including jockeys, horse trainers, race-club staff, and wagering and hospitality workers (IER & COPS, 2006). Importantly, many of the jobs in horse-racing are based in rural communities where employment opportunities can be scarce.

The Jockey

The life of a professional jockey is marked by dedication to physically and psychologically demanding work, long and unusual hours, and high personal risk. Many aspiring riders leave school at a young age, abandoning the comforts of home and family life to live and work at a horse training facility, with a dream but no guarantee of financial security or even physical safety (Speed et al., 2001). It can be a challenging career path, with performances scrutinized by the media and public, but one that also carries with it the lure of fame and fortune.

There are approximately 250 professional jockeys and apprentices currently licensed to ride in Victoria, and a further 20 amateur riders (Australian Racing Board, 2005), however interstate based and international jockeys are included in these figures. Precise demographic statistics are not available, but the number of jockeys actively riding in Victoria is closer to 150, with the youngest approximately 15 years of age, and the oldest more than 50 (N. Wallish, former executive officer of the Victorian Jockeys Association, personal communication, January 2004). The typical jockey has been in

the industry for greater than 10 years, is between 25 and 39 years of age, and lives in the metropolitan area of Melbourne (IER & COPS, 2006).

Athlete and Strategist

Professional jockeys are faced with significant physical and psychological challenges in pursuit of a career in horse-racing. Jockeys are required to be extremely fit, strong, coordinated, and alert in order to control horses that are ten times their own weights, travel at speeds of more than 50 km an hour (Leone, 2005), and may behave erratically at times. In Hillenbrand's accounts of champion American racehorse "Seabiscuit", the author characterised the unique challenge of race-riding by stating that, "to pilot a racehorse is to ride a half ton catapult. It is without question one of the most formidable feats in sport" (Hillenbrand, 2001, p. 70). DeBenedette (1987) quoted findings from an unpublished US study illustrating that jockeys were among the fittest of all athletes examined, with equivalent or better strength, flexibility and endurance than elite football, basketball, and baseball players.

Much of the work that goes into successful race-riding has been done before the rider mounts the horse. A jockey must understand the strengths and weaknesses of his or her mount, and every other horse in the field, to develop a winning race strategy (Field, 2004). Jockeys must know where their mounts like to race in the field (e.g., front, mid-field, or rear), the most suitable sections of the track, and the recent performances of other runners in the race. In this way, jockeys will spend hours checking the *form* of the horses in each race, before deciding on their race tactics, so the ability to plan and strategize are fundamental to success.

Once the race begins, jockeys require all the physical strength they can muster. A point, little known by those outside of racing, is that jockeys do not "sit" on the saddle when racing, but rather perch perilously in the stirrups with only a small part of

their feet in contact with the horse (R. Hall, RVL Education and Training Centre officer, personal communication, April 8 2004). Hillenbrand (2001) described this act as “like perching on the grille of a car while it speeds down a twisting, pot-holed freeway in traffic.” Although most races are over in a matter of 1 to 2 minutes, it takes a great deal of strength in the thighs, ankles, and arms, and balance to maintain this position while grasping the reins to guide the horse, and using the whip to urge it on. With up to 10 races in a typical meeting, jockeys must be well enough conditioned to repeat this effort a number of times throughout the day.

A jockey must also be mentally sharp as well as physically fit to be a successful race-rider. Quick reaction times, composure, and decision-making abilities are paramount (Baze, 2006), as jockeys constantly monitor and take advantage of momentary gaps and shifts in the field. Split-second decisions can mean the difference between winning and losing, so a significant degree of courage is also a prerequisite.

Professional Development

Before becoming a professional, aspiring jockeys must undergo a formal apprenticeship indentured under the supervision of an approved *master*. The master is a licensed horse trainer, and sometimes a former jockey, who takes responsibility for the on-the-job training of the novice jockey (Speed et al., 2001). In Victoria, apprentices also attend RVL’s Education and Training Centre, which provides nationally accredited training to jockeys and apprentices. In addition to tuition in riding skills, the centre provides apprentice jockeys with professional training in diet and nutrition, weight management, injury prevention and financial systems. The standard duration of an apprenticeship is 4 years, with 3 years of attendance at the Education and Training Centre, and a fourth year of riding-only training under the supervision of the master.

The most important criterion for entry into the apprentice training program is the weight of the applicant. RVL conducts medical screening tests with potential inductees to gauge their physical suitability for a career as a professional jockey, paying particular attention to the applicant's weight and growth potential (C. Watson, RVL Education and Training Centre manager, personal communication, November 26 2004). The current literature states that the maximum weight recommended for new apprentices is 48 kg, to reduce the likelihood of future weight problems in trainees (Racing Victoria Limited, 2005b), and regular checks are conducted to monitor the weight of all trainees (Ron Hall, RVL Education and Training Centre officer, personal communication, April 8 2004). The weight criterion is so crucial that anecdotal reports have recently emerged that young jockeys are taking growth hormones to prematurely close the epiphyseal plates of their long bones, in an attempt to limit their growth potential (Speed, Carlson, & Iuliano-Burns, 2005). Historically most apprentices have been males, but, perhaps due to their lighter frames, the proportion of interested females has risen in recent years (M. Just, RVL Education and Training Centre officer, personal communication, January 19 2005).

Motives for aspiring jockeys entering the racing industry are many and varied, and include: a love of horses and riding, the perceived glamour of the racing industry, an interest in sport, physical suitability, and the opportunity for significant income and a high public profile (Speed et al., 2001). Many jockeys in the past also had close family connections to the industry, being sons and daughters of former jockeys or trainers (Hill & O'Connor, 1998; Moore et al., 2002; Speed et al., 2001). Current Victorian jockey Darren Gauci's early forays into racing epitomized these strong family connections: As a schoolboy, Gauci caught the train from his home across town on Fridays after school, to bunk in the stables with his jockey-brother at night, before they rode track-work

together on Saturday mornings (Bartley, 2005). RVL now actively encourages applicants with no prior experience with horses to apply for apprenticeships (Racing Victoria Limited, 2005b), particularly if they exhibit the appropriate anthropometric profile. Speed et al. (2001) reported that the traditional trends for familial racing and rural connections were reversing, with many young apprentices now coming from urban environments with little or no exposure to horses or horse riding.

Because of their riding inexperience, apprentices are granted weight claims that allow them to reduce the amount of weight their mounts must carry in races. For example, an apprentice with fewer than 20 metropolitan first place rides can claim a 3 kg allowance at Victorian city race-meetings. The allowance reduces on a pro rata basis with the number of winners the apprentice has ridden, until it is totally removed after 60 metropolitan winners (Racing Victoria Limited, 2005d). Apprentices may outride their claim, or “come out of their time” in racing vernacular, before or after the typical 4 year time frame, depending on the number of winners they ride. The weight claim makes engaging an apprentice jockey for a race-ride an appealing prospect for some owners and trainers, who wish to give their horse a better chance of winning by allowing it to carry less weight than its rivals.

With little published data available, most of what is known about the daily lives of apprentices comes from anecdotes, provided by retired or current jockeys, which often highlight the sacrifices and commitment required of these young athletes. One former jockey, interviewed by Speed et al. (2001) for their report on the welfare of retired jockeys, recalled the following of his daily routine as an apprentice:

I was apprenticed to [master's name] and I was 14 years of age, and we used to start work at 4 o'clock in the morning, and get half an hour for breakfast, and we'd work through to 12 [p.m.], and then off until afternoon. We'd then start at 3 [p.m.] and we'd work through till 5.30. Then we'd come back at 7 and work through till 7.30 - 8 o'clock at night. And that was 7 days a week.

The routine described clearly involved early morning starts, long hours, and physically demanding work, all of which would have been abhorrent to many youths of this apprentice's age.

Once the apprenticeship period has been successfully completed, RVL has the power to grant aspiring jockeys four different types of licenses to ride at race meetings in Victoria: Jockey "A" – licensed to ride in all flat races conducted by Registered Clubs; Jockey "B" – licensed to ride in all flat races at Country Race Meetings conducted by Registered Clubs; Jockey "A" Cross Country – licensed to ride in all jumping races conducted by Registered Clubs, and licensed to ride in all flat races at Country Race Meetings conducted by Registered Clubs; and Jockey "B" Cross Country - licensed to ride in all jumping races at Country Race Meetings, Point-to-Point meetings, and all flat races at Country Race Meetings conducted by Registered Clubs (Racing Victoria Limited, 2005d).

In March 2004 there were a total of 269 professional jockeys and apprentices licensed to ride in Victoria (Racing Victoria Limited, 2004b). The composition of this jockey population according to license type and gender is summarized in Table 2.1. The main difference between flat-race jockeys and jumps (i.e., hurdle or hunt) jockeys is that the minimum-weight scales are considerably higher for jumps jockeys. For example, the lightest weight allocated in most jumps races in Victoria is 60 kg, compared to 53 kg for flat races (Racing Victoria Limited, 2005d). Reference is also made in racing circles to "picnic" or "point-to-point" riders, who are amateur jockeys and not subject to the strict weight standards of their professional counterparts, so neither jumps nor point-to-point jockeys are considered further in this review.

Table 2.1

Number of Jockeys Licensed to Ride in Victoria in July 2003

Category	n	Males (%)	Females (%)
Jockey "A"	168	154 (92%)	14 (8%)
Jockey "B"	20	13 (65%)	7 (35%)
Jockey "A" Cross Country	24	22 (92%)	2 (8%)
Jockey "B" Cross Country	14	14 (100%)	0 (0%)
Apprentice	43	29 (67%)	14 (33%)
Industry Total	269	232 (86%)	37 (14%)

Transitions into, through, and from professional sporting careers have been described as problematic for some athletes for a variety of reasons, with reports of emotional, social and financial difficulties encountered (Gordon & Lavalley, 2004; Grove, Lavalley, & Gordon, 1997; Grove, Lavalley, Gordon, & Harvey, 1998). The transition from apprentice to fully licensed jockey can be difficult for many young riders for these reasons, however jockeys may experience a number of additional difficulties unique to their sport and the regulations that govern it. For example, most apprentices make the transition to senior ranks between the ages of 18 and 21 years, a time when some (especially males) are still going through the final stages of their adolescent growth spurt (Hill & O'Connor, 1998; Speed et al., 2001). Research indicates that both males and females can continue to grow in height and weight up to the age of 20 years (Malina, 2004), and an average weight gain of approximately 2 kg per year has been reported in a normal population at this age (Buckler, 1990). Many young jockeys are unprepared for this continued growth, and, being unable to maintain a sufficiently

low weight, discontinue their riding careers in their early 20s (C. Watson, RVL Education and Training Centre manager, personal communication, November 26 2004).

In addition to the maturational changes, newly registered jockeys move to self-employment and financial independence, which may have indirect effects on their weight. No longer obligated to do the physical stable-work such as cleaning out stalls and riding track-work, and without the master's supervision of diet, apprentices can experience sudden and again unexpected weight gain as energy intake increases and energy expenditure decreases (Speed et al., 2001). Further, all the winnings earned by apprentices during their training period are held in trust until the young riders complete their apprenticeship. The increase in disposable income when this money becomes available, coupled with more personal freedom over diet and exercise, can be temptations too strong to ignore (Speed et al., 2001), adding further upward pressure on a young jockey's weight.

Over and above the seemingly inevitable increase in weight, the previous supply of race-rides can quickly evaporate after an apprentice becomes a fully licensed jockey, causing further weight and financial problems. The jockey may no longer be provided with the regular stable-rides by the former master (Speed et al., 2001), and, without the inducement of a weight claim, other horse trainers and owners may be less inclined to engage the still inexperienced jockey ahead of a more seasoned rider of the same weight. Fewer race-rides can mean less exercise, compounding the aforementioned weight problems, with a gain of as little as 1 kg creating a vicious cycle, where the weight increase reduces the jockey's pool of potential rides, and fewer rides then lead to an increase in weight.

In recent years the Victoria racing industry has recognized the difficulties faced by many jockeys making this transition into the professional ranks, and now provides

financial assistance and support to jockeys through the Jockey Assistance Program (Racing Victoria Limited, 2005a). Racing Victoria also provides jockeys with access to career development, personal and financial counselling, formal mentoring partnerships with former jockeys, and a range of financial benefit schemes (e.g., superannuation, and a career benefits scheme). These programs provide resources, counselling and practical support from professionals such as doctors, physiotherapists, dieticians, and financial advisors.

Very little information about the day-to-day working lives of professional jockeys has entered the public arena, however the support and resources provided by RVL appear to be warranted. A recent industry report stated that jockeys average 34 hours per week in riding related activities, and typically accept more than 230 riding engagements per year, in addition to 25 rides in other states (IER & COPS, 2006). Speed et al. (2001) described a jockey's typical work-day as likely to include the following: rising at 4am to drive to the race-track or training facility for track-work, riding until 8.30am, attending to personal matters (e.g., weight-management activities, rest, and study in preparation for race-rides), travelling to a race-meeting, meeting horse owners and trainers, completing riding engagements, attending industry events to promote him or herself, before finally returning home to eat and satisfy family commitments. This daily schedule is much like that of apprentice riders, with the exception of the stable-work that the trainees are required to do for their masters.

Occupational Health and Safety Risks

Several researchers have reported that, behind the glamour and spectacle of racing, jockeys compete in an extremely dangerous sport, with constant risk of permanent, debilitating and life threatening injuries (McCrory, Turner, LeMasson, Bodere, & Allemandou, 2006; Press et al., 1995; Speed et al., 2005; Turner, McCrory,

& Halley, 2002; Waller, Daniels, Weaver, & Robinson, 2000). Although the rates of injury among jockeys are not as high as those among some other athletes, the types and severity of injury that occur in horse racing are arguably the most extreme of all sports (Press et al., 1995). The most common injuries among jockeys are fractures, followed by bruises and concussions (Press et al., 1995; Turner et al., 2002; Waller et al., 2000). Press et al. (1995) reported that most fractures were to the legs and upper limbs, but a large number were also to the critical areas of the spine (10%) and skull (9%). The authors stated that jockeys suffered concussions at a higher rate than is found in either boxers or football players. Waller et al. (2000) found that nearly one in five injuries to British jockeys (18.8%) were to the head or neck, despite the fact that helmets are compulsory in British racing. The most common context of injury in this study was while the horse and jockey were entering, within, or leaving the starting gates, but many injuries also occurred from race falls.

In emphasizing the occupational health and safety risks faced by professional riders, DeBenedette (1987) stated that more than 100 US jockeys had died and a further 37 had been made paraplegic or quadriplegic in the 40 years preceding her report. Statistics have not been published on the number of racing-related injuries and deaths in Australia, but Leone (2005) estimated that over 300 jockeys had lost their lives in race falls since racing began in Australia 160 years ago, and many more had sustained serious injuries. She cited two recent cases of Australian jockey fatalities, both occurring in the same month, and both involving young jockeys. Clearly then, the Sport of Kings carries considerable risk of death and disablement to its most important human participants, and so any practice that potentially compromises a jockey's physical or mental capacities should be considered a serious occupational health and safety issue.

Weight Management and the Australian Racing Environment

Several aspects of the Australian racing environment serve to make weight management challenging for professional jockeys and apprentices. Specifically, the system of pre-determined weights, the rules concerning weigh-ins, and year round racing, all combine to make horse-racing in this country unlike any other sport in terms of the significance of weight to its participants.

The Set-Weight Scale

The weight handicapping system that underpins horse racing requires horses to carry a pre-determined weight in each race. That weight, which includes the weight of the jockey, the saddle and other riding equipment, is determined by a number of criteria, including: the age, sex, and number of wins of the horse; the distance of the race; and the prize-money on offer. Under the current weight scale, the minimum weight for most races in Victoria is set at 53 kg, and the maximum is 60 kg (Racing Victoria Limited, 2005b). These standards ensure that body weight is an inescapable professional criterion for a jockey, and it should be reiterated that jockeys must maintain their weight slightly below these target riding weights, to allow for the weight of their clothing and riding apparatus.

For feature races, such the Melbourne Cup and Cox Plate run during Victoria's Spring Racing Carnival, minimum weights can be as low as 46 kg (Racing Victoria Limited, 2005e). These reduced weight minimums present a dilemma for many jockeys, in that the most important and lucrative rides (i.e., those on offer in cups and carnivals), are often the lightest and therefore the most demanding, requiring substantial weight cutting over and above the usual amount. Many jockeys also accept rides at several different weights on a single race-day to secure as many riding engagements as possible. This circumstance can mean that a jockey needs to be at his or her lightest weight to

ride a horse at the end of a race-day, eliminating any opportunity to eat and re-hydrate in between rides, and necessitating continued weight loss during the racing day.

Weigh-out and Weigh-in Procedures

The strict weigh-out and weigh-in regulations that govern horse racing also underline the importance of weight in the sport. Current RVL regulations require all jockeys to weigh-out with the stewards of the course 30 minutes before each ride (i.e., they are weighed before competition), and the first five placegetters must also weigh-in (i.e., they are re-weighed at the completion of a race), before “correct weight” is declared and the result of the race becomes official (Racing Victoria Limited, 2005d). In contrast, most other sports have only one weigh-in, typically 3 to 12 hours before competition (Walberg-Rankin, 2000). The period between weigh-in and participation affords athletes in other weight division sports ample time to refuel and re-hydrate before they compete, an opportunity denied jockeys. Details of the weighing procedures for various sports are provided in Table 2.2 in the next section.

Penalties imposed by Stewards for failures to maintain correct weight on race-days include monetary fines, and also suspensions, which are usually reserved for repeat offenders. An inspection of the Stewards’ reports from the three feature race-meetings of Victoria’s 2005 Spring Racing Carnival (i.e., the Melbourne Cup, Caulfield Cup, and the Cox Plate) reveals that two jockeys were fined either \$200 or \$300 for weighing-out 1 kg above their set weights (Racing Victoria Limited, 2005f). A recent newspaper article reports that an apprentice jockey was fined twice on the same day by stewards for weighing-out above her prescribed weight (Bartley, 2006). The reporter described how this apprentice was forced to abandon one riding engagement and sit in her car with the heating on to lose 1 kg, in order to fulfil her last riding engagement of the day. The stewards’ report of this incident reveals that the jockey was fined heavily because

she had committed the same offence the previous day as well (Racing Victoria Limited, 2006).

Horse-racing punters can also make life difficult for jockeys who return to scale on a beaten horse and weigh-in as little as half a kilogram over their set weight (Bartley, 2006), particularly if the beaten horse was favoured to win. A recent newspaper item articulated the punter's frustration, declaring that, "overweight hoops should cough up." The article stated that jockeys, and particularly apprentices with weight claims, should take responsibility for their weight or be fined, in light of recent minimum weight concessions made by the industry (Dunn, 2005). The author cited several recent examples of apprentices who were unable to take advantage of their weight claim because they were over their designated weight, but who were not disciplined by stewards.

The Australian Racing Calendar

A jockey's need for strict weight management is further exaggerated by the sheer volume of racing in Australia. The present racing calendar has races scheduled year round, meaning that jockeys do not enjoy the "off-season" recuperation that many other weight-restricting athletes do (Moore et al., 2002). Commenting on the significance of respite for weight-restricting populations, King and Mezey (1987) stated that the off-season may act as a safety valve, preventing dietary restraint from developing into more serious problems.

At the present time, racing takes place on almost every day of the year in Australia: Christmas Day and Good Friday are the only exceptions. In total, the 2004 Australian racing season encompassed 572 official race meetings, held in every state and territory in the country, and over 4500 individual races (Australian Racing Board, 2005). Data provided by the racing industry in Great Britain, where the racing calendar

is equally frenetic, revealed that one jockey rode in 998 races during one year, equivalent to nearly three rides per day (Turner et al., 2002). As an illustration of the huge amount of racing currently scheduled in this country, the 2005 Spring racing carnival in Victoria, considered the most important and prestigious racing event in Australia, was held over 47 days and entailed 72 separate race meetings at country and city race-tracks, and nearly 600 individual races (Racing Victoria Limited, 2005a).

In recent years, the already busy Australian racing calendar has been extended with the addition of night or twilight race-meetings. These meetings are usually held in the warmer months (November to February), on Friday evenings (Racing Victoria Limited, 2005c), and many follow an earlier daytime race-meeting. Furthermore, the racing industry in Victoria recently announced that field sizes (i.e., the number of horses starting in a race, and thus the number of jockeys required to ride them) were up 12% on the previous year (Racing Victoria Limited, 2005c), so the trend for more racing, more riding engagements, and increased weight pressure on the pool of current jockeys looks set to continue. To underline the overwhelming spectre that constant weight management can be for some jockeys, recent research has indicated that as many as one third of former professional riders in Victoria retired prematurely due to an inability to manage their weight consistently (Speed et al., 2001).

Body Size and Composition of Jockeys

Although the capacity to attain low weights for special rides is required from time to time, the ability to control weight indefinitely is of prime importance, and thus body size and composition are critical for longevity as a professional jockey. In order to be able to compete for the bulk of available rides, jockeys in Australia must be able to consistently maintain their weight at around 52 kg (Speed et al., 2001), a figure much

lower than would be expected for people in the general population of similar heights and ages (King & Mezey, 1987).

Height and Weight

Recent Australian Bureau of Statistics (2006) data indicated that the average height of Australian males aged 25 to 34 years is 1.79 m and their average weight is 85 kg. The average height of Australian women of this age range is 1.65 m and their average weight is 67 kg. Several studies have indicated that male jockeys typically average approximately 1.60 m in height (Apted, 1988; Moore et al., 2002), considerably below the population averages described. Only two studies have provided height data for female jockeys, and these list mean heights of 1.56 m and 1.57 m (Leydon & Wall, 2002; Moore et al., 2002). Despite their usually diminutive stature, the low body weights required in horseracing are difficult to achieve even for jockeys, and especially as they get older (Apted, 1988).

In a discussion of the relationship between body dimensions and sporting performance, Norton, Olds, Olive and Craig (1996) present compelling statistics supporting the case that an evolutionary trend towards increased body mass in humans, evident for more than a century in the general population, has made it increasingly difficult for jockeys to manage their weight to meet the current criteria. The authors contend that, because the general population has grown taller and heavier while racing weight standards have remained relatively static, the divergence between the average heights and weights of jockeys and other Australians has increased. This divergence has reduced the pool of potential jockeys, with estimates of the proportion of the male population weighing under the current maximum weight standard falling to below 3% (Australian Bureau of Statistics, 2006; Norton et al., 1996). The authors reported that the good news for the few individuals still able to manage their weight at such lows

levels is that the laws of supply and demand mean that a career as a professional jockey should be more lucrative than ever. Norton et al. (1996) also explained that the reduced number of males able to ride at the present weights may increase the opportunities for female jockeys because females are naturally lighter than males in general. In support of their contention, a female jockey took part in the Cox Plate in 2006, one of Victoria's premier races, for only the second time in the 80 year history of the race (Moonee Valley Racing Club, 2006): She rode the lightest horse in the field, at 46 kg, a riding weight that few males jockeys can meet.

Body Dimensions and Health

Body Mass Index (BMI) is a common anthropometric measure, calculated by dividing a person's weight in kilograms by their height in metres squared ($BMI = \text{Weight in kg} / \text{Height in Metres}^2$), and is often applied as an indicator of health status (Australian Bureau of Statistics, 1998). Tables classifying BMI scores have been produced by the World Health Organisation (World Health Organization, 2000) and the National Health and Medical Research Council, and are re-presented in Table 2.2.

Recent survey data indicated that the average Australian male over 18 years of age had a BMI of 26.8, and the average adult female had a BMI of 25.7 (Australian Bureau of Statistics, 2006). Abernethy, Olds, Eden, Neill, and Baines (1996) caution that BMI is a questionable predictor of health status in athletes, because the formula does not differentiate between lean and fatty tissue, or assess the distribution of body fat. Notwithstanding the caveat about the use of BMI statistics with athletes, a jockey weighing 53 kg (the weight required to be able to accept rides at the current minimum weight for most races) should be between 1.46 and 1.62 m tall, based on the accepted healthy height to weight ratios (i.e., BMI of 20 to 25). The most recent data on the anthropometric profiles of Australian jockeys shows an average BMI of 20.3 for male

jockeys and 20.5 for females (Moore et al., 2002). Irish male, flat-race jockeys were lighter than their Australian counterparts, with an average BMI of 19.88, and ranged from a low of 17.65 to a high of 21.20 (Warrington, McGoldrick, & Griffin, 2006). Although these figures put the average jockey within the lower reaches of healthy BMI ranges, there are clearly many jockeys, and especially male jockeys, who fall well below the accepted healthy BMI standards in pursuit of their mandated weight targets.

Table 2.2

Classification of Body Mass Index Ranges

BMI Range	WHO Classification	NHMRC Classification
Less than 16.0	Severe thinness (grade 3)	Underweight
16.0 to less than 17.0	Moderate thinness (grade 2)	Underweight
17.0 to less than 18.5	Mild thinness (grade 1)	Underweight
18.5 to less than 20.0	Acceptable weight	Underweight
20.0 to less than 25.0	Acceptable weight	Acceptable weight
25.0 to less than 30.0	Overweight	Overweight
30.0 to less than 40.0	Obese (grade 1)	Obese
40.0 or more	Obese (grade 2)	Obese

Summary

The previous section outlines the important role that thoroughbred horse racing plays in Australian and, in particular, in Victorian society. The industry provides revenue to governments, opportunities for recreation and social interaction for members of the community, and employment for many. Although they play a vital role in this important industry, jockeys' lives are not without challenges. Jockeys often work long

and unusual hours, with meagre financial rewards for all but the most successful. Moreover, race-riding places enormous physical and psychological demands upon these athletes.

Arguably the most demanding aspect of a jockey's life is the requirement to maintain for an extended period of time a body mass within the low and narrow band of weights that comprise the industry-mandated weight scale. Due to the set-weight handicapping system operating in Australian racing, professional flat-race jockeys must weigh no more than 60 kg, and closer to 52 kg, to be able to compete for the bulk of rides. These weights are difficult for many jockeys to attain, despite their diminutive stature, and the hectic Australian racing calendar means that most jockeys enjoy little, if any, post-season respite from their weight-management activities. It is little wonder that problems with weight force as many as 50% of former jockeys to retire prematurely from the sport (Speed et al., 2001).

Weight Loss in Weight-Regulated Athletes

The practice of intentional weight loss is often misleadingly referred to as "making weight" within athletic circles (Walberg-Rankin, 2000), or sometimes, and more accurately, as "cutting weight". Fogelholm (1994) identified two types of weight loss based on the rate of loss, defining rapid weight loss as a reduction in body weight occurring in 7 days or less (and sometimes as little as a few hours), while distinguishing it from gradual weight loss, which occurs over a period greater than 7 days. Buskirk and Puhl (1996) applied a stricter interpretation of rapid weight loss, considering it to be acute weight loss occurring over 72 hours or less. One reason for the distinction between rapid and gradual weight loss is that the methods used to achieve weight loss often depend upon the period of time available, with negative energy balance (i.e., greater energy expenditure than energy intake) the primary tactic for gradual weight

loss, whereas dehydration is the central mechanism for achieving rapid weight loss (Fogelholm, 1994).

Within the thoroughbred horse racing industry, the rapid, short-term weight-loss cycles of jockeys are colourfully dubbed “wasting” (Apted, 1988; Moore et al., 2002), in reference to the diminishing form of the jockey. Although the term wasting is most often used in the context of acute weight loss, it is also used at times to describe more gradual or long-term weight-loss actions. For the purposes of this review, the narrower definition will be applied, and terms such as weight maintenance, weight management or weight control will be used to denote more gradual weight-loss efforts. In addition, the terms body mass and body weight are used interchangeably in sport and scientific literature, and will be done so here as well.

The three primary motives for weight loss in athletes are: to gain a competitive, or strength advantage over naturally lighter opponents; for aesthetics or appearance; and to comply with the weight divisions or regulations of their sport (Brownell, Steen, & Wilmore, 1987; Fogelholm, 1994). Due to the strict weight limits placed on them by horse racing’s ruling bodies, professional jockeys fit squarely into the latter category. Participants in a number of other sports, such as wrestling, rowing, the martial arts, and weight lifting, also purposefully lose weight to conform to the regulations and traditions of their sport (Buskirk & Puhl, 1996). A review of the weight-loss literature from these sports will therefore provide valuable insights and contrasts to that concerning the wasting behaviours and experiences of jockeys. Please see

A summary of the major sports with weight divisions is provided in Table 2.3, adapted from Walberg-Rankin (2000). The table presents information concerning the absolute weight limits of the lightest division in the various sports, and the weigh-in procedures for each. Note that the table is a guide only, because standards and

procedures can vary from event to event depending on the competitive level, and the country or state in which the event is held. Note also that the term weigh-in is used to denote the process of being re-weighed after competition in racing, in contrast to other sports where the term refers to weight measures taken prior to competition. It is clear from this table that jockeys compete under the most onerous weight regulations of any weight-division sport, with the lightest absolute weight standards and the most rigorous weighing processes.

Table 2.3

Summary of Weight Divisions and Weigh-in Procedures in Weight-Regulated Sports

Sport	Lightest weight division (kg)	Weigh-in (and out) procedures
Horse-racing (jockeys)	Minimum weight in Victoria is 43.5 kg (varies according to the ability and age of horses).	Jockeys weigh-out 30 min before each race. The first 5 place-getters weigh-in after each race.
Wrestling	Lightest weight divisions are 54 kg and under (males), and 46 kg and under (females)	Wrestlers weigh-in once, at least 12 hours prior to competition.
Boxing	Lightest weight division is < 48 kg (male)	Boxers weigh-in at least 3 hours prior to each competition.
Judo	Lightest weight division is < 60 kg (males), and 48 kg (females)	Athletes weigh-in at least 2 hours prior to competition.
Lightweight rowing	Maximum weight is 72 kg (males), and 59 kg (females)	Rowers weigh-in 1 – 2 hours prior to race start. Rowers weigh-in for each day and each event.
Lightweight football	Maximum weight is 71.8 kg	Athletes weigh-in 2 days prior to competition

Extent of Weight Loss in Weight-Regulated Athletes

The overwhelming majority of research relating to the extent of intentional weight loss in sport has focused on American athletes from a few sports with weight divisions, such as wrestling, rowing, and boxing. Wrestling has been the most prolific in terms of the volume of research that it has generated, with several large-scale investigations conducted over the last 30 years. Issues examined in this wrestling research include the prevalence of weight cutting, the magnitude and frequency of weight loss, and the perceived difficulty of weight management. Comparatively few studies are available for each of the other sports listed in Table 2.3.

Direct comparisons between studies of weight cutting in sport are not always possible due to differing aims and methods, with some measuring maximum weight-loss amounts and others examining typical or weekly weight loss. Further, some studies quantify weight cutting in absolute terms (i.e., kg or lb), whereas others report percent body-weight figures, and some include prevalence and frequency of weight-loss data while others do not. Nevertheless, the available studies collectively indicate that many athletes in a variety of weight category sports intentionally lose weight, and that this weight loss can be frequent, rapid, and substantial.

A search of scientific databases revealed eight studies addressing weight management in jockeys. Not all these studies include specific data on the degree, frequency or difficulty of weight loss typically experienced by these athletes, however Table 2.4 summarises the major findings relating to the extent of weight loss in jockeys. These few studies indicate that the proportions of total body weight lost by jockeys are consistent with those of athletes in other weight-category sports. This conclusion is important, because weight patterns and body composition are thought to vary according

to the demands of the sport, the event, and the prevailing culture within the sporting community (Brownell et al., 1987).

Table 2.4

Summary of Major Findings on the Extent of Weight Loss in Jockeys

Study	n	Prevalence of weight loss (% of sample)	Magnitude of weight change (in kg)
King & Mezey (1987)	10	90% weighed less in-season than during the off-season	Off-season weight = 52.1, In-season weight = 49.2
Apted (1988)	9	88.9% reported wasting at some time	“Working” weight was > 1kg above riding weight
Labadarios et al. (1993)	93	98% had lost weight in the previous 12 months	75% had lost maximum of 2 - 6 kg, 5% lost 6 - 8 kg
Leydon & Wall (2002)	20	67% currently used at least one weight loss method	N/A
Moore et al. (2002)	116	N/A	Current weight = 52.6, Ideal weight = 51.3

Note. N/A = statistics not provided.

Prevalence of Weight Cutting

Only a minority of the studies which examine weight cutting in athletes have reported the proportions of athletes in these populations who actively lose weight. Nevertheless, the few studies providing these details suggest that the number of athletes who intentionally cut weight is substantial. For example, in one of the first studies of weight cutting in sport, Tipton and Cheng (1970) found that approximately 89% of the 747 high-school wrestlers they weighed had lost some weight in preparation for competition over the 17 days of the study. The prevalence figures reported in this study

include data for heavyweight wrestlers who do not compete under any weight constraints, and therefore do not need to cut weight, so this finding should be considered a conservative estimate.

Steen and Brownell (1990) found that the majority of elite wrestlers cut weight, regardless of their age or competitive level, reporting that 89% of college wrestlers and 68% of high-school aged wrestlers surveyed lost weight prior to competition. Despite health warnings and rule changes in the 1990s designed to curb the practice of weight cutting, Kinningham and Gorenflo (2001) found that little had changed in wrestling, with two thirds of high-school respondents reporting that they cut weight for competitions. No prevalence data is available detailing weight cutting in other weight division sports, but researchers investigating boxing and judo have reported that most, if not all, athletes competing in these sports cut weight to comply with the weight regulations of their sport (Degoutte et al., 2006; M. Smith et al., 2001).

Analysis of the overall prevalence of wasting in horse racing has also been largely overlooked in research to date, with most studies focussing instead on the prevalence of specific weight-loss methods. Nonetheless, available data suggest that the general practice of wasting may be even more widespread in jockeys than in other weight-regulated athletic populations. For example, in an early study describing the lifestyle and weight-management practices of Australian jockeys, eight of the nine riders interviewed reported engaging in wasting activities (Apted, 1988). Interestingly, the sole non-wasting participant also stated that he checked his weight twice daily, and described several practices, including sauna use, as his preferred methods of weight loss. Taken together, the apparently contradictory statements suggest that this jockey perceived his weight-management activities to be part of a constant or gradual process of weight control, and thus fall outside his definition of wasting (i.e., rapid weight loss).

Nevertheless, weight management, as evidenced by his constant monitoring and weight-loss activities, was clearly still a pervasive facet of life for this professional jockey.

More recently, Labadarios et al. (1993) surveyed 93 fully licensed South African jockeys (i.e. apprentices were excluded), reporting that 98% had deliberately lost weight for a race in the year preceding the study. Moore et al. (2002) did not directly address the general prevalence of wasting, but reported that approximately two thirds (63%) of all Australian A-grade jockeys surveyed usually lost weight in the 24 hours before a race-day. Prevalence statistics provided for individual wasting practices, such as fasting and fluid restriction (discussed in wasting methods section), suggested that wasting was almost universal among this cohort of jockeys.

Magnitude of Weight Loss

There is general consensus that athletes in a variety of weight-regulated sports typically lose between 5% and 10 % of their total body weight in preparation for competition, irrespective of their age and competitive level (Buskirk & Puhl, 1996). One could assume that heavier athletes lose the largest proportions of weight, but evidence suggests that the lightest athletes may actually experience the greatest degrees of weight loss (Alderman, Landers, Carlson, & Scott, 2004; Oppliger, Steen, & Scott, 2003). For example, Tipton and Cheng (1970) reported that wrestlers in the two lightest weight categories lost an average of 6.1% and 6.7% of their total body weights, whereas wrestlers in the heaviest weight-restricted category lost an average of 3.5%.

Alderman et al. (2004) studied over 2600 15 to 18 year-old wrestlers competing at the junior National Wrestling Championships, recording the amount of weight which they gained between the official weigh-in and the competition to measure the extent of weight cutting the wrestlers had undergone prior to competition. The randomly selected wrestlers were weighed immediately before their bout, and results indicated that the

average magnitude of weight gain since weigh-in was 3.4 kg, or 4.8% of their total body weight. Not all wrestlers had gained weight during the time between weigh-in and competition, but the maximum amount of weight gain by an individual was 13.4% of his weigh-in body weight (Alderman et al., 2004).

Jockeys have the lowest absolute weight limits of all athletes, yet few researchers have reported the typical, recent, or maximum weight losses these athletes experience. King and Mezey (1987) noted that jockeys' weights in-season (i.e., riding weight) and out of season differed by approximately 3 kg, but Labadarios et al. (1993) completed the first scientific investigation of wasting to quantify the magnitude of weight losses which jockeys achieve. Asked to report the maximum weight they had lost in the year prior to the study, 75% of jockeys reported losing between 2 and 6 kg on at least one occasion, and a smaller number (5.4%) had lost between 6 and 8.5 kg. In relative terms, the vast majority of jockeys had recently lost greater than 3.7% of their total body weight to make their target riding weight for a particular race-meeting, and some had lost in excess of 16% of their total body mass in a single episode of wasting. Typical weekly estimates of weight loss were equally substantial, with 53% of jockeys reporting 2 – 4 kg losses, and 23% losing 4 – 6 kg.

Moore et al. (2002) indirectly quantified the magnitude of weight loss typical of jockeys by asking respondents to nominate their "ideal" riding weights (i.e., their preferred riding weights) and their current weights (i.e., their training or pre-wasting weights, also known as *walking around weight*). On average, senior riders' ideal weights were 1.3 kg lower than their current weights. If these jockeys were to lose the 1.3 kg they desired to get down to their ideal riding weights, the weight losses would amount to approximately 2% of their total body masses.

Temporal Patterns of Weight Loss

Several researchers have commented on the timing or patterns of weight loss and regain experienced by athletes in weight-regulated sports, with considerable variation found in the length and number of these cycles (Brownell & Steen, 1992). These variations are determined largely by the competitive calendar of the sport in question (McCargar, Simmons, Craton, Taunton, & Birmingham, 1993; Morris & Payne, 1996). For example, some athletes necessarily lose and regain weight on a weekly basis during their competitive season, whereas others may only lose weight to compete at a certain time of year, thus experiencing relatively few cycles. Body builders are an example of the latter, with estimates that athletes in this sport cut weight for competition an average of 1.2 times in each 6-month competitive season (Anderson, Barlett, Morgan, & Brownell, 1995).

Lightweight rowers also typically compete in a small number of regattas each season, and thus experience relatively few cycles of weight cutting (McCargar et al., 1993; Sykora, Grilo, Wilfley, & Brownell, 1993). McCargar et al. (1993) reported that female lightweight rowers cut weight gradually over a period of 3 to 4 weeks prior to their major competition of the season. Post-season weight measures taken 6 to 8 weeks after the conclusion of the competitive season indicated that these rowers had regained all the weight previously lost for competition. Slater et al. (2005) revealed that lightweight rowers also engaged in acute episodes of weight loss, continuing to lose weight during a regatta in the 24 hours before a race. Sykora et al. (1993) observed a gender difference in the frequency of weight cutting in lightweight rowing, with males cutting weight an average of 4.8 times per season compared to 0.4 cycles for females. The authors speculated that the female athletes were naturally leaner, and thus did not

need to cut weight as frequently as the males, but anthropometric data were not taken to substantiate this claim.

In comparison to lightweight rowers, wrestlers typically complete shorter and more frequent cycles of weight change, engaging in regular weight cutting lasting anywhere from hours to several days (Oppliger et al., 2003). For example, Tipton and Cheng (1970) reported that most weight was lost in the 10 days before competition, and Steen and Brownell (1990) reported that the weight cut by college-aged wrestlers in their study was typically lost over a period of 3 days immediately preceding a competitive bout.

Steen and Brownell (1990) commented on wrestlers' post-competition weight regain, stating that the weight-cycling process is repeated numerous times over the course of the competitive season, before these athletes finally enjoy some prolonged weight loss respite during their off-season. The usual number of cycles of weight cutting these athletes engaged in was 15 per season. A subsequent large scale study, conducted over a decade later, found that collegiate wrestlers had tempered their weight loss behaviours somewhat over this time, averaging only eight weight cutting episodes per season (Oppliger et al., 2003). Both the high-school and collegiate wrestlers participating in this study had regained all weight lost for competition when followed up during their off season.

Like wrestlers, boxers and martial arts competitors engage in weight cutting in the lead up to weigh-ins, to compete in divisions below their natural body weights. If they are successful in their bouts, boxers may have to repeat their acute weight-loss regimens up to six times over the course of a tournament (M. Smith et al., 2001). There are few detailed descriptions of weight cutting in boxing, with only two experimental studies examining the issue (Hall & Lane, 2001; M. Smith et al., 2001). Hall and Lane

(2001) examined weight loss in 16 amateur boxers from different weight classes, in interviews and an experimental condition. The boxers interviewed in this study revealed that they progressed through several distinct phases of weight status, with a desired weight target associated with each phase. The phases identified included: natural weight (average of 74.5 kg), training weight (71.9 kg), and championship weight (67.9 kg). The substantial differences evident in the boxers' self-reported average weights during each phase indicate that systematic weight manipulation is an important part of boxers' preparations for a bout or tournament. Judo athletes, who compete in tournaments similar to those of boxers, typically lose weight 4 to 5 days prior to their bouts (Degoutte et al., 2006).

The only information concerning how often jockeys waste comes from two studies providing general descriptions of weight loss frequency. Apted (1988) reported that 11% of jockeys wasted "regularly", and 55% "occasionally," although more precise details of the usual number or length of these wasting episodes were not provided. Despite the lack of empirical evidence, it is almost certain that jockeys waste more frequently than any other group of athletes. Given that the competitive calendar of racing in Australia is year round, and that Moore et al. (2002) reported that jockeys ride at an average of 3.4 meetings per week, it is possible that some jockeys in this country waste as many 150 times per year. In relation to the timing of weight loss, Labadarios et al. (1993) reported that jockeys in their study typically lost weight rapidly, over an average period of 17 hours, but stated that this time varied depending on circumstances such as the amount of weight to be lost.

Perceived Difficulty of Weight Management

It is not surprising, given the details of the frequency and magnitude of weight loss provided in the previous sections, that many weight-regulated athletes perceive

weight management to be one of the most difficult and stressful aspects of their sporting participation. In one of the first scientific investigations of weight cutting at the collegiate level, Steen and Brownell (1990) surveyed 63 NCAA college wrestlers competing at a tournament, finding that the majority (56%) had at least some difficulty attaining their desired weight targets.

Research into horse racing has found that weight management is equally problematic for many professional jockeys, with between 40% and 70% of various jockey populations reporting difficulties (Atkinson, Storrow, & Cable, 2001; Hill et al., 1997; Labadarios et al., 1993; Moore et al., 2002). For example, after studying 92 male British jockeys, Atkinson et al. (2001) concluded that weight was a serious concern for most, with almost half describing managing their weight as *difficult*. Approximately two thirds of South African jockeys had problems with weight management (Labadarios et al., 1993), and 73% said that the difficulty that they experienced was increasing as they aged. Nearly half (49%) of a sample of Australian jockeys said that weight management was the most difficult aspect of being a jockey, while only 14% said that weight was not a problem for them (Hill et al., 1997).

More recently, over 40% of a large sample of Australian jockeys considered that maintaining their riding weight was either *difficult* or *very difficult* (Moore et al., 2002). This perceived difficulty in maintaining weight appeared to be related to the professional standard of jockeys, with the number of jockeys finding weight management either difficult or very difficult rising to 47% when only A grade jockeys were considered (i.e., with B grade jockeys removed), and to 50% when only the responses of apprentices were included.

It is hardly surprising that many jockeys consider leaving their sport due to the difficulties they experience in managing their weights. For example, 20% of the current

British riders surveyed by Atkinson et al. (2001) had contemplated retirement due to weight concerns. Although it was not among the explicit aims of the research, many of the current and retired Australian jockeys interviewed by Speed et al. (2001) spoke of the difficulty they had managing their weight, and the health problems which stemmed from their weight-management activities. As many as 50% of the former jockeys in this study claimed weight problems were a contributing factor in their premature retirements.

Weight-Management Practices of Weight-Regulated Athletes

It is clear that weight losses of the magnitude described in the previous section does not happen by chance. Those athletes wishing to substantially reduce their body masses must identify and carefully follow effective regimens, selecting from the diverse range of weight-loss methods available. These methods can be classified into two broad categories: energy balance, and dehydration strategies, based on the mechanism of weight loss (Fogelholm, 1994). Athletes wishing to lose substantial amounts of weight, or to lose weight rapidly, may consider methods that combine energy balance and body fluid reduction, as is the case when exercise is performed in vapour impermeable clothing (i.e., sweat gear).

Most studies indicate that, over time, weight-regulated athletes develop a weight-management regimen, combining a number of separate methods into a consistent routine. For example, Kinningham and Gorenflo (2001) asked over 2,500 high-school wrestlers, including heavyweights, about a variety of weight-loss practices, and found that 72% of respondents used at least one weight loss method each week, and 12% used a combination of five or more methods per week. Jockeys are no exception, with half of all New Zealand jockeys surveyed combining several methods to keep their weights at acceptable levels, and two thirds (67%) including at least one method in their

current weight-management regimens (Leydon & Wall, 2002). A slight decrease in prevalence from past to current weight management behaviours was observed in this study, illustrating the tendency of jockeys to use trial and error before settling on the methods which suited them best.

Slater et al. (2005) provided compelling evidence that athletes who cut weight apply the various practices which make up their regimen at different times in their weight-loss schedules. The lightweight rowers in this study used energy balance methods almost exclusively 1 to 4 weeks before a regatta, and then applied fluid-reduction strategies in the last week, and especially the 24 hours prior to competition.

Energy Balance Manipulation

Energy balance strategies, which include fasting, food restriction, and excessive physical activity, target metabolic processes and have the goal of creating negative energy balance (i.e., where energy expenditure through exercise exceeds energy intake from food sources). This process, if sustained for several weeks, has the long-term result of reducing the amount of fat stored in the body, and maximising the body's lean muscle mass (Brownell et al., 1987), and is among the most common tactics used by weight-regulated athletes.

Wrestlers appear to be strong advocates of energy balance methods for weight management. Most of the young wrestlers studied by Tipton & Cheng (1970) favoured inducing negative energy balance to cut weight, by both increasing their usual amount of exercise (reported by 88% of all wrestlers) and decreasing their food consumption (83% of wrestlers) to achieve their weight targets. Exercise, in the form of jogging (used by over 90% of wrestlers), was the most prevalent weight-loss method among the college wrestlers Kinningham and Gorrenflo (2001) studied, with varying degrees of

energy intake reduction, such as gradual dieting (90%) and complete fasting (55%) also common.

Findings of weight cutting by minimising energy intake and maximising energy expenditure are not restricted to wrestlers, however, or to male athletes. Male body builders (Newton, Hunter, Bammon, & Roney, 1993), judoka (Degoutte et al., 2006) and boxers (Hall & Lane, 2001), female gymnasts (Harris & Greco, 1990), and lightweight rowers of both sexes (Sykora et al., 1993), have all been found to systematically use energy-balance tactics to control their weights. The most common approach to weight cutting among the lightweight football players studied by DePalma et al. (1993) was to invoke negative energy balance, with almost three quarters (72%) of all players surveyed combining exercise and fasting. Considered in isolation, exercise was the most common method (used by 87.5% of athletes), with approximately 40% reporting they exercised every day specifically to control their weight. Two thirds of respondents had fasted at least once in the previous month, and almost 20% had fasted at least once a week during that period. A sizeable proportion of players (17%) also admitted self-inducing vomiting for weight loss.

The wasting judoka studied by Degoutte et al. (2006) were free to use any methods to accomplish their weight reductions, and an analysis of their diet showed that they had reduced their energy intake by 33% on average over the week of the study to achieve the 5% weight-loss target. The boxers interviewed by Hall and Lane (2001) revealed they used a combination of methods to achieve the weight loss they need for competition, but all interviewees stated that they ate less in the week prior to competition, and also on the day of the weigh-in. Further, nearly three quarters of boxers exercised for weight loss.

In contrast to the paucity of literature dealing with the extent of weight loss in jockeys, significantly more information on their wasting tactics is available. Articles in popular media, such as newspapers and magazines, and several autobiographies written by jockeys, have revealed some details of their efforts to lose weight. These reports have tended to sensationalise the issue, focussing on the most severe examples of wasting in high profile jockeys, and the most extreme and occasionally bizarre methods used. This tabloid approach has raised public awareness of weight management to a certain extent, but has also served to obscure the day-to-day weight battles being waged by many jockeys outside the glare of the media spotlight. In an interview about his life-long commitment to virtual starvation diets, American jockey Lafitt Pincay talked of having an “all nuts diet” at one time, before eventually settling on a balanced, but calorie controlled plan, including food such as fruit, cereal, and lean chicken (Hoffer, 2001). Such was his dedication to diet, a horse trainer travelling with Pincay on an aeroplane observed the jockey take one peanut from a packet, cut it in half, eat the first portion, and put the other half away to be eaten later. Another American journalist called wasting “horse racing’s dirty little secret” after seeing a “heaving bowl,” a toilet specially designed to allow jockeys to vomit into it easily, inside the jockeys’ room at a race-track (Schmidt, 2004). Jockeys who self-induce vomiting to lose weight are known as “flippers” or “heavers” in some racing circles (Forde, 2002).

The issue of wasting has come into the public domain in Australia as well, with some high profile jockeys revealing both the extent of their wasting and the methods they resort to in order to achieve their weight goals. For example, current jockeys Peter Mertens, Glen Boss and Darren Gauci, have all recently discussed the weight-loss activities they engaged in which enabled them to accept light rides in important races. Mertens said that, in order to get down from his usual riding weight of 52.5 kg to 49 kg

for the Melbourne Cup, he existed on a diet of brown rice and very little else: His breakfast consisted of one cup of tea and a piece of dry toast, lunch was another cup of tea and perhaps a dry biscuit, and dinner consisted of rice with lemon juice and perhaps a slice of steamed fish (Lester, 2003).

Boss also highlighted the popularity of the brown rice diet amongst jockeys when he described the regimen he put in place to lose 3 kg for a light ride (Pramberg, 2003). Boss, who considered himself to be a natural lightweight jockey able to eat “like normal people,” said that, in the 48 hours before his ride, he would drink a cup of coffee for breakfast, eat a piece of fruit for lunch, and consume a bowl of clear (i.e., watery) soup for dinner with rice, before totally avoiding food and drink on race-day. He would combine this Spartan diet with exercise, such as swimming, jogging, golf, and tennis.

Veteran jockey Darren Gauci revealed that he experimented with a nasal spray to control his appetite. He reported that the spray had enabled him to lose 1.5 kg without his usual reliance on the sauna (Habel, 2005). He said that, by the third day of using the spray, he was able to restrict his normal diet of brown rice and vegetables, eaten twice a day, solely because he didn't feel hungry.

Descriptions of jockeys and their weight-management practices from the scientific community are less sensational, and the available data provide some of the details missed by the popular media. The first published scientific insights into the weight management practices of jockeys appeared in the late 1980s, in the form of small descriptive studies from the UK and Australia (Apted, 1988; King & Mezey, 1987). King and Mezey (1987) studied 14 British jockeys, conducting psychiatric interviews with 10 of them about their weight, eating habits, and eating disorders. In keeping with the reliance of other weight-restricting athletes on energy balance methods, skipping meals to keep their weight in check, especially on race-days, was universally popular

with these jockeys. All the jockeys also included unspecified strenuous activity in usual weight-management regimens.

The first Australian study to describe the wasting tactics of jockeys was also a small-scale investigation. Apter (1988) surveyed 8 senior jockeys and 1 apprentice rider (all males) about their weight-management regimens. The most popular method reported was dietary restriction, which was used by 8 of the 9 participants. All jockeys also reported that they engaged in regular physical exercise (e.g., golf, swimming, jogging), and rode track-work for up to 40 hours per week.

South African jockeys' energy balance tactics appear to be more varied than their Australian and British peers. Most jockeys surveyed by Labadarios et al. (1993) reported that, like jockeys in other countries, they predominantly rely on exercise, including track-work, and dieting for weight management. Almost half this large sample of jockeys, however, also used appetite suppressants to keep their energy intake as low as possible. The researchers also included smoking cigarettes as a weight-control method, and found that 58% of respondents considered smoking to be an instrumental part of their weight-control regimens.

A subsequent survey of Australian jockeys, conducted by Hill et al. (1997), reported the prevalence of a number of weight-management practices, and suggested that food restriction of varying degrees was primarily a gradual weight-loss or weight maintenance tactic. Whereas dehydration was used for wasting, the most common methods used to maintain low weights in general were not eating between meals (used by 76% of jockeys) and complete fasting (55%). The extent of food restriction and fasting in this group of athletes was evident in the finding that the average number of meals consumed by jockeys on non race-days was just 2.2. This figure dropped to a mean of only 1.3 meals eaten on race-days, with many jockeys skipping both breakfast

and lunch to ensure their weights fell below their target levels. A smaller number also used laxatives (22%) and appetite suppressants (13%) to their control weight.

The results of a recent British study (Atkinson et al., 2001) closely mirrored previous Australian research in both the type and prevalence of energy balance methods favoured by jockeys. The vast majority (92%) of British jockeys said they routinely skipped lunch on race-days to ensure they met their weight targets, and between 41% and 59% skipped breakfast, dinner and snacks. Only a small proportion of the sample (2%) admitted using laxatives to control their weight. The authors stated that the use of “drugs” was much less frequent than other “legal” tactics, but precise statistics were not provided, nor is it clear which drugs or methods they considered illegal and which they considered legal.

The most widely practiced weight-control methods among recent New Zealand jockeys again emphasised the ubiquity of restriction of food. Approximately two thirds of jockeys surveyed by Leydon and Wall (2002) currently restricted their food intake, but none said they went so far as to fast completely. A comparatively smaller proportion of jockeys (22%) used exercise, such as jogging, roller-blading, and gym work, to control their weights. The researchers state that several jockeys offered an interesting explanation for their avoidance of such activities, stating that they did not exercise because they believed they would gain muscle and therefore increase their body weights. A number of jockeys (22%) also said they currently used “other” methods to manage weight, such as taking appetite suppressants.

When considered on gender lines, the New Zealand study revealed some interesting results. Overall, male jockeys were more likely to engage in each of the listed weight management activities than female jockeys (Leydon & Wall, 2002). For example, twice the proportion of males used food restriction and saunas, and 6 times

more men than women exercised for weight control. It is unsurprising that the researchers found that male jockeys had significantly lower percent body fat figures than the female participants.

The results of this study must be compared carefully with others for several reasons. The small number of participants obtained contained an overrepresentation of young female apprentice jockeys, who made up 45% of the overall sample. At this point in their careers these young apprentices did not need to do much at all to keep their weight below the required levels (Leydon & Wall, 2002), and it seems likely that a more representative sample, with more senior male jockeys, would have seen even larger proportions overall engaging in the wasting methods examined in the study.

More important, the authors also stated that some under-reporting of wasting was evident in the study (Leydon & Wall, 2002). Four out of the six female jockeys who stated that they did not waste actually recorded food intake levels consistent with energy restriction diets. It may be that these participants deliberately mislead the researchers for some reason, or, more likely, that such under-eating is so pervasive in jockey culture and that of young women, that they considered their low energy diets to be normal. If the normalization of some weight-loss practices does exist among jockeys, then it is likely that the statistics reported in this study, and others, represent an underestimate of the true prevalence of wasting behaviours in these populations.

Moore et al. (2002) reported a wide range of weight-control methods popular among Australian jockeys, for both long-term weight maintenance and short-term wasting. Over half of all jockeys (50.9%) reported having long-term weight control strategies, however nearly as many said they had no relatively permanent strategy at all. Although it is unclear which of the weight-loss methods that jockeys considered long-term strategies and which they did not, the previous finding is surprising, considering

that weight is an acknowledged and unavoidable criterion of career longevity for a professional jockey.

In terms of the prevalence of specific methods, several wasting strategies common in other groups of jockeys were again evident in the Moore et al. (2002) study. Over 80% of all jockeys surveyed, including both male and female riders, said they routinely restricted food intake in the 24 hours before racing, and one third skipped at least one meal a day on a regular basis. Although the highest percentage skipped only one meal, one quarter skipped two meals and over 10% said they skipped all three major meals the day before a race.

Dehydration Methods

In contrast to the more gradual energy balance methods, dehydration strategies aim to reduce weight rapidly by minimising the amount of fluid in the body, a goal which can be achieved in a little as a few hours (Fogelholm, 1994). A number of such practices have been described in the weight-cutting literature, including: restricting fluid intake, the use of saunas and other hot environments to stimulate sweating, the use of diuretic and laxative substances, and spitting (Buskirk & Puhl, 1996). The application of various dehydration tactics appears to be more variable than energy restriction methods, perhaps dictated by cultural traditions within each sport or region.

Although not as common as exercising and fasts, sauna use (21%) and wearing sweat gear while exercising (23%) were also popular weight-loss strategies among the wrestlers surveyed by Kinningham and Gorenflo (2001). The presence of these dehydrating methods was unexpected because such practices had been banned at high-school level several years before the study commenced, suggesting that competitors found ways to avoid detection in order preserve their familiar and trusted weight-cutting regimens. More recent studies confirm that dehydration continues to be a common

weight loss strategy among elite wrestlers, with saunas used by 28% of collegiate and 55% of high-school competitors (Alderman et al., 2004; Oppliger et al., 2003).

Participants in other combat sports apply similar dehydration tactics to wrestlers, to cut weight immediately before competition. For example, two boxers in Hall and Lane's (2001) experimental study exercised in sweat gear on the day of their weigh-in to make last minute weight adjustments. Fluid restriction was also common the day before competition with participants, with some stating that they consumed no fluid whatsoever in the 24 hours prior to a weigh-in. French Judo athletes have been found to reduce their fluid intake by as much as 22% in the week prior to a weigh-in for a simulated competition (Degoutte et al., 2006).

Minimising body fluid also appears to be a key wasting strategy among jockeys, with evidence emerging that a range of these rapid weight-loss methods are applied on a regular basis. For example, Patrick Payne, a well known heavyweight jockey from a prominent racing family in Australia, stated that he was so strict with his fluid intake that he could not take a sip of water to sooth his dry mouth at times when he wasted. Payne remarked, "All I can do is wash my mouth out with water. I don't even have the luxury of taking a sip," of these wasting episodes (Bartley, 2004).

The majority of jockeys surveyed by Moore et al. (2002) indicated they required methods over and above manipulating energy balance to manage their weights. For example, although fluid restriction was not included as a separate weight-management strategy, 5% of jockeys reported not drinking at all in between races on race-days. The information gathered on the timing of other weight loss activities confirms the picture of a group of athletes with a "last minute" approach to weight loss, using dehydration both just prior to, and especially on the day of racing. For example, almost sixty percent of all jockeys used the sauna regularly, and one third (28%) did so on race-days to achieve

their target weights. Thirty seven percent used diuretics regularly, and one fifth (21%) used diuretics on race-days. Male and female jockeys used all weight-loss methods equally, with the exception of saunas. More than two thirds of male jockeys at least sometimes used saunas to reduce their weight, and 14% did so every day, whereas 28% of females reported using the sauna at all, and none used them on a daily basis.

Sources of Weight-Management Knowledge

Considering the prevalence of weight cutting among weight-regulated athletes, and the reports of severe dehydration and restrictive dietary practices, one could assume that researchers and sport administrators would be eager to examine the foundations of these behaviours. Yet little attention has been directed to date to appraising the sources of athletes' weight-management information. A small number of reports suggest that the majority of wrestlers receive information from their coaches and other wrestlers (Lakin, Steen, & Oppliger, 1990; Oppliger et al., 2003; Tipton & Tchong, 1970), although weight-loss education has not been a major research focus in this sport to date.

Few studies in racing have examined the issue of weight-management education, but most have reported similar findings to those reports from wrestling. When South African jockeys were asked about the source of their weight-management knowledge, the vast majority stated they selected their current methods following a period of trial and error, usually after consultations with other riders. Only a tiny proportion (3%) had consulted a health professional (e.g., doctor) for weight-management advice (Labadarios et al., 1993). In contrast to their South African counterparts, more British jockeys appear to seek professional help with their weight loss, with reports that 73% used a dietician at some point in their careers (Atkinson et al., 2001).

Just like their New Zealand and South African peers, the Australian jockeys surveyed by Moore et al. (2002) relied predominantly on industry sources, such as

current and former jockeys, for their information on weight management. Nearly two thirds (63%) got nutritional advice from other jockeys, while less than one quarter sought out dieticians, and even fewer (11%) went to medical practitioners for help. A small number of jockeys (16%) said they had received information on weight management from their apprentice training program. In commenting on the problematic nature of weight management for jockeys, the authors stated that wasting is such an integral feature of racing culture, that many of the extreme weight-loss practices engaged in by jockeys are actually considered "normal" within the industry. Given this normalisation of potentially harmful practices, the prevalence of jockey-to-jockeys transfer of weight-management knowledge is concerning.

Summary

The studies and anecdotal reports reviewed here provide ample and compelling evidence that athletes from a variety of weight-regulated sports, such as wrestling, the martial arts, and lightweight rowing, find weight management a necessary, pervasive and difficult aspect of their sporting participation. Weight losses in the order of 5% or greater of total body weight are typical of the majority of athletes in these sports (Buskirk & Puhl, 1996), and figures as high as 15% losses of body weight are not uncommon. Moreover, the substantial degrees of weight loss achieved by weight-regulating athletes are often accomplished in only a few days, and sometimes in as little as a few hours.

A small number of studies provide preliminary insights into weight regulation in professional jockeys. Significantly, it appears that most jockeys find weight management difficult, and that weight losses of up to 16% of total body weight have been reported prior to race meetings. This substantial degree of weight loss is consistent with estimates of weight losses from other weight-regulated sports, and occurs despite

jockeys having lower initial body weights than competitors in these other sports. Nevertheless, several gaps still exist in the knowledge base about weight loss in jockeys. For example, little information has been collected to date on the typical weight losses that these athletes achieve, both in absolute and relative terms, and scientific data is scarce regarding the frequency and duration of their weight-loss cycles.

Many of the weight-restricting athletes examined in the literature reviewed here engage in acute weight-loss practices, some of which are considered extreme outside weight category sport cultures, to achieve their target weights. Methods designed to induce negative energy balance, such as caloric restriction and engaging in physical activity, and dehydrating techniques, such as exercising in hot environments and wearing vapour-impermeable clothing, have been consistently reported. Like other weight-cutting athletes, jockeys appear to take a multifaceted approach to managing weight. Almost all jockeys report using some degree of food restriction (e.g., diets, complete fasting), and many restrict their fluid intake as well. The use of saunas and diuretics to rapidly reduce body fluid levels also appears to have been particularly prevalent among jockeys in the recent past. From the available information presented here, it is not yet clear how or why jockeys combine these methods to achieve the weight loss they require, or whether their wasting practices have any detrimental effects on their physical or psychological health, in both the short and long term.

The Negative Effects of Weight Cutting in Athletes

Despite evidence of a strong wasting culture existing in thoroughbred horse racing and a cross section of other weight-regulated sports, the effects of these weight-loss practices on some key aspects of health and performance remain largely unknown. Findings regarding the physiological complications associated with weight cutting are numerous and have been well documented, to the point that both the American Medical

Association (American Medical Association Committee on the Medical Aspects of Sports, 1967) and the American College of Sports Medicine (American College of Sports Medicine, 1996) have warned against many of the practices associated with it. In contrast, little is known yet about the psychological sequelae, and especially within sporting contexts. This section will examine the deleterious consequences that weight cutting may have on some health and performance outcomes considered important for athletes.

Weight Cutting and Impaired Physiological Function

In terms of physiological function, athletes who cut weight are at risk in both the short and long term, for a number of reasons. Weight loss has been hypothesised to deplete plasma volume, impair the body's thermoregulatory mechanisms, and affect the normal growth and function of muscles and bones (Armstrong & Anderson, 2003; Buskirk & Puhl, 1996; Walberg-Rankin, 2000). These acute physiological effects and subsequent performance decrements are generally accepted to occur at approximately 5% or greater loss of total body weight (Buskirk & Puhl, 1996; Walberg-Rankin, 2000), but some researchers have detected impairments at a threshold as low as 2% loss of body weight (Armstrong, Costill, & Fink, 1985). For a jockey with a body weight of approximately 52 kg, this estimate means that an acute loss of as little as 1 to 2 kg has the potential to bring about a variety of undesirable side effects. The epidemiology of long-term effects is more difficult to determine, but nonetheless important.

Intuitively it would seem that the method of weight loss would be important factor in determining the physiological effects of cutting weight (Fogelholm, 1994). Maughan (2003) supports this notion, stating that the body can well tolerate periods of fasting, but that the effects of inadequate water intake can be felt within as little as 1

hour. The majority of research has examined the consequences of dehydration, but studies have also investigated the effects of dietary restriction.

Dehydration and Physiological Function

Sedentary individuals living in temperate climactic conditions lose approximately 2 - 3 litres of body fluid a day (about 5 - 10% of total body water), predominantly via urination and through sweating (Maughan, 2003). Strategies designed to further reduce levels of fluid in the body as a whole, such as taking diuretics, wearing vapour impermeable clothing (i.e., sweat gear) and using saunas to stimulate sweating, would also be expected to have direct and negative effects at the micro-level on plasma volume and other body fluids. Blood flow is particularly vital for athletes because blood carries oxygen to working muscles, and also transports excess heat from the muscles to the skin where it can be dissipated (Maughan, 2003).

To illustrate the immediate and substantial effect of acute systemic fluid loss on blood flow, Griewe, Staffey, Melrose, Narve and Knowlton (1998) showed that wrestlers who dehydrated via intermittent 15-minute bursts in the sauna lost an average of 3.8% of their body weight, and actually depleted their plasma volumes by a mean of 7.5%. Yankanich, Kenney, Fleck and Kraemer (1998) examined the effects of rate of weight loss (either gradual, moderate or rapid, using thermal or exercise methods) on plasma volume. Overall, wrestlers in this study lost an average of 6% of their body weight via self-selected methods, and all experienced significant loss of plasma volume (approximately 11%). The speed at which the wrestlers lost weight did not, however, affect the total plasma loss. In other words, all wrestlers, regardless of the rate or method of their weight loss, were equally dehydrated, equally depleted in plasma volume, and therefore equally exposed to the consequences of reduced blood flow. Based on these findings, it would appear that irrespective of the methods used to

achieve it, weight loss by dehydration has substantial effects on the plasma volume of athletes.

Important consequences of systematic dehydration relevant to athletes relate to its effects on the body's thermoregulatory systems. Maughan (2003) and Castellani (2003) describe dehydration, and its association with falling cardiac output, low blood pressure, decreased sweating, and reduced blood flow to the skin and muscles, as the most important pre-disposing and modifiable factor limiting the thermoregulatory response. Under normal conditions, body temperature is maintained between 35 ° and 39 ° Celsius, via processes such as sweating, dilation and constriction of the blood vessels, and shivering (Castellani, 2003). Once the environmental temperature rises above 20° C, evaporation (i.e., sweating) becomes the primary means of heat dissipation, accounting for up to 95% of body cooling (Ellis, 1994). Therefore, anything that impairs the ability of the body to dissipate heat by the evaporation of sweat will have a significant effect on a person's ability to maintain homeostasis in core temperature. Exercise itself places increased demands upon the body's thermoregulatory systems because of the active, estimated to be enough to raise core body temperature by 1° C every 5 minutes if unchecked (Nadel, Wenger, & Roberts, 1977). Further, if exercise takes place in a warm environment, heat can be absorbed through the skin via radiation from the sun and the convection of warm currents of air past the skin.

Heat illness is the medical umbrella term used to describe the condition resulting from the inability of the body to compensate for excessive heat generation (Ellis, 1994), and includes a continuum of syndromes, ranging in severity from mildly annoying to potentially fatal (Coris, Ramirez, & Van Durme, 2004). Ellis (1994) distinguishes between "classic" heat illness, which occurs mainly in those who become dehydrated such as the elderly and those with chronic diseases, and "exertional" heat illness, which

accompanies physical activity, and occurs primarily in athletes, soldiers and manual labourers. Jockeys, with the high physical demands of their profession, and their reliance on dehydrating weight loss methods, appear to be an at-risk population for both types of heat illness.

Among the milder forms of exertional heat illness is heat cramp. It involves acute, involuntary and painful spasms of skeletal muscles, often of the arms and legs (Coris et al., 2004). Heat Syncope involves a brief fainting episode resulting from pooling of the blood in the legs and skin, and may be accompanied by tunnel vision and nausea. It is considered to be temporary with a complete recovery within a matter of hours (Armstrong & Anderson, 2003). Heat Exhaustion is an even more severe form of heat illness, diagnosed when the core body temperature is between 39° and 40.5° Celsius, and is caused by depleted water or sodium levels or both (Ellis, 1994). Ellis (1994) likens a heat exhaustion diagnosis to having flu-like symptoms, characterised by an inability to continue exercising, mild confusion, vomiting and syncope, but again is not life-threatening, with recovery occurring within 24 - 48 hours. The most extreme type of heat illness is Heat Stroke, which is considered a medical emergency because of the potential for organ damage if left untreated. In the acute phase, this condition involves a core temperature above 40.5° Celsius, the cessation of sweating, tachycardia (i.e., rapid heart beat), and pronounced deterioration in mental status (Coris et al., 2004).

Clearly then, a disruption to the body's ability to dissipate the heat generated during exercise can have significant effects on normal physiological and mental function. Unfortunately, there is little data about the prevalence of heat illnesses among athletes, especially the milder forms, although several authors believe they are extremely common (Castellani, 2003; Maughan, 2003), and can occur in a matter of minutes or hours (Armstrong & Anderson, 2003).

Food Restriction and Physiological Function

Walberg-Rankin (2000) suggested that food restriction tactics, as well as contributing to dehydration, can reduce the body's stores of energy for activity, and can lead to nutrient deficiencies that may ultimately impair the normal growth of bone and muscle tissue. Such restrictive-diet strategies can be classified as either gradual or acute (Fogelholm, 1994), and, although it is unlikely that a short-term fast of a few hours will have a detrimental effect on nutritional status, athletes who restrict their diets repeatedly over longer periods are at greater risk.

Walberg-Rankin (2000), and Fogelholm (1994) both state that carbohydrate intake, necessary to fuel physical activity, is often insufficient during both rapid and gradual bodyweight reduction, and that restrictive diets can lead to reduced protein levels and reductions in lean body mass. In support of their first contention, several studies have illustrated that athletes losing approximately 5% of their body weight through energy restriction diets depleted their muscle glycogen stores by greater than 30% (Burge, Carey, & Payne, 1993; Tarnopolsky et al., 1996). Important vitamins and minerals may also be lacking when diets are restricted, illustrated in a study of dieting wrestlers who were found to consume less than 70% of the recommended daily amounts of vitamins A and C (Steen & McKinney, 1986). More research is required, however, to more clearly determine the long term effects of repeated fasting on nutritional status.

There is also evidence that the normal growth and development of bones may be compromised by dietary weight-loss practices. Leydon and Wall (2002) reported that 44% of the jockeys they studied were found to be osteopenic in the spine, hip, or both, with only mean wrist measurements considered to be within normal limits. Osteopenia, the pre-cursor to the condition of osteoporosis, is defined as the presence of less than normal bone density, and is usually associated with the elderly (Reid, 1997). The

investigators attributed the abnormal bone densities found in such young people (average age of 28 years for senior jockeys, and 20 years for apprentices) to compromised diets and other lifestyle factors, specifically a low calcium intake, smoking, and excessive alcohol intake. Any potential deterioration of the structural integrity of the body should be of concern to jockeys due to the high number of falls and traumatic injuries they suffer. These bone density effects may be even more serious for female jockeys, because menstrual disturbances, also associated with dietary restriction, can further deplete bone density. This combination of conditions has become known as the *female athlete triad* (American College of Sports Medicine., 1997).

Weight Cutting and Reduced Physical Performance

The goal of most weight-restricting athletes is to increase, or at the very least maintain, athletic performance while reducing their body fat and fluid levels (Walberg-Rankin, 2000). Given the prevalence of weight cutting among various athletic populations, it is not surprising that researchers have also investigated the effects of these actions on sporting performance outcomes. Research to date indicates that the method of weight loss, and the type of performance required (e.g., aerobic, anaerobic, or muscular endurance), are actually as important as the degree of weight loss in assessing the effects of wasting (Walberg-Rankin, 2000). The vast majority of the available research focuses on rapid weight loss engaged in for periods lasting less than 1 week, as opposed to gradual weight loss carried out over periods of weeks and months, and again, a preponderance of this research examines college-aged wrestlers.

In comprehensive reviews of the literature on rapid weight reduction and performance in athletes, Fogelholm (1994) and Walberg-Rankin (2000), summarised the acute effects of rapid body weight reduction on aerobic, anaerobic or muscular performance. They both concluded that findings relating to aerobic performance are

clearly negative, citing several studies showing that VO₂max (a measure of aerobic efficiency) was reduced by up to 10% with rapid weight loss of 4 - 5% of total body weight (Caldwell, Ahonen, & Nousiainen, 1984; Webster, Rutt, & Weltman, 1990), although the effects seemed dependent on the amount and speed of weight loss.

Muscular Performance

Findings relating to the effects of wasting on muscular performance are inconsistent, and may depend upon: the muscle group being investigated, the method of weight loss, and the duration of the performance effort required (Fogelholm, 1994). In one study, decreased performance on anaerobic tests involving 30-60 second cycling bouts (Webster et al., 1990), and on tests of upper body strength, were found with a 4.9% loss of body weight, achieved by exercising in sweat gear over a 36 hour period. In a second study, wrestlers who lost an average of 3.8% of their body weight in the sauna, showed no effects of weight cutting on maximal muscle power in their knee extensors and elbow flexors (Greiwe et al., 1998). The researchers in this study had originally planned to dehydrate all participants by at least 4%, however they noted that several of the wrestlers were unable to complete the sauna sessions because they experienced symptoms of heat illness, such as headaches and dizziness. In contrast to the lack of power effects found in the previous study described, Viitasalo, Kyrolainen, Bosco and Allen (1987), again found that sauna-induced, and diet and diuretic-induced dehydration, but not diuretic-alone-induced dehydration, produced a 7.8% drop in maximal leg strength of volleyball players and track and field athletes.

Studies involving intermittent bouts of muscular performance (i.e., repeated efforts of short but intense muscular activity), tasks common to many weight category sports including horseracing, show that weight loss of approximately 5% can impair muscular performance (Walberg-Rankin, 2000). For example, weight loss of 3.3%

through an energy restriction diet caused a reduction of 7.6% in the arm strength endurance of wrestlers (Walberg-Rankin, Ocel, & Craft, 1996). Hickner et al. (1991) also found that wrestlers could not sustain their previous levels of work on an arm crank test after 4.5% loss of body weight.

Much of the research reviewed by Fogelholm (1994) and Walberg-Rankin (2000), involved performance on simple laboratory tasks, such as arm crank tests, designed to produce physical stress similar to that experienced in sport competition (Hickner et al., 1991). Unfortunately, these tasks appear to bear little resemblance to the actual competitive performances of the athletes studied. For example, wrestlers engage in a sport where many of their muscular efforts are static holds, rather than the dynamic efforts required in arm crank tests. In contrast, these tests would appear to bear a closer relationship to the demands of race-riding, and thus the findings of impairments in muscular performance discussed here are particularly relevant to jockeys.

No studies have examined the effects of wasting on muscular performance of jockeys, although one current jockey interviewed by Speed et al. (2001) stated that he or she had difficulty pulling up (stopping) his or her horse at the conclusion of a race due to physical weakness and dehydration caused by wasting. Current jockeys have continued to report such anecdotes of physical fatigue associated with their wasting.

Athletic Success

Attempts to link weight loss, and subsequent regain after weigh-in, to competitive wrestling success have not been able to verify a relationship between the two (Horswill, Scott, Dick, & Hayes, 1994; Utter & Kang, 1998). Investigations so far have revealed that nearly all wrestlers (approximately 95%) lose weight (Horswill et al., 1994; Scott, Horswill, & Dick, 1994), leaving no adequate control group for

comparison. In addition, athletic competition also introduces mediating elements, such as skill and experience, which affect successful outcomes, but are difficult to control.

In discussing the return to normal functioning after a period of weight loss, Fogelholm (1994) stated that, after athletes start to re-hydrate, muscular performance does not necessarily return to pre-dehydration levels commensurate with their body-weight gain, particularly when the re-hydration period is short (1 to 3 hours). The author speculated that this delay may be due to physiological factors, such as depleted muscle energy stores, and the body's impaired thermoregulation (Fogelholm, 1994), however it could also be evidence of a psychological deficit contributing to poorer performance.

Weight Cutting and Impaired Psychological Function

In addition to the fatigued muscular efforts and physiological symptoms of heat illness that athletes experience with weight loss, many also report psychological problems when they cut weight. An athlete's mood, cognitive functioning, and perceptions of effort can all suffer, even after only a short period of weight loss (Walberg-Rankin, 2000).

Former Australian jockey, Rod Griffiths, talked candidly in his autobiography about his severe wasting regimen and the psychological effects it had on him, when recalling a bad race fall (Griffiths, 2003, p. 203):

I remember that I'd had very little to eat for the whole week, and had no fluid in my mouth since 5am when I had half a cup of coffee. On my way to Cabrini hospital one of the paramedics asked me how I was feeling. I couldn't say much but the one word that came out was 'hungry'.

So overwhelming was Griffith's hunger, that despite the pain of a punctured lung, broken ribs, and three broken vertebrae, food still dominated his thinking. Griffiths went on to say that he thought he would die as a result of his horrendous injuries, and that his dying wish was simply to eat and drink unrestrained: "If I could've drunk a gallon of Crown Lager [beer] and eaten out at MacDonald's I would've died a happy man."

Steen and Brownell (1990) reported that up to 63% of wrestlers *often* or *always* experienced similar pre-occupying thoughts of food to those described by Griffiths, but the issue of pre-occupying thoughts of thirst was not addressed. Jockeys surveyed by Hill et al. (1997) confirmed that thirst is a major problem for wasting athletes, present the majority of their lives. These athletes reported experiencing thirst more frequently than hunger, despite the fact that more jockeys restricted their food intake than restricted their fluid intake.

Weight Cutting and Cognitive Function in Athletes

Several mechanisms potentially explain how weight loss can affect cognitive function. Primary among these explanations is the effect of a systemic reduction in the body's fluid levels associated with dehydration (Wilson & Morley, 2003). It is estimated that up to 80% of the brain is water (McIlwain & Bachelard, 1985), and therefore a significant reduction in overall body fluid would likely lead to changes in the brain's composition and function. Dickson et al. (2005) confirmed that brain composition changed in response to a period of weight cutting, finding a correlation between overall dehydration and the volume of fluid in the brain and its surrounding structures. A second proposition is that hypoglycaemia, a frequent consequence of fasting, causes cognitive decrements (Cox, Gonder-Frederick, McCall, Kovatchev, & Clarke, 2002; Frier, 2001). Frier (2001) stated that low blood glucose may affect cognitive functions differentially depending on the complexity of the mental operation, with more demanding tasks suffering most, and that response speed appears to be more affected than response accuracy. Green, Elliman and Rogers (1997) disputed the validity of the glucose – impairment theory, stating that the brain is invulnerable to fasts of less than several days duration, and countered that changes in cognitive function are more likely related to fluctuations in the sympathetic nervous system activity (i.e.,

arousal levels) of study participants. Third, mood changes have been hypothesised to lead to impairments in the efficient operation of memory, attention and other cognitive functions (Blaney, 1986).

Only three published studies of athletes, two from wrestling and one involving unspecified athletes, have examined the potential for cognitive impairment with rapid weight loss. As described previously in this review, wrestlers engage in similar cycles of weight gain and loss to jockeys, and employ similar methods to achieve weight loss, and thus make an appropriate reference group.

The first of these studies examined 29 American collegiate athletes (14 wrestlers, and 15 off-season control group athletes (Choma et al., 1998). Participants were measured on body weight, hydration status, hypoglycaemic profile, mood and cognitive performance, one week before a wrestling match, and again after their pre-competition weigh-in. The authors reported that wrestlers lost an average of 6.2% of their body weight, but weight data on controls was not provided. The researchers assumed that their weight was stable because they were not competing and not intentionally trying to lose weight at the time of the investigation.

Choma et al. (1998) found that the athletes who cut weight (defined as a loss of 5% or more of their pre-season body weight) reported 37% more hypoglycaemic symptomology than controls, and that wrestlers' plasma volumes had dropped by 11% after their weight loss, whereas controls' levels remained stable. These findings establish that at least two of the potential mechanisms of cognitive dysfunction were present in the experimental group at the time of the test session.

Results of the psychological test battery indicated that cutting weight was associated with several negative cognitive outcomes. Specifically, problems with attention and short-term memory (STM), measured by the digit span and story recall

subtests of the Wechsler Adult Intelligence Scale-Revised (Wechsler, 1981), were detected in the wrestlers, and Choma et al. (1998) concluded that the impairments in STM and attention were probably related to the hypoglycaemia observed. Other cognitive tests involving timed efforts, such as letter cancellation and digit symbol substitution, were not significantly affected, and the authors attributed this to the fact that the motivational stimulus of competing against the clock may have enabled the wrestlers to overcome the transient effects of weight loss on these measures.

Choma et al. (1998) reported that the cognitive effects of rapid weight loss in this study may have been confounded with competition effects (e.g., increased tension, distraction, and arousal associated with the upcoming competitive event), due to the timing of the experimental testing session, and the nature of the control group.

Wrestlers' cognitive functions were assessed immediately after weigh-in, approximately 24 hours prior to competition, a time they normally use to eat and re-hydrate, and when pre-competition anxiety may be increasing for some competitors. In contrast, the control group was not actually competing at the time of testing, and therefore would not have experienced pre-competition effects, nor frustration caused by delays in their refuelling activities.

Despite the potential experimental noise caused by competition effects, Choma et al. (1998) concluded that cognitive performance was unlikely to be affected by pre-competition anxiety or heightened arousal so far in advance (more than 18 hours) of a match. Curiously, the authors also noted that wrestlers seemed to be in "much better spirits" two hours after their weight loss data were recorded, when they had refuelled and re-hydrated. This observation appears to confirm that the impairments found at pre-competition time in the wasting athletes may have been associated with their weight loss, or frustration at the delay in their ability to refuel, or both.

A second study of wrestlers, by Landers et al. (2001), attempted to replicate the previous findings of weight loss related cognitive impairments, while also balancing any extraneous effects amongst controls and wrestlers who cut weight. Again, the cognitive and psychomotor functions (e.g., attention, short-term memory, and choice reaction time) of 14 weight-cutting wrestlers, this time of high school age (14 - 18 years), were compared to 14 competing wrestlers who maintained a steady weight. All participants were tested 5 to 10 days prior to competition, and again 8 to 12 hours prior to weigh-in.

Wrestlers in this study lost an average of 4.7 kg, or 6.3% of their total body weight, while the controls lost a mean of 0.3 kg, or 0.4% of their baseline body weight. Although there are age differences between the participants of the two studies reviewed here (i.e., college aged v high school aged), the percentage weight loss figures attained by wrestlers in each study are almost identical (6.2% and 6.3% respectively), allowing for close comparisons.

Unlike the Choma et al. (1998) study, no deficits in cognitive function were found that could be attributed to weight loss. Performances of both wasters and controls across a range of cognitive tests (e.g., Trail-Making A and B, Digit Span, Stroop test) improved, or, at the very least, remained constant at weigh-in when compared to baseline data. This finding is consistent with the hypothesis proposed by both Landers et al. (2001) and Choma et al. (1998) that pre-competition effects could moderate any cognitive changes associated with weight loss.

Despite the apparent absence of any cognitive effects of weight loss found by Landers et al. (2001), the results of one test used in this study warrant further discussion. The Trail-Making test B (Reitan, 1958), which assesses attention and visuomotor skills, requires participants to trace a line between sequential points on a

piece of paper as quickly as possible. Mean performance by the weight loss group on this test was degraded from baseline measures, but did not reach statistical significance. Interestingly, the control wrestlers' performances on this test improved from baseline to weigh-in, which may indicate the presence of practice effects, as well as the arousal effects alluded to earlier. It is not clear whether practice trials of the subtests were allowed to reduce the potential for practice effects, but the lack of improvement displayed by the wrestlers could be construed as evidence of mild, albeit statistically insignificant, cognitive impairment.

A recent study of athletes provided further evidence of the selective effects of dehydration on specific cognitive functions related to sporting performance. Callow et al. (2003) dehydrated athletes by 1, 2 and 3%, and found that perceptions of effort on a cycling task increased incrementally with dehydration. Further, attention, but not working memory or decision making, was also adversely affected by dehydration.

Only two published studies have included any commentary on the cognitive performances of wasting jockeys. Although information about the procedures and measures is not provided, Labadarios et al. (1993) attempted to assess the effect of weight loss on a jockey's ability to perform tasks involving perceptual and cognitive processing. Without providing any statistical data to support their claim, the researchers reported that jockeys performed worse at tasks including memory, recall, and reaction times, on race-days when they were at their lightest weight compared to baseline measures of these functions. Apted (1988) also suggested that jockeys' cognitive functions may be responsive to weight loss, stating that the excitement and pre-occupation with racing could mask the ill effects of wasting, but did not clarify what these effects were. These findings must be accepted with extreme caution due to the lack of information provided, but they do suggest the possibilities of an association

between diminished cognitive function and weight loss in jockeys, and an effect of arousal on cognition, albeit possibilities needing further investigation.

Weight Loss and Cognitive Function in Non-athletic Populations

The research literature examining the effects of weight loss on cognitive function in non-athletic populations is more prolific, but also more difficult to assimilate than that relating to athletes. Methodological differences make direct comparisons between studies problematic, with contrasting measures of physiological status and weight loss common. For example, some studies have examined the effects on cognitive function of overall weight loss, whereas others have measured hydration levels or degrees of fasting as markers of weight loss. Further, the presence or absence of other extraneous variables that affect cognitive function, such as arousal levels, mood, and diurnal rhythms (i.e., time of day effects), have not been accounted for in much of the literature. Nevertheless, studies involving military personnel, and restrained eaters and drinkers, all have sufficient similarities to those of weight-regulated athletes, and provide glimpses of the potential psychological effects of weight cutting among weight-regulated athletic populations.

A number of studies in military settings have considered the effects of weight loss on psychological outcomes, in groups such as soldiers in the field on rations, and prisoners of war. In reviewing these studies, Mays (1995) concluded that findings on under-consumption in military personnel, which she defined simply as loss of total body weight, were "astonishingly consistent". Specifically, she asserted that weight loss of 6% or less over a period of 10 to 45 days produced no impairments in cognitive performance. Actually, cognitive performance was often improved in the first 3 to 15 days of moderate under-consumption. These performance results are reversed however, in the case where food intake falls below 50% of daily caloric requirements. Under such

conditions, the rate of decline in cognitive performance is “steady and significant”, occurring within a matter of days (Mays, 1995, p. 292). Cognitive impairments in these military studies were most extreme when food restriction was combined with other stressful events, such as sleep deprivation, danger, and intense physical activity, conditions often present in special operations training, and also in the working lives of jockeys.

Several studies of fasting or restrained eaters, and those with clinical disorders such as anorexia nervosa and bulimia, have indicated that cognitive impairment is associated with low caloric intake. For example, Pollit, Leibel and Greenfield (1981) examined the effect of skipping a single meal (i.e., fasting) on cognitive function in school children. In this study, children aged between 9 and 11 years, whose blood glucose levels had dropped after fasting overnight, made more mean errors on a matching task, but their speed of short-term memory responding was increased (Pollitt et al., 1981). Green, Elliman and Rogers (1995) found no such impairment of cognitive function with short-term fasting however, and reported that previous findings of impairment may have been attributable to other psychological changes related to the fast (e.g., anxiety, stress), as opposed to any nutritional deficiencies. A later study by the same authors (Green et al., 1997), confirmed that acute hypoglycaemic deficits resulting from missing one meal did not cause impairments to short-term memory and simple reaction times.

The cognitive effects of long-term or severe food restriction appear more consistent than those relating to acute fasts. In their pioneering study, Keys et al. (1950) showed that 6 months of semi-starvation, resulting in losses of up to 25% of body weight, was related to self-reported impairments to concentration and memory, and an inability to sustain mental effort for long periods of time. Participants also reported

transient visual disturbances, such as seeing “spots” or an inability to focus their vision. Subsequent studies have revealed a number of cognitive decrements among dieting adults, including attentional difficulties (Rogers & Green, 1993), and problems with short-term memory recall and slow reaction times (Green et al., 1994). A recent study of dietary restraint and cognitive performance in 8 to 11 year old girls again found that highly restrained eaters had slower simple reaction times and problem solving processing than low restrained eaters (Brunstrom, Davison, & Mitchell, 2005).

Several researchers have investigated the effect of dehydration on cognitive function, with consistent negative findings. With only mild dehydration of 1 to 2% loss of body mass, subjective ratings of alertness and concentration decline while perceived tiredness increases, and objectively measured impairments in several domains of cognitive function have also been observed at this level (Maughan, 2003; Wilson & Morley, 2003). For example, Sharma, Sridharan, Pichan and Panwar (1986) found that both memory and psychomotor function were impaired when healthy adults became dehydrated by 2% or greater of their initial body weight through a combination of exercise in a hot environment and fluid restriction. Gopinathan, Pichan and Sharma (1988) also found that the accuracy of short-term memory deteriorated and the speed of visuomotor tracking slowed proportionately with participants’ degree of dehydration, again becoming significant beyond 2% loss of body weight. Maughan (2003) cited driving a motor vehicle as an example of an activity that may be compromised by these deleterious cognitive effects, but race-riding could easily be substituted for driving because of the similarities between the two activities in regard to judgment and coordination.

In a comprehensive investigation of dehydration and mental operations, Cian, Koulmann, Barraud, Raphel, Jiminez and Melin (2000) examined the effects of two

different mechanisms of dehydration on various cognitive functions. Dehydration was found to have generally detrimental effects, but there was no difference between exercise induced (i.e., active) and heat or environmentally induced (i.e., passive) dehydration. In terms of specific cognitive functions, choice reaction times slowed, short-term but not long-term memory performance declined, and visual tracking was impaired, after participants achieved weight loss of greater than 2.5% of their initial body weight. In a subsequent study of dehydration and cognitive function, the same authors again found impairments in short-term memory with a similar degree of weight loss (Cian, Barraud, Melin, & Raphel, 2001). No effect of dehydration was found on tasks involving simple reaction time and visual tracking. This study also examined the effect of re-hydration on cognitive performance, and found no beneficial effect of fluid intake after dehydration. That is, dehydrated participants' cognitive function recovered to baseline levels after 3.5 hours, despite a lack of fluid intake to compensate for the initial dehydration.

Weight Cutting and Affective Disturbances in Athletes

In contrast to the equivocal results regarding cognitive function, studies of weight-cutting athletes have consistently revealed mood disturbances related to weight loss. Both Choma et al. (1998) and Landers et al. (2001) found that wrestlers reported significant changes in mood reactivity when they lost weight. For example, the wrestlers studied by Choma et al. (1998) had greater negative affect, as measured by the Profile of Mood States (POMS), than controls after a period of cutting weight. Landers et al. (2001) confirmed that weight cutting was associated with adverse mood responses, but found that positive mood states were more affected than negative mood states. That is, although effects sizes were large for both aspects of mood (positive affect $ES = 1.34$, negative affect $ES = 0.73$), wrestlers reported greater decreases in their positive moods

than increases in their negative moods when cutting weight. Endurance cyclists also exhibited both decreased positive affect and increased negative affect after losing 4% of their body weight during competition (Linderman, Demchak, Dallas, & Buckworth, 2003).

Affective dysregulation has also been reported by wasting jockeys in a number of studies. For example, both King and Mezey (1987) and Labadarios et al. (1993) stated that jockeys reported feeling irritable when in their most wasted states. The latter contend that this irritability was likely to be a consequence of jockeys' frequent diuretic use. Caulfield, Karageorghis, Terry and Chatzisarantis. (2003) also found that wasting was associated with mood disturbances as measured by the POMS-A subscales. Jockeys in this study reported significantly more anger, depression, confusion and tension, and significantly less vigour when at their lightest weights compared to their "relaxed" (i.e., out of competition or non race-day) weights.

Jockeys also report more extreme mood disturbances, with angry outbursts, depression and even suicide the eventual outcomes. For example, an article describing the effects of weight loss on jockeys quotes one rider as stating that an angry outburst, where he lashed another jockey with his whip, was a response to two days of severe wasting (Wainright, 2006). A researcher, quoted in the article, lists depression as a foreseeable psychological outcome of wasting in jockeys, and Speed et al. (2001) reported that most of the jockeys they interviewed provided examples of anxiety, loss of confidence, and despair related to wasting.

Weight Cutting and Disordered Eating in Athletes

Over and above the mood related effects discussed in the previous section, several researchers have suggested that athletes, especially those in sports where weight and leanness are emphasized, may be at risk of developing pathogenic eating behaviours

(Beals, 2004b; Fogelholm, 1994; Hausenblas & Carron, 1999). The problematic eating behaviours they range along a continuum from clinical disorders, such as anorexia nervosa and bulimia nervosa, to subclinical syndromes, referred to as disordered eating (Beals, 2004a). In explaining the nature of this relationship, researchers have suggested that extended and repeated cycles of weight cutting may precede and exacerbate maladaptive attitudes to eating, and some authors have gone as far as say that the sport environment may “legitimize” unhealthy attitudes and behaviours around eating (Thompson & Sherman, 1993). Studies have examined a variety of athletes, including those from weight dependent sports such as wrestling and light-weight rowing, judged sports including gymnastics and diving, and endurance sports such as distance running (for a comprehensive review of this research, see Beals (2004b).

Studies examining the extent of the relationship between disordered eating and sport have yielded equivocal results, with prevalence estimates varying from as low as 1% to a high as 62% (Beals, 2004b), and lack of agreement as to whether some athletes are at greater risk than others, and whether athletes are at higher risk than non-athletes. Sundgot-Borgen (2004) found that approximately 20% of athletes across a variety of sports satisfied clinical or subclinical criteria for problematic eating. In this study, prevalence was highest among participants in sports demanding leanness for performance or aesthetics. In contrast, a meta-analytic study of this issue found distance runners to be at no greater risk of disordered eating than non-athletes (Smolak, Murnen, & Ruble, 2000).

Moore et al. (2002) noted that it has not been conclusively established whether or not jockeys are at heightened risk of developing eating disorders, with only two studies specifically examining the issue. King and Mezey (1987) reported that none of the 9 jockeys they interviewed satisfied the criteria for a clinically diagnosed eating

disorder, whereas Leydon and Wall (2002) found that approximately 20% of jockeys, both male and female, displayed signs of disordered eating. Both studies included only small numbers of participants, so firm conclusions regarding disordered eating in jockeys are premature.

Weight Cutting, Morbidity and Mortality

Undoubtedly the most extreme outcomes of severe weight cutting and dehydration in athletes are serious injury and death. Published data are not available on the rate of morbidity in athletes due to weight loss, but Oppliger and Bartok (2002) report that such injuries are too numerous to record. Instances of mortality in athletes caused by dehydration have been more clearly documented. For example, the American Medical Association [AMA] (1998) reported that three previously healthy young collegiate wrestlers died in 1997 as a result of their wasting activities. The degree of weight loss attempted by the three wrestlers was considered extreme, averaging 15% of their pre-season total body weight, but the cases highlight the dramatic effects that weight loss, dehydration, and hypothermia in particular, can have on the health of athletes.

In the first of the cases described by the AMA (1998) report, a 19 year old male tried to lose approximately 7 kg over a 12-hour period. He had already lost 10.5 kg in the preceding 10 weeks, and was attempting to lose these final kilograms through a regimen of food and fluid restriction, coupled with systematic dehydration strategy involving exercising in sweat gear in a hot environment. On the day prior to his bout the wrestler had lost 4 kg of his goal, when he began to experience extreme fatigue and became “incommunicative”, before eventually suffering a heart attack.

Using similar methods to the first wrestler described, a 22 year old wrestler attempted to lose 2 kg in 4 hours to reach his competition target weight (American

Medical Association, 1998). He had lost 1.5 kg of this amount before he started to experience shortness of breath. The wrestler then drank some water, rested for 30 minutes and continued exercising in his sweat gear. Like the first wrestler, this young athlete went into cardio-respiratory arrest and could not be revived.

The final case involved a 21 year-old male wrestler who was attempting to lose 3 kg in a 3-hour period (American Medical Association, 1998). Again, he adhered to a regimen of food and fluid restriction, combined with exercise in sweat gear to promote loss of body fluid. Like the others, this wrestler experienced fatigue on the day before competition, had shortness of breath, and became unresponsive, before finally experiencing cardiac arrest and dying.

The editorial notes of the AMA report stated that these were the first identified deaths associated with intentional weight loss in high school or college wrestling in the USA since national records began in 1982 (American Medical Association, 1998). Nevertheless, one of the sport's most powerful governing bodies, the National Collegiate Athletic Association, was so concerned that they immediately made changes to the weight loss guidelines they issue to wrestlers and coaches (National Collegiate Athletic Association, 1998). Procedures were altered to move weigh-in times closer to competition, and weight loss methods such as laxatives, diuretics, saunas, and sweat suits, were explicitly prohibited with the threat of penalties for breaches. Curiously, the use of "artificial" re-hydration techniques, such as intravenous drips, in between weigh-in and competition was also banned.

The AMA made several recommendations relating to weight division sports, based on their investigation of the deaths (American Medical Association, 1998). Due to the traditional reliance of weight division athletes on rapid weight loss via dehydration, chief among these recommendations were the individual assessment and

monitoring of safe rates and amounts of weight loss for individual athletes, and the introduction of hydration tests to monitor the health status of athletes.

Deaths as the result of wasting are not unheard of in horse-racing either. Although there have been no recorded fatalities in Australian racing linked to wasting, there has been at least one highly publicised court case involving a near fatality, and several deaths in other countries as well. The ACT (Australian Capital Territory) Supreme Court recently awarded an Australian jockey \$1 million in damages, after finding that the jockey had used an on-course sauna to lose weight and subsequently suffered a heart attack (*Cook v. Australian Capital Territory Racing Club Inc.*, 2001). The judgement stated that the race-club was negligent in allowing the jockey to use the sauna, when it was reasonably foreseeable that this action could “give rise to significant risk of vascular thrombosis” in the already dehydrated individual. American newspaper articles have also reported wasting as the primary cause of death in the case of jockey Chris Mackenzie who collapsed in 2000 and could not be resuscitated (Schmidt, 2004).

The racing industry in Victoria has responded to the legal and scientific challenges relating to the risks associated with wasting in its athlete population, with several recent policy changes, including increases in the minimum weight scales, regulation of on-course saunas (Racing Victoria Limited, 2002), and the provision of accredited nutrition and weight-management training (Racing Victoria Limited, 2003a). In particular, on-course sauna use is now closely monitored by industry officials, and jockeys are limited to 15-minute maximums per hour. These changes to the racing environment in Victoria described were designed to protect the occupational health and safety of jockeys. The extent to which they have had any effect on the weight-management practices of the current cohort of jockeys, however, is unknown.

Summary

Research has clearly established that athletes who cut weight place themselves at risk of seriously compromising their health and well being, and possibly their chances of sporting success. In particular, studies show that restrictive diets and dehydration strategies have detrimental effects relevant to athletes on such diverse physiological and performance outcomes as nutritional status, bone density, thermoregulatory function, and aerobic capacity.

Preliminary evidence indicates that psychological status can also be compromised in previously healthy athletes and others who cut weight by as little as 2% of their total body weights. Mood disturbances have been consistently found in weight-cutting athletes, and transient impairments in some cognitive functions including short-term memory, decision-making, and attention have been associated with reductions of as little as 2% of body weight (Choma et al., 1998; Gopinathan et al., 1988; Landers et al., 2001). In particular, acute weight loss achieved via mild dehydration appears to have potentially transient but detrimental effects on a range of cognitive and psychomotor variables, including perceived exertion, short-term memory, decision-making, and attention (Cian et al., 2001; Cian et al., 2000; Gopinathan et al., 1988). No research has been conducted to date to ascertain whether or not regular episodes of rapid weight loss, such as occurs in jockeys who repeatedly waste, have any lasting effects on cognitive or psychological function. It may be that, over time, the brain can adapt to the impairments, as occurs in the reorganising and repairing process of neural plasticity (Benton & Tranel, 2000). Alternately, brain structures and functions may be irreparably damaged by chronic dehydration and food restriction, to the point where normal processing can never be restored.

Summary of the Literature on Weight Cutting and its Effects on Athletes

Based on the review of the racing and weight-cutting literature presented here, it is clear that many athletes competing in weight-regulated sports engage in rapid, frequent, and substantive weight loss to meet their weight targets. For example, it is common for wrestlers, boxers, and judo athletes to lose 5% or more of their total body weight in order to negotiate the weight divisions that separate athletes in these sports for competition. Available evidence also suggests that many professional jockeys engage in both rapid and prolonged weight loss to comply with the strict weight regulations imposed by racing's governing bodies.

Despite evidence of a wasting culture in the ranks of professional jockeys (Moore et al., 2002), and the widespread use of potentially harmful weight-loss methods, the typical extent of weight loss and full range and temporal patterns of weight-loss methods used by jockeys are yet to be fully explored. Further, the rationales behind jockeys' choices of preferred weight-loss practices remain unclear.

Perhaps the least understood aspect of wasting in jockeys, and in other weight-restricting athletes as well, relates to the consequences of their weight-loss practices on important aspects of health and well-being. Although scientific evidence continues to mount regarding the disturbing physiological and physical consequences of some weight-cutting behaviours, little is known yet about the effects of these practices on important psychological variables (e.g., mental fatigue, sleep quality, depression, decision-making and concentration).

Purpose of this Research

The purpose of this research was to extend the limited body of literature on wasting in jockeys by providing a comprehensive description of the weight-management practices and experiences of current Australian jockeys, including their

preferred methods, the timing of their chosen weight-management activities, and the rationales that guide their selection and practice.

Further, the research examined jockeys' perceptions of the direct consequences of their wasting on important aspects of their psychological health and well-being, with cognitive functioning as the primary variable of interest. In addition to ascertaining the prevalence of negative psychological side effects associated with wasting, the research endeavored to gauge the perceived severity of these side effects.

To achieve these aims, Study 1 sought to examine the broad issues relating to weight management among a cross section of current Australian jockeys, using survey methods. Study 2 built on the knowledge gained in the first study by exploring the attitudes, beliefs and experiences of current and former jockeys to weight management in greater depth. Jockeys' weight-management attitudes and beliefs were then augmented with the perceptions of other key stakeholders, such as racing industry employees and health professionals who work with jockeys. Finally, Study 3 provided a focused and detailed examination of weight management and its relationship to the health and well-being of jockeys. Here, case-study methods were used to describe the weight-management practices and experiences of a small number of current jockeys, with particular emphasis on their cognitive functioning as it related to weight status.

Key reasons underlying the adoption of the "broad before specific" framework included: the busy work schedules of most jockeys, the small number of professional jockeys and their geographical remoteness from one another and the research team, the outsider status of the researcher, and the sensitivity of the research topic. With these issues in mind, it was considered appropriate to conduct the most superficial and least invasive of the studies (i.e., Study 1) first, with the more intrusive, demanding and sensitive studies to follow. This methodology is recognized within sport psychology

research, and has been used in a study of this population to good effect (Speed et al., 2001).

CHAPTER 3

STUDY 1 – A QUANTITATIVE EXPLORATION OF WEIGHT MANAGEMENT IN AUSTRALIAN JOCKEYS

Introduction

Although many athletes in sports with weight divisions purposely cut weight (Hall & Lane, 2001; Kiningham & Gorenflo, 2001; Morris & Payne, 1996), jockeys compete in a sport with weight demands unlike any other. Horse racing's extremely low and restricted weight range and its unrelenting competitive calendar compel many jockeys to engage in both rapid and prolonged wasting to reach their target weights (Apted, 1988; Moore et al., 2002). Several studies provide evidence that jockeys engage in wasting practices, many considered extreme outside racing culture, and that some of the practices they engage in may actually be harmful to their health and well-being. Nevertheless, the full range and temporal patterns of weight-loss methods used by jockeys, and the psychological effects (e.g., mental fatigue, depression, decision-making and concentration difficulties) of these methods are yet to be fully explored.

The aim of the present study was to extend the limited available research on wasting in jockeys by providing a comprehensive description of the weight-management practices of current Australian jockeys, including the timing of their chosen weight-control activities. Further, the study sought to investigate jockeys' perceptions of the direct consequences of their wasting on important aspects of their psychological and physical functioning, including an evaluation of the severity of any effects they experience.

Method

Participants

The participants for this study were 42 professional jockeys and apprentices currently licensed to ride in flat races in Victoria, Australia. Approximately 76% of participants were male jockeys. The majority of participants in the sample ($n = 35$) were fully licensed jockeys (i.e., category "A" or B" jockeys), and a smaller number ($n = 7$) were apprentice jockeys. Their ages ranged from 17 to 56 years ($M = 29.6$ years, $SD = 8.6$ years). The senior jockeys sampled had an average age of 31.3 years ($SD = 8.4$), and the apprentice jockeys averaged 21.1 years of age ($SD = 2.8$).

Measures

A survey instrument was developed specifically for the current study, based on a comprehensive search of the literature related to weight management, jockeys and the horse racing industry, and other weight division sports, and discussions with industry representatives from RVL and the Victorian Jockeys Association (VJA). The instrument previously developed by Moore et al. (2002), containing items addressing demographics, anthropometrics, and the prevalence and the timing of some weight-loss activities, provided a valuable initial framework, and was subsequently expanded with the addition of issues uncovered in the review of the literature described and through consultation with industry stakeholders. The survey contained a total of 74 items in total.

Items included in the survey fell into four broad categories: personal and riding demographics (e.g., age, gender, height and weight, length of riding career), extent of weight loss and weight-management practices (e.g., preferred methods, and patterns of use), perceived psychological consequences of weight-management activities (e.g., short-term memory loss, mood swings), and self-reported physical consequences of

weight-management activities. The majority of items were closed ended (e.g., "Please indicate how often you use the following weight control methods: sauna, food restriction, fluid restriction e.t.c."), asking participants to respond on a 5-point scale, with response categories of *never*, *rarely*, *sometimes*, *often*, and *always*. Space was also provided in the survey for participants to write comments on each of the four sections if they wished. Similar survey instruments have been used successfully with this population in the past (Labadarios et al., 1993; Moore et al., 2002), with return rates of between 50 and 60%. A copy of the survey can be found in the appendices (see Appendix A).

Procedures

Approval for the study was gained from the Victoria University Human Research Ethics Committee. Mailing lists of all category "A" and "B" registered jockeys and apprentices licensed to ride in flat races in Victoria as of July 2003 were compiled in consultation with RVL and the VJA. Jockeys' contact details were checked against the most recent edition of RVL's official monthly periodical, "Inside Racing" (Racing Victoria Limited, 2003b), which contains a list of all jockeys and apprentices who are registered to ride in Victoria (i.e., the list includes local riders, as well as jockeys based interstate and overseas who ride in Victoria at times). International riders who were registered to ride in Victoria were excluded from the study due to their periodic involvement in the local industry and the increased costs associated with overseas mail.

In all, 252 licensed jockeys and apprentices were contacted by mail and invited to participate in the study. Participants received a package containing the survey and a plain language statement outlining the aims of the study. The survey took approximately 30 minutes to complete.

Survey return was considered to constitute informed consent on the part of adult participants. Participants under the age of 18 years, deemed minors in Australia, were required to return a signed parental/guardian informed consent document included in the package as well. Jockeys who did not return the questionnaire after 14 days were sent reminder notices in the mail. A notice was also placed in the VJA monthly newsletter, and posters were put up in the jockeys' change rooms at ten major Victorian racecourses, reminding participants to return the completed survey.

Data Analysis

As a primarily exploratory investigation, descriptive statistics (e.g., frequencies, means, and standard deviations) were first calculated to summarize key facets of the complete data set. Inferential tests (e.g., *t* - tests and correlations) were applied where necessary to compare selected data sets (e.g., gender, riding experience), and to explore relationships between key variables of interest (e.g., usual weight and psychological effects). Textual responses provided by participants were coded and analyzed for common themes.

Results

An overall response rate of 17.21 % ($n = 42$) was achieved for the study, after eight jockeys who could not be contacted by mail (i.e., surveys were returned "addressee unknown") were removed from the initial sampling frame. The response rate figure seems low in comparison to past survey research on jockey weight management (Labadarios et al., 1993; Moore et al., 2002), where approximately 50% of surveys were typically completed. Explanations for the unexpectedly low response rate include: the difficulty accessing this self-employed population to promote the research prior to mail-out, the potentially sensitive nature of the subject matter, the busy schedule of many professional jockeys, the "outsider" status of the researcher, and the low educational

status of the target group. Any single, combination, or all, of these factors could explain the apparent unresponsiveness of the population. Several racing industry officials actually expressed their satisfaction at the eventual number of survey respondents when questioned by the researcher, in tacit acknowledgement of the difficulty in accessing and motivating this group (N. Wallish, personal communication, January 2004; C. Watson, personal communication, January 2004).

Demographic and Riding Profile

In the first section of the survey, jockeys supplied basic anthropometric and career information to provide background information and context for the subsequent discussion of weight management. Important aspects of this data are summarised in Table 3.1, which shows the mean heights, weights and Body Mass Index (BMI) scores of the jockeys surveyed, and Table 3.2, which presents information relating to jockeys' professional status and riding history. The weights reported in Table 3.1 are jockeys' usual (i.e., pre-wasting) or *walking-around weights* in racing vernacular. Subsequent items addressed the amounts of weight jockeys require to reach their typical riding weights.

The average self-reported weight of all jockeys surveyed in this study was 53.9 kg (SD 3.1 kg). The male jockeys surveyed were 1.63 m (SD = 0.06) tall and weighed 54.4 kg (SD = 3.2) on average, and the female jockeys averaged 1.59 m (SD = 0.06) in height and weighed 52.4 kg (SD = 3.1). The data also show that, on average, the senior riders were taller and heavier than the apprentice riders.

Table 3.1

Demographic and Anthropometric Information (Means and Standard Deviations)

Jockey group	n	Age (years)		Height (m)		Weight (kg)		B.M.I.	
		M	SD	M	SD	M	SD	M	SD
All	42	29.6	8.6	1.62	0.06	53.9	3.1	20.5	1.6
Males	32	31.2 ^{a**}	9.1	1.63	0.06	54.4	3.2	20.5	1.8
Females	10	24.3 ^{a**}	3.7	1.59	0.06	52.4	2.5	20.6	1.1
Licensed	35	31.3 ^{b**}	8.4	1.63	0.06	54.2	3.2	20.5	1.6
Apprentice	7	21.1 ^{b**}	2.8	1.61	0.06	52.5	2.4	20.4	1.6

Note. ^a Significant difference between males and female jockeys. ^b Significant difference between fully licensed jockeys and apprentices. ** $p < .01$.

Jockeys were also asked to provide details of their professional experience in horse-racing, such as the length of their careers to date, and the number of hours they worked per week, because jockeys who work and ride regularly are more likely to engage in weight-management behaviours than those with only periodic involvement.

Table 3.2 presents the data relating to participant's professional profiles. The table shows that male jockeys, who averaged over 15 years of racing industry experience to date, performed their jockey duties for approximately 45 hours per week and were engaged for almost 12 race-rides each week. In contrast, female jockeys had an average career length of only 5 years at the time of the study, and worked for 51 hours per week as a jockey. The average number of race-rides for female jockeys was approximately 50% that of male jockeys.

A second notable feature of the demographic data related to the professional profiles of fully licensed and apprentice jockeys. Licensed jockeys averaged nearly 15 years of racing industry experience, and worked approximately 46 hours per week as a jockey. They had approximately 11 race-riding engagements per week on average. Not

unexpectedly, apprentices had minimal professional experience, averaging just over 2 years in the industry to date. Despite their relative inexperience, apprentices were involved in their jockey duties for 52.5 hours each week at the time of the study, and they were engaged for an average 8.5 race-rides per week. Five jockeys reported that they were not riding at the time they completed the survey due to injury ($n = 4$), and difficulty maintaining a sufficiently low riding weight ($n = 1$).

Table 3.2

Professional Profiles

Jockey group	n	Mean career length (years)	Mean race-rides per week	Mean hours worked per week
All	42	12.87	10.48	46.81
Males	32	15.27 ^{a**}	11.97 ^{a*}	45.37
Females	10	5.20 ^{a**}	6.00 ^{a*}	51.11
Licensed	35	14.97 ^{b**}	10.91	45.67
Apprentice	7	2.36 ^{b**}	8.43	52.50

Note. ^a Significant difference between males and female jockeys. ^b Significant difference between fully licensed jockeys and apprentices. * $p < .05$. ** $p < .01$.

Weight Management: Ease, Extent and Practices

When asked to rate their current ability to manage their racing weights at the time of the study, nearly 50% of jockeys either *always* (36.6% of jockeys), or *usually* (12.2%) had difficulties managing their weights. In contrast, only 19.5% of participating jockeys reported never having difficulties with weight.

Jockeys were also asked to report the extent of their usual (typical at the time of the study) and recent (occurring in the 7 days prior to completing the survey) weight loss (see Table 3.3). The vast majority of jockeys (80%) indicated that they usually needed to lose some weight to make their riding weights, with the average amount of

weight lost by this group being 1.7 kg ($SD = 0.6$). In relative terms, jockeys usually lost 3.0% of their total body weight on average. Nearly three quarters of participants (71.8%) had lost some weight in the 7 days prior to completing the survey in order to make their riding weights. The average amount of weight these jockeys lost during this period was 2.1kg ($SD = 0.9$), or 3.7% of their total body weight. The maximum percentage of total body weight lost by an individual in the 7 days preceding the survey was 7.41%, higher than the maximum usual weight loss of 4.7%.

Table 3.3

Extent of Usual and Recent Weight Loss Required to Make Riding Weight

Time	Relative weight loss							
	Absolute weight loss (kg)				(% of total body weight lost)			
	Min.	Max.	Mean	<i>SD</i>	Min.	Max.	Mean	<i>SD</i>
Usually	1.0	3.5	1.7	0.6	1.8	4.7	3.0	0.9
Last 7 days	1.0	4.0	2.1	0.9	1.8	7.4	3.7	1.5

An examination of the relationships among key weight-loss variables showed that several significant positive correlations existed. Most notably, the difficulty jockeys reported in managing their weights (rated as either *never*, *sometimes*, *usually*, or *always*) was related to both their usual weight ($r = 0.667$, $p < 0.01$), and to the absolute amount of weight they usually lost ($r = 0.747$, $p < 0.01$). That is, the higher their initial weight, and the greater the amount of weight loss they required, the more often jockeys perceived they had weight-management difficulties.

Jockeys were asked to detail their preferred weight-loss methods at the time of the study, and most indicated that they took a multifaceted approach to weight management. The majority of jockeys (64.3% of the total, 80.6% of males and 50% of females) used a combination of six or more different methods to control their weight at

the time of the study, and three jockeys (7.2%) used 10 or more methods. Only one of the 42 respondents reported using no specific strategies to maintain weight.

The second column of Table 3.4 summarises the overall prevalence of various weight-management methods, reflecting the proportion of the total population who, at the time of the study, included the method in their weight-management regimen at some time. The table shows that the most widely used weight-management methods overall were those that affect energy balance. For example, jockey exercise (used at some time by 95% of jockeys), and food restriction (88.1%) were almost universal in application. More than three quarters of respondents (76.2%) also used other exercise (e.g., walking, jogging, and swimming) at some time to help them control their weight. Several of the dehydrating methods listed were also common, with 78.6% of jockeys using fluid restriction, and 71.8% using saunas to manage their weight. Exercise in sweat gear, and exercise in hot environments were also used at some time by most jockeys. Almost 12% of jockeys included diuretics in their weight-management regimens at the time of the study, 14.9% used laxatives, and approximately 3% self-induced vomiting. No jockeys reported using amphetamines to manage their weight at the time of survey completion.

Jockeys who reported using a particular method were also asked to indicate the timing of their weight-loss activities, selecting from response categories of *on race-day*, *in between race-days* (i.e., non race-days), and *the day before race-day*. The day before race-day was considered a special case of non race-day because it represents the last opportunity for jockeys to reduce their weight substantially before competition begins. Several authors have recognised this time as a critical period where marked changes in diet, fluid intake, and other wasting behaviours can occur (Labadarios et al., 1993; Moore et al., 2002).

Table 3.4

Prevalence (%) and Timing of Wasting Activities

Weight-loss method	Overall Prevalence	Timing of Wasting Methods		
		Between race-days	Day before race-day	On race- day
Adjust Energy Balance				
Exercise as jockey	95.0	97.4	65.8	60.5
Food restriction	88.1	54.0	62.1	64.8
Other exercise	76.2	84.4	40.7	37.6
Appetite suppressants	11.9	40.0	80.0	40.0
Laxatives	10.0	0.0	100.0	25.0
Self-induced vomiting	2.4	100.0	100.0	0.0
Body Fluid Reduction				
Fluid restriction	78.6	24.2	78.8	87.9
Sauna	71.8	25.0	71.5	82.8
Hot salt bath	47.5	42.1	84.2	57.9
Diuretics	11.9	0.0	20.0	80.0
Combination				
Exercise in sweat gear	72.5	34.4	44.4	62.0
Exercise in heat	54.1	45.0	60.0	35.0

Note. Overall prevalence percentages are the proportion of all jockeys who use the particular method. Timing percentages refer only to jockeys who use the particular method at some time in their weight management regimen (i.e., jockeys who did not use the method at all have been excluded from this part of the analysis).

The temporal patterns of jockey's wasting activities, shown in the last three columns of Table 3.4, reveal that wasting jockeys used the various methods at different times in their competitive schedules. In general, most jockeys who used energy balance techniques (e.g., exercise, food restriction) did so on non race-days. For example, almost all (97.4%) jockeys who did jockey exercise for weight management did this in

between race-days, and 84.4% of jockeys who engaged in other exercise did it at this time. The proportions of jockeys who restricted their food intake were relatively even across the three time periods.

In contrast to their use of energy balance techniques, jockeys who used body fluid reducing methods tended to do so either the day before race-day or on race-day. For example, most of the jockeys who restricted their fluid intake (78.8%) did so the day before a race-meet, and 87.9% of this group used this dehydrating method on race-day. A similar pattern was evident in the use of saunas, with 71.5% of sauna advocates using them the day before race-day and 82.8% of advocates using them on race-day. Further, 80% of diuretic users engaged in this weight loss practice on race-day. Of those jockeys who combined exercise and sweat gear to lose weight, the largest proportion (62.0%) did this on race-day, and the largest proportion (60%) of those who intentionally exercised in hot environments (e.g., a heated room) used this method the day before race-day.

Those jockeys who used a particular method to manage weight were then asked to indicate their reasons for choosing the method (i.e., rapid weight loss, and/or gradual weight loss/weight maintenance). Table 3.5 presents information on the intended goals of wasting jockeys' weight loss activities, and shows several clear patterns in the data. It appears that methods that manipulate energy balance were used to achieve gradual weight loss by many or most jockeys who used them. For example, most advocates of physical activity stated that it achieved their gradual weight loss or weight maintenance goals. All jockeys who included jockey exercise in their weight management regimens used this method to maintain their weight, and a similarly large proportion (89.7%) of those who jockeys who did additional exercise indicated they did so for gradual weight loss or maintenance purposes. In contrast, most jockeys who used methods designed to

reduce their body fluids considered these to be rapid weight loss strategies. For example, almost all jockeys (93.1%) who reported restricting fluid intake used this method to lose weight rapidly, and 91.7% of those who used the sauna did it for such acute weight loss results. Hot salt baths were similarly viewed as a rapid weight loss tactic by 80% of jockeys who advocated their use.

Table 3.5

Goal of Wasting Jockeys' Activities

Weight loss method	n	Reason for Activity (%s)	
		Gradual weight loss	Rapid weight loss
Adjust Energy Balance			
Exercise as jockey	33	100.0	15.3
Food restriction	35	62.9	51.4
Other exercise	29	89.7	17.2
Appetite suppressants	4	100.0	50.0
Laxatives	3	33.3	100.0
Self-induced vomiting	1	100.0	100.0
Body Fluid Reduction			
Fluid restriction	29	17.2	93.1
Sauna	24	16.7	91.7
Hot salt bath	15	33.3	80.0
Diuretics	4	25.0	75.0
Combination			
Exercise in sweat gear	26	38.5	84.6
Exercise in heat	18	33.3	77.8

Note. Percentages refer to the proportion of jockeys who use the wasting method at some time. Jockeys who do not use the method at all have been excluded from the analysis.

Food restriction appears to be one of few methods to satisfy jockeys' dual goals of gradual and rapid weight loss. Of the jockeys who restricted their food intake, the majority (62.9%) considered this to be a gradual weight loss method, but most also stated that they used dietary restriction as a rapid weight loss strategy. In a similar way, appetite suppressants were viewed as a gradual weight-loss method by all jockeys who used them, and as a rapid wasting technique by 50% of this group. Self-induced vomiting, which is a variation on restricting food intake, was also considered to achieve both long-term and short-term weight management goals by its sole proponent.

Self-Reported Psychological Effects of Wasting

Jockeys viewed a list of negative psychological symptomology, and were asked to indicate how often, if at all, they experienced each while they wasted. The number of separate psychological side-effects reported by jockeys was high, with jockeys experiencing an average of 10.17 ($SD = 5.96$) individual symptoms at some time when they wasted. Three jockeys (i.e., 7.1% of the sample) experienced 19 out of the 20 listed symptoms, while only 2 jockeys (4.8%) reported being completely asymptomatic when wasting. Table 3.6 presents a summary of the overall prevalence (i.e., the proportion of all jockeys who experienced each symptom at some time) and frequency information (i.e., how often symptomatic jockeys experienced the effect) for each psychological effect.

Table 3.6

Prevalence and Frequency of Psychological Effects Experienced While Wasting

Psychological effect	Overall prevalence	Frequency of Effect (%)			
		Rarely	Some -times	Often	Always
Affect					
Mood swings	83.3	25.7	31.4	28.6	14.3
Irritability	77.5	29.0	38.7	22.6	9.7
Depression	63.4	34.6	30.8	26.9	7.7
Angry outbursts	52.4	27.3	59.1	13.6	0.0
Anxiety	37.5	46.7	13.3	33.3	6.7
Cognitions					
Persistent thoughts of food	81.0	20.6	23.5	32.4	23.5
Persistent thoughts of thirst	76.2	12.5	25.0	25.0	37.5
Wandering thoughts	53.7	27.3	31.8	31.8	9.1
Angry thoughts	51.2	38.1	33.3	14.3	14.3
Irrational thoughts	32.5	46.2	23.1	23.1	7.7
Suicidal thoughts	12.5	80.0	20.0	0.0	0.0
Cognitive Function					
Poor decision making	63.4	53.8	34.6	7.7	3.8
Can't concentrate (long periods)	48.8	35.0	40.0	20.0	5.0
Short-term memory loss	43.9	27.8	44.4	11.1	16.7
Can't concentrate (on > 1 thing)	42.5	23.5	58.8	11.8	5.9
Slow decision-making	41.5	58.8	35.3	0.0	5.9
Long-term memory loss	26.8	63.6	18.2	9.1	9.1
Other					
Mental fatigue	75.0	36.7	16.7	30.0	16.7
Sleep disturbance	48.8	20.0	40.0	30.0	10.0
Slow reactions times	39.0	25.0	68.8	0.0	6.3

Note. Overall prevalence percentages refer to the proportion of all jockeys who have experienced this effect at some time when wasting. Frequency percentages refer only to jockeys who have experienced the effect (i.e., asymptomatic jockeys have been excluded from this part of the analysis).

The most striking feature of Table 3.6 is that nearly every negative psychological symptom listed was experienced by a sizeable proportion of the overall

population. Common psychological effects reported (see overall prevalence column) included mental fatigue, and those related to disturbed cognitions. For example, the vast majority of jockeys experienced general mental fatigue (75% of all jockeys), and persistent thoughts about food (81%) and drink (76.2%) at some time when they wasted. Almost half (46.7%) of symptomatic jockeys either “often” or “always” felt mentally fatigued when they wasted, and most had intrusive thoughts about food (55.9%) and drink (62.5%) this often. A number of jockeys (12.5%) also experienced suicidal ideation when wasting.

Negative affective responses to wasting were also common, with most jockeys experiencing mood swings (83.3% of all jockeys), irritability (77.5%), and/or depression (63.4%). Further, a large number of jockeys who reported these mood disturbances experienced them repeatedly. For example, over 40% of jockeys who had mood swings experienced them *often* or *always* when they wasted, and one third of those who experienced irritability felt this way as frequently.

Common impairments to cognitive function experienced by jockeys when they waste included poor decision-making (experienced by 63.4% of all jockeys), difficulty maintaining concentration (48.8%), and short-term memory loss (43.9%). One quarter of jockeys who had difficulty maintaining their concentration when they wasted reported this happens *often* or *always*, and 27.8% of those who experienced short-term memory loss reported difficulties this frequently. Negative behavioural outcomes such as angry outbursts and sleep disturbances were also common, experienced at some time by 52.4% and 48.8% of jockeys respectively.

Jockeys who indicated that they experienced psychological side-effects when they wasted were asked to evaluate the severity of each effect reported, rating it as either minor or serious. Table 3.7 summarises this severity data, showing the ratings of

symptomatic jockeys only (i.e., jockeys who did not experience the effect were excluded from the analysis).

Table 3.7

Perceived Severity of Psychological Effects Experienced While Wasting

Psychological effect	n	Severity (%s)	
		Minor	Serious
Affect			
Mood swings	28	60.7	39.3
Irritability	26	65.4	34.6
Depression	19	52.6	47.4
Angry outbursts	17	47.1	52.9
Anxiety	9	64.3	35.7
Cognitions			
Persistent thoughts of food	28	53.6	46.4
Persistent thoughts of thirst	25	32.0	68.0
Wandering thoughts	15	46.7	53.3
Angry thoughts	15	60.0	40.0
Irrational thoughts	10	60.0	40.0
Suicidal thoughts	4	100.0	0.0
Cognitive Function			
Poor decision making	19	89.5	10.5
Short-term memory loss	16	75.0	25.0
Can't concentrate (for long periods)	13	84.6	15.4
Can't concentrate (on > than 1 thing)	13	76.9	23.1
Slow decision-making	12	91.7	8.3
Long-term memory loss	8	87.5	12.5
Other			
Mental fatigue	23	65.2	34.8
Sleep disturbance	16	62.5	37.5
Slow reactions times	12	91.7	8.3

Note. Severity percentages refer only to those jockeys who experience the effect. Asymptomatic jockeys have been excluded from the analysis.

Despite many affected jockeys describing their psychological responses to wasting as minor, the table shows that a sizeable number also considered the negative

consequences of their weight management to be serious. For example, 68% of the jockeys who experienced persistent food cravings stated they were serious in nature, and over half those who experienced wandering thoughts (53.3%) considered this to be serious. Approximately one quarter of jockeys who experienced short-term memory loss (25%) and difficulty concentrating on more than one thing at a time (23.1%) stated that these effects were serious. A variety of prevalent mood effects were also rated as serious by many of the jockeys who experienced them. For example, over 50% of jockeys who reported outbursts of angry behaviour associated with their wasting, and 47.4% of those who experienced depressed feelings rated these as serious. Paradoxically, none of the jockeys who experienced suicidal thoughts when they wasted considered them to be serious.

Self-Reported Physical Effects of Wasting

In addition to psychological side effects, jockeys were also asked to report any negative physical consequences that they had experienced related to their wasting activities. Table 3.8 summarises the data relating to the physical effects of wasting, again showing the prevalence (i.e., the proportion of all jockeys who had experienced each symptom at some time) and frequency (i.e., how often symptomatic jockeys experienced the effect) of jockeys' symptoms. The table shows that jockeys reported experiencing a variety of acute adverse responses to their wasting, many of which are consistent with symptoms of heat illness. For example, nearly 80% of jockeys stated that they felt physically fatigued when they wasted, and 67.6% of this group stated that they *often* or *always* became fatigued. Two thirds of jockeys experienced muscular cramps when wasting, and 78.6% of jockey who cramped did so at least *sometimes* when they wasted. Many jockeys (61.9%) also reported that they felt dizzy at times when wasting, and a smaller proportion (14.3%) had fainted as a consequence of their

wasting practices. Although most jockeys who had fainted indicated this happened *rarely*, one jockey *always* fainted while wasting. Over 40% of all jockeys had experienced, at some time, one or more of a variety of stomach ailments associated with their wasting, such as stomach cramps and nausea.

Table 3.8

Prevalence and Frequency of Physical Effects Experienced While Wasting.

Physical effects	Overall prevalence	Frequency of Physical Effects (%)			
		Rarely	Some-times	Often	Always
Physical fatigue	78.6	21.2	21.2	45.5	12.1
Muscular cramps	66.7	21.4	67.9	7.1	3.6
Dizziness	61.9	42.4	50.0	3.8	3.8
Joint pain	54.8	21.7	52.2	21.7	4.3
Upset stomach	52.4	36.4	50.0	9.1	4.5
Nausea	45.2	47.4	47.4	5.2	0.0
Poor circulation	43.9	27.8	27.8	33.3	11.1
Stomach cramps	40.5	64.7	35.3	0.0	0.0
Visual distortion	22.5	33.3	44.4	22.2	0
Fainting	14.3	83.3	0.0	0.0	16.7
Fever	14.3	33.3	50.0	16.7	0.0

Note. Prevalence percentages refer to the proportion of all jockeys who experience this effect at some time when wasting. Frequency percentages relate only to jockeys who experience the effect (i.e., asymptomatic jockeys have been excluded from this part of the analysis).

Jockeys who indicated that they had experienced physical side-effects associated with wasting were also asked to evaluate the severity of each effect reported, rating it as either minor or serious. Table 3.9 presents this severity information, again reflecting the proportions of symptomatic jockeys only. Effects that seem directly related to riding performance were rated as serious by the highest proportions of affected jockeys. For

example, approximately one third of jockeys who had experienced physical fatigue (34.6%) and 29.4% of those reporting joint pain associated with wasting, effects that could directly affect a jockey's ability to ride, stated that these symptoms were serious. Similar proportions of those who experienced visual impairments (33.3%) and fainting symptoms (33.3%) considered that these effects were serious. Symptoms that may have little or no direct effect on riding performance or ability, such as stomach cramps, poor circulation and fever, were regarded as minor by most jockeys who experienced them.

Table 3.9

Perceived Severity of Physical Effects Experienced While Wasting

Physical effects	n	Severity (%s)	
		Minor	Serious
Physical fatigue	26	65.4	34.6
Muscular cramps	24	75.0	25.0
Dizziness	21	81.0	19.0
Joint pain	17	70.6	29.4
Upset stomach	18	100.0	0.0
Nausea	15	93.3	6.7
Poor circulation	14	85.7	14.3
Stomach cramps	14	92.9	7.1
Visual distortion	6	66.7	33.3
Fever	5	100.0	0.0
Fainting	3	66.7	33.3

Note. Severity percentages refer only to jockeys who experience the effect. Asymptomatic jockeys were excluded from the analysis.

Discussion

The aim of this study was to describe the weight-management practices of Australian jockeys, and to explore the psychological effects of these practices as self-reported by jockeys. Jockeys were also asked to self-report any physical side effects

they experience to satisfy a secondary aim of investigating other consequences of wasting that may affect their health and well-being. The information gathered from 42 jockeys shows that most of the current cohort struggle with weight management, and that many jockeys report experiencing a range of emotional and cognitive side effects, some serious, associated with their weight-loss activities.

The majority of jockeys studied here usually need to lose weight to make their riding weights, with an average loss of 1.7 kg or 3.0% loss of their total body weight. When considering only the 7 days prior to their participation in the study, jockeys' weight loss estimates are higher, with an average loss of 2.1 kg or 3.7% of total body weight. The average degrees of weight loss self-reported here are consistent with those of previous studies of South African, New Zealand, and Australian jockeys (Labadarios et al., 1993; Leydon & Wall, 2002; Moore et al., 2002). Importantly, the weight loss estimates provided by jockeys in this study are above the threshold of 2% loss of total body weight at which impairments to physiological and psychological functioning have been reported previously in a range of athletic and other populations (Armstrong et al., 1985; Buskirk & Puhl, 1996; Cian et al., 2000; Gopinathan et al., 1988; Sharma et al., 1986; Walberg-Rankin, 2000). Approximately two thirds of the jockeys surveyed here usually lose 2% or more of their body weight, and 71% had exceeded this weight loss threshold in the last 7 days, with one jockey reducing his weight by 7.4% before a recent race-meeting. These findings must cast doubt on the popular racing myth of jockeys as "natural lightweights"; athletes who freely eat and drink and reach minimum weight standards without wasting.

The discrepancy between the usual and recent weight-loss amounts reported here is intriguing, and may simply be due to the timing of the survey, which was disseminated to jockeys just before the Victorian Spring Racing Carnival. During this

period, the minimum weight limits are at their lowest for the feature races, and more race meetings are held at city tracks, where again weights tend to be lower than at provincial or regional meets. Conversely, the difference may be a recency effect, reflecting jockeys' tendencies towards underestimation when recalling more distant weight-loss events, or may even be evidence of a coping strategy (i.e., denial) used by some jockeys to deal with the ever-present and overwhelming nature of their weight-loss requirements.

The common weight-loss methods reported by jockeys in past studies (Apted, 1988; Labadarios et al., 1993; Leydon & Wall, 2002; Moore et al., 2002), such as exercise, food and fluid restriction, and saunas to induce sweating, continue to be popular with current Australian jockeys. Actually, the prevalence of some methods among jockeys in the present study exceeds the levels of past research. For example, key wasting methods such as jockey exercise, food restriction, and fluid restriction are up to 30% more common in present jockeys compared to some previous reports (Atkinson et al., 2001; Hill et al., 1997; Labadarios et al., 1993; Leydon & Wall, 2002; Moore et al., 2002). In contrast, self-reported use of diuretic and appetite suppressing substances was minimal here, despite recent evidence suggesting that their use was widespread in other jockey populations (Labadarios et al., 1993; Moore et al., 2002). There are liable to be several reasons for the differences observed between this study and others relating to the prevalence of some wasting methods, but recent changes to the racing environment in Australia are likely to have played a significant role. For example, industry prohibition in Victoria since 2000 of dehydrating substances and regular drug testing (Racing Victoria Limited, 2005d) may have forced jockeys to forego these previously popular weight-management methods in favor of other approved methods. In this way, jockeys who previously used diuretics may have simply

taken up fasting or fluid restriction to lose the weight they need to reach their race-day targets.

Information gathered in this study about the temporal patterns of weight-loss activities tells the story of a group of athletes trying to maintain low weights by continually manipulating energy balance, but also resorting to acute dehydration to lose any remaining weight to reach their targets. Energy balance methods, such as physical activity and food restriction, were practiced routinely throughout their competitive schedules by most jockeys. For example, almost all jockeys who use exercise such as track-work and stable-work to manage their weight do so in between race-days, over 65% engage in this tactic the day before race-days, and 60% of this group do jockey exercise on race-days to lose weight. In contrast to the ubiquitous energy balance methods, most dehydrating weight-loss methods were used minimally several days before a race-meeting, but their use rose suddenly to a peak on or just prior to race-day. For example, only 24.2% of jockeys who restrict fluid intake to lose weight use this tactic in between race-days, whereas 87.9% restrict fluid on race-days. This pattern of last-minute weight loss is also reflected in the timing of jockeys' sauna activities and diuretic use.

Several explanations for jockeys' apparent "energy versus fluid" periodization of wasting appear plausible. First, jockeys themselves indicated that timing of their weight loss activities is related to the rate of weight loss associated with various methods. In this way, as race-day approaches, desperate jockeys who have not managed to reach their weight targets increasingly turn to the more rapid, dehydrating techniques as a last resort, whereas the more gradual energy balance methods are common early weight-loss strategies for most jockeys. Second, the need to conserve vital energy for race-riding could mean that more physically demanding weight-loss methods, such as

additional exercise, are more common several days before a race-meet, to allow jockeys sufficient time to recover their strength for race-riding. In a graphic illustration of the risk taken by jockeys who do not recover their strength sufficiently before racing, one jockey, exhausted from wasting, stated that he or she could have “fallen off the horse at any time” when completing a race (Speed et al., 2001). Third, a desire to confine the common symptoms associated with rapid dehydration methods, such as dizziness and cramps, to a short period of time (e.g., the 24 hours before competition) is a possible explanation for the temporal patterns evident. For example, jockeys who experience dizziness when they sauna, may try to minimize their symptoms by only using the sauna on race-days. Finally, it may simply be that the time or resources necessary for some weight-loss activities preclude their use at certain times. For example, exercise bikes, treadmills and spa baths are not always available to jockeys on race-day, whereas restricting food intake can be done anywhere at any time, and even saunas are available within the confines of the jockeys’ room at most race clubs. A deeper exploration of the weight-management choices made by jockeys, including the rationales for their decisions, is given in subsequent chapters.

The issue of sauna use in the current Victorian racing environment is noteworthy, because large numbers of jockeys still lose weight this way on race-days, despite the recent introduction of on-course sauna regulations that limit the duration of sauna sessions to 15 minute maximums per hour (Racing Victoria Limited, 2005d). The results of this study suggest that many jockeys who previously engaged in race-day sauna use at the race-track have simply moved these sessions “off-course”, rather than adopt other strategies, and in doing so have potentially exposed themselves to the dangers of driving a motor vehicle to and from the track while experiencing the negative health effects associated with their wasting.

The findings relating to the acute consequences of jockeys' weight-management activities paint a disturbing picture of wasting, confirming that many of the potential health risks outlined in the review of the literature presented earlier are realized. In addition to the adverse physical responses to dehydration and energy depletion that many jockeys reported, such as physical fatigue, dizziness and cramps, many also experience numerous psychological problems. In particular, the mood disturbances reported by other groups of weight cutting athletes, such as wrestlers (Choma et al., 1998; Landers et al., 2001), appear to be almost universal among jockeys. Over 80% of participants in the present study reported mood swings and two thirds experience depressed thoughts and feelings associated with their wasting. Deleterious cognitive effects, such as mental fatigue (experienced by 75% of jockeys) and decision-making problems (63.6%), are also commonly associated with wasting, supporting the findings of Choma et al. (1998). A smaller but noteworthy proportion of jockeys (12.5%) are so distressed while they waste that they contemplate suicide.

Even more worrying than the high prevalence of negative wasting-related reactions is the perception among jockeys that the side-effects they experience are benign. The majority of jockeys who experience deleterious psychological and physical consequences of wasting, including mood swings, physical and mental fatigue, and suicidal thoughts, consider them to be minor in nature. Not to be overshadowed, a smaller but not insignificant number of jockeys consider the negative effects they experience to be of a serious nature. It is likely that, for this group of jockeys, the consequences of their wasting complicate what is already a psychologically and physically demanding occupation. For example, intense feelings of depression and anger, severe hunger and thirst, disrupted sleep, and mental fatigue, may compromise their workplace health and safety, job satisfaction, and general quality of life.

Although the severity findings reported here reflect jockeys' subjective perceptions, some degree of scepticism about the veracity of their self-reports must be raised. While jockeys may accurately report that fatigue and lapses in memory have little effect on them, it is difficult to understand how an event as disturbing as suicidal ideation can be viewed as anything but serious, yet the all jockeys in this study experiencing this effect stated that it is an insignificant consequence of wasting.

Reasons for jockeys understating the significance of their responses to wasting are not immediately clear. A less sinister motive concerns a possible confusion of the severity rating with the frequency rating. That is, jockeys may have erroneously reported their symptoms as minor (a measure of intensity or consequence of experience) because they did not experience them often (a measure of frequency). Alternately, it may simply be that most jockeys waste so frequently that the negative consequences that they reported here have been normalised for them, and therefore seem trivial. Moreover, the high prevalence of psychological and physical effects among jockeys ensures that most jockey's normative referents are likely to be experiencing the same deleterious effects they do, further reinforcing that these responses are all just part of being a jockey. A more sinister explanation for the underreporting of the effects of wasting concerns the degree of trust between participants and the researcher regarding the research findings. One jockey mentioned in a private conversation that he did not want to become a "scapegoat" among other jockeys if the research lead to unpopular changes to the weight-management regulations in Victorian racing, and it is possible that others deliberately minimised their severity ratings to ensure there would be no such outcomes.

When considered together the findings of this study are alarming. Many jockeys necessarily lose a significant proportion of their total body mass to reach their riding

weights, and often employ a variety of potentially dangerous dehydrating and energy-depleting strategies to achieve their goals. Moreover, the timing of the more unhealthy of their activities, such as fluid restriction, diuretic and sauna use, regularly coincides with their preparation for competition, and with competition itself. This is a recipe for disaster, as jockeys struggle with physiological, emotional and cognitive problems, while planning race tactics, traveling to competition venues, communicating with horse owners and trainers, and performing the physically and mentally demanding task of race-riding. Furthermore, evidence of a pervasive practice of denial appears to exist in horse-racing, where jockeys dismiss the seriousness of the effects they experience.

In refuting the serious implications of their weight loss activities, some jockeys report that the “adrenaline” of competition helps them overcome any short-term functional deficits associated with wasting, but this contention has not been tested empirically. Even if wasting does not compromise their race-day functioning, there are other important areas of a jockey’s life outside of race-riding, such as maintaining satisfying relationships with family and friends, organizing their domestic and professional schedules, and maintaining their day-to-day health and well-being, where this short-term, compensatory effect is not available.

CHAPTER 4

STUDY 2 – A QUALITATIVE INVESTIGATION OF WEIGHT MANAGEMENT AND COGNITIVE FUNCTION IN AUSTRALIAN JOCKEYS

Introduction

The information gathered via a survey of 42 Australian jockeys in Study 1 shows that many jockeys struggle with weight management, and experience side effects, some serious, associated with their weight-loss activities. The findings of this study indicated that majority of jockeys must lose weight to ride, and physical effects, such as fatigue and cramps, are common. Many jockeys also reported psychological difficulties related to their weight-loss activities, including unwelcome cognitions, impaired decision-making and attentional problems. Further insight into the significance of weight management for jockeys, and of the effects it has on important aspects of their lives can be gained through focussed interviews with current jockeys and other key racing-industry stakeholders.

The aim of Study 2 was to explore in greater detail the issue of weight management in jockeys, and to validate the results obtained in Study 1. The study examined the personal weight-management experiences of jockeys, obtained through qualitative methods, and focused in particular on jockeys' perceptions of the consequences of their activities on their psychological functioning. The study also included the views of those people who work closely with current jockeys, regarding their perspectives of jockeys' weight-management practices.

Method

Participants

The participants for this study included seven current Victorian jockeys, and six racing-industry stakeholders with intimate knowledge of jockeys and their weight

management practices. The jockeys' group consisted of two females and five males, ranging in age from 20 to 55 years, and included five fully licensed jockeys and two apprentices. All jockeys were currently riding at the time of their interview, although one reported receiving infrequent race-riding engagements. Participants in the racing personnel group all had important roles within the industry, covering key areas including: jockey education and training, jockey advocacy and representation, racing integrity, and jockey health. This group comprised four male and two female participants, all of whom were adults and had been involved in the racing industry for greater than five years.

Measures

Two interview guides were constructed to provide basic structure for the in-depth interviews (one for jockey participants, and one for industry personnel). The guides contained general topics or themes for discussion, derived from the review of the weight management and racing literature presented in Chapter 2, with the addition of further weight-management issues identified in Study 1.

The jockey interview guide contained five sections or topics: personal riding history and industry background; weight and weight-management practices and experiences; psychological effects of weight management; physical effects of weight management; and suggested industry changes. The industry-personnel interview guide also contained five topics: industry background and involvement; knowledge of jockey weight-management practices; psychological effects of weight management practices on jockeys; physical effects of weight-management practices on jockeys; suggested changes or improvements. These guides are available in the appendices (Appendix B).

Although it was intended that most, if not all, the issues listed in the guides would be covered in each interview, individual participants were free to address

particular topics and omit others, and to introduce topics not included in the guide. Further, the guide listed themes in an intended chronology, with the most sensitive and complex issues covered late in the interview, however the order of questions was negotiated during the interview and reflected each participant's personal agenda, a process described by Minichello, Aroni, Timewell and Alexander (1995) in their comments on structuring and controlling in-depth interviews.

Procedures

Approval for this study was obtained from the Victoria University Human Research Ethics Committee prior to the research commencing. The jockey participants for the study were recruited in two ways: first, survey respondents from Study 1 were asked to indicate their willingness to participate in follow up interviews by providing their names and contact details on a detachable page of the weight-management survey. Second, two key industry informants (Patton, 2002, p. 320) provided the names and contact details of a small number of jockeys who they believed would be willing and informative interviewees. Industry personnel were also recruited with a purposive sampling rationale, chosen for their intimate knowledge of jockeys and their weight-management activities.

All potential jockey and industry participants were phoned by the researcher to ascertain their interest, and, once this had been confirmed, an interview time and location was arranged. Five of the jockeys initially identified as potential participants for this study, either by the survey return or informant methods, were subsequently unavailable when contacted by the researcher. One had moved or changed phone numbers since completing the survey and was not able to be traced, three did not respond to messages left for them, and one further jockey was unable to commit to a

mutually agreeable time for the interview to take place. All industry personnel who were approached by the researcher agreed to participate.

A plain language statement (see Appendix B) explaining the aims and procedures of the study, and a consent form were then posted to the interested jockeys and industry personnel. Consent forms were either posted back via a reply-paid envelope, or were collected by the researcher prior to the interview commencing.

Participants were offered three interview options to ensure minimal inconvenience: a face-to-face interview conducted at their home or workplace, a face-to-face interview at the offices of Victoria University, or one carried out over the telephone at the researcher's expense. Face-to-face interviews conducted at participants' homes or workplaces were considered preferable by the researcher because they allowed observational data, as well as verbal data, to be collected. Further, such visits would ensure that participants were in a familiar environment, and as relaxed as possible, while also minimizing the time and travel demands of their involvement in the study. Two of the 12 interviews were conducted over the phone because the participants concerned resided a considerable distance from the researcher, and all others were done in person. Interviews involved just the researcher and interviewee, with the exception of an interview with one of the apprentice jockeys. This jockey was the youngest participant, and, although he was an adult, his father was present during the interview without participating in any meaningful way.

Interviews of approximately 1 to 1.5 hours in duration were then carried out with the remaining seven jockeys and five industry personnel, in order to add depth to the data gathered via the weight management surveys in Study 1. Although the interviews were semi-structured, and the interviewer followed an interview guide, the communications were allowed to take on a conversational style to put the participants

and researcher at ease while discussing potentially sensitive topics. Participants were given a short introduction explaining the context and aims of the research at the start of the interview, and then invited to discuss anything they believed was relevant to the topic. This introduction was intended to “place” both the research and researcher, and to set a reciprocal tone for the relationship, actions that can enhance the quality of interviews on sensitive issues (Edwards, 1993; Minichiello et al., 1995).

The interview questions were predominantly open-ended, to allow participants to explore the weight-management topics and issues that they felt were most important to them. Examples of the questions asked of jockeys are: “Tell me how you currently manage your weight,” and, “In your opinion, how do the weight-control practices you engage in affect your day-to-day mental functioning?” Interviews concentrated on the interviewee’s weight-control practices in general, and their beliefs about the effects of these practices on cognition, riding and daily life. For example, the participants were asked: “In your opinion, how does wasting affect your ability to ride on race-day?” Clarification and elaboration probes (Patton, 2002) were used when necessary to ensure depth of participants’ responses, and to facilitate understanding by the researcher. The exact sequence of questions and probes differed slightly depending upon the participants and their experiences of weight management. Industry personnel were also invited, in the manner described for jockeys, to share their opinions on weight management, and to express their views about the effects of jockeys’ practices on their health and safety.

Interviews were audio taped, and transcribed verbatim by the researcher as soon as possible after the fact. After transcription, the researcher re-read each interview while listening to the audio tape to ensure accuracy of transcription, and to note any non-verbal clues, such as coughing, laughter, and tone of voice, that could assist in

interpreting the dialogue. All interviewees were sent the full transcripts of their interviews for member checking (Creswell, 1998), and invited to verify the accuracy of the transcripts, and to contribute any additional comments that would clarify or extend them.

Data Analysis

Interview transcripts were organized and interpreted using content analytic strategies, where the text is broken into its smallest units that can be interpreted alone, and then fitted together with like material so that common themes and patterns in the data can be detected and described (Patton, 2002). Patterns or themes were derived both deductively, where key issues and concepts from the literature review and Study 1 served as organizing codes, and inductively, where codes emerged from the data during the process of analysis. Miles and Huberman (1994) recommend this strategy, where a “start list” of themes is formed a priori, and then revised and added to as data collection and analysis continues.

To achieve a degree of triangulation of investigators (Patton, 2002), two researchers who were familiar with the research and trained in qualitative methods read the transcripts independently, and familiarized themselves with the content. Each researcher then coded the text according to their own themes. After all the transcripts had been coded, the researchers met to compare and discuss the themes, until a consensus was achieved on the most appropriate and parsimonious coding structure. This process of code checking served as an important reliability check, and reduced the likelihood of erroneous analyses and interpretations (Miles & Huberman, 1994, p. 61).

Results and Discussion

The results are organized and discussed in five sections and 14 sub-sections, reflecting the key themes apparent in the data. See Table 4.1 for a summary of these

themes and sub-themes. The findings relating to jockeys are presented and discussed first in each section, supplemented where appropriate with industry personnel data, to enable a triangulation of opinions on each key weight-management issue.

Table 4.1

Major Themes and Sub-themes from In-depth Interviews

Key Issues	Common Themes	Sub-themes
Current weight status	Narrow range of typical weights	Individual differences in minimum, riding, and walking-around weights Become more stable with time and experience
	Weight loss is essential	Precise knowledge of degree and rate
Weight-loss regimens	Difficulty of weight management	Difficult for most jockeys Transition from apprentice to fully licensed jockey is problematic Few others understand the difficulty
	Right/natural methods	Unclear what these are
	Energy balance Dehydration	Fasts and exercise for gradual weight loss Fluid restriction, saunas, hot baths and sweat gear are used Can lose weight rapidly this way
Psychological effects	Cognitive	Intrusive cognitions (e.g., thirst, weight) Attentional difficulties Short-term memory lapses
Physical effects	Mood	Negative mood responses
	Muscular	Fatigue Muscular weakness and cramps
	Heat illness	Dizziness and headaches Immune system dysfunction
	Onset of symptoms Chronic effects	After completing race duties Takes days to recover Largely unknown Possible kidney problems
Industry changes	Minimum weight scale	Needs to be raised Industry indifference
	Other rules	Increase race-day sauna allowance Weigh-in procedures
	Racing calendar	Reduce the workload Financial incentives to maintain status quo

Representative quotes are used where possible to illustrate each theme and to allow the data to speak for themselves. This type of “thick description” affords the

reader the opportunity to see the “bedrock” from which the interpretations of the data have come (Patton, 2002, p. 438). When reporting extracts from the interviews, parentheses, brackets, italics, and ellipses have been used to help clarify the text. Parentheses have been used to add or replace words in situations where the text is ambiguous. For example, words have been added when pro-nouns such as “it” and “he” have no obvious contextual referent, and where colloquial expressions need clarification. Brackets have been used to insert comments relating to the manner a statement was made, or to include non-verbal communication, such as coughs, pauses, or laughing. Italics and ellipses (. . .) have been used to add emphasis and indicate omitted material respectively, as is suggested in the current APA style manual (American Psychological Association., 2001).

Current Weight Status

This theme reflects participants’ statements about their current weight ranges, including their typical, lowest and highest weights, and the amount of weight loss they require to reach their usual riding weights.

Narrow range of typical weights. The jockeys interviewed reported having idiosyncratic, but universally narrow current weight ranges, incorporating their *walking around* or pre-wasting weights (i.e. highest weights), their usual riding weights, and their minimum riding weights (i.e. lowest weights). All the jockey participants were quickly and precisely able to describe these weights, with typical comments including, “My lightest riding weight is 53 kg,” and, “Since I’m back ridin’, I walk around at 54 [kg].” Usual riding weights were all within the current Victorian set weight scale, and ranged from 49.0 kg to 55.5 kg. A 20 year-old female apprentice jockey reported the lowest usual riding weight, and a 25 year-old male jockey reported the highest. This

range is consistent with the results from Study 1, where jockeys reported an average weight of 53.9 kg ($SD = 3.1$).

In illustrating the keen awareness that jockeys have about their weights and the subtle variations in them, one female jockey remarked, "The last couple of weeks . . . [I've] probably been walking around at about 49.5, or 50 [kg]," noting a change of less than 0.5 kg in this figure compared to her typical pre-wasting weight of previous months. Further, the majority of jockeys liberally used phrases such as, "You know your limits," and, "You know your body," when discussing their weights. Such comments demonstrate the monitoring and preoccupation with weight, bordering on obsession, which is characteristic of this group of athletes.

Another pattern emerged in jockeys' responses to questions about their weight, related to both their maturation and industry experience. All seven jockeys reported that their weights had stabilized as they gained knowledge and experience with weight-management, and as they physically matured. For example, when asked to compare their current and past weight status, remarks such as, "As I've got older, the last 3 or 4 years, it [riding weight] is easier to maintain," were common among jockeys of all ages. The comments, "My body's just leveling out nicely now," made by a 20 year-old jockey, and, "I'm lighter now than what I was back then," made by a 55 year-old jockeys, typified the belief that jockeys' weights become more stable over time.

Weight loss is essential. All of the jockeys interviewed normally require weight loss to reach their usual riding weights, and so all actively manipulate their weights in the days leading up to each race meeting. Wasting on race-day itself was also common, reported by five of the seven jockey participants. The typical requirement is two to four episodes of wasting per week, depending upon the jockey's riding engagements. The

remark, “You’re sorta walkin’ around, trying to stay lean every day,” as expressed by one weary interviewee, captures the ubiquitous nature of weight loss for jockeys.

Jockeys in the present study demonstrated that they have precise knowledge of their weight-loss limits, such as the amount and rate of loss that they can tolerate. A remark illustrative of this theme is:

Like, if I know I’m riding at 55 [kg] in the next couple of days, I’ll work it that I’m waking up on the morning of the ride at about 56, 56.5 [kg] tops. If I’m trying to ride 55 [kg] and I’ve got much more than a kilo to lose, well that’s when it’s pushin’ shit up hill a bit. Like, I can lose 2 or 3 kg when I’m riding 57 [kg], but that’s not the same as when you’re doing 55 [kg].

The jockey responsible for the previous quote, typical of participants in this study, suggested that he begins to reduce his weight several days before a ride, but leaves a sizeable amount of weight loss (1 kg in his case) until race-day. The usual degree of weight loss reported by the seven jockeys ranged from 1.0 kg to 2.5 kg (approximately 2% of body mass on average), figures consistent with the average self-reported usual weight loss of jockeys in Study 1 (1.7 kg). When discussing their wasting tactics, several jockeys also noted that weight loss seems to obey laws of diminishing returns, where early weight-loss activities in each cycle of wasting result in substantial reductions, but subsequent efforts produce smaller losses, despite the investment of equivalent time and energy.

Most jockeys reported that they occasionally need to lose more weight than usual. The reasons jockeys gave for this extra weight loss varied, but commonly included: accepting lighter rides than usual; returning to racing after an injury, suspension, or holiday; and lapses (referred to as “blowouts”) in normal weight-management activities. Almost all jockeys described at least one episode of wasting involving the first situation, where they had lost an excessive amount of weight to take an exceptionally light ride. For example, one experienced jockey remarked, “Oh, probably

the worst, the hardest day that I can remember . . . I had two [light] rides at Flemington, and I lost 2 kg in 1 hour,” when asked to describe an episode of wasting. Another jockey explained a common rationale for accepting these light rides, commenting that he drops below his usual minimum riding weight “if I think it’s a good enough ride.” As an example of the third situation, one young jockey remarked, “A couple of times I’ve had to lose sort of 3 to 3.5 kg in a few hours to ride, but that’s probably my fault for not managing myself [my weight] the day before.” The 3.5 kg this jockey lost was the equivalent of 6% of his total body weight. An industry stakeholder described a fourth factor responsible for jockeys wasting for a light ride. This interviewee explained that some jockeys employ agents or managers to arrange riding engagements for them, and that some agents accept rides below their clients’ usual minimum riding weights, without first consulting the jockey.

Difficulty of weight management. Despite jockeys’ willingness and ability to manage their body weights within their self-reported ranges, there is acknowledgement that continual weight manipulation, especially to achieve their lowest riding weights, is difficult, unnatural, and perhaps unhealthy. One jockey summed up the ubiquity and challenge of weight management for jockeys by contrasting the weight requirements of racing with those of other sports: “Compare us to a boxer or to a rower or whatever. They peak [cut weight] once every 3 months. They’ve gotta be that weight, and they’ve got 3 months to worry about being that weight on that day. I’ve gotta peak every single day of me life.” A strong sub-theme emerged here, relating to jockeys’ perceptions of indifference from racing officials and members of the general public about their weight management problems. Commenting on a lack of empathy among outsiders for the difficulties which jockeys face, one rider stated that other people often did not realise that, “We’ve [jockeys have] got to really be [substantially] below our natural body

weight.” Several other jockeys reiterated the belief that few people, with the exception of current and former jockeys, understand how hard it is to waste.

Jockeys varied in their perceptions of the difficulty of managing their weight to acceptable levels. Several stated that weight management is often a “struggle” for them, whereas others fatalistically noted that weight management is an unavoidable part of their job, and as such does not unduly concern them. Notwithstanding personal differences in their weight-management circumstances, the general consensus among this group of jockeys is that weight management is problematic for the majority of professional riders. For example, when asked about the common perception that jockeys are naturally light individuals, able attain low weights with ease, one jockey stated, “In my opinion, only about 5% of riders are naturals.”

In contrast to jockey participants’ views about their continuing difficulties, most industry personnel stated that weight management had recently become easier for jockeys. Industry stakeholders mentioned the comprehensive training in diet and fitness, which most young riders now receive during their apprenticeship, and recent rises in minimum weights, as key factors in reducing weight-management problems among jockeys. For example, when asked about the formal training provided to jockeys, one RVL official stated:

Diet and nutrition is a major part of it, and we use qualified sports dieticians and nutritionists to run those programs. Jockeys are actually weighed every time they have a session, and there’s advice available to them on an individual basis as well. So, if they have a weight problem, or if they’ve had a growth spurt, they might have a one-on-one dietary session.

Another industry stakeholder stated that the majority of current jockeys managed their weights well, with the few exceptions occurring predominantly in the feature races of Victoria’s Spring Racing Carnival, where minimum weights are lower than usual: “I don’t think we’ve got an awful big [weight] problem during the bulk of the year, with

the weights now up to the level that they are. But we had a few problems over the [Spring Racing] carnival.” The winter months were also mentioned by industry personnel as a more difficult time for jockeys to manage their weights:

Coming to the cooler months of the year, you always seem to eat, because energy gives you warmth. And that’s why you don’t see a lot of the senior jockeys ride: They go on holiday. There’s no point trying to keep light for crappy money. You are better off hanging around when there’s big money: Spring carnival.

According to this industry participant, apprentices and jockeys of lower status are left to do the bulk of the riding in the winter months, when, not coincidentally, prize-money tends to be lower.

Both jockeys and industry stakeholders mentioned the period between a jockey’s late teens and early 20s, when most make the transition from apprentice to senior jockey, as a particularly common time for weight problems. Comments including, “[The] start of my third year [of apprentice training], I was starting to get pretty heavy,” and, “then I came out of my time [finished apprentice training]: that first 12 months, it was probably the hardest [to manage weigh],” were characteristic of jockeys’ accounts of this time. Industry personnel agreed that this period is problematic for jockeys in terms of weight management, and that weight gain can be sudden and unexpected: “The person who at 24 years of age is 59 [kg], looked terrific at 15 when they were 45 kg.” One industry participant, engaged in jockey training in Victoria, provided an explanation for the weight increases seen at this age:

Young jockeys find difficulty when they leave here [RVL supervised training] and they go back to Mum and Dad, or they go back home to the house they’re sharing with a few friends. It’s difficult: they find it difficult to maintain a reasonable nutrition routine or diet.

This industry stakeholder believes that a lack of on-going support for young jockeys, once they leave their formal training, plays a role in at least some instances of weight

gain. A second industry interviewee agreed that family support for young jockeys regarding their health and weight management was vital at this time:

If there's a commitment from the family to support the child [apprentice], and it's a big step at 14 or 15 to move away from home to pursue a career, but if you have got a family there that's supportive and are checking up on what they're [the jockey is] eating and that they're sleeping enough, and they are balancing it all out, I think that helps a lot.

Weight-Loss Regimens

The jockeys interviewed for this study revealed that they have consistent weight-management regimens, consisting of a number of complimentary weight-loss methods. The exact content of these regimens varied according to the individual, but a pattern emerged where jockeys remarked that there are "right" or "natural" ways to lose weight. For example, one jockey commented that he "probably wouldn't have been doin' it [losing weight] the *right* way," when discussing his former weight-loss routine. Most jockey participants believe that they currently lose weight the right way the majority of the time, with occasional divergences into extreme or unhealthy practices, although none specified which methods they consider natural or right, and which they consider unnatural or wrong.

Industry personnel are equivocal about the weight-loss practices of current jockeys. Some believe that jockeys in general, and especially those who have been trained at the RVL Education and Training Centre, adhere to safe weight-loss regimens. For example, an RVL employee remarked, "It's [healthy weight management] drummed into them through a sound education program." In contrast, other industry personnel think that jockeys will do anything to achieve a weight which will help them remain competitive in their industry. Asked to describe how jockeys manage their weight, an industry representative solemnly stated, "Desperate. When they get to the lower weights they try just about anything."

Energy balance methods. All the jockeys interviewed indicated that they use at least one, and often several, energy-balance methods to manage their weight. The two key energy-balance methods most commonly mentioned were dietary restriction and physical activity, mirroring the results of Study 1, where 95% of jockeys considered the vigorous exercise they undertake as part of their jockey duties (e.g., track-work, race-riding) to be part of their weight-management regimens, and 88% of jockeys reported engaging in dietary restriction. In general, jockeys in the present study considered these methods to be effective in maintaining or gradually reducing weight, but energy balance tactics were also used for last minute weight adjustments as times.

Fasts (i.e., complete avoidance of food) of varying lengths of time were especially common in this group of jockeys, with most skipping entire meals such as breakfast and lunch the day before, and on race-day: “When I’m riding the next day, I don’t have breakfast and I don’t have lunch. Basically, I eat somethin’ for dinner.” One jockey in particular discussed extreme fasts lasting several days, although he reported that he has recently tempered this tactic somewhat: “When I was 19, I was riding at 50.5 [kg] in Melbourne, I was that dedicated with me weight . . . I would go 3 days with nothing to eat.” Other jockeys reported less severe dietary tactics, eating regularly but restricting the content or caloric total of their meals: “I live on a high protein, low carb diet: I don’t eat cereals, breads, pastas; I only drink milk in my coffee; and I don’t eat a lot of dairy products.” Those jockeys who eat regularly stated that they are the exceptions among their peers: “Sometimes I’ll have to miss dinner, but I’m one of the fortunate (pause) well, more fortunate ones [because I eat regularly].”

In addition to restricting their energy intake, jockeys stated that physical activity, performed either as part of their jockey duties or as an adjunct to them, is important in maintaining a stable weight. Six of the seven jockeys engage in regular track-work

riding, and report burning a considerable amount of energy in the process. The one jockey who does not ride track-work stated that he rides almost every day, and therefore he does not have the time or the need to do additional riding for weight control.

The majority of jockeys interviewed for this study participate in some form of additional physical activity, such as walking, jogging, or a recreational sport to boost their daily energy expenditure. It seems that participation in physical activity outside of racing, however, is carefully considered. For example, the comment "I've got a speedball [boxing equipment] outside, and I do *Boxercise* [group exercise class involving boxing activities] and skipping and things like that to keep it [weight] down," was typical of an emphasis on aerobically-based, and non riding-related activities. Participation in these additional activities is particularly common among the younger jockeys in the study. An industry participant confirmed that apprentices frequently participate in such activities, and often do so in formal exercise settings: "They spend quite a bit of time at the local gymnasiums doing circuit [aerobic] sort of training." Several jockeys suggested that they shun certain forms of exercise, citing fatigue, fear of building up muscle mass, and laziness, for their intentional avoidance of activities that could otherwise assist them in controlling their weights. The older jockeys in this study tended to expend extra energy in less formal exercise settings, such as while performing household chores, or working on their farms and gardens.

Body-fluid reduction methods. Dehydration was a key short-term weight-loss tactic of many of the jockeys surveyed in Study 1, with 78% restricting fluid intake for weight loss, and 72% using saunas. Body-fluid reduction tactics are also adopted by all the jockeys interviewed in the present study bar one, with saunas and restricting fluid intake again the two most common methods. One jockey underlined the extent to which he engages in such tactics, commenting that he usually combines several body fluid

reducing activities in his weight-management regimen: "Like, you're saunaing, and you're not drinking anything: in a day, all you can have is a glass of water, half a glass of water and half a glass of apple-and-blackcurrant juice." The one jockey who reported avoiding dehydration tactics for weight loss is also the lightest of the seven jockeys interviewed, and remarked that she refuses to accept rides that necessitate sweating:

I tell people straight out [that] I'm not gunna waste, I'm not gunna sweat to claim off this horse. If you want me to ride it you've got to be prepared for me to show up and ride it at whatever I can, because I'm trying to lose weight for the long run, not just for now.

This jockey seems to indicate that her resistance to sweating for weight loss is tied to her belief that it is only a short-term solution to weight-management problems.

The majority of jockeys interviewed for this study regularly and carefully monitor the volume and type of fluid they consume, as a key tactic in their wasting regimens. Remarks such as, "One mouthful of water could mean the difference," and, "You can't drink plenty of water when you're trying to lose it in the sauna," illustrate the important that role fluid restriction plays for this group of jockeys in the delicate balancing act of weight management. Even the jockey who claimed not to use dehydrating methods to manage her weight conceded that, although she does not monitor the volume of her drinks, she is careful about the type of fluid she drinks, consuming only water and low-calorie beverages.

Regular sweating sessions are a further feature of the weight-loss regimens of nearly all the jockeys involved in this study. For example, five of the seven jockey participants reported regularly using either saunas or hot baths, and one rider seems to rely on this dehydration method almost exclusively for his weight loss. This jockey stated, "At the moment, it's [my weight-management regimen is] just sauna. I go down to the gym [to sauna for] probably 2 hours a day...5 or 6 days a week." Among this

group of jockeys, losses of approximately 1 kg in 1 hour are typical of these sweating sessions, and are repeated a number of times in the 48 hours prior to a race meeting.

Several jockeys commented on the surreptitious practice of jockeys sweating in their cars on the way to the races to lose weight. This dehydration method involves using the car heater to induce or intensify a jockey's sweating response, and is similar to the way weight-regulated athletes use saunas and other hot environments to reduce their body fluids. Some jockeys expressed concern about the dangers of sweating when driving, but at least one jockey is an enthusiastic supporter of this method: "Out in the car, I do it [sweat] every single day. I can go for a 2 hour drive (pause) I've only gotta lose a kilo and a half today, so I'll sweat the whole 2 hours, and get to the races and I'll have lost it, you know."

Exercising in sweat gear to promote body fluid loss is another common weight-loss method used by the jockeys in this study, and also the jockeys in Study 1. Several jockeys commented on the substantial amount of weight they can lose with this method: "When it [the weather] gets hot, I put my wetsuit on and go and ride [track] work in the mornings, and sweat that way. I lose a fair bit [of weight] there." Sweat gear is also worn by jockeys while exercising in contexts other than riding. For example, one jockey remarked, "I went through a stage where I was playin' squash [to lose weight] . . . in 20 minutes, I could pull off 1.5 kg. That's putting on sweat gear and playin' squash," before adding that his playing partners were often other jockeys attempting to lose weight.

There was some discussion about the use diuretics during each interview, and, although no participants admitted currently using them, "fluid tablets" or "piss pills" appear to be an open secret among jockeys. One experienced jockey, after stating that he stopped using diuretics many years ago, claimed that other jockeys continued to use these dehydrating substances for last-minute weight loss, despite the recent bans: "A lot

take fluid tablets: A lot still take 'em." This jockey remarked, however, that diuretics are probably less prevalent than in the past, in response to industry sanctions, stating, "They've [racing authorities have] clamped down now." Another jockey suggested that it was the undesirable side effects, rather than the industry ban, that determined her use of this method. She stated that, "through my whole riding career, I virtually lived on the fluid tablets," but said she had recently stopped taking diuretics because her body actually responded to the drug in the long term by increasing its fluid content.

Psychological Effects

All the jockeys interviewed for this study discussed acute psychological problems of varying degrees related to the weight-management methods which they employ, but many were vague about the specific effects of their practices. For example, several made comments such as, "it's very hard to comment on that," when asked how wasting or dehydration psychologically affected them. One jockey remarked that sitting in the sauna is like "fryin' your brain for half an hour," but could not elaborate further on what he meant by this, and many others used general terms such as "stuffed" or "drained" to describe their psychological status when wasting.

Cognitive Effects. The most commonly reported and specifically cognitive disturbances experienced by wasting jockeys are related to intrusive or recurring thoughts about weight, food and drink. Several jockeys commented that, of these unwanted cognitions, thirst was the most serious and pervasive. Approximately three quarters of Study 1 jockeys experience intrusive thoughts about thirst, and most jockeys in the present study remarked that thirst is a near constant companion for a wasting jockey:

If you'd see an ad on TV or something about food, you'd go, 'Oh, yeah, I'm hungry.' But you didn't have to see anything [about drinking], you didn't have to, you were just thirsty all the time. Like, you just sit there thinking, 'Jeez, it'd

be nice to drink right now. Maybe just an ice cube or just an ice block; anything to get my mouth wet.' . . . it's [being thirsty is] not very nice.

A jockey who wastes often and substantially made the following comment, typical of this theme, about his constant thirst, and his relief when he is finally able to quench it: "I keep thinking, 'It'll be good to have a couple of drinks when I get home.' You've got no idea how nice a glass of water is."

Several jockeys mentioned that these recurring or intrusive thoughts related to their weight-management activities often, but momentarily, disrupt their attentional foci. For example, one jockey described her difficulty in attending to conversations with others when wasting: "Sometimes, if they'd go on a long time [talk effusively], 'Geez, I'm thirsty,' would go into my head." Further, two jockeys revealed that concerns about attaining their weight targets can become distractions in a similar way, diverting their attention from race planning and riding: "If you're under pressure to lose your weight, well that's the only thing you're thinking about: to make the weight."

An experienced jockey, who admitted to having his own occasional lapses in concentration when he wastes, stated that young jockeys who ride and waste for several consecutive days appear to be most at risk of losing concentration. He recalled the following conversation with one such jockey, after the younger man had been involved in a race mishap: "I said to one of these kids, 'What happened?' And he just said, 'I just lost the plot. Didn't know what I was doing'" A number of jockeys commented on the unfocussed appearance of some jockeys when they are wasting, with one describing dehydrated and hungry jockeys as looking "glassy eyed." An industry official with race-day contact with jockeys agreed that wasting appears to compromise their attentional functioning: "They get badly dehydrated, which I believe can affect their way of focussing. What I mean by focussing, it's not visual, [or] seeing; I mean concentrating."

Three jockey participants discussed problems with their short-term memory that they believe are related to wasting. For example, asked about his cognitive functions when he wastes, a jockey remarked, "My memory is a little bit worse, I'd say. Sometimes I don't really remember certain things that I would normally." When invited to provide an example of this memory impairment, he replied, "I just forget to take things. I forget my shorts, and I'm on the way to the sauna, and then I remember. I'm sort of not thinking straight." This lapse in memory, related to clothing and riding equipment, was confirmed by a second jockey who recalled forgetting to take his saddles and other riding gear to a race meeting after a busy morning of wasting and working. The third jockey, after mentioning that he often forgets things when he wastes, asked for the question to be repeated because he actually could not remember it: "Forgetting things, yeah, that wasn't a joke: I did forget [your question]. I knew there was another question." It was not apparent whether this jockey had been wasting at the time of his interview or not, but he was certain of his wasting-related memory problems.

Beyond the attentional and memory deficits described in the preceding paragraphs, other cognitive consequences of wasting appear to be idiosyncratic among this group of jockeys. For example, one jockey reported that wasting slows her reaction times, whereas another believes his reactions are fine, but his decision-making has been permanently impaired by a lifetime of starvation and dehydration. When asked how he thought wasting jockeys functioned cognitively, one racing-industry interviewee remarked that they appear to lack the cognitive capacity for quick decision-making:

Being weak on the horse: not making the right decisions. They really have to make a fast decision, a split second decision, and I think if you're heavily wasted, then I think you're unable to do that...if you haven't eaten for a couple of days, haven't had a drink for a couple of days, I really don't think you're up to it. I think it can be very dangerous actually.

The importance of fast reactions and decisions in horse racing are emphasised in the previous extract, and the author of these comments fears for the safety of wasting jockeys, remarking that, “Every time you see them walk into the mounting yard [before a race], you’re not sure if you’ll see them come back again.”

When asked whether the mental effects of wasting affected their ability to ride, jockeys were adamant that they are fit to compete. In general, there was consensus among jockeys that the excitement of racing helps them overcome the cognitive problems they encounter. Remarks such as, “You know your brain, you know you’re struggling, but come the race, with the adrenaline pumping . . . ,” and, “I know that when I’m ridin’ that, even at times when I’m absolutely stuffed [mentally fatigued], . . . I’ll be right come race time,” were indicative of this belief. Another jockey, describing recent episodes of wasting, remarked, “Even if I had felt terrible on the way to the races, when I was out there on the horse everything was sort of suddenly cleared up.” Jockeys’ perceptions of adequate or improved race-day cognitive functioning, however, are not shared by all racing-industry stakeholders. For example, in refuting jockeys’ perceptions, an industry participant bluntly remarked, “Ask a drunk if he’s a good driver. He’s the worst driver in the world, isn’t he?” A health professional with considerable experience working in the racing industry, stated that some jockeys may use amphetamines to counter the negative cognitive effects of dehydration.

Mood effects. Just like the majority of the jockeys surveyed in Study 1, the seven jockeys in the current study reported that, for them, wasting is associated with a range of negative affective states. Questions about their emotional reactivity to wasting were met with a variety of responses from jockeys, including: “grumpy”, “frustrated”, “depressed”, “agitated”, “on edge”, and “stressed out”. In the most poignant example of this effect, a jockey recalled a distressing interaction with a close family member about

her mood swings: "Saddest day of my life was when my mum said to me, 'What's happening, and who are you?' I was wasting and probably in a very, very bad mood, and she just said, 'You're not the [jockey's name] I know.'"

Racing-industry personnel all agreed that wasting jockeys are easily identified by their obviously negative mood states. Asked what he noticed about wasting jockeys' psychological states, one such interviewee replied, "They're cranky as all hell, you know. We used to see a jockey coming in, and we'd say, 'Get out of the way, dive quick. He must've been wasting, he must have a light ride.' You could tell."

Physical Effects

In contrast to their reports of varying psychological effects, the seven jockeys' accounts of the acute physical consequences of wasting appear to be more consistent. For example, all of the jockeys reported experiencing physical fatigue when they are wasting, with the majority describing muscular weakness as a typical outcome of this fatigue. One jockey light-heartedly suggested he feels like he has "lead in his boots" at times after starving himself. According to several jockeys, exhaustion awaits those who continue to push their bodies beyond this point: "It was a very hot day, and when I went for a run I probably got [lost] at least 1.5 kg, and [then] the body said, "I just can not go any further." More than three quarters (78.6%) of Study 1 jockeys are similarly affected by fatigue when they waste.

Some jockeys reported a number of short-term physical complaints, related to their weight loss activities, some of which are characteristic of heat illness. For example, jockeys mentioned experiencing muscular cramps, headaches, and dizziness. Jockeys reports of these symptoms were confirmed by industry personnel. A small number of jockeys also associate an increase in minor illnesses with prolonged or more intense periods of wasting. In the following extract, a jockey linked his faltering

immune system to his consistently low weight: "Oh, and I've just got the flu again, second time . . . But that's what comes with being 8 to 10 kg underweight. You know, walking around at about six percent body fat." Ellis (1994) stated that individuals diagnosed with heat illness experience flu-like symptoms, much like those experienced by the jockey responsible for the previous remark. Dehydration also causes communication problems for several of the jockeys interviewed, who complained of dry mouths, swollen tongues, and shortness of breath when they waste.

Almost all the jockeys in this study remarked that the onset of the most debilitating physical side-effects of wasting coincides with the completion of their race-day duties. Soon after they leave the race track, wasting jockeys experience an increase in physiological symptoms that can last for several days. Asked about the aftermath of an episode of wasting, comments such as, "You feel like you're doing it pretty hard for a couple of days," and, "The next day that I'm not riding, I sleep a lot. It takes me while to get over it [wasting]," were typical. Some jockeys described a more immediate physiological response, occurring while they are still riding the horse after passing the finish line: "It [wasting] doesn't take a bit away from you until you pull up [stop the horse] afterwards [at the end of a race], and then you feel pretty tired. That's when I can't get me breath . . . You've had to let the horse pull up [stop] themselves." The situation described in the previous extract is potentially dangerous, because horses can still travel at high speeds after crossing the finish line, and riders can easily lose their grip on the reins and stirrups if they lack strength.

By their own admissions, the long-term repercussions of repeated wasting are not well understood by either jockeys or industry participants. Nevertheless, several experienced jockeys and industry personnel speculated that frequent wasting may have some lasting effects on the health of jockeys. In particular, chronic kidney problems

were mentioned as a possible physiological consequence of repeated and prolonged bouts of dehydration, and interviewees from both groups claimed to know of cases of kidney failure in jockeys who have wasted over long periods.

Changes to Assist Jockeys with Weight Management

The jockeys' responses to questions about making weight management safer and easier for jockeys fell into three categories: changes to the minimum weight scale, changes to other rules and the racing environment, and changes to the current racing calendar. Both jockey and industry participants spoke at length on these issues.

The minimum weight scale. All the jockeys interviewed here are in favour of raising the minimum weights in Victorian racing, although few actually quantified the extent to which they believe the weights should rise. Most attributed the need for this change to the steady increase from generation to generation in the size and weight of jockeys, and the Australian population in general, a change noted by researchers of body dimensions in sport (Norton et al., 1996). Typical of this theme was the remark, "Our bodies are getting naturally bigger anyway [compared to jockeys of the past]. The majority of people grow to be bigger than their parents. So I think probably the weights could be raised to help jockeys out."

Racing industry personnel agree that jockeys are getting heavier with each subsequent generation: "There's very few boys coming through the apprentice school now, through the certificate of jockey practice, who can ride at 51 [kg]." There is also an attitude of indifference, however, among some industry personnel towards raising minimum weights, stemming from a belief that jockeys are seeking to avoid a difficult but not unreasonable requirement of their profession. For example, the remark, "No matter what the weights are they'll [jockeys will] want them higher," was made in reference to a question about raising the weight scale.

Other rules of racing. Several of the male jockeys interviewed expressed displeasure at the current on-course sauna regulations in Victorian racing. These jockeys agreed that sauna use should be monitored, but suggested that the permitted time be extended beyond the current 15 minute limit per hour. The basic rationale given for such an increase was that the current allowance is insufficient for jockeys to sweat adequately.

Opinion was divided among racing-industry stakeholders regarding the current sauna regulations. Several industry participants agreed with jockeys that the regulations are not ideal, and force some riders to leave the race track and drive to alternate venues where they can sweat for longer periods:

There was a race meeting at [country race club] one day, where they [jockeys] all had 57 or 58 [kg rides], so that was alright. But later on in the day the boys had lighter rides. So they rode in the race, and five or six of them got in their cars from the course and went into [a nearby town], to the sauna, to take their extra 2 or 3 kg off, and came back. Well, that to me is more dangerous than just having it [saunas] on the course where it can be monitored.

In contrast, other industry personnel stated that the current regulations are a sound compromise between the need for some jockeys to sweat and the industry's responsibility to protect the health and safety of its workers. A reply indicative of this attitude is: "I think the controls that we've got in place at the moment for sauna use are working pretty well." One industry participant provided the following explanation for the current RVL policies on saunas:

They've [RVL] probably gone as far as they can with the sauna use, with the education for jockeys, and the procedures at the door of the sauna, and monitoring all that . . . there's an argument that jockeys will still find a way [to sauna], and, if the sauna is not there [at the track], what are they going to do? What other sort of weight-loss measures will they go back to? Whether they go back to diuretics, or putting the plastic bag [sweat gear] on with the heater on in the car, or finding a local sauna if they're riding in [country area], and sit in their car for 2 hours before they ride at the race track, which is not monitored? That's [alternatives to restricted sauna use] the danger. So, at the moment, what we've got is pretty good.

This industry employee believes that time limited on-course saunas represent the most acceptable solution to the conflict between jockeys' needs and responsible industry practices, in that at least race-track saunas can be monitored, whereas other wasting activities may be more dangerous because they may be carried out covertly by jockeys.

Other issues to receive attention in discussions with industry personnel concerned the practice of jockeys nominating their own riding weights, weigh-in procedures, and the standard of food provided to jockeys at race meetings. A suggestion from one industry official was to move to a system where individual jockeys' weights (e.g., optimal and lightest healthy riding weights) are established and monitored, not by jockeys, but by accredited health professionals. Under the official's proposal, jockeys must seek approval to move below their established weight ranges before accepting a light ride:

I think we've got to get to the stage where, you know, a jockey's got to disclose what his [true riding] weight is. And not just say, he might be 52 kg, and not just say, "Well, I'm going to be 48 [kg]", just because he might get a ride in the Cox Plate. Know what his weight is, and be weighed constantly. We don't do it, but I think we should. And if they do get a lighter ride, we need to have medical advice as to whether he can waste to lose 2 or 3 kilograms.

The official providing this suggestion stated that such a system would eradicate the current situation where jockeys accept lucrative rides at unhealthy or unachievable weights. Another suggestion, provided by a health professional with links to Victorian horse racing, was to weigh jockeys at the start of a race-day only, and then allow them to re-hydrate, instead of weighing them before each race. This system of once only weigh-ins occurs in many other weight-regulated sports (Walberg-Rankin, 2000).

The racing schedule. The majority of jockeys mentioned the volume of racing as an area needing urgent attention, if weight management is to become less problematic for jockeys than it is at present. These jockeys' made their feelings about their busy schedules quite clear, with the following quote typical of their attitudes:

It's pretty tough now, like only 5 years ago there was only two Sunday meetings a year, and now there's 52. There's only 52 weeks in a year. Now with night racing as well (pause) Last Friday, the last race at [country race venue] was at 7.20 pm. I left the races after race 6 at 6.50 pm, and ended up getting home at 10.15 pm. And that's driving 6 hours in the day. There's been times where I've ridden at [another country venue] and gone to [city race venue] that night, and get home at 11 pm . . . I don't like the twilights, I reckon it's terrible. I reckon the twilight meetings are a bit hard on us. Like when we are already doing so much anyway . . . there shouldn't be Sunday racing.

The frustration at the increasingly busy Victorian racing calendar and the extra weight-management burden this adds to jockeys' lives is almost palpable in the previous quote.

Industry personnel recognised the effects that continual racing and wasting can have on jockeys, both psychologically and physically. An experienced RVL official commented on the effect of repeated episodes of wasting:

A lot of them [jockeys], it's more of a concern that they're riding so many days in a row: 14 or 15 days on the trot . . . We've stopped apprentices from doing it, but we haven't really addressed the issue with jockeys. We know of one jockey who rode 22, 23 days in a row. Well, that is why we've got to introduce protocols to stop them from doing that. You can't do that on a building site.

One jockey participant recognised that racing authorities may be reluctant to reduce the large number of race meetings, because of the financial windfall that a large volume of racing brings to the industry. Commenting on the number of race meetings held on Sundays and public holidays, such as Boxing Day, she remarked:

I think it [racing on public holidays] is just something the jockeys of course will just have to live with. That is something the bosses will have to sit down and think about, but really there is not much they can do about that, because for public purposes and money making it is too big a day to pull the pin on.

In a further comment on the hectic schedules of many jockeys, an industry stakeholder remarked that it is not only the industry, however, that has a vested interest in constant racing: "If we [other industry employees] take holidays, we still get paid: they [jockeys] don't. If they don't ride and do track work, they get nothing: they lose the capacity to earn. It's not a real incentive to take a holiday."

One young jockey combined his thoughts on the crowded racing calendar and the unreasonably low weight scale, in suggesting that minimum weights could be raised on a few days each week, to give jockeys some respite from the demands of continual weight management: “Even just on certain days, have them [minimum weights] heavier: like night racing, and Sundays, and one day during the week.” According to an industry stakeholder, this innovation has recently been introduced at night race meetings, with minimum weights 1 kg higher than usual.

Summary

This study sought to explore the weight-management experiences of current Victorian jockeys, in order to examine the importance of weight management for them, and the effects of their weight-loss practices on aspects of their occupational and personal health and safety. In particular, the study aimed to investigate how weight management affects jockeys’ cognitive and other psychological functions, and included the opinions of several industry employees with extensive knowledge of jockeys and wasting.

The jockeys interviewed in this study reported manipulating their weights within precise and narrow ranges, encompassing their pre-wasting weights and typical riding weights. The weight loss these athletes require to reach their riding weights is usually greater than 1 kg, or approximately 2% of their total body mass. These figures are consistent with self-reports obtained from jockeys in Study 1, and elsewhere (Moore et al., 2002). In general jockey participants stated that they, and most other professional riders, have difficulty managing their weight to the current industry mandated levels, despite their willingness to do so. Further, most jockeys remarked that few people, industry personnel included, understand just how difficult weight management is for them.

In relation to the methods that jockeys use to control their weight, gradual weight loss, based on negative energy-balance methods, is common in this group of jockeys, just as it was among the jockeys surveyed in Study 1 and elsewhere (Labadarios et al., 1993; Moore et al., 2002). Riding (either in track-work or in races) and varying degrees of fasting and dietary restriction are almost universally applied for weight control by jockeys in both studies of this research. Jockeys in the present study suggested these methods are part of the “natural” or “right” way to manage weight, although they did not go so far as to nominate methods are unnatural or wrong. Many of the younger jockeys in the present study also report engaging in additional aerobic exercise to increase their energy expenditure.

Although energy balance methods play a vital role in weight management for these professional athletes, they are insufficient for the majority. All jockeys in the present study rely on body fluid reduction tactics for the purpose of short-term weight loss. For example, all jockey participants habitually restrict the content and/or volume of their fluid intake, and the majority include multiple sweating sessions in their usual weight-management regimens because of the rate of weight loss they can achieve. This finding supports the notion, proposed in Chapter 3, that the speed and degree of weight loss achievable via dehydration are the key factors in the popularity of these methods. Industry personnel contend that Victorian racing authorities have recently reduced the prevalence of the some unhealthy weight-loss tactics, such as race-day sauna and diuretic use, with a combination of education and policy changes. Contrary to this opinion, jockeys stated that diuretics, saunas, and exercising in sweat gear are still popular among jockeys, and especially so on or just before race-days.

Jockeys in the present study experience a range of troubling psychological side effects related to their wasting activities, similar to those symptoms reported by jockeys

in Study 1. In particular, attentional and mood disturbances caused by severe thirst and hunger, appear to be most common. For example, jockey participants described how thoughts about their weight and thirst can distract them from important cognitively-based tasks, such as tactical planning and communication. Without the aid of first-hand experience, Industry personnel were not able to comment as insightfully as jockeys about the cognitive consequences of wasting, but both groups of participants are unequivocal about the negative mood effects of weight loss. Jockeys bemoan the seemingly inevitable deterioration in their mood states in response to their thirst and hunger, and industry participants recalled numerous encounters with angry, irritable, and depressed jockeys.

Both jockey and industry interviewees discussed a number of potential changes to the Victorian racing environment which could ease weight-management problems among jockeys. Prime among these suggestions is an increase in the minimum weight scale, to reduce the need for jockeys to waste as severely or as often as they do presently. There is also agreement among all participants that the busy racing calendar in Victoria adds to the burden of weight management for jockeys. Suggestions regarding lessening the current schedule were made, but both jockey and industry participants noted that the financial incentives of a large volume of racing may preclude a significant reduction in the number of meetings.

CHAPTER 5

STUDY 3 – CASE STUDIES OF WEIGHT MANAGEMENT AND COGNITIVE
FUNCTION IN AUSTRALIAN JOCKEYS

Introduction

Many jockeys necessarily lose substantial amounts of their body masses regularly in order to reach the riding weights mandated by their sport. Past research has indicated that athletes who lose weight rapidly and frequently to negotiate weight categories, including wrestlers (Choma et al., 1998; Landers et al., 2001), boxers (Hall & Lane, 2001), rowers (Sykora et al., 1993), and jockeys (Labadarios et al., 1993; Leydon & Wall, 2002), are at risk of experiencing a range of emotional, cognitive, and physiological problems related to their weight loss. In relation to cognitive function, impairments in attentional processing and short-term memory (Choma et al., 1998; Cian et al., 2000) in particular, have been observed in weight-cutting athletes and other dehydrated individuals.

The Australian jockeys participating in Studies 1 and 2 of the present research indicated they experience a range of difficulties associated with their frequent episodes of weight loss. The findings of Study 2, in particular, suggested that the effects of wasting may be both transient and idiosyncratic, and especially as they relate to cognition. It may be that dehydration and negative energy balance affect cognitive functions and individuals differently, or that situational influences such as arousal can moderate negative effects for some functions and in some individuals. This chapter contains the personal stories (Sparkes, 2002) of four jockeys, obtained through a combination of quantitative and qualitative methodologies, regarding their experiences of weight management, and its effects on important aspects of their working and private lives.

Method

Design

A mixed method design, consisting of a simultaneous qualitative-quantitative sequence (Tashakkori & Teddlie, 1998) of data collection and analysis, was adopted to explore the issue of weight management and cognitive function in jockeys. The study was based on the holistic multiple case-study design Yin (2003) described, where an issue is studied within the distinct contexts of several cases. The current design involved conducting a series of individual case studies about weight management in jockeys, with the intention that the study is more robust, and findings more compelling than with a solitary case (R. E. Smith, 1988; Yin, 2003).

Strong rationales for the selection of case-study methods stemmed from the idiosyncratic nature of jockey weight management and weight-loss responsivity, the low degree of control possible in this investigation, and the anticipated difficulties in recruiting participants. Yin (2003) explained that case studies are appropriate for examining events when behaviour cannot be precisely manipulated. The researcher was acutely aware of the strict weight demands on professional jockeys and the health risks associated with wasting, both through reviewing the scientific literature and from personal discussions with jockeys, and considered it unethical to request that participants engage in wasting activities for the purpose of scientific investigation. Such a requirement would also be highly disruptive and invasive, or even impractical for many jockeys.

The intention of the study was to examine several jockeys and their experiences with weight management in detail, using principles of redundancy and variety of cases (Stake, 2000) to understand better how jockeys are affected by their wasting activities. Stake (2000) described this approach to research as a collective case study, stating that

interest lies in both what is particular to each case, and common to all. Yin (2003) contended that cases can be selected on the basis of a literal replication logic, where the results of cases are predicted to be similar, and a theoretical replication logic, where results of cases are predicted to be contrasting but for foreseeable, and theoretically derived reasons. In the present research on wasting and cognitive function, several jockeys were selected for examination who were known to waste regularly and extensively (i.e., literal replications), and several divergent cases (i.e., jockeys who did not usually waste extensively, or at all) were also chosen for comparison (i.e., theoretical replications).

Participants

Participants for the present study were all males, and originally included seven Victorian category “A” (i.e., fully licensed) flat-race jockeys, and one jockey completing the third year of his apprenticeship. One fully licensed jockey was excluded from the study because he was unable to complete sufficient testing sessions to enable accurate analysis. From the final group of seven jockeys, four cases were selected for inclusion in this chapter based on the richness of data collected. Further information about these participants, such as demographic details and riding history, is provided in each case study. Short summaries of the three case studies that are not described here are provided in Appendix D. Pseudonyms have been used, and any potentially identifying information has been modified to maintain the confidentiality of the participants.

Measures

Both quantitative and qualitative information was collected to enable a triangulation of data sources and methods of collection (Patton, 1990).

Weight-Management Experiences

In-depth interviews were conducted to gather rich data about the riding and weight-management experiences of the participating jockeys. The interviews were semi-structured to accommodate the likely variability in individuals' riding and weight-management histories, with important issues and topics uncovered in Studies 1 and 2 forming a basic interview guide (see Appendix C). Jockeys were first asked to discuss their personal and professional backgrounds to provide context for the subsequent discussions of wasting. The focus of the interviews at this point was to collect information about their ages and physical statures, their riding histories, and current riding status. Jockeys were then asked to detail their usual weights and weight-management regimens. In the third section, jockeys were questioned about their physical and psychological responses to their weight management activities, with emphasis on the cognitive aspects. For example, jockeys were asked to reflect on their ability to concentrate, make decisions, and strategize when wasting. In the final section, jockeys were asked for their opinions about the current racing environment and its effects on weight management, and were given the opportunity to make suggestions regarding weight-management advice to other jockeys.

All interviews were audio-taped, with participants' permission, to allow for accurate transcription and analysis. Where possible the researcher also took field notes to provide additional qualitative data to assist in the interpretation of the interview data. Once completed, all interview transcripts were forwarded to jockeys for member checking, with names, dates, and other references that could identify participants modified or removed. This process was also intended to reassure jockeys of the confidentiality of the research.

Weight and Weight-Management Activities

Jockeys were weighed at the start of each test session, and asked to retrospectively record the types and frequency of weight-management behaviours they had engaged in during the previous 12 hours, on a record sheet supplied by the researcher (see Appendix C). Specifically, the record sheet requested details of any physical activity (track-work, race-riding, and other exercise), food and fluid intake, and sweating sessions that jockeys had engaged in. The weight management self-reports served as reliability checks for the information supplied by the jockeys in their interviews, and assisted in the analysis and interpretation of the quantitative data.

Cognitive Function

Each participant's cognitive functions were objectively assessed by CogSport (Collie, Maruff, Makdissi et al., 2003), a 20-minute computerized test battery of cognitive and psychomotor function. The battery assesses a number of cognitive functions, such as simple reaction time, choice reaction time, attention, and working memory. The various CogSport battery subtests ask participants to respond to visual stimuli (playing cards) presented on a computer monitor by striking designated keys, with the speed and variability (in ms), and accuracy of participants' responses measured as dependent variables.

The complete CogSport test contains seven separate subtests, but after consulting with the test designers, the simple reaction time, choice reaction time, one-back, learning, and monitoring subtests were chosen as the most relevant for assessing the cognitive functioning of jockeys. These five subtests and the general cognitive functions they correspond to are described in Table 5.1. Further, the CogSport designers stated that the speed of processing on these subtests was the most sensitive parameter, and therefore this data was selected for analysis over the variability and accuracy data.

Table 5.1

CogSport Subtest Descriptions

Subtest Name	Task Demand	Cognitive Domain Measured
Simple reaction time (SRT)	Is the stimulus present?	Psychomotor - Simple reaction time
Choice reaction time (ChRT)	Is the stimulus red/black?	Decision-making
One-back test (OBT)	Does the stimulus match the previous one (now obscured)?	Working memory
Monitoring (MON)	Are any of the moving stimuli in a particular area of the screen?	Continuous/sustained attention
Associative learning (LRN)	Has the stimulus been presented before?	Memory, learning & strategy

Note. Adapted from Falletti, Maruff, Collie, Darby and McStephen (2003).

The CogSport test battery has previously demonstrated sensitivity to mild cognitive changes caused by concussion, fatigue, and alcohol (Makdissi et al., 2001; Maruff, Falletti, Collie, Darby, & McStephen, 2005) and its psychometric properties and correlations with standard paper and pencil tests of cognition have been well established (Collie, Maruff, Makdissi et al., 2003). CogSport was chosen over traditional pencil and paper tests of cognitive function for its sensitivity to minor cognitive fluctuations, and its practical advantages, such as ease of administration, and its motivational or “game-like” qualities. For more detailed discussions of these issues please refer to Collie, Darby, and Maruff (2001), and Collie et al. (2003). CogSport has been used successfully with other athletic groups, such as Australian Rules football and rugby players (Collie et al., 2001; Collie, Makdissi, Maruff, Bennell, & McCrory, 2006;

Makdissi et al., 2001), and is currently used by the horse-racing industry in the United Kingdom as a concussion management system.

Procedures

The Victoria University Human Research Ethics Committee gave approval for the present study prior to the research commencing. Jockeys participate in a highly regulated sport, with strict procedures governing their conduct, particularly on race-days. For example, jockeys must report to racing stewards on race-day no less than 1 hour prior to their first riding engagements, and have no further contact with members of the public until the completion of their duties. For these reasons, the researcher obtained the approval and cooperation of each racing club where the research was conducted, and of the stewards and other officials present. Further, the study was conducted concurrently with two others, investigating the mood and physiological status (e.g., hydration levels, body temperature) of working jockeys. Data relating to all three studies were collected simultaneously, and thus the procedures of the other studies affected this study. For example, blood and urine samples were required to investigate the hydration status of jockeys, and this contributed significantly to the overall time commitment required of each jockey (approximately 45 minutes on six separate occasions). Although data were collected simultaneously, the two other studies were independent of the research presented here, and no mention is made of their procedures or results in this thesis.

Consistent with case study methods (Yin, 2003), and due to the substantial time commitment and strict protocols involved in participation, purposive sampling strategies were used to recruit jockeys for this study. A key industry informant with a clear understanding of the purpose of the research, the study procedures, and an intimate knowledge of most current jockeys' riding weights, weight management histories and

work schedules, assisted in the identification and recruitment of participants. The informant initially identified 12 jockeys as being suitable based on their individual weight management histories (a maximum variety logic – Patton, 1990) and their availability (a convenience logic – Patton, 1990), and discussed the study and their possible involvement with these potential participants. The researcher then telephoned those jockeys who expressed interest in participating, and sent them written information (i.e., a plain language statement) about the aims and procedures of the study in the mail. Consent forms were also included in the mail-out package, for return prior to the commencement of the study (see appendix C). Eight jockeys subsequently volunteered to participate in the research.

Jockeys were encouraged to attend a pre-study briefing held at the offices of Racing Victoria Limited one week prior to the commencement of the study, where they were informed more fully of the test protocol, and familiarized with the cognitive test battery to allow the potential for practice effects to diminish (Collie, Maruff, Darby, & McStephen, 2003). Three jockeys were absent from this briefing session, without explanation. An RVL official reported later in a private conversation that some (unnamed) jockeys had been reluctant to have their weights and cognitive functions measured in their pre-wasted states for fear that their subsequent results would “look bad”, and that they could be prevented from riding, if this was indeed the case. It is reasonable to infer from these comments that there was an initial degree of uncertainty among the jockeys recruited about the purpose of the research, the use of any results obtained, and the allegiances of the researcher. Confirmation of the independence of the researcher from the Victorian racing industry, and of the complete confidentiality of data was again provided to jockeys prior to the start of data collection.

Semi-structured interviews of 1 to 1.5 hours were conducted with each jockey to gather information about their experiences of weight management, including their preferred weight loss methods and their perceptions of the effects of their weight-management activities. Interviews took place at a time and place convenient to the jockeys (e.g., after finishing track work in the morning). Procedures for the conduct of the case-study interviews closely followed those for the interviews in Study 2 (See Chapter 4 for a detailed description).

Serial cognitive testing of participants was necessary to fully meet the aims of this study, because researchers have suggested that cognitive function is sensitive to situational factors, including the extent of weight loss (Choma et al., 1997), arousal levels associated with competition (Landers et al., 2001), and the time of day (Carrier & Monk, 2000; Maruff et al., 2005; Winget, DeRoshia, & Holley, 1985). Given that jockeys weights can fluctuate markedly over relatively short periods, jockeys were invited to participate in a series of six test sessions, including two pairs of race-day tests (i.e., one pre-racing and one post-racing) and two non race-day tests. Testing was conducted on multiple occasions to facilitate comparisons between their cognitive functions at different stages of wasting, and to assess any competition effects that may occur. Each test session involved measuring the jockeys' weights, recording their weight-management activities of the previous 12 hours, and noting any negative physiological and psychological symptoms they had experienced in this time. Finally, jockeys completed the 20-minute CogSport (Collie et al., 2003) computer test to assess their cognitive and psychomotor function at the time.

On race-days, jockeys were tested with the CogSport cognitive battery twice: Pre race, when they first arrived on course (approximately 1.5 hours prior to their first race); and post race, after completing their riding commitments for the day. These tests

were conducted in either a private room or partitioned section of the jockeys' change-rooms provided by the racing clubs. Non race-day tests were conducted in a private room, either at the offices of RVL or Victoria University. The researcher supervised all race and non race-day tests to ensure consistency of procedures.

Due to the near constant requirement to maintain a low weight, and the busy racing schedules of jockeys, obtaining "true" baseline measures of weight and cognitive performance (i.e., a total absence of wasting) was not possible. The majority of jockeys reach their lightest weights on race-days, so jockeys' highest non race-day weights were considered as baselines for the purpose of this investigation. Previous research has indicated that jockeys engage in less wasting on non race-days than race-days (Moore et al., 2002), and that cognitive function in dehydrated athletes recovers quickly (within 24 hours) once normal eating and drinking resumes outside of competition (Choma et al., 1997). For these reasons, CogSport measures taken at the test session coinciding with jockeys' highest non race-day weights were considered to best represent participants' baselines of cognitive functioning. Despite the difficulties inherent in obtaining weight and weight-loss baselines for jockeys, comparisons across multiple testing sessions will reflect the patterns of change in the variables of interest over the course of each jockey's racing and weight-management cycle. Jockeys' records of weight and weight management activities over the previous 12 hours assisted in establishing baselines and in the interpretation of test results.

Data Analysis

The qualitative and quantitative data obtained were analyzed and presented as exploratory case studies (Yin, 2003). The analysis of the interview data was the same as that for Study 2 (see Chapter 4 for a description). The quantitative CogSport data were analyzed visually for trends across time periods using time-series strategies

(Kratochwill & Levin, 1992), and across participants using pattern matching strategies (Yin, 2003). Of particular interest were the patterns of cognitive change relative to participant's weight-loss status evident in the former analyses. Each jockey's highest non race-day weight was considered his baseline weight, and the cognitive and psychomotor response measures taken at the same non race-day session were also considered to represent baseline measures of functioning. Weights (in kg) and processing speeds (measured in ms) were converted to percentages of baselines to facilitate comparison. Graphical presentations of the trends in the focus variables (weight and speed of cognitive functions), are used to display the data.

Results and Discussion

Mike

Background

Personal profile. Mike is a male jockey, aged in his 40s, with a mid-secondary school education. Mike lived in a rural community in another country, before he came to Australia almost 15 years ago to live and work permanently. He was not sure of his exact physical dimensions, but Mike epitomises the stereotypical image of a jockey: diminutive physical stature, with narrow shoulders and hips, and a lean but muscular body hardened by many years of physical labour. Mike is married, and lives with his wife and children on a small farm in an outer suburb of Melbourne, the capital city of Victoria, Australia.

Current riding status. Mike is an experienced and fully licensed category "A" jockey, working in Victoria. He has been a professional rider for over 25 years in the horse racing industry, more than 12 years longer the average career duration of the jockeys surveyed in Study 1, and almost 10 years longer than the current jockeys that Speed et al. (2001) surveyed. Mike reported that he is engaged for up to 20 race-rides

per week, a high number when compared to the average of nearly 10 rides per week other jockeys have reported here and elsewhere (Speed et al., 2001). Further, Mike rides almost exclusively at city race-tracks, where the best horses race for the greatest prize-money. His strike rate, the ratio of a jockey's wins to rides, was over 14% at the time of the study. This figure compares favourably with most other Victorian jockeys (Virtual Formguide, 2006) and is a further indication of his status as a prominent senior jockey in Victoria. Mike's high profile and success rate combine to keep him in regular work. His profile with horse trainers and owners allows him to select from among the best rides on offer each week, which helps maintain his strike rate, and his good strike rate encourages owners and trainers to continue to engage him on their best horses in return.

Mike is not sure how much time his jockey duties usually take up each week, but noted that he has many regular and important tasks that take up the majority of his available time. In general, Mike's working week involves riding at race-meetings on 3 days, riding track-work for trainers on a few mornings, and performing other tasks such as contacting owners and trainers and managing his weight. Most important, Mike said he typically rides on the two major weekly metropolitan race-days at Melbourne city tracks (i.e., Saturday and Wednesday), and one other race-day, such as Sunday. Mike also views track-work as an integral part of his working life, because it allows him to gauge the fitness and ability of potential rides, and it keeps him in touch with horse trainers, who are often the key decision makers about which jockeys are engaged to ride their horses. Mike also discussed, as part of his regular duties, the vital task of *doing form*, where jockeys study the field of horses that they will race against to help them plan race tactics. In the following extract, Mike portrays this activity as part history lesson, part personality profiling, and part fortune telling:

You've all got a bit of an idea; well, that jockey likes to ride up the front; that jockey has a preference to ride back. So if that jockey is on a front runner and

he's a back-riding type of jockey, then you've gotta be a bit more sharper in the race, and see in the corner of your eye if he's gonna go forward, if he's gonna lead, or he might only sit second or third because he's not a real natural jockey that likes to lead. Just little idiosyncrasies about each rider. A lot of trainers have a bit of a pattern as well; they like to train their horses to run on. [A trainer's name] loves to have her horses up front. [Another trainer's name] likes his horses to come from behind. And if there's a mix up in the jockeys then you've got to be ready for the unexpected. You've got [a jockey's name], who likes to come from behind, on one of [first trainer's name] horses that likes to lead, so what's going to happen here? You know the colours, you know the barrier draw, where it is, so you're ready for it.

With field sizes for each race sometimes amounting to 20 horses or more, it is clear that studying the *form* of horses in a race, as Mike described it, is a cognitively demanding activity, involving memory, decision making, and problem solving. He could not estimate exactly how much time this activity involves, but said he usually studies the *form* for at least an hour on the night before a race meeting. Mike explained the importance of this activity, stating:

You must know the form of the race. That's imperative, that I must know the opposition; I must know their colours. I must know where my horse likes to race. I must know the answers before the questions are asked. Like, a trainer will ask, "Well, where does that horse like to race?", or "Who is drawn next to you?", or "What barrier draw are you coming out of?" So you know the answers before the questions are asked.

In Mike's estimation, studying the *form* in a race is important not only for his own peace of mind, but also as a demonstration to horse trainers that he is thoroughly prepared and will give their horses the best chance of winning the race.

Riding history. Like many jockeys, Mike has a family background in horse-racing. His father owned a small property in a rural area where the family lived, and where he also trained a small stable of race-horses. This environment had a strong influence on Mike as a child, and he explained that horses have always played a prominent role in his life because of his rural upbringing. When asked about his recollections of his initial interest in horses and riding, Mike said:

Being [living] on a small property, I was always around horses. I had ponies when I was a kid. My brothers and sisters had ponies, but I was probably the one that took it to another level after pony club and show riding. I helped Dad with his racehorses, not so much training them but riding them.

Family involvement was mentioned as a key reason for engaging in a career as a professional jockey in a recent study of jockey welfare, but ranked fifth behind other attractions such as a love of horses and racing, and the financial rewards associated with a career in racing (Speed et al., 2001).

Mike's interest in a career as a professional jockey increased as he graduated from riding ponies and helping his father with the family's race-horses, to taking on part-time work at the stables of a prominent local race-horse trainer. Mike had to travel by bus for over an hour each weekend to work in the stables at this time, but the experience was enough to convince him to pursue a full-time career as a jockey. He then left school at the age of 16, after only two years of secondary school, eager to begin a jockey's apprenticeship. Mike's father helped him select a suitable master with a reputation for teaching young apprentices the "right way" to do things, a euphemism for stern discipline. Mike's father also believed that it was important that Mike got the opportunity to ride high quality horses, and so they chose a master with a stable full of high performing horses, as well as a strong belief in discipline.

As a young apprentice, Mike revelled in the sense of freedom and maturity he gained from living and working away from home. He described his earliest memories of his apprenticeship with almost palpable glee:

Oh, it was exciting. It [his initial introduction to racing] was a year before I left school, so I was about fifteen, and I was hanging around with boys that were a couple of years older than me, and that was good, that was exciting. I didn't have my Mum and Dad looking over my shoulder, or me looking over my shoulder to see if they were watching me. I was pretty independent.

Moreover, Mike was not daunted by the hard work and long hours that confronted him, but rather comforted by the constant activity and sense of purpose provided by his new work environment. He said the following of his demanding schedule:

We had a job to do, to work at the stables, and look after these racehorses, and take them to the races. And I was in with a bunch of say, well the stable had about 30 horses, so there was stable-staff of about eight to ten people. So there was always activity.

Mike believes the order and routine demanded in his formative years by his master and his profession have stood him in good stead in the ensuing years. In response to a question about the discipline required of someone so young, Mike commented,

. . . and that [having responsibility] was good. I think, as you look back, having somebody with stern discipline sets you up. If you can handle it [the discipline] early, mentally, it will set you up in a good standing later in life. It's [learning that discipline] done good for me, and I know it's done good for the other riders that were apprenticed at the time I was growing up. They've become good trainers and good riders.

The bonds Mike formed with other jockeys and the constant contact with stable staff left him little time to feel homesick or lonely, and also enabled him to learn a great deal about his craft. When asked about the other apprentices and jockeys he worked with during his apprenticeship, Mike commented on the important professional and social influences they had on him. He explained,

We socialised. Like, we didn't go to the pubs or anything, but we'd go to the movies. And I would learn off those other riders that were apprenticed at the time, and watch them, and get tips on how to do it [perform the duties of a professional jockey]. Especially on track-work and barrier trials.

Mike added that a great deal of the weight management information he now uses came directly from the other apprentices, and one senior jockey in particular, who lived at the stables with him at this time. Here, Mike describes the learning environment he encountered in these formative years:

. . . I definitely had mentors. And they were older apprentices, almost finishing their time, but they [the stable Mike was apprenticed to] also had a stable jockey. He was a senior, about 28 or 29, and he had a young family so he was quite

settled. And he had a good influence, or a bigger influence on the younger riders. He was a top rider, so we would look up to him and listen to his words of wisdom. He was the jockey that would take us to the races as well in his car, and bring us home. The young apprentices were always around at least one experienced, older rider.

The previous extract illustrates how this young apprentice quickly became immersed in the culture of racing, and how the social isolation of living and working only with other jockeys assisted this process. Several authors have remarked on the prevalence of this kind of transfer of professional knowledge amongst jockeys (Labadarios et al., 1993; Moore et al., 2001).

After completing what he described as a “very successful apprenticeship,” Mike made the transition from apprentice to senior jockey easily. When asked to explain how he handled the often problematic progression, he said, “I just was aggressive, I’ve always been aggressive. I just took it in my stride. I didn’t have a second thought that it [his career] wouldn’t work. I just kept movin’ on.” It is clear that Mike did not contemplate failure at any stage, and attributes his success to his strong self-belief and dogged persistence towards his goals.

Mike left his country of birth in his late 20s to come to Australia, and quickly rose to a position of prominence in the industry in this country. Mike stated that he chose to come to Australia for two main reasons: money, and the professional challenge. He explained that the large pool of prize-money on offer in Australian horse-racing was enticing to a jockey, particularly because the money available in his home country had become “stagnant”. In addition, Mike felt that he had realized all the career ambitions he had in his home country, and needed the challenge of some new goals. Mike was proud to say that he has featured regularly in the top 10 in the Victorian Jockeys’ premiership since arriving in Australia, winning the State’s award on one

occasion. Mike's single-minded pursuit of success is evident in his career anecdotes, and appears to have contributed to his secure position in the Victorian racing industry.

Mike clearly enjoys his career as a professional jockey, and he intends to keep riding professionally for at least another ten years. When asked about his future plans, he replied, "This is the only job I want to do, and I want to be a jockey for as long as I can. And when I finish being a rider then I want to retire, do nothing." Although he would not put an exact time frame on his involvement in racing, Mike did mention that he has always been mindful that a jockey's career could be frustratingly short. The following quote summarises Mike's attitude to his profession, implying that the potential for both financial reward and career uncertainty exist equally in the life of a professional jockey.

You should always think that you might not be a jockey all the time, so when you're making good money put it away for the rainy day. And pretty much, that's what we've done, myself and my wife, all our life. And we've enjoyed life, in that we have our holidays and nice cars and clothes, but we've always thought of the future.

According to Speed et al. (2001), Mike's regard for his long-term future is uncommon in jockeys. The authors of this study reported that less than a third of the current jockeys they surveyed were actively preparing themselves for life after racing. Mike's preparations for his rainy day may be a consequence of his maturity and experiences in the unpredictable racing industry, but are also an indicator of his cautious nature.

Study Participation and Engagement

Mike participated in two pairs of race-day tests, and two non race-day tests. His two sets of pre and post race-day tests were completed 5 days apart, and his non race-day measures were taken approximately 7 weeks later, after he had commenced a holiday of several weeks. Mike also participated in an in-depth interview lasting approximately 2 hours, conducted in a café near his home. Unfortunately, Mike did not

attend a pre-experimental briefing session because his riding commitments clashed with the briefing session. Mike's first CogSport test results (i.e., his pre race-day 1 scores) must therefore be interpreted with some caution because he did not have a chance to familiarise himself with the test prior to the commencement of the study (as recommended by the test designers).

Mike was alert and compliant during all his interactions with the researcher, and had a business-like approach to his participation in the study. Mike scheduled appointments with the researcher and attended in a timely fashion, dressed neatly on each occasion. He answered all the questions asked of him politely, but rarely engaged in any casual or informal conversation. Mike took his time in giving carefully considered responses to the questions he was asked in his interview, evidence of an ability to reflect and think critically about the issues he discussed. Furthermore, he paused and corrected himself when he felt he had given a hasty answer to a question, or made a comment that he wanted to clarify in hindsight. His willingness to take part in an interview in a public space was evidence both of his engagement in the study, and his ease with the potentially sensitive subject matter.

In general, Mike appeared to be forthright in his views, but was also eager to present a positive image of jockeys and the sport of horse-racing. In support of this opinion, Mike commented during one race-day test that he was disappointed by a recent newspaper article that highlighted rates of depression and suicide in warring Victorian jockeys. Mike felt that the article sensationalized these issues and portrayed the profession, and him by association, in an undeservedly negative light. In his interview, Mike described himself as a relaxed person, but also someone who tended to avoid conflict. Mike's casual observation about his interpersonal style may explain his reaction to the negative, but factually based, views expressed in the aforementioned

newspaper article. More likely, his comments were an attempt to shape an outsider's attitude to one of the more negative aspects of the sport of horse-racing.

Current Weight Status

Many jockeys struggle to consistently maintain the low riding weights mandated by the sport's governing bodies (Moore et al., 2002), despite their usually diminutive stature. Anecdotal evidence from jockeys, as well as stewards' reports and media accounts, also support this observation. I asked Mike to report his typical riding weight range, his day-to-day or pre-wasting weight (also referred to by jockeys as "walking around weight"), and his perceived ease with weight management, in order to gain a detailed picture of his current weight status.

Typical riding weight. I first asked Mike to discuss his current weight range, including his typical riding and his pre-wasting weight, in order to ascertain the usual start and finish points of his weight management activities. Initially, Mike summed up his intentions with regard to his current weight range, saying:

I always like to keep my weight around a level which is compatible to (pause) I don't want to get too light, but I don't want to get too heavy. When you're growing up you find out your level [weight] that you're comfortable at.

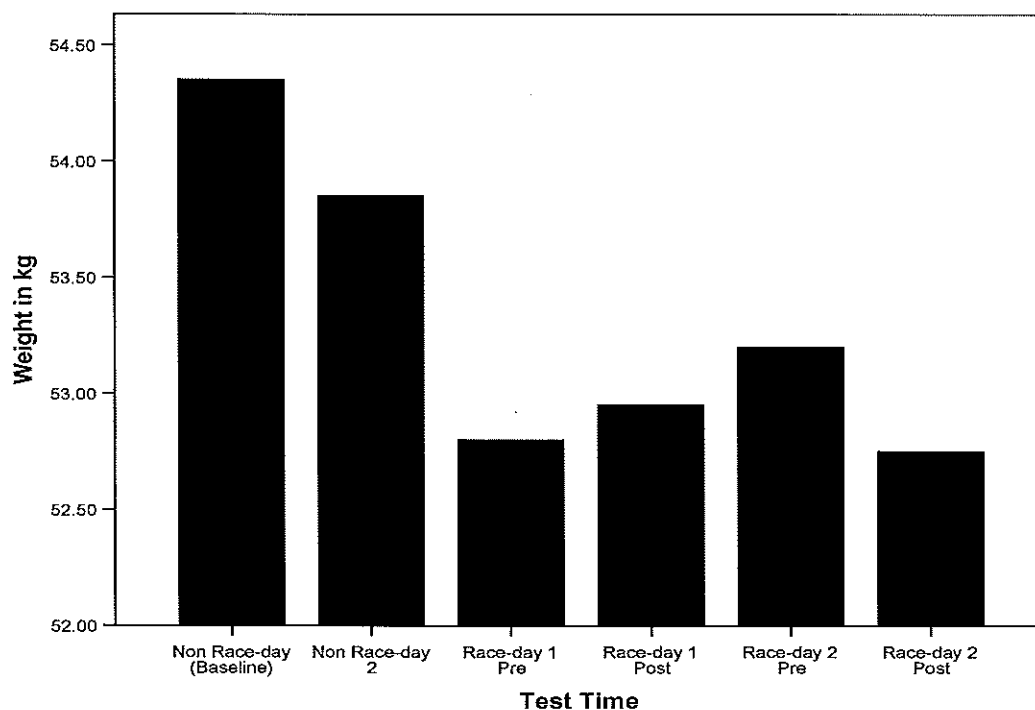
These comments suggest that some trial and error was involved before Mike settled on his current weight range, and that there was probably some degree of discomfort associated with his earlier errors. Although he spoke initially in the first person, Mike also applied his point to jockeys in general, commenting that a jockey's weight range seems to be idiosyncratic, before reiterating that each needs to find a range that he or she can manage easily to remain competitive in the racing industry over a long period of time.

Mike commented that he is very strict with his own riding weight, staying within a narrow range in the middle of the current Victorian weight scale. For this reason Mike

is considered a middleweight jockey by racing industry standards in that State. When asked to nominate his usual riding weight, he stated, “I’ve never pushed myself below my average [weight]. My average riding weight is about 52.5 or 53 kilos. The lightest I would ride is 51 [kg]. I have never pushed myself below that.” The accuracy of Mike’s self-reported typical riding weight range of 51 to 53 kg is confirmed both by his official riding weight of 52.5 kg listed in RVL publications (Racing Victoria Limited, 2004b), and by riding weight measurements in this study. These test measurements, illustrated in Figure 5.1, show that Mike’s four race-day weights varied by less than 0.5 kg, from a high of 53.2 kg to a low of 52.8 kg. Mike’s usual riding weight of 53 kg was 0.5 – 1.0 kg below the average riding weight of the Australian jockeys studied recently by Moore et al. (2002), and those surveyed in Study 1.

Figure 5.1

Mike’s Weight in kg on Race-days and Non Race-days



Data obtained from an independent racing source support Mike’s claims regarding his refusal to go beyond his reported minimum weight threshold, showing that

Mike has not taken any rides in Australia below 51 kg, and only 16 rides between 51 and 52 kg, in the last 5 years (Virtual Formguide, 2006). During this 5-year period Mike has ridden in over 1,800 races at weights between 53 and 56 kg.

Mike stated that his ability to attain weights below those of other jockeys had enabled him to remain consistently competitive in the racing industry. He succinctly elucidated the importance of maintaining his weight below that of heavier jockeys, explaining, "Being able to ride fairly light, so that you can (pause) if you're struggling [not getting regular riding engagements] you can ride the lightweights, and still make a living." This statement illustrates the point that weight is a key point of difference between jockeys, and one that can be used to gain a professional advantage over rivals in a fiercely competitive industry. The attitude of this middleweight jockey was clearly that wasting in order to ride often poorly performing lightweight horses was more acceptable than not wasting and having no rides at all. Intriguingly, Mike comments appear to be hypothetical, in that he has not yet needed to resort to riding the lightweight horses he spoke of, but he is obviously comforted that riding light is still an option for him.

Mike's baseline weight recording was taken several days after he had begun a holiday of several weeks, and he reported that he had relaxed his weight management regimen somewhat in the days preceding this test. With his cessation of normal weight management activities in mind, Mike's baseline weight represents a reasonably accurate measure of his un-wasted weight. At baseline, Mike's weight was approximately 54.5 kg, slightly heavier than his other non race-day test taken 2 days before, and close to the weight he self-reported in his interview (54 kg) as his usual pre-wasting weight. Mike commented that his weight would increase beyond this current baseline level if he did not take any action to manage it. He suggested, ". . . if I just ate and drank normal, I'd

probably think my riding weight would be 56 kg, because that's what I am when I'm on holiday." Mike's comments highlight the difficulty in measuring a jockey's baseline weight. Even on holidays, when Mike had temporarily relaxed his regular eating and drinking restrictions, he had not reached his hypothesised maximum weight, and the question must be asked, do jockeys like Mike ever reach a completely un-wasted weight?

Extent of wasting. After describing his usual weight range, Mike then discussed the extent of his regular wasting activities, including how much weight he typically needs to lose to get down to his riding weight, and the frequency and duration of his weight loss episodes. First, Mike quantified the amount of weight he usually needed to reach his target riding weight, describing the following as a typical episode of wasting for him:

On a Thursday, let's say I'm about 53 and ½ kilos stripped [without clothes and riding equipment], and I've gotta ride, and I wanna be around 52 kilos stripped. So I've got about 3 pounds, about 1.5 kilos to lose [in 1 – 2 days].

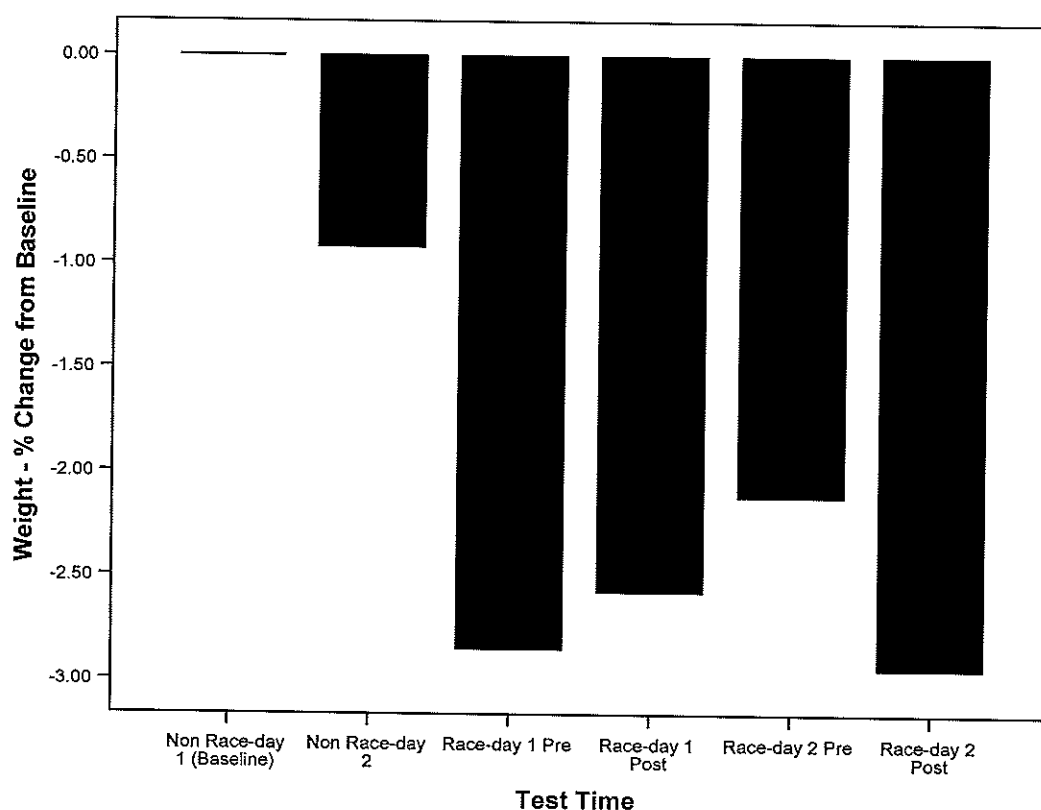
A loss of 1.5 kg from his hypothetical starting point of 53.5 kg equates to a proportional loss of nearly 2.8% of Mike's total body weight, however the relative weight loss required to reach a riding weight of 52 kg rises to more than 4% if his start point is close to the 54.5 kg baseline weight he reached during the study's testing period. Jockeys surveyed in Study 1 usually lost an average of 3.0% of their total body weight, close to the figure Mike described. Previous estimates of typical relative weight loss among jockeys vary from 2 to 5% of total body weight loss (Labadarios et al., 1993; Moore et al, 2002), but losses in excess of 10% are not unusual.

Mike engaged in activities associated with wasting, such as food restriction and dehydration, in the 12 hours prior to both his race-days. The most weight Mike self-reported losing on these occasions was, however, only 0.25 kg. This small amount of

weight loss in the time before race-day is nevertheless consistent with Mike's comments about maintaining a narrow weight range. Figure 5.2 shows that Mike's recorded race-day weights ranged from 2 to 3% below baseline, suggesting that he may have lost slightly more than the (0.25 kg) that he self-reported at these times.

Figure 5.2

Percent Change from Baseline in Mike's Weight on Race-days and Non Race-days



Mike then discussed the frequency of his wasting, describing a perpetual pattern of short cycles of weight loss and subsequent regain, which occurs several times a week over the course of the racing calendar. Deliberate wasting usually begins 1 to 2 days before each race-meet for Mike, and may even continue throughout the race-day if his lightest ride happened to be near the conclusion of the race program. Mike noted that he would quickly regain the weight he had lost for a race meet, before losing an equivalent

amount a few days later for his next riding engagement, adding matter-of-factly, “I lose it, and then I put it back on.”

The patterns of weight loss described by Mike in his interview, and witnessed in his objective weight measurements, suggest that Mike adopts a regimen of short cycles of weight loss, losing small amounts of weight progressively as he approaches each race-day. This relatively frequent, but gradual approach contrasts with reports of rapid weight loss detailed in some past jockey research, where a substantial portion of the weight to be lost occurs in the hours prior to a race (Leydon & Wall, 2002; Moore et al., 2002).

Perceived ease of weight management. The results of Study 1 indicated that the normal body weight of jockeys and the amount of weight loss they require to reach their riding weights are both positively correlated to the degree of difficulty that jockeys report in managing their weight. With an un-wasted weight of approximately 54 kg, and a typical requirement of 1.0 to 1.5 kg of weight loss to make his riding weight, one could assume that Mike would perceive some degree of difficulty with his weight management. On the contrary, Mike went so far as to say that he almost enjoys wasting. In the following extract, Mike reveals his attitude to his familiar wasting routine:

It's not as if I'm not looking forward to doing it [wasting]; I look forward to doing it again [the] next Friday. I look forward to it, you know; I don't mind losing a bit of weight. I don't mind that, honestly, 'cause I don't have to lose a lot. It just tunes you down, trims you up, makes you feel (pause) it probably makes you feel you've done it, righto let's go.

Mike believes that the degree of wasting he engages in is minor, and that he handles weight management with such ease that he is actually excited about the prospect of doing it again for his next ride. This positive attitude to weight management is in stark contrast to the 80% of jockeys in Study 1 who at least sometimes have difficulty managing their weight, and the 43% of jockeys Moore et al. (2002) surveyed who said

that weight management was either “difficult” or “very difficult.” It may be, because Mike has been wasting for his entire adult life, that wasting now seems both natural and normal to him. It is possible that he would view any change to his normal routine as stressful, particularly in light of his preferences for stability and structure in his life. Alternatively, it may be, due to the close temporal connection between wasting and race-day, that Mike generalises the excitement he feels as race-day approaches to all the activities that occur in this period, including his weight loss activities.

Despite his assertion that weight management is usually easy for him, Mike acknowledged that some months were more difficult than others. While discussing his typical weight range, Mike noted, “I don’t have a big weight problem. But when I’m race riding in the Spring, it’s a bit harder because it’s still a bit cold, and I’m still coming off my winter, where I have my holiday.” For Mike, managing weight in the Spring is more difficult than at other times for two reasons. First, he stated that the cold weather is not conducive to weight loss, because his body does not sweat as freely. Second, Mike takes his only extended break from racing and wasting during the winter months, and relaxing his weight management regimen at this time makes it more difficult to reach his riding weight targets for the first few weeks once he returns to riding again in the Spring.

Beyond his typical weight range. Although most jockeys have a typical riding weight, they are not limited to this weight, and can accept rides at other weights (i.e., heavier or lighter). Heavier rides involve jockeys either relaxing their weight regimens or carrying lead weights in their saddles, whereas lighter rides necessitate even greater than usual wasting. Mike has rarely gone below his usual weight range, and he offered a sound rationale for his decision to stay within his narrow weight range in the extract that follows:

Experience tells me that, and my experience in that I've done it myself and I've seen a lot of other jockeys do it, you don't want to push yourself to the extreme [very light weights] too often, because it ruins your desire. It just takes a lot out of you. It takes you a long time to recover; sometimes you don't recover. What I'm saying is that there's jockeys I've seen [who usually] ride 51 kilos or 52 kilos, that have pushed themselves so hard to ride 48 kilos that they have struggled to (pause) they've lost a lot of that fire in the belly.

Mike believes that repeatedly trying to reach unreasonable weight targets can be so damaging that it can eventually cause a jockey to lose motivation and leave the sport prematurely. In support of his belief, Speed et al. (2001) found that 20% of former jockeys had retired from racing involuntarily because of their perceived inability to manage their weight. Mike continues his commentary on the excessive wasting he has witnessed in other jockeys in the next extract, this time observing a more short-term effect:

Their [jockeys who waste excessively] weight goes back up. I haven't seen their weight balloon back up over their average, but they find that they will never do that light weight again. And even then they struggle to get down 2 kilos [a typical and achievable weight loss amount for most jockeys, according to Mike] below their average weight, because they pushed themselves to 4 kilos below, and it just killed them.

In Mike's opinion, even a single instance of extreme weight loss can make any future weight loss attempts seem more difficult, no matter how substantial, and is therefore not worth the effort. Bearing Mike's attitude to excessive weight loss in mind, it is not surprising that Mike accepts rides at 51 kg only on rare occasions, a decision that necessitates only one extra day's wasting for him.

Weight-Management Methods

Previous research has indicated that jockeys typically use a variety of methods to achieve the low body weights they require for race-riding, including exercise and dietary restriction to manipulate energy balance, along with fluid restriction, sauna, and spa use to diminish body fluids (Apted, 1988; Atkinson et al., 2001; Labadarios et al., 1993; Leydon & Wall, 2002; Moore et al., 2002) The results of Studies 1 and 2

supported these findings, revealing that the majority of current Victorian jockeys needed multiple methods to keep their weight in check. In Study 1, the average number of weight management methods used by jockeys was approximately six, with energy restriction and dehydrating strategies often combined for maximum effect.

Mike was asked to describe the weight management methods he used, and he summed up his weight management tactics succinctly, stating, "Eat little and work harder. That's pretty much it, eat little and work harder (pause) it's the only way to lose weight. There's no shortcuts." Throughout the course of this research many jockeys commented on the importance of "doing it natural," a reference to managing weight through exercise and food restriction, and Mike's approach to weight management, as he described it here, appears to fit neatly within this cultural edict. Despite his simple principles regarding weight management, Mike still practiced a multifaceted regimen, combining several methods depending on his needs and preferences.

Manipulating energy balance. Mike believes that energy balance methods, as opposed to dehydrating methods, are the keys to consistent and long-term weight management. Mike was particularly emphatic about the role of food restriction in keeping his weight in check. In his interview, Mike revealed that he eats progressively smaller portions of food, and even skips entire meals, the closer he gets to race-day. For example, he described his food intake in preparation for a Saturday afternoon race-meeting as comprising, ". . . only a cup of tea and toast for dinner [on Friday night], and sometimes nothing for breakfast that morning [Saturday], or maybe some tea and toast for breakfast. And that's without much lunch either on Friday." The frequency and degree of caloric restriction Mike engages in before competition is both obvious and alarming, especially considering the physical nature of his work. Further, it is evident

that his need to provide fuel for his physically demanding work is regularly usurped by his desire to keep his weight as low as possible.

Mike's reliance on skipping meals and controlling his meal portions stems from his observations of other jockeys when he was a young apprentice. Mike saw that many of the jockeys he worked with at this time gained weight as they matured, and that they relied on dehydration to reach their weight targets. He noted, "I just personally watched those jockeys sauna and diet and run in sweats around the race-track, and do it tough." Mike saw what happened to these jockeys, and decided to take a different weight management path to the one followed by his peers. Mike describes his response to the weight gain of his colleagues:

But they [the older jockeys] did get heavy, and they were forced out of the game. So, as I said, I was mindful of that. So I tried to slow it down [weight gain] by missing out on lunch, and I would miss out dinner the night before the races, even though I didn't have to. I didn't miss out altogether though; I would eat something. I just wouldn't have that big meal.

Mike reasoned that weight gain was inevitable, and that the only thing he could reliably control was his food intake. Mike recalled his thoughts at this time, saying, "I won't have lunch in the middle of the day. And if I did have lunch, then it would only be crackers and fruit. I would try and slow the process down of getting heavy." Unlike his older peers, Mike resolved to take what he considered to be preventative, as opposed to remedial weight management action, and he has been intentionally and systematically restricting his diet ever since.

Mike also believes that high energy expenditure, in addition to low energy intake, helps him control his weight. He reported that regular physical activity helps him keep his weight in check, but that he is not nearly as meticulous about this method of weight control as he is about food restriction. When asked whether he jogged or went to a gym, Mike replied that the physical nature of his jockey duties and his farm work is

sufficient to counterbalance his energy intake. He said that his energy expenditure during the week consisted of simply, "Track work, and mucking around on the farm," and that extra activity was unnecessary. In support of this claim, Mike did not do any weight loss related exercise in the 12 hours prior to his testing, although he continued to feed the animals on his farm.

Manipulating body fluid balance. Another common and noteworthy feature of jockeys' weight-management regimens is the inclusion of methods designed to reduce levels of body fluid. Careful regulation of drinking (Apted, 1988), and the use of dehydrating devices, such as saunas, spas or hot baths, and sweat gear (Leydon & Wall, 2002; Moore et al., 2002), have been prevalent among jockeys in past studies.

Mike adheres to a regular regimen of hot baths, usually taken the night before a race-meeting, and seems comfortable doing so in spite of his earlier endorsement of energy balance methods. Mike said in his interview that he always has a hot bath the night before a race-meeting to either maintain his weight or lose a small amount of weight, but did not engage in any sweating sessions in the 12 hours prior to either of his race-days measurements sessions for this study. Presumably then, the hot baths Mike spoke of were taken more than 12 hours before he presented for his testing sessions, and therefore he did not note them on his record of weight management activities. Hot baths were not as prevalent as saunas among the jockeys surveyed in Study 1, but were used by 40% of that sample on the day before a race meet. Mike also uses dehydration on race-days to lose weight, noting that he used the on-course sauna on race-day 2 of the present study to reduce his weight by 0.5 kg, a further indication of his ease with various dehydrating methods.

Mike's interview comments and weight-management records provide evidence that he used other methods to manipulate his body fluid balance, over and above his

habitual use of saunas and hot baths. For example, Mike indicated on his fluid intake record sheets that he drank regular but small amounts of water on race-days (e.g., 100 ml of lemonade and two cups of tea over 5 hours on race-day 2), in an apparent attempt to stay adequately hydrated without gaining a substantial amount of weight. Mike's ability to recall the exact amounts of each drink, down to the millilitre, suggests that controlling his fluid intake was an important aspect of his usual weight-management plan, and is consistent with the reports of widespread fluid restriction on race-day reported in Study 1. Mike also reported in his non race-day 1 weight management record that he had not had anything to drink for the 14 hours since having one cup of tea before bed the previous night. That this test session was a non race-day, occurring several days into Mike's holiday of 2 weeks, makes this episode of fluid restriction especially noteworthy. Mike did not say why he had not re-hydrated at the time, but the test was conducted at 10.30am, approximately 4 hours after he woke, so insufficient opportunity can be ruled out as a reason. Whatever Mike's reasons, it is evident that controlling fluid intake is not solely associated with race-day weight management for this jockey. Further, it is obvious that Mike regularly goes well beyond the "natural" strategies of food restriction and hard work he initially espoused, and perhaps his tactics would be more accurately described as, "eat little, drink little, dehydrate, and work harder."

Other methods. Past research has revealed that some jockeys resort to using a range of potentially hazardous methods to lose weight, including diuretics, laxatives, appetite suppressants, and self-induced vomiting (Labadarios et al., 1993; Leydon & Wall, 2002; Moore et al., 2002). Mike stated that he currently has no need for any of these methods, nor has he used them in the past. When asked whether he had any "last resort" techniques if he needed to lose weight quickly, Mike replied that all he ever

needs is, “. . . a little bit of dieting and a little bit of saunaing.” In these comments, Mike eventually acknowledged the importance of dehydration in his weight-management regimen, but his description of his degree of body fluid reduction as “a little bit” is debatable considering he uses hot baths before every race-meeting. Mike’s refutation of other weight-loss methods is somewhat surprising, particularly in light of the prevalence of diuretics in other cohorts of jockeys (Leydon & Wall, 2002; Moore et al., 2002). Diuretics are now prohibited in Victorian racing, and concerns of sanctions may have led Mike to withhold any information on his past and present use.

Psychological Effects of Wasting

Previous research has revealed that athletes in weight-regulated sports, such as jockeys, wrestlers, and boxers, who lose weight substantially, rapidly, or frequently, are at risk of experiencing acute negative psychological side effects related to their wasting, including affective disturbances and problems with short-term memory (Caulfield et al., 2003; Choma et al., 1998; Cian et al., 2001; Labadarios et al., 1993; Landers et al., 2001). The jockeys surveyed in Study 1 reported experiencing a wide variety of undesirable psychological symptoms associated with wasting. The number of these symptoms jockeys experience was correlated with both the amount of weight they usually lost ($r = .53, p < .01$), and their perceived difficulty in managing weight ($r = 0.50, p < 0.01$). Jockeys interviewed in Study 2 also reported experiencing psychological difficulties related to their wasting activities.

Mike described weight management as easy for him, although he did report that he usually needs to lose 1.0 to 1.5 kg to make his riding weights. This absolute weight loss figure places him beyond the 2% loss of total body mass threshold at which cognitive and emotional difficulties have been observed in other athletes (Cian et al., 2000; Gopinathan et al., 1988; Sharma et al., 1986). Moreover, the weight management

methods he uses to achieve this weight loss also include some, such as sauna use, that have been associated with negative psychological sequelae (Cian et al., 2001; Cian et al., 2000). Mike is therefore potentially at risk of experiencing the psychological difficulties described by jockeys in Studies 1 and 2, and by other wasting athletes (Choma et al., 1998; Landers et al., 2001).

Mike was first asked about how he functions “mentally” when he wastes, and he expressed an unusual opinion. He responded that he actually feels his weight management activities act as catalysts for enhanced cognitive performance. When questioned specifically about whether he thought wasting impaired his cognitive functions such as his memory or decision-making, Mike declared:

Ah, I don't think so [that wasting negatively affects him]. No, again I think I think better [when I'm wasting]. I'm more alert and get things done. Because, you know, I've got a small property up the road, and I'm more aggressive and (pause) around race-day, a couple of days before, I'm more (pause) 'cause it's race-day, I'm more alert.

The last sentence of Mike's quote is significant, because, in voicing his belief that he is actually more focussed when he wastes, Mike again highlights the temporal connection between wasting and competition. Race-day is usually when jockeys are at their lightest weights, and when any cognitive decrements associated with their weight loss should hypothetically be greatest. Heightened arousal is associated with race-day as well, and can also have a positive effect on cognitive function (Potter & Keeling, 2005). This relationship between arousal and cognition may help jockeys overcome any deleterious effects that wasting could otherwise have on cognitive function on race-days. In other words, what Mike described as his positive cognitive response to wasting may actually be his positive cognitive response to the arousal effects of race-day.

Relatively superior cognitive functioning on race-day in comparison to non race-day may also be a result of a decline in cognitive performance that can happen after the

completion of race-day duties. For Mike, the day after a race-meet is a day dedicated to recovery, and a time when he sometimes feels mentally fatigued. After describing himself as being mentally sharper on race-day, Mike added, “. . . it’s the next day that you let yourself down and relax. You just go along with life.” The intentional letting-down that Mike implied happens after race-days could involve a conscious decrease in vigilance and cognitive effort, in addition to the mental fatigue he mentioned, all of which would make Mike’s race-day cognitive performance, in contrast, seem sparkling to him.

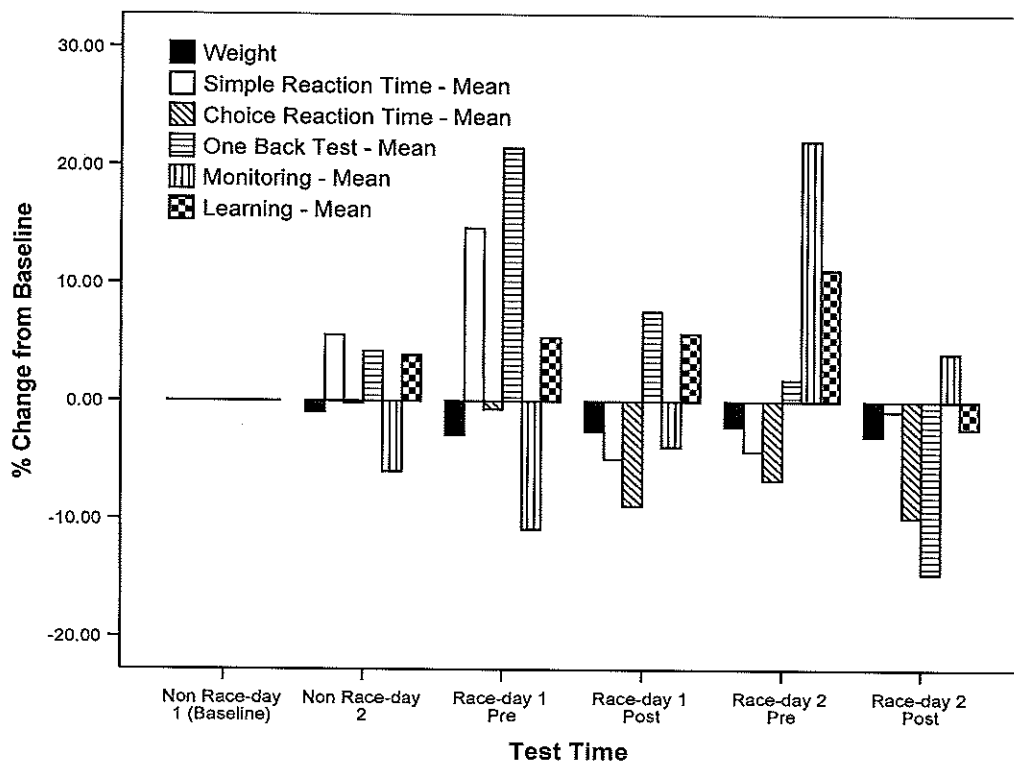
Mike underwent serial testing of his cognitive function on 2 race-days and 2 non race-days, with his cognitive performance at his highest non race-day weight (i.e., non race-day 2) taken as a baseline. The percentage change from baseline in Mike’s scores on each of the subtests of the CogSport test battery at each time point are shown in figure 8. Scores above the horizontal axis of the figure indicate slower (i.e., worse) than baseline speeds of processing, and scores below the axis indicate faster than baseline (i.e., improved) processing speeds. Mike’s general cognitive performance is discussed initially, and then his performance on each individual subtest is examined in isolation. Attempts have been made to link performance on the various CogSport subtests to actions performed by jockeys, in order to establish the ecological validity of the results, but no measures of behaviour have been formally calibrated against the test battery, and thus the implications of the tests results are speculative.

An analysis of Mike’s general cognitive performance, as seen in Figure 5.3, only partially confirms his prediction of improved cognitive performance when at his lightest weights. Many of his race-day subtest scores appear below the horizontal axis (i.e., baseline), indicating faster than baseline processing, but a number of scores also appear above the line, making a consistent pattern in his overall cognitive functioning difficult

to discern. For example, four of his five subtest scores (i.e., simple reaction time, choice reaction time, one back test, and learning) were faster at his post race-day 2 test session than they were at baseline, but three of five scores were slower than baseline at his pre race-day 1 session. Mike's scores from his pre race-day 1 test should be interpreted with some caution, due to his lack of familiarity with the test battery, and the subsequent potential for practice effects on his next test.

Figure 5.3

Percent Change from Baseline in Mike's Weight and Processing Speed on Five CogSport Subtests



Psychomotor performance. The most obvious act that jockeys perform relating to psychomotor reactions is that of responding to the barrier gates flying opening signalling the beginning of a race. Jockeys need to react quickly to this cue by urging their horses into action, or risk being left behind the rest of the field. Jockeys also use the environmental features of race-tracks, such as grandstands and distance markers, as

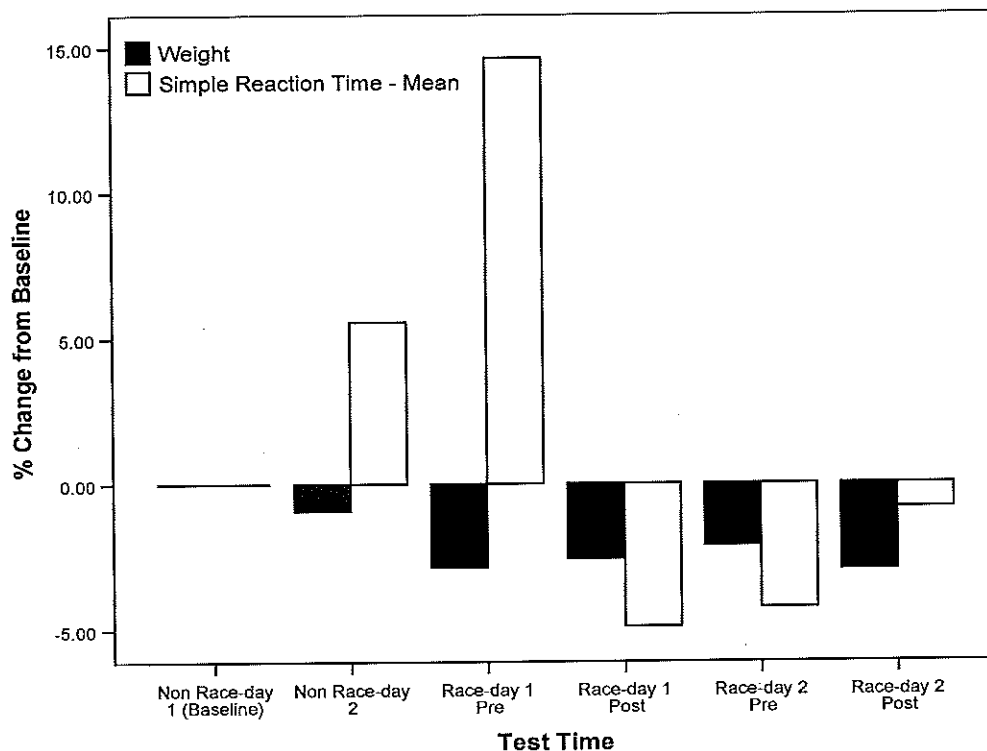
indicators of when to make their moves during a race. This strategy also relies on quick reactions to these cues, and a failure to initiate action at the instant planned may be the difference between winning and losing a race. Simple reaction time is usually a robust function, relatively unaffected by physiological changes, such as those associated with hypoglycaemia (Green et al., 1995). Despite this supposed resistance to change, almost 40% of all jockeys in Study 1 reported that they had experienced slow reactions at least once when they wasted.

The simple reaction time (SRT) CogSport subtest has participants respond by striking a designated key as soon as a stimulus appears on the computer screen in front of them. The authors of the test considered it to be a measure basic psychomotor function (Falleti et al., 2003). Figure 5.4 shows the fluctuations in Mike's weight and average speed of simple reaction time, measured serially across 2 race-days and 2 non race-days. The data are expressed as the percentage change from Mike's baseline recordings, which were operationalised as those from the non race-day when his weight was at its highest level.

In his interview Mike commented that he feels "sharper" when he wastes, an indication that he considers his reactions are faster than when he has not wasted. Mike's psychomotor response times, as displayed in Figure 5.4, were actually quicker than baseline levels on three of his four race-days, albeit by a small margin (1 – 5%). The obvious exception was his pre race-day 1 test, which was nearly 15% slower than baseline. This score, however, may be an anomaly considering his lack of familiarity with the test. In general then, Mike's psychomotor reactions appeared to be unaffected by his weight loss. Mike was able to react at least as quickly when at his lightest weights as he was when he was un-wasted.

Figure 5.4

Percent Change from Baseline in Mike's Weight and Mean Simple Reaction Time



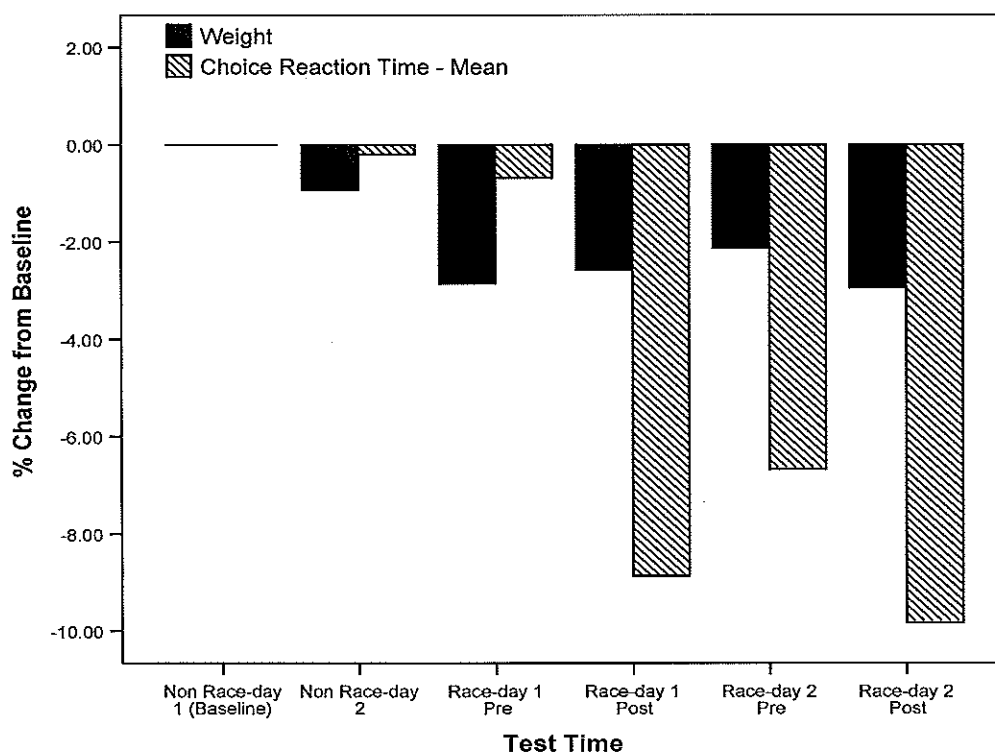
Decision-making. Jockeys are often presented with a number of options during a race, such as whether to move their horse into a gap in the field or hold their current position, and they must choose the best ones given their current situations. The dynamic nature of horse-racing, where horses are in constant motion and the majority of races last less than 2 minutes, ensures that rapid decision making is a critical cognitive function for jockeys. More than 40% of jockeys in Study 1 felt their decision-making speed was slowed by wasting.

The choice reaction time (ChRT) subtest of the CogSport battery measures the speed of decision-making. Participants are faced with a choice between two options and decide as quickly as possible which one is correct. Figure 5.5 shows the percentage change from baseline in Mike's weight and his average speed of decision-making. The figure shows a consistent pattern, where Mike's average speed of decision-making

scores were improved from baseline levels on all his race-day tests. Specifically, three of Mike's four race-day decision making test scores were in excess of 5% faster than his baseline processing score, whereas his other score, his problematic pre-race day 1 test, was less than 1% faster. This slightly faster processing means that Mike was capable of quicker decisions on race-days than he was on non race-days, and may therefore have been better able to take advantage of the fleeting opportunities that he was presented with in a race.

Figure 5.5

Percent Change from Baseline in Mike's Weight and Mean Choice Reaction Time



A second pattern was also evident in Mike's decision-making scores. Specifically, he processed information faster at both his post race-tests than he did at his corresponding pre-race tests. His post race-day 1 test score was nearly 10% faster than his pre race-day 1 test, and his post race-day 2 score was nearly 4% faster than his corresponding pre race-day 2 score. This pattern suggests that Mike's self-reported

“sharpness” on race-days may not peak until he has completed his duties, a time when it is no longer of use to him in his working life.

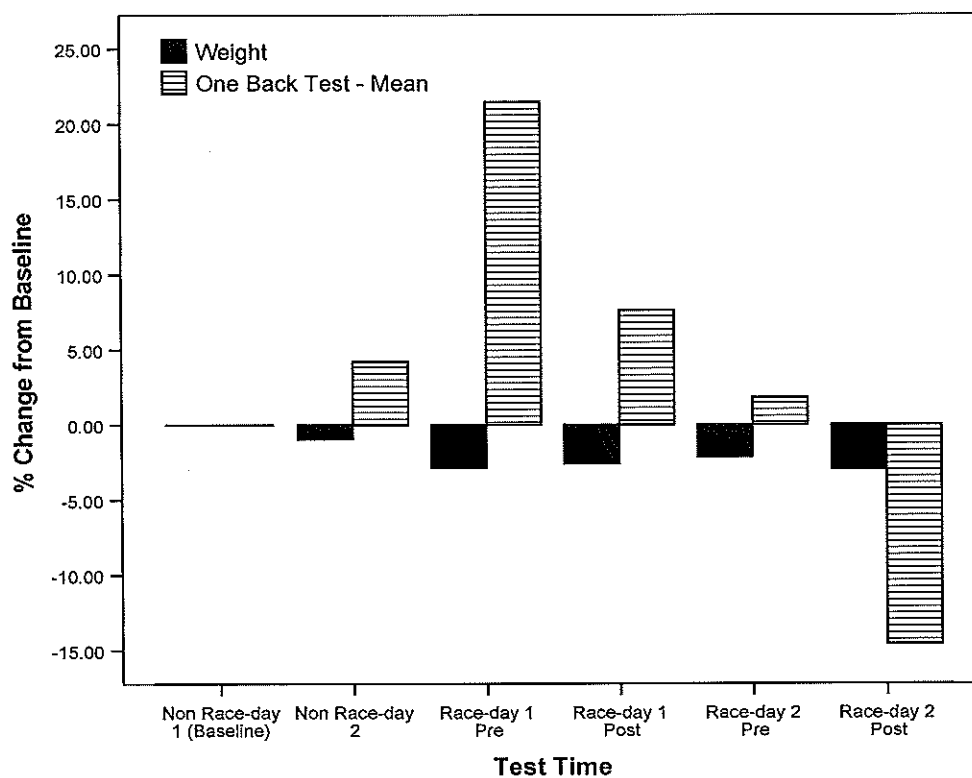
Reasons for Mike’s slightly faster processing at the completion of race-days than at the beginning of race-days are unclear. The variations, however, do not appear to be related to Mike’s weight. Previous research has suggested that circadian rhythms can cause changes in cognitive function (Carrier & Monk, 2000), with improved performance associated with increased body temperature. It is possible that Mike’s body temperature changed throughout the course of his race-days, increasing as he engaged in more exercise, and resulting in faster decision-making. A second plausible explanation is that the changes observed were a product of a reduction in pre-occupying cognitions that occurred over the course of race-days. Specifically, Mike may have had such things as race tactics and his pre-race routine competing with the demands of the test for his cognitive resources at the pre-race sessions, cognitions that were not present at the conclusion of his race-days.

Working memory. Many important activities in a jockey’s working life rely heavily on the efficient functioning of his or her working memory. For example, jockeys do regular head-checks throughout a race, quick glances to see which horses are in their immediate vicinity, before they refocus on the field in front of them. Jockeys must remember their position relative to their rivals so that they can strategise effectively from moment to moment and give their mounts the best chance of winning. Over 40% of the jockeys surveyed in Study 1 reported that they had experienced problems with working memory associated with wasting. Findings relating to the memory function of wasting wrestlers have been equivocal, with one group showing decline (Choma et al., 1998), and another showing steady memory performance (Landers et al., 2001).

The one-back subtest of the CogSport battery assesses working memory by asking participants to recall recently presented, but now obscured stimuli. Figure 5.6 shows the percentage change from baseline levels of Mike's weight and average speed of working memory. Mike's series of scores on this test of cognitive function show that three of his four race-day test scores, taken when his weight was at least 2% below baseline levels, were slower than baseline speed. His pre race-day 1 score (21.5% slower than baseline) was again his slowest, and only his post race-day 2 score was faster than baseline. These results appear to indicate that Mike's working memory was impaired when he was at his lightest weights, in line with the findings of Choma et al. (1998) relating to the memory function of wasting wrestlers.

Figure 5.6

Percent Change from Baseline in Mike's Weight and Mean One Back Test Response Speed



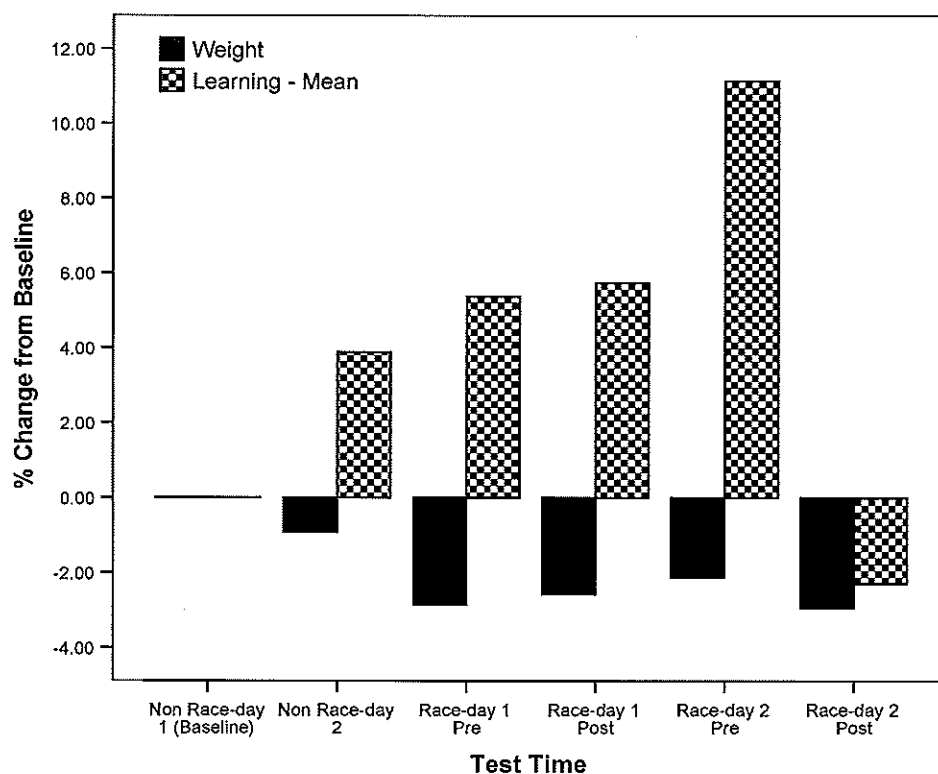
A closer inspection of Figure 5.6, tracking Mike's working-memory scores temporally from his first to his last race-day score, shows that he made steady and consistent improvement in his speed of processing over the course of his four sessions. This improvement was surprising, considering that practice effects were not expected to influence participants' scores after their first exposure to the test (Collie, Maruff, Darby, & McStephen, 2003). Viewed in this light, Mike's working memory data appear to support more closely the findings of Landers et al. (2001), that weight loss has no significant effect on working memory function.

Learning. According to most jockeys, careful and on-going consideration of the trends and patterns of racing can affect the outcome of races. In essence, jockeys continually adjust their tactics based on their knowledge of factors such as track conditions, the recent performance history of their rivals, and the weather, to improve their chances of winning. The cognitively complex ability to problem solve is most obviously manifested in the strategising that jockeys do prior to a race-meet when they plan tactics, also referred to as *doing form*.

The CogSport learning subtest asks participants to deliberately develop strategies in order to remember pairs of stimuli for later recall. Figure 5.7 shows the percentage change in Mike's weight and average speed of processing on the learning subtest. This figure shows a similar pattern of processing speed to that evident in Mike's decision-making scores, with slower than baseline processing when Mike was at his lightest weights, evident at three of his four race-day test sessions. The only exception to this slower processing occurred at race-day 2 post test, when Mike's average speed was approximately 2% faster than baseline. This means that Mike may have taken considerably longer to plan and update his tactics for each race, to the point where he may not have had time to complete his *form* work before a race began.

Figure 5.7

Percent Change from Baseline in Mike's Weight and Mean Learning Response Speed



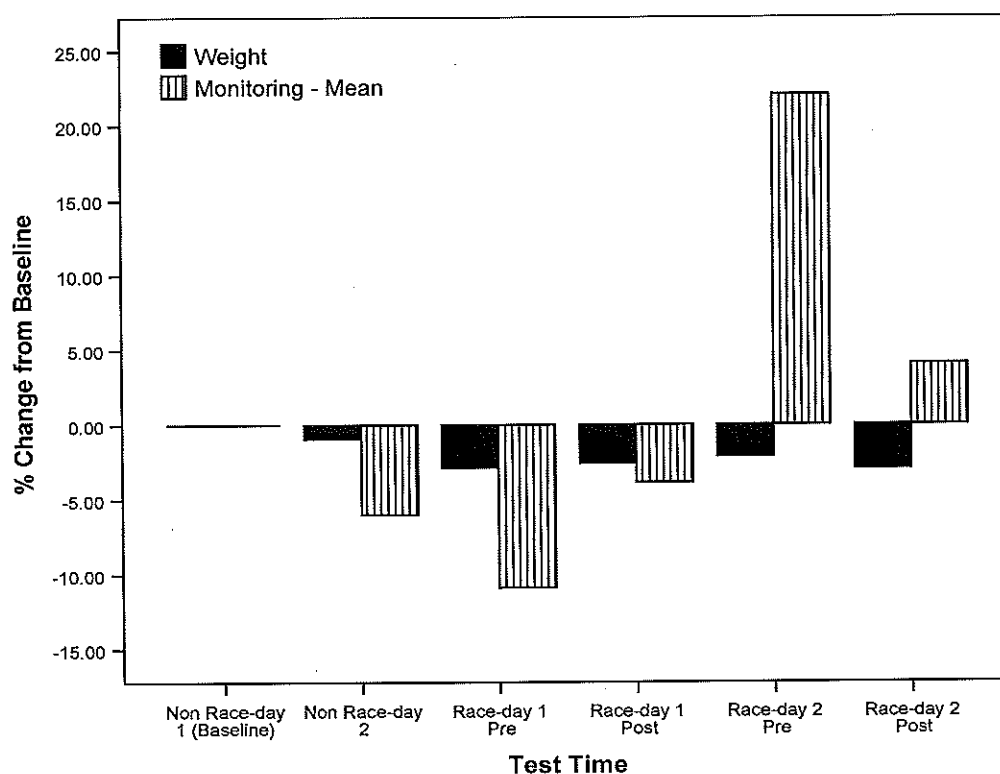
Attentional function. During a race, jockeys need to continuously monitor the distance between their mounts and other horses in the field, for the sake of their own safety, and so that they can manoeuvre their mounts into more advantageous positions. This task is akin to driving a car in heavy but fast moving traffic, and requires jockeys to divide their attention between a number of stimuli (i.e., other horses in the race), to sustain their vigil for the duration of the race, and to respond instantly if the need arises.

The monitoring subtest of the CogSport test battery requires participants to track a number of randomly moving visual stimuli presented on a computer screen, responding when one or more of the stimuli moves beyond fixed boundaries on the screen. Figure 5.8 shows the percentage change from baseline levels of Mike's weight and average speed of monitoring responses. This figure shows no clear pattern connecting the jockey's monitoring speed with either his weight or competition. Mike's

response speed was faster than baseline on both his race-day 1 tests, by as much as 10%. This trend was reversed on Mike's second race-day however, where both pre and post race scores, and his pre race test in particular, were slower than baseline level. On this day, Mike may not have been able to monitor the changes occurring during the race as quickly as he was capable of in his was pre-wasted state, and may have missed opportunities to improve his horse's position through his more sluggish performance.

Figure 5.8

Percent Change from Baseline in Mike's Weight and Mean Monitoring Response Speed



Mood. The most consistent finding relating to the negative psychological effects of wasting in weight-restricting athletes is that of mood disturbances. Affective disturbances related to wasting have been found previously in jockeys (Caulfield et al., 2003), and wrestlers (Choma et al., 1998; Landers et al., 2001), and were also prevalent among the jockeys participating in Studies 1 and 2.

In his interview, I questioned Mike about whether he notices any unexplained mood changes when he wastes, and he said he thinks his emotions are relatively stable. In reference to his normally calm state, he explained, "I'm a pretty easygoing guy anyhow. I'd rather just (pause) not confrontational. Just chill out, you know. It will work itself out. And that's me, that's my makeup, and I don't think that changes when I'm wasting". I asked Mike whether his wife would say he is moody, and he responded initially with mock indignation, before reiterating that he is not prone to emotional outbursts:

Well, no, no, no (laughing sarcastically). Well I don't really know. I don't think (pause) if anything I actually chill out. If anything, I go the opposite. Knowing that you can go the other way, that you can be irritable and snappy, knowing that, I actually go the other way; I chill out.

It is not obvious from this statement whether Mike becomes irritable himself, or has simply witnessed other jockeys respond this way to wasting, but he clearly expresses his belief in the potential for mood disturbances associated to wasting. Mike also suggests that he makes a conscious effort to suppress his emotions when he wastes knowing that he could be short-tempered if he didn't take the precaution.

Mike later acknowledged that his deliberate calming strategy is not always effective however, and that like many other jockeys he knows, he does become impatient when he wastes. Strangers who do not understand how little he wants to communicate at these times, and want to "chit-chat," are typically the source of his irritability. When I asked what upset him, Mike explained:

When you're getting close to the race-day and you're watching your weight, and small talk with people that you don't know, and they don't know what they're talking about, meaning that they ask just silly questions. I can't think of any [examples] at the moment. But you know, you're polite, you just cut it off [finish the conversation] and you move on. You've gotta go and make a phone call or whatever. But yeah, it's irritable.

Mike believes he can steer a conversation away from topics he does not want to discuss when he feels easily irritated, or make an excuse to cut the conversation short, and so his occasional bouts of moodiness do not require him to avoid social situations altogether. Nevertheless the previous two extracts illustrate a contradiction in Mike's statements about his mood states: first, he states that he is an emotionally stable person, unbothered by wasting, but later Mike says he gets irritated easily by "silly questions", a clear admission that he is actually bothered by his wasting. This contradiction suggests that Mike is engaged in a degree of impression management (Schlenker & Weigold, 1992), presenting himself and his sport in a socially desirable light to someone (i.e., the researcher) outside his cultural group.

Physical Effects of Wasting

Several authors have reported that athletes who waste experience serious physical and physiological complications associated with their weight loss, including cramps, dizziness, fatigue, deficits in physical performance, and impaired tissue growth (Fogelholm, 1994; Walberg-Rankin, 2000). During his interview, I asked Mike to describe any acute or chronic physical side-effects that he had encountered due to his wasting, including the timing and severity of these effects. I also asked him to indicate whether he had experienced any acute symptoms associated with heat illness during the experimental testing period in this study.

Acute effects. In addition to being psychologically unaffected by wasting, Mike reported being largely untroubled by acute physical side-effects when he wastes. Mike's assertions of being asymptomatic are surprising, given the frequent and substantial wasting that he engages in, usually amounting to a 2% loss of his total body weight three times a week. Mike claims regarding his physical response to wasting are also in stark contrast to the reports of jockeys surveyed in Study 1. These jockeys averaged five

separate adverse physical reactions associated with their weight loss, and more than 40% experience seven or more undesirable physical symptoms when they waste, and over 30% experience 8 or more such symptoms.

One of the few physical effects that Mike had experienced when he wasted was feeling physically fatigued. This effect was also experienced by more than three quarters of the jockeys surveyed here in Study 1, and nearly half reported that they *often* or *always* experienced the physical fatigue Mike described. This fatigue happened to Mike only when he wasted to ride at his minimum weight of 51 kg, and, although the weakness was present on race-days, he did not think that it was serious because these light rides were a rarity for him. Mike said that his fatigue manifests itself in a loss of muscular strength, which can make it difficult to pull the reins of the horse hard enough at the end of a race to slow the horse down. Mike feels that the fatigue he experiences on these rare occasions does not impair his ability to ride, and most important to him, does not affect the outcome of his races.

As was the case with the mental fatigue he experienced, Mike commented that his physical fatigue is most apparent after his race-day duties are complete. He noted, "When you knock off [complete your jockey duties] I let myself down, and I feel a bit fatigued, but I'm not bad". Mike did report feeling more fatigued at his post race-day testing sessions than he did at his corresponding pre race-day test sessions. It would have been enlightening to observe how Mike coped with the physical chores around the farm and his home in the days immediately after a race-meet to gauge whether this fatigue effect increased further, however it was beyond the scope of the present study.

Despite a belief that fatigue is only a minor hindrance to him, Mike acknowledged that he sometimes takes steps to overcome the physical toll that wasting exacts on him. For example, he commented that when he thinks that his lack of physical

strength may be problematic at the completion of a race, "I'll tell the clerk of the course to help me pull up [stop] my horse when I know that the horse is a hard horse to slow down, and I've wasted." Further, Mike went on to say that if he feels himself becoming weak on race-days he will eat something to restore his strength. He also conceded that this strategy for overcoming fatigue was problematic. Mike described the dilemma that he faces, along with other jockeys who rely on food restriction to manage their weight, explaining that after eating a restorative snack, ". . . hopefully you're still under the weight. And if you're not, well you've gotta have something [to eat]. Experience tells me I've gotta have something, because I'll be no good to nothing." Mike realises that food is both his friend, in terms of the energy it provides him, and his foe, in that whatever he eats will also contribute immediately and directly to his body weight.

A second acute physical consequence of wasting, undoubtedly related to the practice of dietary restraint so common in jockeys, is that of hunger. Mike was resigned to the fact that he would live in a state of near permanent hunger from an early age. In response to a question about his weight management activities as a young jockey, Mike recalled, "Yeah, sure you were hungry, but you were a jockey. That's what jockeys have gotta be: hungry." Mike appears to be fatalistic about this consequence of his restrictive diet, but downplayed the seriousness of the hunger pains he encounters as a mere annoyance. He feels hunger is a transient state, and one that he can control by focussing his attention elsewhere, waiting until the feeling passes, or such time as he can eat without worrying about his weight.

Mike thinks that his refusal to drop below his comfortable minimum riding weight has buffered him against some of the more serious side-effects of wasting reported by other jockeys. He went so far as to say that his careful weight management may actually have given him a physical advantage over his more wasted rivals. Mike

noted that, "If they're [other wasting jockeys] not feeling good, then that's good for me 'cause then I can go and beat 'em. I'll beat 'em in a tight finish. I'd rather have a weak jockey on [riding against me] than a strong one." Mike's point is that he will have a strength advantage over jockeys who are feeling physically fatigued after wasting more heavily than he has, and that his superior strength will give him a winning edge in a close race. Mike's statement also highlights the individualistic and highly competitive nature of the sport, where self-employed jockeys continually compete against each other for rides and wins.

When I asked whether he was perhaps atypical of the general jockey population because he does not experience many negative physical effects when he wastes, Mike replied that he has noticed other jockeys look unwell at times, but that he thinks it happens infrequently. For example, when I asked Mike if many jockeys ride when they are physically unfit to do so, he stated, "Well, from time to time you'll see jockeys pretty (pause) looking very terrible. But they'll push themselves. Do I think they push themselves too far? Some do, yeah." Mike did not explain what he meant when he said that some jockeys push themselves too far with their wasting, but it is certainly his opinion that wasting is physically problematic for only a small minority of jockeys.

Chronic effects. Frequent and continued wasting can have chronic, as well as acute, consequences (Walberg-Rankin, 2000), and Mike raised an interesting point about the potential for lasting physiological effects in his interview. Mike was unequivocal in his beliefs about the inevitability of weight gain as young jockeys approach adulthood, and that the only way to control this was by restricting dietary intake. He mentioned several times that this approach may have permanently halted his physical development, stating at one point,

Well, think about this: I have two brothers and one sister. My sister is older than me, and my two brothers are younger than me, and they are all a foot taller than

me. So, did I stunt my growth by not eating enough at that young age? I don't know. I wouldn't say a foot, but (pause) well, actually it [the height difference between Mike and his siblings] would be about 12 inches. They're all quite tall, a lot taller than me. So you tell me.

Few studies have been conducted examining the link between long-term dietary restriction and impaired growth, but Walberg-Rankin (2000) suggested that the potential is real. Later, when discussing the options available to another current young jockey who was experiencing weight gain, Mike returned to the theme of his impaired physical development. He suggested, "You know, does he [the young jockey] want to stunt his growth just to be a jockey? Well, that's what I did. And I'm pleased I did it." Mike was clearly cognisant of the consequences that his wasting may have had on his growth, but was satisfied with his choices.

Weight-Management Advice for Other Jockeys

Previous weight-management research examining jockeys indicates that their primary source of information about diet and weight management is current or former jockeys (Leydon & Wall, 2002; Moore et al., 2002). Further, research has shown that the weight-management information that jockeys pass on to each other can be erroneous at times (Labadarios et al., 1993). I asked Mike whether he had any weight-management advice for other jockeys, and in particular for jockeys who had weight problems.

Perhaps surprisingly, given his age and experience in the racing industry, Mike did not have a great deal advice for other jockeys about how to manage their weight. Mike reiterated his opinion that long-term weight management comes down to a simple strategy of limiting energy intake and maximising energy output. He commented again that, "There are no shortcuts. I mean there's ways of managing it, but the only way to lose weight is eat less and work hard. And that's what I did (pause) and sauna a little." The last phrase of Mike's comment, regarding sauna use, is intriguing. Mike had stated previously that he watched older jockeys continually dehydrate themselves to lose

weight during his apprenticeship, and determined that he would not adopt this quick-fix remedy. It appears that Mike too has eventually resorted to regular dehydration, albeit to a lesser extent than the jockeys of his youth. Furthermore, Mike is now carrying on the jockey tradition of passing on this strategy to younger jockeys, both by his actions and his words.

Mike concluded his advice to other jockeys about weight management by proposing a question. He asked, "I guess the question that could be asked to younger riders is, 'What would you do if you got too heavy?'" His question, intended to prompt aspiring professional jockeys to consider life after racing, is again underscored by a belief that weight gain is inevitable for most young jockeys. Mike believes that the latest cohort of jockeys currently in, or entering, the industry will quickly become too heavy to have a long-term career in the sport, and therefore must consider career options outside race-riding.

The Racing Environment

With over 20 years of professional riding, and experience of the racing environment in two different countries, Mike was asked to suggest any changes that he thought would make weight management easier for jockeys. His comments revolved around the issue of the minimum-weight scale. Mike thinks that the scales which currently exist in Victoria have become increasingly unrealistic in recent years. In the following extract, he stated clearly that:

I think they [Victorian racing's governing body] could raise the minimum weights. I just think that by putting too high (pause) too high demand, I just think that [the attitude held by racing officials that] 17 and 18 year old kids can ride at 48 kilos is just ridiculous. Or even [requiring] grown men like myself to ride 48, 49 kilos [is ridiculous].

Mike believes that there are an ever diminishing number of current jockeys who can achieve the lightest weights safely, a position Hill and O'Connor (1998) support. Mike

thinks that 53 kg is a more attainable weight for the majority of current jockeys, a rise of 1 kg in the current Victorian minimum weight for most races.

Mike made a further point about the minimum-weight aspect of the current Victorian rules of racing that he thinks increased the pressure on weight management for jockeys: not only are minimum weights too low, but the lowest minimum weights are usually assigned to the most important races. Mike makes his attitude to the sport's rule-makers abundantly clear in the extract that follows:

They [the lowest minimum weights] are the weights they have for these Melbourne Cups, Caulfield Cups, and other races, handicaps (pause) See, 51 or 52 [kg] is around the minimum [normally], but when these big races come they drop it down to 48. Now, they shouldn't. They should bring them up to 52, keep everything around 52.

Mike thinks that it is illogical to keep minimum weights at a reasonable level for the majority of the season, only to lower them when the most important races on the racing calendar are held. In his opinion, if 52 kg is a reasonable minimum weight for one race, then it is a reasonable minimum for all races.

Case Summary

Mike regularly rides at weights in the middle of the weight scale operating in Victoria, and has done so for the majority of his long career. Despite his perceived ease with weight management, Mike regularly loses up to 3% of his total body mass, before regaining it, and repeats this cycle twice to three times a week over the course of the entire racing calendar. This continual pattern of weight loss and regain is achieved through a carefully planned regimen involving manipulation of energy balance and body fluid. Mike's key wasting methods include food and fluid restriction, and body fluid loss achieved via hot baths and saunas. These methods are consistent with those described in past research on jockeys and other weight-restricting athletes, but the

dehydration strategies contrast with Mike's stated belief in achieving weight loss "naturally".

Fortunately, Mike reported being relatively asymptomatic, both psychologically and physiologically, in response to his weight-management practices. Actually, a case could be mounted, based on the evidence of some CogSport test results, and Mike's subjective reports, that the heightened arousal associated with competition (i.e., race-day) is a more powerful influence on his general functioning than his weight loss. For example, several of the functions assessed by the objective cognitive test battery were improved when Mike was at his lightest weights, times that also coincided with his race-day activities. Mike also reported that he becomes more alert and energetic as race-day approaches.

Despite indications that some aspects of this jockey's cognitive and physiological function are enhanced by competition effects, wasting, or both, there is also evidence that other functions are differentially affected. For example, Mike's problem solving response speed was slowed at three of his four race-day tests compared to baseline, and a similar pattern was evident in his working memory data. Mike also associates other negative psychological effects with wasting, such as mood disturbances, but because they are rare and usually manifested outside the context of race-days Mike does not think they are particularly debilitating. Acute physiological effects, such as physical fatigue, and an associated loss of muscular strength are evident for him on both race and non race-days, but Mike does not consider these symptoms serious either. Mike's assertions of trouble-free wasting must be viewed with some scepticism though, due to the occasional contradictions in his statements, and therefore his self-reports should be considered a conservative representation of his overall responsivity to weight loss.

Mike believes that elements of the professional racing environment exacerbate the problem of weight management, and suggested that changes should be made to ease the burden on jockeys. In particular, he believes that the minimum-weight limits existing in Victoria have become unrealistic for the majority of jockeys. Despite the perceived ease with which Mike manages his weight, and the lack of negative effects he associates with his weight management, he thinks lifting the minimum-weight scales is a simple strategy to off-set the gradual and population wide increase in body mass over time that has made the current weight scale increasingly problematic for jockeys.

Bryan

Background

Personal profile. Bryan is another fully licensed jockey, currently riding in Victoria, and is the youngest of the four jockeys described in this chapter. He is an extroverted 20-year-old single male, with a mid-secondary school education. Like middleweight jockey Mike, Bryan thinks he has a “natural jockey’s build”: lean, with strong shoulders, arms, and thighs from his riding. Bryan did not know his height when I asked him for it, but added light-heartedly, “I probably wouldn’t want to grow much more (laughing).” This apparent indifference to his height may seem surprising, given that physical stature has been cited as a reason for aspiring jockeys first entering the profession (Speed et al., 2001), but Bryan’s jibe actually reflects the reality that weight is the key physical criterion for longevity as a jockey. Bryan currently boards with a married couple in suburban Melbourne, the capital of Victoria, close to some of the State’s major metropolitan race-tracks and training venues.

Current riding status. Bryan recently finished the final (i.e., fourth) year of his jockey apprenticeship, and is now a fully licensed category A jockey, able to ride in all flat races at metropolitan and country race venues in Victoria. Bryan is a relative novice

in the racing industry, with only 1 year as a fully licensed jockey to his name, less than half the average professional experience of the jockeys surveyed in Study 1, and considerably less than veteran rider Mike.

Bryan was not sure how much time his weekly jockey duties usually demand each week, but said he continues to ride track-work regularly, in addition to race-riding on 3 or 4 days, and performing his weight management activities. Bryan is already receiving plenty of regular race-rides, and said that the majority of his riding engagements are at the lucrative metropolitan race-meets. Bryan also gets regular invitations to ride interstate at various cups and carnivals. He estimated that he has between 20 and 30 race-rides most weeks, a high number when compared to the average of just over 10 rides per week reported in Study 1, and particularly considering his relative inexperience. In comparison, veteran jockey Mike averages approximately 20 rides per week. Bryan is a lightweight jockey by Victorian standards, and his frequent riding engagements are due in some degree to his continuing ability to ride at weights that other jockeys can not attain. In the following extract, Bryan succinctly sums up the professional advantage that lightweight jockeys have in their industry, and his desire to maintain it:

I think, for me, if I can keep really light it's a big advantage, because when the big races come along there's lots of rides where they're under 51 [kg] sort of thing, and there's hardly anyone that can do it [achieve such low weights]. And that's where most of my rides will be. I'm a lightweight, so it's pretty important for me to be light.

As a postscript to this statement, Bryan noted ruefully, "It took me 46 rides to ride a winner. I didn't think I was ever gunna ride one; it was that long." His strike rate of less than 10% is well below that of the top echelon of Victorian jockeys (Virtual Formguide, 2006), and suggests that he is still a relatively minor figure in the industry.

Nevertheless, it appears that Bryan has continued to receive regular race-rides, despite

the lack of success he has experienced in the early part of his career and his relatively low status, further underlining the importance to him of keeping his weight low.

Riding history. Unlike Mike's family, Bryan's close relatives did not have any involvement in horseracing. Bryan's upbringing and induction into the jockey fraternity was virtually the polar opposite of Mike's. Although he lived in a rural area, Bryan had never ridden a horse before deciding to become a jockey, nor had he visited a race-track. When I asked Bryan about his introduction to racing, he described his first encounter:

I was in year 8 or 9 [second or third year of secondary school]: 15 or 16 [years of age]. And I was walking to football training, and I walked past the racecourse, past the stables there, and my boss, Jimmy [pseudonym for Bryan's Master], he come out and asked me if I wanted to be a jockey. I was small, and me mates were a lot taller than me, and I touched the horses, and it sort of went from there.

Although he had little knowledge of the industry, and his introduction to racing came unexpectedly, Bryan's simple love of horses and horseracing is the most common motive jockeys give about entering the racing industry (Speed et al., 2001).

After his serendipitous encounter on the way to the football ground, Bryan soon went to work for the trainer he met, labouring after school most afternoons and on weekends. Bryan's parents did not want him to leave school until he completed year 10 of secondary school, so he continued to work part time for approximately a year at this time. Over two thirds of the current Victorian jockeys studied by Speed et al. (2001) left school at year 10, and only 17% completed their final year of secondary school. Upon finishing his year-10 studies, Bryan left home to take up a formal jockey's apprenticeship with the trainer, who had relocated his stables by then to another regional area of Victoria. Bryan relocated twice more, following his master, before finally arriving in Melbourne to complete the last year of his apprenticeship with a second trainer. Bryan described his reactions to all these relocations:

I didn't think I'd ever leave [his hometown], but now, I don't think I'd move back there, to tell the truth. I took it pretty well, I think. I found it harder leaving school and leaving [town where Bryan began his apprenticeship], leaving [master's family], than I did leaving [hometown]. Don't you tell mum and dad that, though (grinning widely).

This extract illustrates the intense bond that can be formed between a young apprentice and his or her master, a relationship that can approximate or even replace that of a traditional parent-child dyad. Importantly, Bryan also said he "lived with" his master's family for 3 years, and his choice of this phrase, as opposed to "worked for" or "stayed with," is further evidence that Bryan has a connection with these people that goes well beyond the scope of a typical employer-employee relationship. For Bryan, the bonds he formed with his master's family were so strong that, when the time came, he actually found it more difficult to leave them than he found it to leave his family of origin.

On completing his apprenticeship and gaining his full jockey's license, things did not go smoothly for Bryan. When I asked Bryan to describe his transition into the senior jockey ranks, he summed up his experience in one word: terrible. Bryan reiterated that it took him a long time to ride his first winner, before going on to describe the erratic progress he made in the past year:

I only rode on the weekends when I first started [as an apprentice], so it took a fair while to ride a winner. And then, once you get a few on the board [ride a few winners], you sort of get on a bit of a roll until your claim runs out, and then you sort of slow down again. That was a slow start; towards the later part of the year it was pretty good.

It is clear from Bryan's comments that the transition from apprentice to senior jockey has been difficult for him, and his confidence seems to rise and fall in concert with the number of winners he rides. The extract also underlines the important role that an apprentice's weight allowance plays in enticing owners and trainers to engage them to ride their horses, and how out-riding this claim can then be problematic. This young

apprentice grew in confidence as he rode winners, but each winner brought him closer to the point where he would lose his weight claim, a key weapon in securing rides.

After his self-confessed slow start, Bryan now relishes his life as a professional jockey, and wants to continue riding indefinitely. Bryan reflects on the possible length of his career in the following excerpt, stating the he wants to continue to ride,

... as long as my body lets me, and injuries (pause) I think that stops a lot of people. But I'll probably (pause) I'd like to ride until I'm 40, I suppose: if I'm fit. Like, there's people riding older than 40, but I think (pause) if I can set myself up now, then I'll probably finish at 40 or so.

This young man obviously intends to pursue a long-term career as a professional jockey. He also thinks he may become a trainer after he retires from the saddle. The frequent pauses for thought in his reply probably indicate that Bryan's future plans are little more than vague aspirations at this stage, but the lack of detail he offers about his future is not unexpected from someone so young and inexperienced. Nevertheless, Bryan identified injury as a key barrier to career longevity for jockeys, and his observation that this problem could be a major obstacle impeding his progress is validated by both the current and former jockeys surveyed. In Speed et al. (2001), this 36% of retired jockeys surveyed cited injury as the main reason they retired from racing. Other injury surveillance data show injury rates among jockeys are high, and that a large number of the injuries they incur are potentially career ending (McCrory et al., 2006; Turner et al., 2002; Waller et al., 2000).

Study Participation and Engagement

In all, Bryan participated in two pairs of race-day tests sessions, and two non race-days sessions, where he was weighed, filled in a weight management record sheet, listed any physiological and psychological symptoms of heat illness, and then completed a 20 minute CogSport test of cognitive function. Bryan's two race-day tests were conducted in April, 4 days apart. Bryan's first non race-day test was conducted 2

days after his last race-day test, and his second non race-day tests was conducted approximately 1 month later in June. Bryan also participated in one face-to-face in-depth interview lasting about 1.5 hours, conducted at his home.

Bryan was cheerful and compliant during all his contact with the research team. For example, he was an eager participant in the study briefing and familiarisation session, and remarked at this time that he looked forward to receiving his results at the completion of the study. His participation was his first experience of scientific research, yet Bryan showed no signs of nerves, smiling and laughing readily as he talked easily with the research staff and other participants who were present. He even engaged in light-hearted banter with the other jockeys involved in the study, saying that he would outscore all of them on the computer test, despite having little idea of what the test actually involved. Bryan arrived in a timely manner to all his subsequent appointments, and promptly returned phone messages left for him when test session times were being negotiated.

Bryan's optimistic personality and engagement in the research process is perhaps best illustrated by his demeanour at the completion of his first race-day of the test period. Bryan rode several horses that narrowly missed running a place (i.e., first, second, or third) on this day, and therefore he did not receive the extra cut of prize money that such a finish would have brought. Further, he was nearly thrown from his mount in the last race of the day, but managed to cling precariously on to the horse's neck for several seconds until he was able to regain his balance and slow the horse down. When I asked Bryan if he was OK, after what others perceived to be a very frustrating day for him, he joked, "Yeah. That one [his bad tempered mount] was a bit of a goat (laughing): It tried to dump me. That's racing." Despite the combination of events, any one of which could have ended his participation in the study for the day

prematurely, Bryan wanted to continue with the testing, and once again engaged in casual conversations with the other jockeys and research staff present.

Current Weight Status

I asked Bryan to describe his typical race-day weight, his day-to-day or pre-wasting weight, and his perceived ease with weight management, in order to gain a detailed picture of his current weight status. Measures of his body mass on race and non race-days were also taken to compare with his self-reported weight estimates.

Typical riding weight. In his interview, I asked Bryan to discuss his usual weight range, including his typical riding and pre-wasting weights, in order to establish the beginning and end points of his regular weight management activities. Bryan initially offered estimates of between 51 and 52 kg as his usual riding weight, and 54 kg as his typical pre-wasting weight. Bryan added that he thinks 54 kg is close to the maximum weight he could reach at the moment, even if he allows his weight to go unchecked. When commenting on his weight at the conclusion of a recent holiday, he noted, "I think if I just ate like a normal person, I don't think I'd get much heavier [than 54kg]. Like, I'd get to 55 [kg] and that'd be about it." Bryan believes that his weight "levels out" after a period of adjustment, similar to the notions of set-point and settling point theory (Keeseey, 1993).

In contrast to his assertions about having a static upper weight limit, Bryan commented that his lowest achievable weight rises when he is not riding regularly, if, for example, he is suspended or goes on holidays. Bryan described the effect a short break can have on his riding weight:

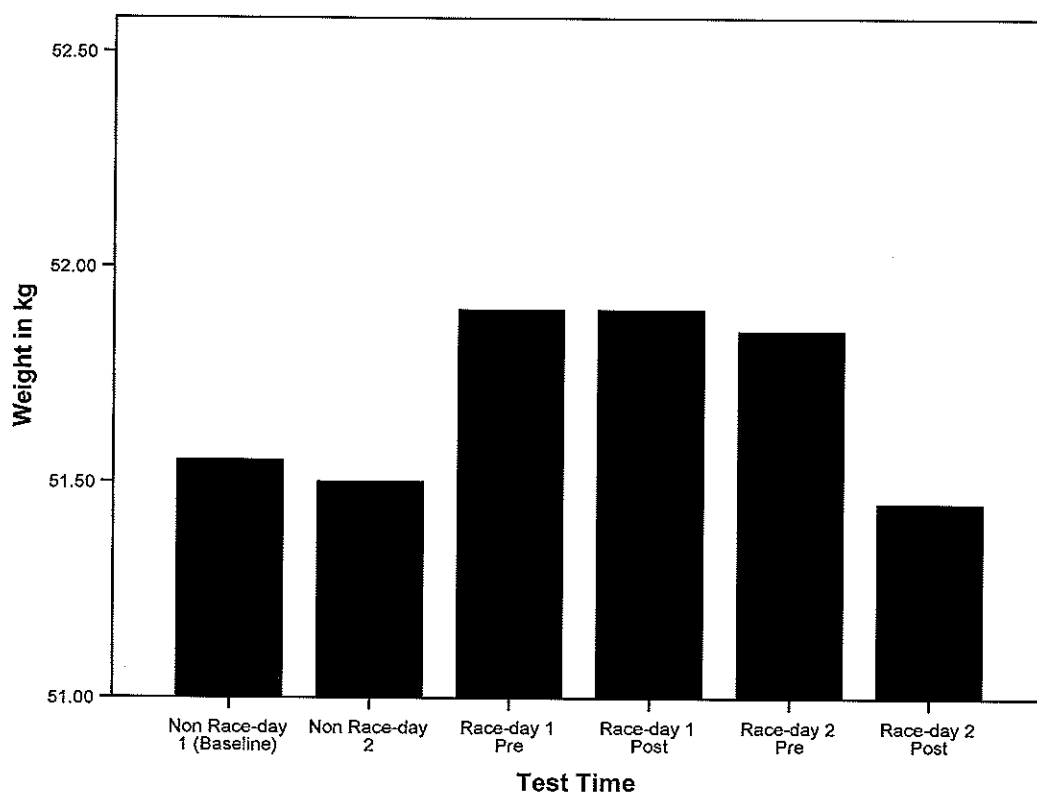
I went on holidays for 3 weeks and come back, and I would've been 54 [kg]. I generally weigh about 51.5 [kg], and it's taken me to now [to get back to my normal weight]. I come back (pause) Oh, I've been back a month now, okay. And now I've sort of got down to the 51 [kg] mark, so it's taken (pause) it took a fair while to get it off [lose the extra weight]. And once it's off, it usually stays off; I can maintain it.

Bryan suggested that he takes longer to lose the weight he gains than he does to gain the weight in the first place, but that once he re-establishes his typical weight he can maintain it within an acceptable range indefinitely. Bryan continued his story about his recent holiday and subsequent return to racing, but seemed to contradict his earlier statements about returning gradually to his typical minimum riding weight. He stated, "A couple of weeks ago I was 54 [kg] and 2 days later I rode 52[kg]. So I had to be 51.5 [kg], and then that night [after completing his riding engagements] I was back up to 54 [kg]." Despite his initial claim that it took him a month to get his weight back down to his usual level, it appears that Bryan was able to achieve the weight loss he required in a matter of days. Further, he returned to his un-wasted weight of 54 kg almost immediately. This second comment about his adjustment from holiday weight gain implies that, although Bryan may favour gradual and systematic weight loss, he resorts to rapid weight loss when the need arises. The quote also suggests that Bryan's weight rebounds quickly to pre-wasting levels after an episode of rapid weight loss.

Bryan's weight was recorded six times, over the course of 2 race-days and 2 non race-days, and these measurements are shown in figure 5.9. The figure shows that Bryan's four race-day weights were within his self-reported usual range, varying from a low of 51.45 kg to a high of 51.90 kg. A check of the publicly available riding weights that jockeys supply to RVL as a guide for horse owners and trainers (Racing Victoria Limited, 2004b), revealed that Bryan's weight was listed as 50 kg, approximately 1 kg lower than what he reported as his usual riding weight in his interviews. Other racing industry statistics show that 11% of Bryan's rides have been have been at weights below 51 kg (Virtual Formguide, 2006), confirming that he regularly rides at the lowest end of the Australian weight scale, and is thus legitimately considered a lightweight jockey in this country.

Figure 5.9

Bryan's Weight in kg on Race-days and Non Race-days



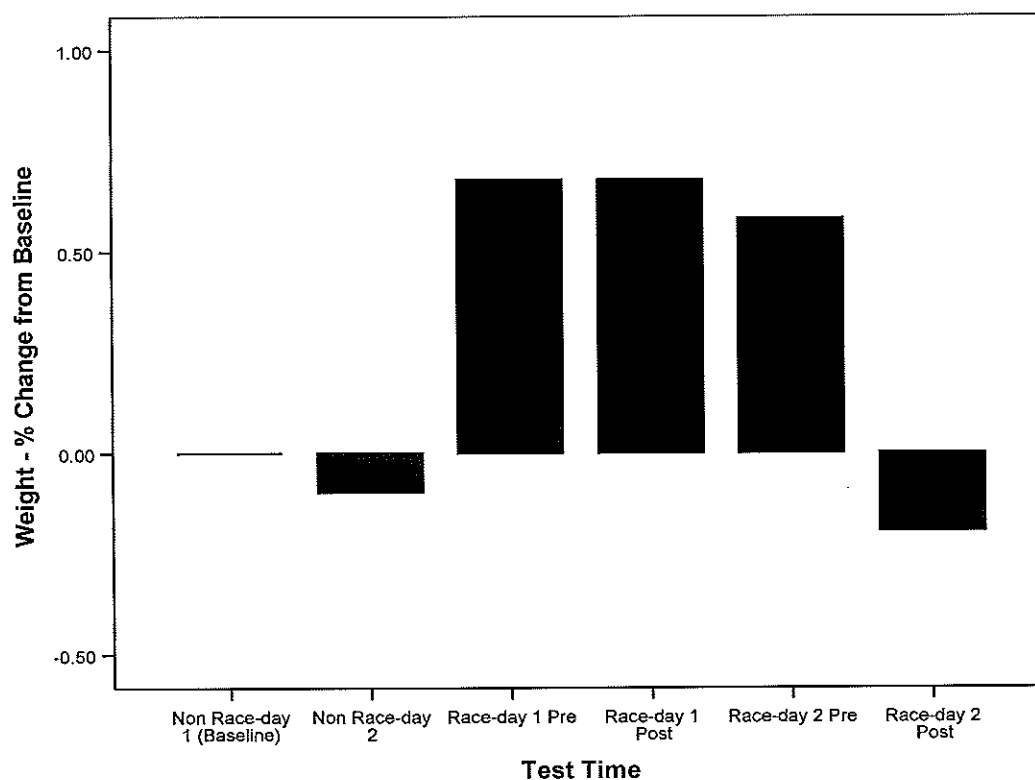
Extent of wasting. Bryan reported that he usually loses 1 kg in the days before a race meet, when asked to nominate the amount of weight loss he needs to reach his typical riding weight. This amount is approximately 0.7 kg less than the average weight loss reported by jockeys in Study 1, and also less than middleweight Mike's self-reported typical weight loss of 1.5 kg. Based on his estimates of a pre-wasting weight of 54 kg, a loss of 1 kg equates to a loss of approximately 1.8% of Bryan's total body weight. In terms of the frequency of his wasting, Bryan said that usually wastes three or four times per week on average depending on the number of race meetings he attends. He reiterated that frequent race-riding assists him maintain a steady weight because it forces him to keep his weight in check consistently.

Bryan's objectively measured race-day and non race-day weights tell a slightly different story than the one he described in his interview. His observed percentage

weight loss, shown in Figure 5.10, was less than half of that he reported in his interview, with his weights varying less than 1% over the course of his six test recordings. Bryan was actually heavier at three of his four race-day tests than he was at his baseline test (i.e., his heaviest non race-day weight). His lowest weight of almost 51.5 kg, recorded at his post race test on race-day 2, was 0.2% below his baseline weight, and was the only measure to fall below baseline. Bryan reported at this time that he had lost approximately 0.5 kg in the preceding 12 hours to achieve this weight.

Figure 5.10

Percent Change from Baseline in Bryan's Weight on Race-days and Non Race-days



Bryan's highest weight (51.9 kg) was recorded on race-day 1, not on one of his non race-days as expected. Bryan's low non race-day weights could be evidence that Bryan was actually wasting in preparation for an imminent riding engagement at these times. In support of this contention, Bryan recorded that he had lost a small amount of weight (0.5 kg) in the lead up to his second non race-day test, but he also indicated that

he had not intentionally lost any weight in the 12 hours prior to his baseline test. A more likely explanation for his low non race-day weights, given the small fluctuations in his weight over the course of all his test sessions, and that he did not approach his proposed pre-wasting weight of 54 kg at any stage, is that Bryan simply maintains his weight indefinitely at a level close to his desired riding weight. If this explanation is true, then Bryan does not engage in the short cycles of weight loss followed briefly by a day of respite, as middleweight Mike described, but instead is continuously acting to maintain a steady weight. Either way, Bryan's non race-day test scores are a good indication of his functioning when in a wasted state (i.e., below his natural weight) but without competition effects.

Perceived ease with weight management. One could assume that with only small changes in his weight required from day to day, Bryan manages his weight with relative ease. When I asked Bryan how difficult he currently finds weight management in general, he quickly confirmed this assumption, replying emphatically, "No worries, no worries at all." Further, Bryan stated that he has not had any trouble managing his weight in the past either. Mike also displayed this confident attitude to weight management, but Bryan has not had the benefit of years of experience to refine his regimen as Mike has. Perhaps Bryan's attitude is a reflection of his optimistic personality, as well as his actual ability to control his weight.

Although Bryan stated initially that he is able to maintain his current low riding weight easily, he later acknowledged that it has become more difficult for him as he has matured. For example, after saying that he had never had any trouble managing his weight, Bryan later added:

It's just (pause) coming out of my apprenticeship, and I got a bit older and filled out a little bit. [At the start of my apprenticeship] I could ride at 49 [kg] easy, and I would have been 47 or 48 [kg] stripped [without clothes and riding

equipment]. [Now] I walk around at 53 [kg], you know, but (pause) I shouldn't have much trouble.

The period of time immediately after the completion of their apprenticeships has been identified as critical for young jockeys' weights, where significant increases can occur due to a combination of the jockeys' growth spurts, and increased personal freedom over exercise and diet (Speed et al., 2001). Bryan is resigned to some degree of weight gain with his advancing age, but the pause before his final comment in the previous extract may be an indication that the subsequent remark about trouble-free future weight management is more hope than conviction.

The time since the completion of his apprenticeship training has not been the only period Bryan has found weight management difficult in his short career. When reflecting on his recent weight management efforts, Bryan identified another occasion when weight control becomes more problematic for him:

In the winter, I find it a lot harder to keep my weight down: It's cold, and you sort of eat more in winter than what you do in summer. In summer you have a lot more fluids, but for that part, you're also sweating it out, and it's [sweating] a bit harder in winter.

Like middleweight jockey Mike, Bryan finds the task of maintaining a low weight more difficult in winter. He explained in the previous extract that, in addition to diminishing his ability to sweat, the cold weather typical of winter in Melbourne is not conducive to outdoor exercise, and also seems to stimulate eating. In this way, Bryan believes his ability to manipulate both his energy balance and his body fluid balance is adversely affected during the cooler months of the year.

Beyond typical riding weight. Despite his already low typical riding weight, Bryan confirmed that he occasionally accepts rides below his usual minimum of 51 kg. Bryan quickly recalled several instances where he has dropped below his minimum riding weight, citing two recent rides:

My last two light rides recently were: [when I] went to Sydney for the Epsom handicap, that was less than 12 months ago, and I rode 49.5 [kg]; and then, about 6 months after that one, I rode 49.5 [kg] again.

Both the rides that Bryan mentioned were in feature races at major metropolitan race carnivals, and he made it clear that the financial rewards on offer were motives for his decisions to accept the offers. Bryan reiterated that wasting for these ultra-lightweight rides is the exception rather than the rule for him, adding, "I probably only really diet for this time of the year [the Spring Racing Carnival]. After the carnivals are over, you sort of, the lowest you have to ride is 52 [kg]." Interestingly, Bryan's test self-reports showed evidence of wasting on two race-days and one non race-day, which casts doubt on his claim that dieting is only a once a year tactic for him. Bryan also explained that he had abandoned a third more recent attempt to ride at 49 kg in an interstate carnival because he could not reach the weight in time. Fortunately for Bryan, another slightly heavier riding engagement (at 51 kg) was still available at the same race meeting, so he was not left without a ride. This aborted attempt at exceptional weight loss could be evidence that Bryan's age-related weight gain, referred to earlier, has diminished his ability to reach the ultra-low weights he was able to achieve in the past.

Weight-Management Methods

During his interview, Bryan readily provided details about his usual weight management methods, and the sources of his weight management information. Like the majority of his peers in Study 1, Bryan regularly uses a combination of methods to control his weight. When first asked what he learned about weight management, Bryan joked that he had not learned anything yet. He quickly added the familiar jockey pronouncement that he just watches what he eats, before adding that he tries to learn as much as he can from the people around him. In particular, Bryan spoke of an RVL

official, in contact with jockeys through the Training and Education Centre, whom he respects and who provides him with a great deal of guidance about weight management.

Manipulating energy balance. The first method Bryan discussed as part of his usual weight management regimen was his dietary control. Bryan said that he had not been careful in the past with his food intake, but had recently adopted an eating plan devised for him by a professional dietician, involving six small low-fat meals per day.

He described a typical day on the diet:

I'd get up [to go to track-work], and I'd have a glass of Sustagen, the milk drink, and then I'd come home [from track-work] and have a little bowl of Cornflakes. Then I'd go to bed [for a rest], and get up and I'd have lunch, and I might have some tuna or dry biscuits. Then, for afternoon tea I'd have a piece of fruit or bit of yoghurt. And then for tea I'd have a bit of rice or some chicken. Which is (pause) I never usually, I've never done that [eat regular meals] before, and it worked pretty good. I just, usually don't eat hardly anything.

Bryan's new diet is a revelation to him in that he eats frequently but has not gained any weight in the 6 weeks he has followed it. Despite the obvious importance of diet and nutrition in weight control and health, few jockeys appear to seek out the assistance of trained dieticians (Moore et al., 2002), and so Bryan may represent a new cohort of Victorian jockeys attempting to take a more informed and scientific approach to their weight management.

In addition to the increased frequency of his eating, Bryan has made other changes to his dietary intake. He talked sheepishly about his former diet:

I like going out for tea a bit, and I'd have a big meal and a few drinks, you know, chicken parmas and everything, Chinese and stuff like that. For breakfast, I don't usually eat much breakfast, but I'd have a fair few drinks of orange juice and that before lunch, and when I get up for work I have a coffee and what not. And I'd go out for lunch a little bit. And then I'd go to the movies, and I'd probably have a coke and some chocolate bullets or something. And I might get a bit hungry before tea, and I might have a drink and something to eat, and then I'd have tea.

The contrasts between Bryan's new eating plan and his former approach to energy intake are obvious. In the past, Bryan ate sporadically, consumed large meals high in fat

and sugar, and seemed to be perpetually hungry; now he eats at designated times, consumes low fat meals and snacks in controlled portions, and does not feel hungry. Leydon and Wall (2002) observed some underreporting of wasting in their study of jockeys, where some jockeys said they did not engage in food restriction despite evidence to the contrary. This underreporting may be evidence that dieting is the norm in this population, and may explain Bryan's earlier comments about only dieting in the spring. Perhaps it was that he only diets severely in the spring, and moderately for the rest of the year.

Although systematic dieting has been a recent addition to Bryan's regimen, he has always been a devotee of regular exercise for weight control. He thinks that the exercise he performs as part of his regular jockey duties, consisting largely of track-work and race-riding, provides the bulk of the energy output he requires to balance his energy intake. For example, he commented, "If you're riding every day it's pretty easy to maintain it [weight]. It's the exercise, the work; you're burning it [calories] off." Bryan's beliefs about the high energy expenditure of his work echo those of Mike, and the vast majority of jockeys in Study 1 who consider jockey exercise to be a key weight management tactic.

Bryan has no hesitation in adding extra physical activity to the exercise he also performs at work each day. He discussed his other exercise habits:

I usually go for a swim, a bit of walking when the weather fines up, and I'm not really lazy (grinning). It's hard when the weather's in the middle of a Melbourne winter. I take natural walks, but other than that just, if you're riding all the time, you just come home and go straight to bed.

Bryan's choices of additional exercise are revealing. He engages in two aerobically based activities (i.e., walking and swimming), but no resistance exercises. When talking later about his body shape, Bryan disclosed his motives for avoiding resistance training, saying, "If you went to the gym and worked out [lifted weights], you'd put muscle on,

and that'd put weight on." His comments highlight a belief held by some jockeys, and uncovered in Study 2, that resistance training increases muscle mass, which subsequently leads to weight gain because muscle weighs more than other types of body tissue.

Manipulating body fluid balance. Bryan is equally comfortable dehydrating himself as he is balancing his energy intake and expenditure, and, like middleweight jockey Mike, uses a combination of body fluid loss methods to waste. For example, Bryan described a recent and typical sweating session:

Well, yesterday I lost just over a kilo. And I would've been in the sauna for ten minutes, maybe fifteen minutes, and then I get out and get in the hot spa, about 37 to 38 degrees. And [the spa] still keeps you sweating. Then I'd sit there [in the spa] for ten minutes. Then I'd get back in the sauna for ten [minutes], back in the spa for ten, then jump back in the sauna for ten.

Bryan said he often uses the sauna "to get off the last half a kilo or something [on] the morning of the races." He added that he can lose up to 1 kg of body fluid in the sauna with ease, but than any more than that can be problematic because of the psychological and physical effects that occur for him beyond this level. Bryan lost 0.5 kg using the spa and sauna for about 1 hour prior to his second non race-day test, but did not record any dehydration sessions in the 12 hours prior to any of his other tests. This episode of weight loss on a non race-day illustrates how ubiquitous weight management is in the lives of many jockeys, emphasising that they must waste in preparation for their next ride even on days between race-meetings. This non race-day wasting also underlines how difficult it is to determine true baseline weights for some jockeys, because the short period of time between race-meets and riding commitments means that they may never allow their weight to return to a completely "un-wasted" level.

Bryan further emphasised the importance of monitoring body fluid balance for lightweight jockeys, and illustrated the precision they require when doing so. When

discussing his battles with constant thirst when he wastes, Bryan remarked, "Like yesterday, I didn't drink: I had half a glass of water after a sauna. But if I could afford to put on half a kilo, I'd go and have a [another] drink." Bryan was cognisant of the exact amount of fluid he could consume without compromising his weight. The degree of self-control Bryan exerts in restricting his fluid intake is also apparent in the following quote. Bryan said, "I sometimes go and have a drink, and I put just a mouthful in a cup and just sip at that."

On his test race and non-race days, Bryan was easily able to recall how much he had drunk in the previous 12 hours, measured in the number of mouthfuls and half cups he had consumed. This detailed recall is no doubt related to his awareness that fluid intake contributes instantly and significantly to his weight. For example, Bryan said, "I find if I have a lot to drink, lots of fluids, I go through the roof [gain weight]." He then quantified his comment about how fluid intake translates into weight, adding, "If you have [drink] 500 ml of water that's like half a kilo [the water adds weight to you]. It's [the water is] good for you, but then I've got to take that off." It is clear that Bryan is facing a dilemma: He understands how important fluids are to maintaining his health, in addition to quenching his thirst, but knows he must restrict his intake with an eye towards his weight target. Essentially, if Bryan drinks then he will have to sweat out an equivalent amount of weight in the sauna later.

Other methods. In addition to managing his weight through diet, exercise, and regular saunas, Bryan also uses several other methods to lose weight on occasions.

Bryan described how he and another jockey recently prepared for their light rides:

Bill [pseudonym for Bryan's jockey training partner] helped me out a bit. It was pretty warm and we used to, a couple of times, we put all our sweat gear on and went for a run with our big jackets and beanies. Plastics: heavy coats and beanies. And we went for a half an hour run, and I lost a good three quarters of a kilo, and Bill lost a quarter.

Exercising in rubber or plastic sweat gear is a rapid weight loss strategy that combines both energy expenditure and body fluid loss achieved through sweating, and its efficacy is clear in the degree of weight loss Bryan achieved in only 30 minutes. Bryan did 2 hours of track work wearing sweat gear on the morning of race-day 1, and lost 0.5 kg, confirming that this method is part of his regular wasting regimen. Exercising in sweat gear for weight loss has been prevalent in studies of wrestlers and jockeys (Labadarios et al., 1993; Tipton & Tchong, 1970).

Bryan said that he has never used amphetamines or chemical diuretics to control his weight, but he has experimented in the past with dehydrating “tablets” and laxative “fruit bars,” and continues to use herbal green tea remedies to flush fluid out of his system on the occasions when he rides below 51 kg. He said that the effects of these substances, however, are unpredictable, and sometimes cause him to rush to the toilet. Similar weight loss substances have been used by jockeys and other wasting athletes in the past (Labadarios et al., 1993; Leydon & Wall, 2002; Moore et al., 2002), but only a small number of jockeys (approximately 10%) in Study 1 admitted using these methods.

Moore et al. (2002) warned that many unhealthy weight loss methods, such as chronic diuretic and laxative use, have become accepted among jockeys, and that the “strong culture” existing in horse-racing, where wasting information is gathered by jockeys from their peers or former jockeys, would make it difficult to eliminate these harmful practices. The substances used by Bryan would appear to be relatively severe weight management methods for a jockey who reports never having any trouble managing his weight. This point seems to confirm that some weight-loss tactics considered extreme, or at least controversial, outside racing and wasting in general, continue to be considered normal by jockeys.

Bryan highlighted the secrecy and controversy that surrounds weight loss in jockeys, when discussing his use of dehydrating and laxative substances. I asked Bryan if these medicinal methods were widespread among jockeys, and he commented, “I know a couple of blokes that have done it, but they don’t talk about it all the time, you know. Like, I’m not sure (pause); I don’t think that stuff was bad for me.” These statements suggest that Bryan is candid on this issue, but his final comment also indicates that he is not certain whether his practices have any detrimental effects on his health. There is no doubt that Bryan’s two statements are intimately connected: jockeys don’t talk about these eliminatory weight-loss methods, especially to people outside racing; and Bryan does not know what effect this particular weight-loss tactic has on him. Clearly then, any educational efforts aimed at improving weight management knowledge among jockeys must include frank discussions of the pros and cons of all weight management methods, not just the “natural” methods such as exercise and diet.

Psychological Effects of Wasting

Bryan said that weight management is easy for him, and reported that he, as a “natural lightweight” jockey, only needs to lose a small amount of weight to reach his usual target weight. Nonetheless, Bryan does engage in regular wasting, albeit to a lesser extent than some of his peers such as Mike, and he does engage in some weight-loss tactics that appear somewhat extreme, and that could potentially lead to adverse psychological effects.

In his interview, Bryan first expressed similar views to Mike about the psychological effects of wasting. Bryan said that he does not believe that wasting affects him greatly, although he does feel some mental fatigue associated with weight loss, and also experiences regular mood disturbances. I asked Bryan how he felt psychologically when at his lightest weight:

Not much different. It's just, like I said, that you're motivated, you're pumped [excited] when you've got a big ride like that [a light ride in an important race]. But, if you're tired, even if you're heavy, and sitting in the jockeys' room nearly asleep, you sort of just go (pause) you're not switched on like you should be.

Bryan's initial reaction was to say that he functions normally when he wastes, and that the heightened arousal of competition assists him in this regard. As he continued his commentary, however, Bryan reflected further and conceded that he is not as focussed after wasting to reach his minimum weight. More than 40% of jockeys surveyed in Study 1 have experienced difficulty concentrating at some time when wasting, including problems maintaining concentration for long periods and concentrating on more than one thing at a time. In the previous extract, Bryan indicated that he believes the mental fatigue that accompanies his wasting is closely related to his lapses in concentration, but also pointed out that mental fatigue can occur independently of weight loss.

In addition to describing the type of cognitive problems he associates with wasting, Bryan also commented on the timing of his impairments in his interview. Asked whether he thought that dehydration was the catalyst for his inferior cognitive function, Bryan agreed and then made an observation about his recovery:

Yeah, I'm sure it [dehydration] has something to do with it [impaired cognitive function]. But, say you have a light ride early in the day, and your last race you're heavy [you have regained weight], like you drink through the day and that, but you're bugged [fatigued] because you had to get down that light and (pause) but even then, you've filled back in and that [regained the weight lost], but you're still (pause) it takes you a day or so to get over it.

In the previous quote, Bryan seems to suggest that it is the extra effort involved and the process of wasting for his light rides, as opposed to his actual weight or hydration status at a particular point in time that causes him problems. The pauses in his speech indicate that Bryan had difficulty analysing his cognitive function, but he does make the point that his mental operations do not spontaneously recover when he re-hydrates; it can actually take him several days to recover.

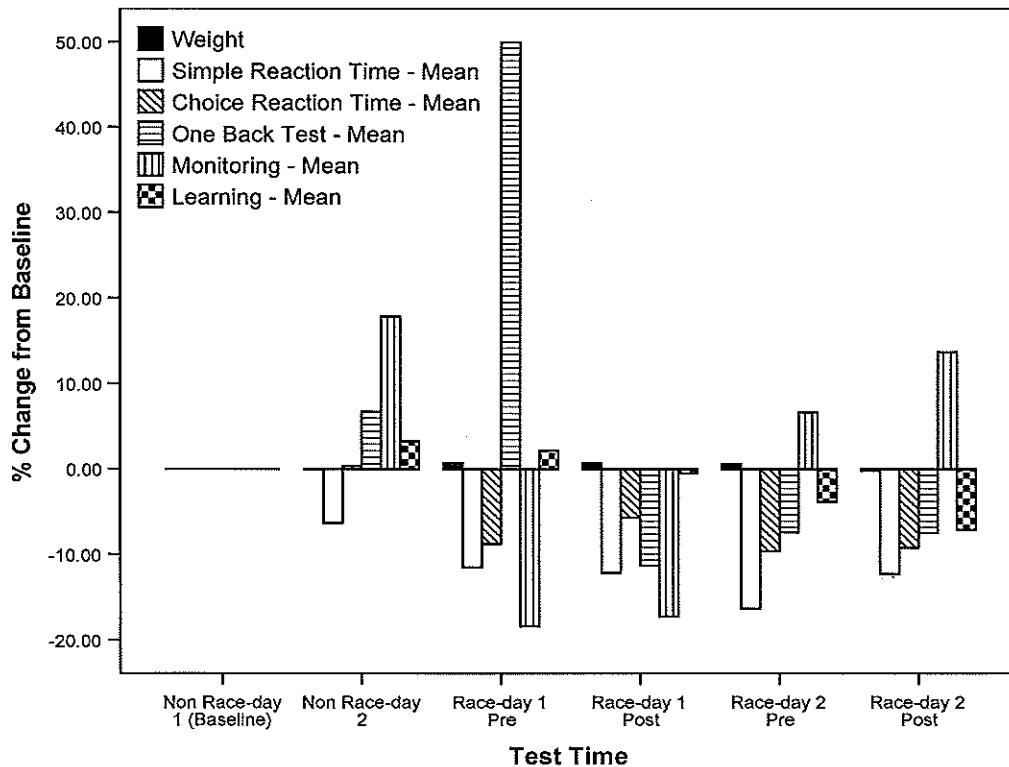
Bryan noted that his cognitive problems can appear outside the context of racing, not surprising given his previous comments about the delayed nature of his recovery. When discussing his mental fatigue, Bryan said his attention can wander involuntarily, especially from everyday tasks when he is wasting. For example, he commented, "You notice [a loss of concentration] when you're driving, like you're sometimes in the middle of a thought." Taken together, the previous two quotes suggest that the period of time following a race-meeting is cognitively the most problematic for Bryan. Middleweight jockey Mike also mentioned this "day after effect" on cognitive function, and the observations of these two athletes raise an important issue about the health and safety of jockeys, and the extent of the duty of care owed to them by the racing industry. If the adverse psychological effects of wasting do not fully emerge until after jockeys leave the track, then perhaps non race-days are the most important time for their mental status to be monitored. Jockeys are observed closely by stewards and other racing officials while they are at race meetings, but once they leave the race-track, often driving home in cars, they are no longer under the watchful eye of the industry observers.

Bryan underwent serial testing of various aspects of his cognitive functioning to compare to his self-perceptions, and his results on five separate CogState subtests at six different time points are presented in figure 5.11. This figure shows that the majority of Bryan's cognitive processing scores were below (i.e., faster than) his baseline scores, indicating a general improvement in function. These changes in the speed of his cognitive processing appear to be independent of his weight, which remained relatively stable over each of his six test sessions. The pattern of scores supports Bryan's general belief that his cognitive function is not unduly affected on race-days, and is relatively

poorer on non race-days in comparison. A description of each individual function follows.

Figure 5.11

Percent Change from Baseline in Bryan's Weight and Speed of Processing on Five CogSport Subtests

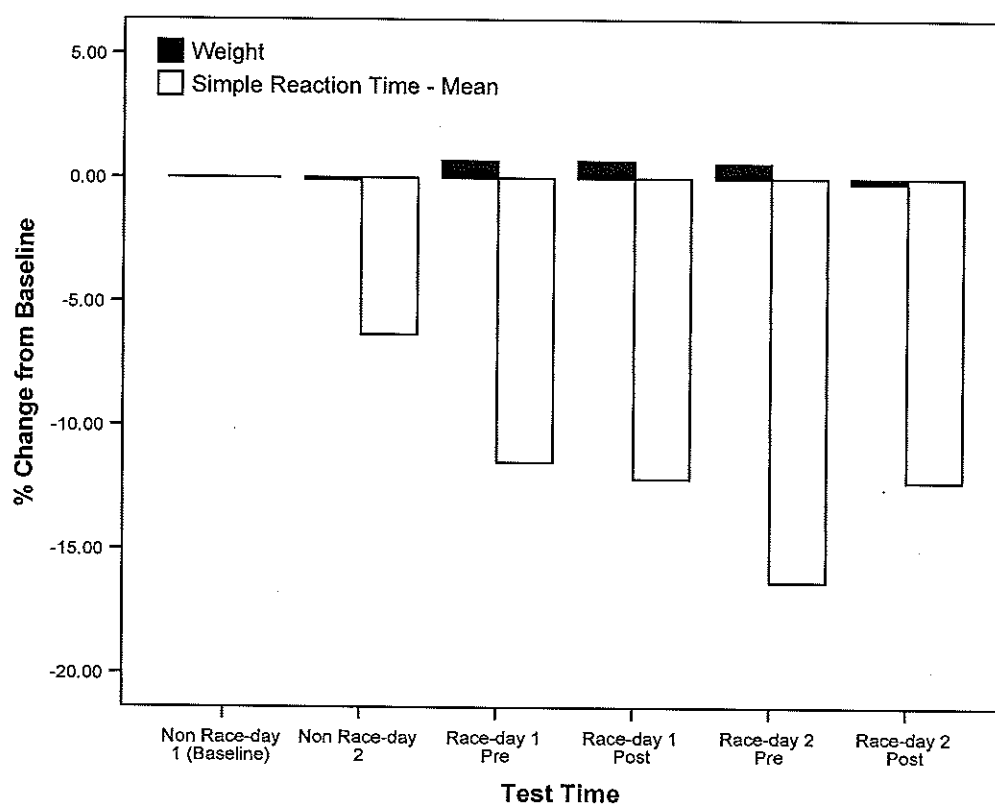


Psychomotor function. Figure 5.12 shows Bryan's six average psychomotor response speed scores on the Simple Reaction Time CogSport subtest. The figure shows that a consistent pattern emerged in Bryan's psychomotor responses, but that the pattern appears to have little to do with his weight or wasting activities. All Bryan's race-day Simple Reaction Time scores were considerably faster than his baseline and second non race-day recordings. Bryan's faster psychomotor performances on race-days were recorded in the absence of substantial weight change, which suggests that competition effects may have influenced his response speed. Bryan either maintained a stable weight, or gained weight on his race-days compared to baseline, and his response times

were between 10% and 20% faster at these competition day times. Based on the results of the two jockeys presented thus far, and Bryan in particular, there is prima facie evidence that arousal associated with race-day plays an important mediating role in the speed of psychomotor function, and that wasting appears to have no direct effect on reaction times.

Figure 5.12

Percent Change from Baseline in Bryan's Weight and Mean Simple Reaction Time

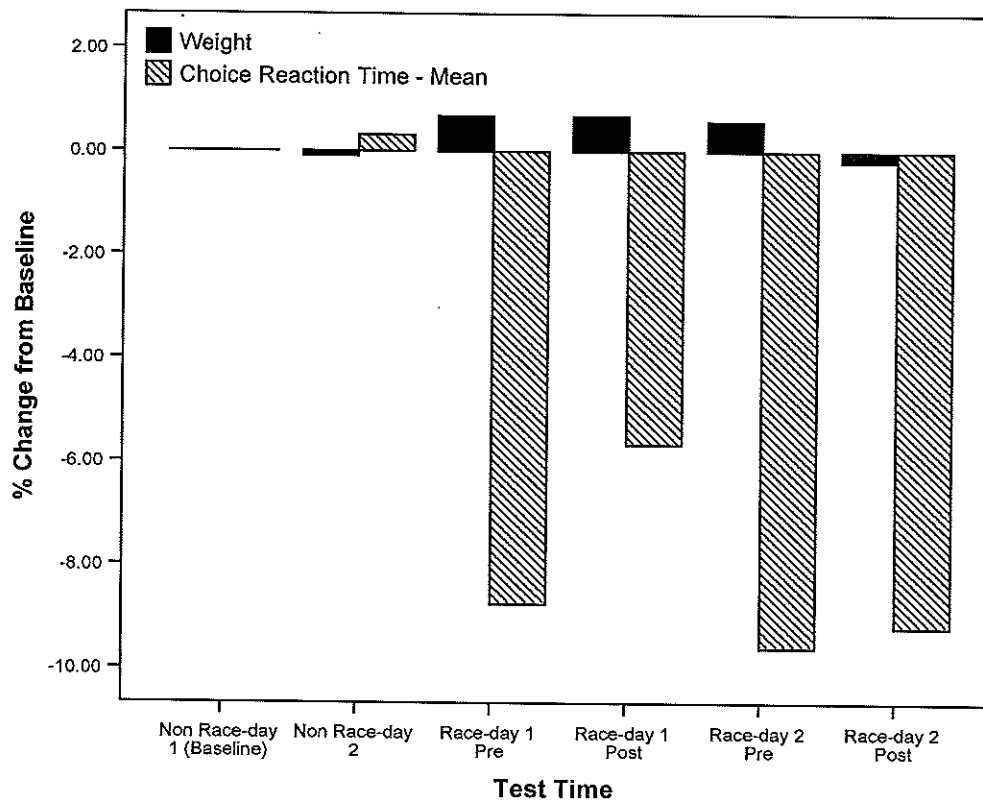


Decision-making. Figure 5.13 shows the percentage change from baseline in Bryan's weight and his average speed of decision-making as measured by the Choice Reaction Time CogState subtest. The figure shows, again, a clear and consistent pattern of improved processing associated with race-days. All four of Bryan's race-day Choice Reaction Time test scores were faster than both his non race-day scores, ranging from approximately 5.5% to 9.5% faster. In comparison, over 40% of jockeys surveyed in

Study 1 experience slow decision-making associated with wasting, although the majority of this group said it happened only rarely.

Figure 5.13

Percent Change from Baseline in Bryan's Weight and Mean Choice Reaction Time

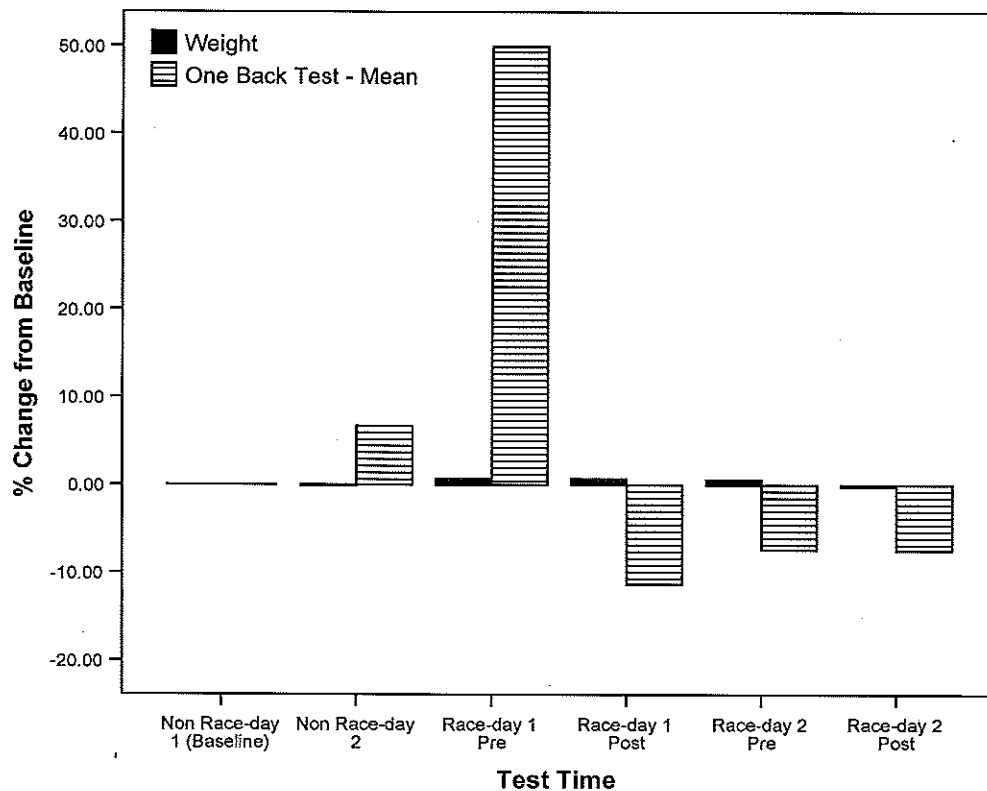


Working memory. Figure 5.14 depicts the changes in Bryan's weight and his average speed of working memory, recorded on 2 race-days and two non race-days. The figure shows that there is similar pattern in Bryan's One Back test scores to those witnessed in his psychomotor and decision-making functions, with one obvious exception. Bryan's race-day 1 pre-race test score seems so out of character that it must surely be an error. Not only is the change in his response speed at this time in the opposite direction to his other race-day scores, but the magnitude of change is vastly greater than all his other scores. Bryan did not report any odd events occurring during this test, but equipment malfunction could be the cause of his unexpected subtest result.

Disregarding this score, it seems that, again, Bryan's speed on cognitive functioning was enhanced on race-days in comparison to non race-days.

Figure 5.14

Percent Change from Baseline in Bryan's Weight and Mean One Back Test Response Speed

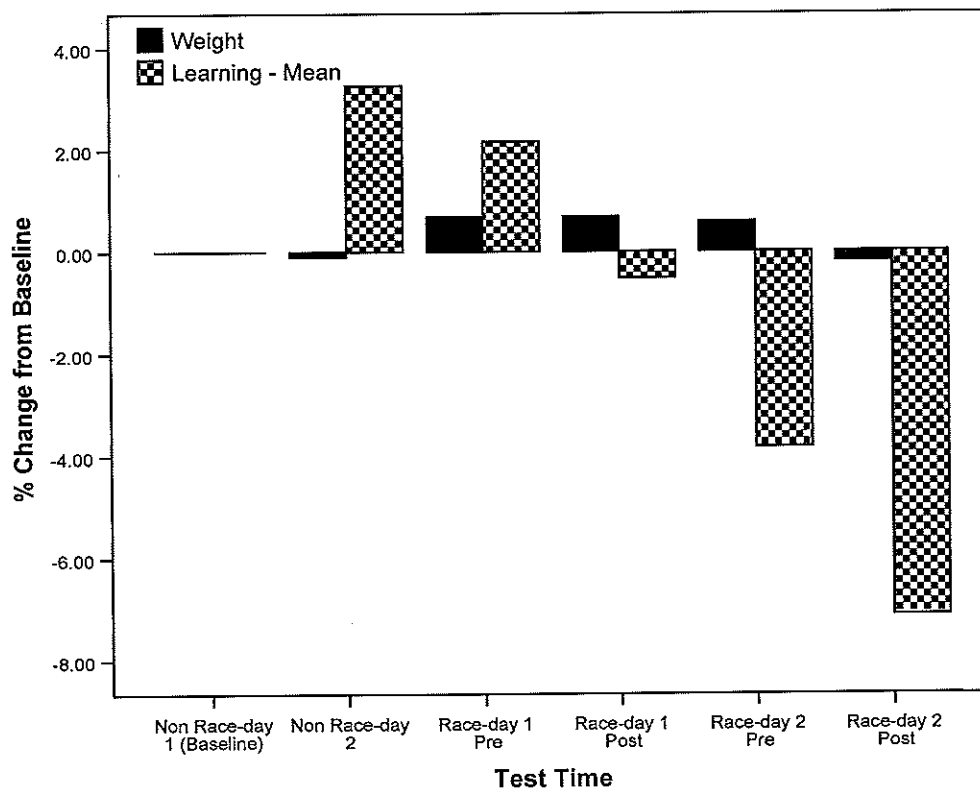


Learning. Figure 5.15 shows the variations in Bryan's mean learning response times measured at six points in time. No clear pattern is evident when comparing race-day and non race-day tests, which suggests that competition does not seem to affect his speed of learning. There is, however, a pattern evident when comparing Bryan's two pairs of pre and post race-day scores. On both race-days, his post score was faster than its corresponding pre score. Further, there is a sustained overall trend, from his first race-day test (i.e., race-day 1 pre test) to his last (i.e., race-day 2 post test), for improvement in the speed of his responses. Such a trend indicates that Bryan became more efficient in his use of learning strategies in this test over the course of his

involvement in the study. Such test to test improvements are most likely practice effects.

Figure 5.15

Percent Change from Baseline in Bryan's Weight and Mean Learning Response Speed

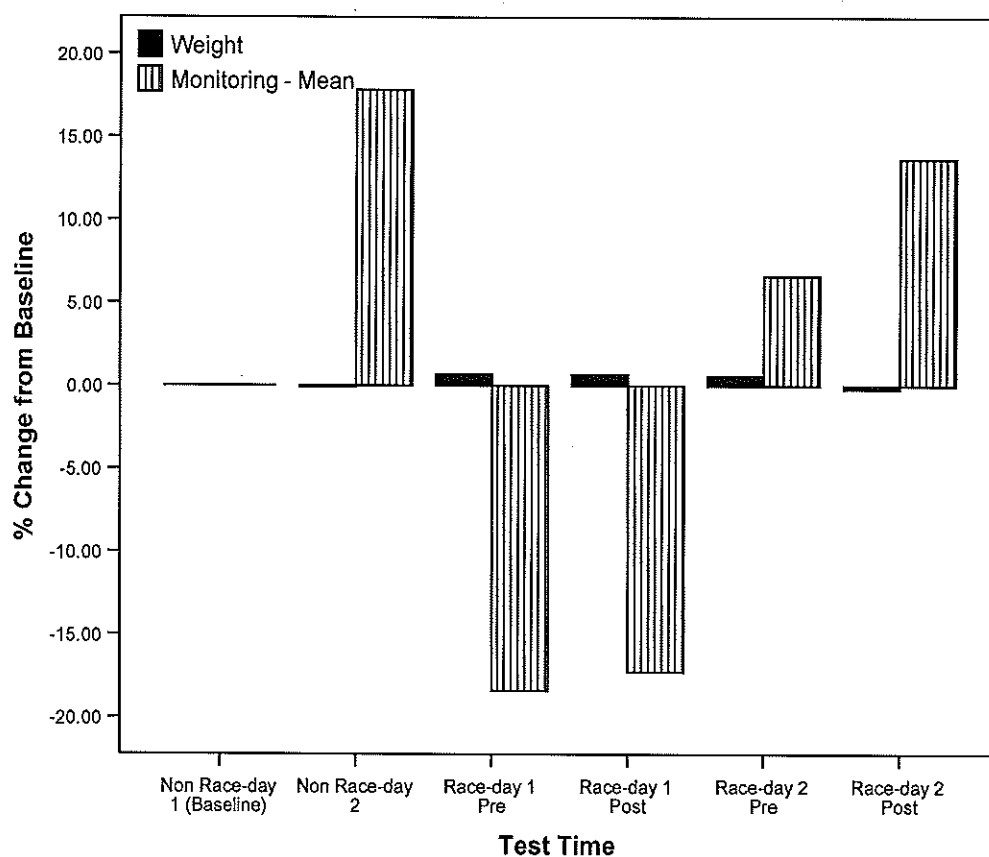


Attentional function. Figure 5.16 illustrates the changes from baseline levels in Bryan's mean speed of monitoring. Bryan's pair of monitoring scores from race-day 2, which coincided with his lightest race-day weights, show that his speed of visual tracking deteriorated from pre to post test, from approximately 6.5% to 13.5% slower than baseline. Bryan indicated that he had not engaged in any sweating sessions on this day, but had consumed only a small amount of food and drink, and had subsequently lost 0.5 kg over the course of the day. Significantly, Bryan's speed of monitoring was also slowed by nearly 20% at his second non race-day test, in the absence of any competition effects, but again in the presence of some recent weight loss. Bryan confirmed that he had engaged in spa and sauna use on that morning to lose 0.5 kg,

despite it being a non race-day. These findings lend support to Bryan's contention, mentioned in his interview, that the deleterious effects of wasting are more related to the process and the methods used than they are to the magnitude of weight loss or to his absolute weight, at least for this particular cognitive function.

Figure 5.16

Percent Change from Baseline in Bryan's Weight and Mean Monitoring Response Speed



Mood. In contrast to his occasional uncertainty regarding aspects of his cognitive functioning, Bryan was clear and consistent in his beliefs about his emotional reactivity to wasting. He readily admitted to being irritable and moody when he is losing weight, and said his emotional instability can cause problems in his personal life. For example, when I asked what he was like to be around when he wasted, Bryan commented, "It doesn't take much, when you're on weight [wasting]; it doesn't take

much for people to upset you, and you snap and you're always cranky." I asked Bryan to provide an example of this moodiness, and he spoke of an altercation he had with a member of the public, an action which is uncharacteristic of him. He recalled the incident in the following extract:

When I was I getting on the plane to go to Brisbane or Sydney, I had a light ride, and I sat in the wrong seat on the plane. And the bloke [the man whose seat Bryan was sitting in] said, 'that's the wrong seat'. And anyway I got up to move, and I stopped a row of people coming through. And the bloke sort of said something to me, and usually I'd say sorry, but I almost bit his head off.

The emotional outburst Bryan described seems totally at odds with the relaxed inert-personal style he displayed on numerous occasions in this study. Further, Bryan used phrases such as "it's bit depressing," and "it nearly brought me to tears" several times during his interview when discussing episodes of wasting, clear references to discord in both his affective state and his cognitions. Bryan reported that he felt aggressive and irritable at the end of race-day 2 when he had eaten minimally, and again on non race-day 2 when he had saunaed for an hour to lose 0.5 kg. The mood disturbances described by Bryan have been observed consistently in a variety of other wasting athletes, including jockeys (Caulfield et al., 2003), wrestlers (Choma et al., 1998; Landers et al., 2001), and boxers (Hall & Lane, 2001), and should be considered a likely consequence of rapid and substantial weight loss.

Although Bryan talked primarily of an increase in his negative mood states, such as anger and dysphoria, he also discussed a decrease in positive mood states. For example, the aforementioned mental fatigue that Bryan mentioned is akin to a loss of vigour, a positive mood dimension of the POMS (McNair, Lorr, & Droppleman, 1971). Wasting wrestlers have also reported lowered levels of positive mood states as measured by the POMS (Landers et al., 2001).

When discussing his mood disturbances, Bryan highlighted the resultant effect that he perceives his wasting behaviour has on his social life. Bryan said that, like other jockeys he knows, he does not want to be around other people when he has to waste. The substantial social effect that wasting has on Bryan is evident in the following comments:

When I have to ride light, I'm the same [as other jockeys]: I hardly talk to anyone, I don't go out or socialise, I just go to the races, and I go to work of a morning, and don't do anything else.

Bryan intentionally isolates himself from others when he is wasting, in the belief that his mood state is not conducive to normal social interaction. It is little wonder some jockeys are reticent to venture out in public when they are wasting, considering the aggressive encounter that that the usually affable Bryan related earlier.

The social isolation Bryan described may, however, have another explanation, still related to his wasting, but less rooted in his mood state. Bryan mentioned that celebrations and social gatherings such as Christmas and birthdays are difficult for him because they are organised around food, and there is an expectation from others, and a desire on his part, to eat and drink like his friends and relatives. Bryan's discomfort in these situations is clear:

Anyway, Christmas, everyone's having Christmas lunch, and it's alright if you've got a heavy ride [the next day]. But if you've got a light ride you don't really want to be there. That's all they do all day is eat and drink, don't they?

Bryan went on to say that these special occasions were more difficult for heavier jockeys than they were for him, but that he had to minimise his participation in them nonetheless. Bryan seems to extend his social avoidance even further, including everyday activities as well as special occasions. He outlined his reason for keeping to himself, and again returned to the theme of social expectations:

I don't go out 'cause you just go out, say shopping, and everyone's eating and drinking, and you can't do it [eat and drink]. So you'd rather go home and play the Playstation [computer games] or watch TV . . . That's why you don't go out,

because you end up eating something that you shouldn't have, and have to sweat it out the next day.

So, Bryan's intentional avoidance of other people appears to be driven both by a desire to be alone when the negative moods he associates with wasting occur, and by a desire to shun situations where there is an expectation, from others or of himself, that he will eat and drink normally.

Physical Effects of Wasting

I asked Bryan to discuss the physical effects of his regular wasting, and he indicated that his activities take a significant toll on him. The most frequent and troubling consequence of wasting for Bryan is a general feeling of physical fatigue or lack of energy that accompanies weight loss. Bryan mentioned that the eventual outcome of his physical fatigue is a loss of muscular strength. Unsolicited, Bryan provided an example of his muscular weakness:

At track-work, you know, you're not as strong. When I rode in Sydney the first time, I rode track-work the morning of the race before I went over there [before flying to Sydney for the races], and I was riding the quietest horse in the stables, and it nearly took off on me. So, you're very weak, and you (pause) and you're not strong. Like, usually [when you haven't wasted] you (pause) you're no worries [you control the horse easily].

Riding track-work is a regular and important task for many jockeys, and it can function as a kind of rehearsal or audition where horse trainers and owners observe the way a rider handles their horses. In this way, a jockey's lack of strength and resultant inability to control a horse at track-work may be construed as a lack of riding skill by observers, and could cost an affected jockey an important ride. When I asked Bryan if he notices a difference in his race-riding when he is at his lightest compared to his usual riding weight, he was firm in his opinions:

Yeah, you can be a lot (pause) physically, a lot stronger when you're comfortable [not fatigued from wasting]; when you don't have to do it hard [waste severely]. And when you have to lose a kilo, or a kilo and half the day of the race, you're a bit flat, and you feel a bit weak on the horse.

Bryan qualified his initial statement that he is “a lot” weaker by saying he is only “a bit” weaker; whichever is the case, it’s clear he feels less physically able to perform when he wastes. Reaffirming his belief that fatigue can affect jockeys both in and out of competition, Bryan reported feeling tired at three of his six test sessions, including two race-day sessions and one non race-day session.

Later in his interview, Bryan revealed that the constant physical fatigue that accompanies his wasting has the additional effect of leaving him feeling drowsy. When I asked how he felt physically during a recent episode of wasting, Bryan offered, “You feel, what I was getting at (pause) like, all I wanted to do was sleep all the time.” Bryan thinks that, like the general fatigue and lack of strength he experiences, drowsiness can affect his behaviour on race-day, although it is most apparent on non-race days, where it is expressed in his constant desire to sleep.

Bryan noted another physiological after-effect of wasting to reduce his weight, where he is unable to eat and drink normally for some time after completing his race-day duties. He complained that, despite looking forward to refuelling his body after wasting for a recent light ride, he found he couldn’t do so. Bryan explained:

After the race I thought, ‘Beauty, I’ll go and have a big feed [meal], and I’ll have a drink’. But I couldn’t eat anything: just had a big stomach ache, and I couldn’t (pause) you know, you’d have a couple of chips and be full. I was just constantly thirsty. I wasn’t giving my stomach (pause) well it had shrunk that much, and all I was wanting was fluid. I was having to make three trips to the fridge during the night: I would wake up and have to have a drink. But after it [wasting], you can’t do anything, like you can’t eat.

Bryan’s wasting certainly seemed to have had a substantial effect on his digestion in this instance, and the familiar manner in which he re-told the anecdote suggests that his digestive problems have occurred on more than one occasion. Slow gastric emptying and disturbed gastric accommodation reflex (where the stomach does not relax as it should when food is taken in) are both symptoms observed in patients with anorexia

nervosa and bulimia nervosa (McClain, Humphries, Hill, & Nickl, 1993). If the symptom that Bryan is describing is such a gastric complication, then it would appear that his wasting diet has consequences similar to those of the problematic eating behaviours of anorexics and bulimics, albeit at a lower and as yet undiagnosed level. A large number of the jockeys surveyed in Study 1 also reported that they experience gastrointestinal problems when they waste, with the most prevalent complaints being stomach upsets (52.4%) and nausea (45.2%).

As well as mentioning gastric problems, Bryan commented in the previous extract on an intense thirst that accompanied his wasting. His overwhelming thirst interrupted his sleep, and caused him to drink despite knowing he would have to sweat it out in the morning. More than three quarters of jockeys in Study 1 reported experiencing thirst cravings when they waste, and a number of jockeys interviewed in Study 2 said that their thirst was far more pervasive and far more debilitating than their hunger.

Weight-Management Advice for Other Jockeys

Not surprisingly, given his young age and relative inexperience as a professional jockey, Bryan does not have detailed advice for other jockeys about weight management. It is probable that he does not yet consider himself to be an “expert” with opinions worth disseminating to other jockeys. Moreover, Bryan perceives weight management to be an easy task, so it is even more unlikely that he has seriously considered how he would counsel others with weight problems. Nevertheless, Bryan did give a general warning to aspiring apprentices and jockeys, related to his contention that weight gain is inevitable with age even for initially light jockeys. He cautioned young jockeys:

Like, you see it day-in, day-out: you get young kids when they first start, they're 47 [kg] stripped [without clothes and riding equipment], and they say, 'beauty',

and just eat and eat. They kid themselves; they say, 'Oh, you don't [I won't] put on any weight', but next year you see them again and they're struggling to ride at 52 [kg].

Bryan's warning about short-sighted approach to diet is based on his observations of other young jockeys, but also on his increasing difficulty with weight management. It is significant that Bryan restricts his comments to the relatively safe topic of diet, with no mention of the more controversial or unnatural weight loss methods that he uses.

The Racing Environment

Bryan believes that several aspects of the present racing environment in Victoria make weight management unnecessarily difficult for jockeys, and should be changed. For example, Bryan, like his older and more experienced peer Mike, is an advocate of raising the Victorian minimum weight limits. He stated that only a select few jockeys, mostly young apprentices, can ride at the current minimum weights set for major races. When I asked Bryan his opinion of raising the weight scale, he revealed multiple motives for his recommendations:

But it's good to know that (pause) if I only had to ride 53 [kg], I could do that pretty easily. Yeah, I think that [raising the weights] could happen, yeah. But it'd be a big help. I mean, most people would be able to ride 53 [kg]; there's some that can't, but (pause) a lot have to struggle to ride 52 [kg], but then I'm comfortable riding 52 [kg].

Bryan's comments include both an altruistic element, where he suggests that lifting the weight scale will be best for all jockeys, and also an egocentric component, where he notes that such a change is not necessary for him, but would make his weight management even easier. Self-interest was a recurring theme in most of Bryan's statements about minimum weight regulations, hardly surprising given that jockeys are considered to be self-employed (Speed et al., 2001). Any increase in the number of jockeys able to take a given ride will decrease Bryan's chances of securing that ride, so

his enthusiasm for raising minimum weights is undoubtedly coloured by the highly competitive environment in which he works.

Bryan acknowledged that his perspective on minimum weight is atypical of the majority of current jockeys due to his low weight and ease of weight management, but he said there is a perception that some jockeys only have themselves to blame for their weight troubles. For example, when I asked him why minimum weight levels have not been lifted in Victoria already, Bryan mused, "But then probably they'll [Victorian racing's governing bodies will] think, well for an extra kilo they'll probably get the same trouble [jockeys unable to reach the revised minimum weights]." Bryan believes that racing's governing bodies may be reluctant to raise the weight limits for fear that many jockeys will simply relax their weight regimens, only to have weight problems again in the near future, or that jockeys too heavy to ride at the current weights will re-enter the industry only to have weight trouble again.

Bryan believes that the Victorian racing industry has made important advances in jockey training recently, but thinks that jockeys could still be better educated about safe and effective weight management. Specifically, he suggested that more frequent and industry-wide assistance from health professionals, such as dieticians, would help make weight management easier for jockeys. For example, Bryan believes that other jockeys could benefit from advice similar to what he received during his apprentice school training. When I asked Bryan what assistance the industry could provide to jockeys, he said:

Like, if you [health experts] came into the Training Centre when there's a class on, you know, only come in every fortnight or once a month or something. And, you know, just (pause) [show jockeys] how to eat properly. We've got a dietician that does that, but (pause) I found that sheet [of dietary information] that I got was pretty good; it was a great help.

Past research has shown that jockeys rely predominantly on their peers for information about weight management, and that the information passed on can be erroneous at times (Labadarios et al., 1993). Bryan's suggested that increased professional support for jockeys around healthy eating may help improve the accuracy of the dietary information they obtain, and, in doing so, may also serve to reduce their reliance on some of the more problematic wasting practices evident in the past, such as diuretic use (Hill et al., 1997; Moore et al., 2002), and long-term fasting (Moore et al., 2002).

Case Summary

The case study just described is the story of a young jockey who regularly rides at the lightest end of the Victorian minimum-weight scale, and works hard to keep his weight stable enough to do so. Bryan, a 20-year-old, regularly rides at 51 kg, and has done so since he entered the racing industry over 4 years ago. Racing industry statistics show that over 10% of Bryan's rides in Australia to date have actually been at weights below 51 kg (Virtual Formguide, 2006). These riding weights are several kilograms below the average weight of jockeys studied here and elsewhere (Labadarios et al., 1993; Moore et al., 2002), and make Bryan's story a contrast to the experiences of a middleweight jockey such as Mike.

Based on comments in his interview, Bryan appears to manage his weight in a similar manner to Mike, wasting to lose between 1.0 to 2.0 kg three to four times per week prior to each of his race-days. Quantitative data collected over the test period of this study indicated that Bryan's pre-wasting weight usually remained much closer to his riding weight than he had indicated, but it was unclear exactly where in Bryan's cycle of riding and wasting his non race-day weights occurred.

Despite riding at such low weights and admitting to a gradual increase in his weight recently, Bryan, like his counterpart Mike, finds managing his weight relatively

easy and takes a multi-method approach to weight management. The majority of Bryan's weight management knowledge is sporadically gathered from other jockeys (past and present), but he has become more systematic in his approach recently. For example, Bryan conceded that he was not careful about food intake in the past, but a new diet devised for him by a dietician is now a key component of his weight management regimen. In addition to controlling his energy intake, Bryan is also a regular exerciser, riding track-work and doing light aerobic exercise several times a week to boost his energy expenditure. Further, Bryan closely monitors his fluid intake, and is a frequent sauna and spa user. Unlike middleweight jockey Mike, Bryan says he also uses a variety of other dehydrating and eliminatory methods at times to assist his more conventional weight-loss tactics. In particular, he spoke of exercising in sweat gear, and consuming herbal green tea drinks that have a diuretic effect.

Although Bryan seems to manage his weight within a strict range, with only a small amount of weight to lose for each race-meeting, he still experiences a number of side effects related to his weight loss. Most notably, he often experiences both mental and physical fatigue when he wastes. Bryan's physical fatigue is manifested in both a reduction in his muscular strength, which hampers his ability to ride, and a state of inordinate sleepiness. Bryan also experiences acute gastric side effects that resemble symptoms of eating disorders when he wastes for his lightest rides.

In relation to his cognitive function, Bryan reported that he notices lapses in his concentration after a period of wasting. This decrease in his ability to concentrate can occur in both race-day and non race-day contexts, and does not recover spontaneously when he refuels and re-hydrates. Bryan stated that it can take him several days to recover normal cognitive function after a period of wasting, and his objective tests confirmed his belief that his cognitive function was poorer on non race-days compared

to race-days. Middleweight jockey Mike also discussed a “letting down” in his mental function the day after competition, and the findings relating to these jockeys suggest that non race-days may be when jockeys are most at risk of acute cognitive dysfunction. The quantitative data collected on race and non race-days support Bryan’s belief that he performs better on race-days across a number of cognitive functions, with the exception of attention. The objective data relating to Bryan’s speed of monitoring, a function integral in race-riding, support his contention that his attentional processing can be compromised after a period of wasting.

As an industry novice, Bryan’s only weight management advice for other jockeys was to suggest they start managing their weight at a young age, in the hope that they can slow down the inevitable weight gain that young jockeys experience as they mature. Bryan does, however, have several suggestions that he believes will make weight management easier for all jockeys in the future. Like his contemporary Mike, Bryan considers the minimum weight levels in Victoria unattainable for most jockeys, and said that they should be raised by 1 kg to 53 kg for all races. This statement is significant for a jockey who is among the lightest athletes competing in the sport, and who finds weight management easy. In addition, Bryan suggested that diet and nutritional information be made more widely available to all jockeys.

Paul

Background

Personal profile. Paul is a male jockey, aged in his 20s, with a mid-secondary school education. Paul was born and lived in another state of Australia, before he came to Victoria to live and work permanently as a jockey in his mid teens.

Initially, Paul was vague about his physical dimensions when I asked for them, simply stating that he is taller and stockier than many other jockeys he knows. After

some prompting, he estimated that he is approximately 1.65m tall, a figure that places him only marginally above the average height of the male jockeys surveyed in Study 1. Paul does appear to be more thick-set than either of the two jockeys described earlier in this chapter, with broader hips and shoulders, and he has the tanned complexion of someone who spends much of his or her time outdoors.

Paul currently lives in suburban Melbourne, Victoria, where he shares a home with another professional jockey of a similar age. Paul says he finds his current living arrangements comfortable because both he and his housemate have similar schedules as professional riders, understand each other's personalities, and share some common interests outside of horse racing. In particular, Paul believes that the interests he shares with his housemate, and their agreement to limit their discussions of the industry when at home, give him a sense of balance that would be lacking in his otherwise racing-dominated life.

Current riding status. Paul is a fully licensed category "A" jockey, working full time in Victoria. He has been a professional jockey for over 7 years in the racing industry, slightly below the average career duration of those surveyed in Study 1, and also several years less than the current Australian jockeys that Speed et al. (2001) and Moore et al. (2002) surveyed.

Like Mike and Bryan, Paul has a flexible and, at times, unpredictable weekly working schedule revolving around race-riding and track-work riding. Paul did not specify the number of rides he is engaged for each week when I asked him about his present schedule, instead replying that he is experiencing somewhat of a slump:

Ah, lately I haven't been riding so much. I've been riding probably 4 times a week, I suppose. I know when I was an apprentice, there was times when I was riding 7 days a week, you know, 6 to 7 times a week.

Paul's comment about the decrease in his riding commitments since the completion of his apprenticeship mirrors the experience of Bryan, and again underlines the importance of an apprentice jockey's weight allowance in securing race-rides. Currently, Paul rides at both city and provincial race-meetings to obtain as many rides as possible, but says he would prefer to ride at metropolitan venues exclusively because they are more financially rewarding, and require less travel. He has a strong working relationship with one prominent Victorian horse trainer, and this relationship provides him with many of his regular riding engagements, and also most of his high quality rides. Paul's strike rate of wins to rides for the current racing season (2004 - 2005) is approximately 9%, down from 14% in the previous season (Virtual Formguide, 2006), confirming the performance slump he described.

Paul is not sure how much time his jockey duties usually take up each week, commenting that it depends on the number of race-meetings he attends. His preference is to have a large number of rides each week (about 20) spread over a small number of race meetings, but he takes rides whenever he can get them at the moment. In describing his ideal racing schedule, Paul stated, "I suppose riding 4 or 5 times a week is probably perfect 'cause you do get a couple of days where you can have a rest." It is debatable, however, how restful these days off are for Paul, because he usually wastes and rides track-work on days when he is not race-riding. Paul continued his commentary on his unpredictable work schedule, highlighting the nexus between a jockey's status with horse trainers and his or her weight management needs:

If you're not getting a lot of rides it's probably (pause) you do pretty much work 6 days. But the hardest thing about not getting a lot of rides is, you can go to the races at four meetings and have eight rides a meeting, or you can go to the races at six meetings and only have two rides a meeting. If you're riding 53 kg, you still (pause) that's 6 days you've gotta get up and waste. Whereas if you're getting eight rides at four meetings, well its only 4 days you have to get up and worry about it [wasting]. So, it ah (pause) it can make it a bit harder if you're struggling for rides.

Paul's point is that the number of race meetings he attends is the key determinant of his weight-management activities, but he also knows that the number of race meetings he rides at is largely beyond his personal control, determined by his standing with trainers. If he is only offered a small number of rides at one particular race meeting, which is often the case at the moment, then Paul has to ride at, and waste in preparation for, several other meetings just to remain competitive with other jockeys and financially secure.

Paul gave a further indication of his current low status in the industry when he described the track-work riding he does in order to secure his race-rides. He provided a hypothetical but apparently typical example of how little regard trainers often gave him, and how his status could lead to an unpredictable work schedule:

. . . say there's Cranbourne trials on. If someone [a horse trainer] says to me, it could get to Sunday, the day before, and someone will say to me, "I've got a horse that's running in the Melbourne cup. Could you go and trial it?", or, "It's running in a good race next Saturday," well, then I've gotta go. You can't say no.

Paul indicated that feels he is at the mercy of trainers, who often ask him to ride a horse in a race trial at short notice. As Paul described it, the uncertainty of the next ride, and the almost constant search for it, is what is most daunting about this competitive profession for jockeys in his position.

Riding history. Paul's father was a professional jockey, and introduced Paul to horse riding at a young age. Although he has been around horses his whole life, Paul estimated that he started taking riding seriously at the age of 9 when he began riding track-work before school at his father's urging. Paul clearly appreciates his father's continued involvement in his career, and commented at one point that he feels that his father is one of the only people who understands what being a jockey is like for him.

Paul began his formal jockey's apprenticeship at 15 years of age, combining his jockey duties with secondary school for a short time before leaving school to permanently concentrate on riding. He described his early years in the industry as "tough." Paul remarked that the hardest aspect of his apprenticeship was moving away from his close-knit family to live in a house on his master's property:

When I came over here [to live in Melbourne], it was sort of hard because you go from being at home to being (pause) I was still in a family environment, but I was still living alone. Like, there were two houses on the property where I lived . . . So, I was living in another house [separate from his master's family], and you go from having your parents around and all your family, to just having no one at home.

Paul commented that, although he considered his master's training venue a family-like environment, his living arrangements were solitary and he felt disconnected from his master's family, who also lived and worked on the property, but resided in another house. Paul explained that food preparation was a particular challenge for him at this time, because his mother had always prepared his meals for him in the past, and he often found that he did not have the knowledge, time, or energy to cook for himself.

Like lightweight jockey Bryan, Paul enjoyed some success as an apprentice, and found the subsequent transition to the ranks of fully licensed jockeys problematic, especially in relation to his weight. Paul quickly experienced a period of sudden weight gain, but he was able to stabilise it a little some years later. Paul explained that a number of factors contributed to his weight increase:

When you come out of your time [finish your apprenticeship] you start eating the wrong things, and that sort of thing . . . You go from sort of not having to do too much with your weight to all of a sudden really having to watch it, just because you're not really used to having to worry [about your weight]. Naturally you're going to get a little heavier as you get older, but you're not really in a set routine all the time.

For Paul, it seems that the ease of his weight management in the early part of his career did not prepare him well for the weight gain he would inevitably experience as he

attained his adult body shape. Paul clarified that his comment about not having a set routine referred to both his weight management (i.e., he did not have a specific diet) and his work schedule (i.e., after completing his apprenticeship his daily schedule was flexible and self-determined). Paul noted that gaining greater access to his jockey earnings at this time had also facilitated a more liberal lifestyle, which in turn affected his weight. He said, "I suppose, once you get, once you're 18 or 19, you start going out and that sort of thing. You start getting on the drink [drinking alcohol] a bit." Paul sheepishly admitted that he has not yet balanced his social and professional lives adequately, although he is more disciplined now than during his late teens.

Now entering his prime earning years as a jockey, Paul is committed to a career as a professional rider, but cannot see himself riding for more than another 10 years at the most. Nevertheless, Paul's identification with his occupation, and his father's continuing influence on him, are evident in his comments on what life as a jockey is like for him. For example, when discussing the demands of racing, Paul repeated a comment that his father had made to him, that being a jockey "is not a career, it's a lifestyle." Paul explained that, unlike some other jobs, he is unable to leave his work at the race-track, and that he thinks the all-encompassing nature of racing will eventually force him to retire from the sport. Paul's attitude to his profession is best captured in the following quote:

I wouldn't wish anyone to be a jockey. Because being a top jockey is not so bad, but geez, there's not a lot [of top jockeys]: you're only talking about 20 jockeys, or 10 jockeys in Victoria out of, what 200?

Paul's ambivalence towards his profession is plainly evident. He believes that a career as jockey can be rewarding, but is painfully aware that only a minority of individuals are successful enough to enjoy it, and that he is not one of the fortunate few at the moment.

Study Participation and Engagement

Paul attended a briefing session, also attended by several other jockeys, where he familiarised himself with the study protocol and the CogSport test in particular. Paul then participated in three race-day test sessions, and two non race-day tests, all conducted over a period of approximately a week. His two race-day test sessions were completed 4 days apart, as were his non race-day measures. Paul did not participate in his scheduled first race-day test session (i.e., his pre race-day 1 test) because he had not yet reached his weight target for the day shortly before the test was to commence and therefore needed to use this time (about 45 minutes) to sweat. Paul participated in an in-depth interview lasting approximately 1.5 hours, conducted at his home on a non race-day several months after his other race and non race-day test sessions.

Paul often appeared tired during his interactions with me, and at times seemed to lack sufficient energy even to maintain a normal conversation. For example, he often yawned or cleared his throat, and paused frequently in speech and changed the direction of a conversation after appearing to lose his train of thought. Paul also appeared to be somewhat disorganised, breaking several appointments. He admitted that he rarely knew what he was doing from one day to the next. Despite his dislike for, or inability to plan, this young jockey gave freely of his time and was a willing participant in the research process when he was available.

My overall impression of Paul is that there was a sense of melancholy about him during much of the time we spent together. Paul spoke about the future without much hope or joy, and, although there were times when his demeanour brightened, such as when he showed me his new motorbike, he gave the impression of a person discontent with the direction his life has taken. It was unsettling for me to observe this demeanour in such a young man.

In general, Paul appeared to be frank in his views, openly discussing topics that some other jockeys seemed unwilling to relate in any great detail. For example, he happily recalled his experiences with the appetite suppressant "Duromine," popular with jockeys in the recent past, but now banned by racing authorities in Australia. Paul also did not hesitate to tell stories that portrayed him in a negative light, such as those where he had lapsed in his weight-management efforts (a "blowout" in his words). In one such anecdote, Paul revealed that he had consumed an entire 750 ml bottle of soda water in less than a minute because he had been dared to by another young jockey. Paul laughed heartily as he recalled vomiting uncontrollably as he took a shower shortly after the event.

Current Weight Status

I asked Paul to discuss his typical weight range, including his usual riding weight, the extent of his wasting activities, and his perceived ease with weight management, in order to establish his current weight status. When I asked him how he perceived himself in relation to the minimum weight scale and other jockeys, Paul stated that he thought of himself as a middleweight jockey, able to ride lightweight horses on occasions, but more comfortable accepting the slightly heavier rides in the middle of the current weight scale.

Typical riding weight. I first asked Paul to discuss his current weight range, including his typical riding weight and his un-wasted weight, in order to ascertain the usual start and finish points of his weight management activities. In describing the variation in his pre to post wasting weights, Paul commented that his current minimum riding weight is approximately 53 kg and his pre-wasting weight is 56 kg. The difference between his pre-wasting and minimum riding weight (3 kg) is larger than that reported by either Mike (1.5 kg) or Bryan (2 kg). Paul stated that the change in his body

shape from pre to post-wasting is so great that he actually needs two sets of clothes: one larger sized set for his pre-wasted body, and a smaller sized set to fit his wasted body shape.

A riding weight of 53 kg is at the lower end of the current minimum weight scale not the middle, a point conceded by Paul. In explaining his views on classifying jockeys in regard to their riding weights, Paul said,

I probably ride a lot of lightweight horses, and people would say, 'Oh, you're a lightweight jockey,' but I'd class a lightweight jockey as a jockey who can get out of bed, go to the races, he can eat his piece of toast and cup of coffee, and ride at the minimum weights, which is sort of 52 kg. Or, he can get up and have a half hour sweat, or do it like that, and just live a normal life. Whereas, for me to just have breakfast lunch and tea I'd be walking around at 56 [kg] and be able to ride at 55 [kg].

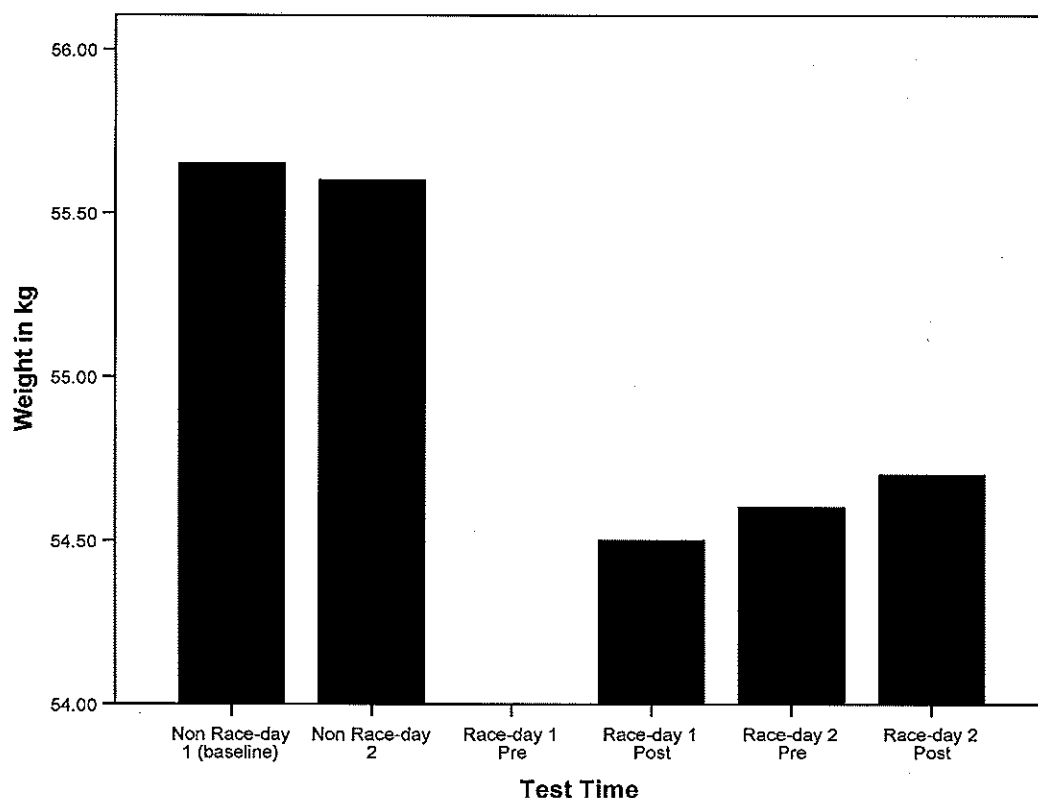
So, even though Paul's usual riding weight is at the lighter end of the minimum weight scale, he labels himself a middleweight jockey because he has to waste in order to ride at 53 kg. Paul's comments appear to be another example of the industry-wide belief in "natural" lightweight jockeys, who lead normal lives (i.e., do little in terms of weight management) and can still ride at the minimum weights. Bryan's stories of extensive sauna use and consumption of herbal diuretic drinks appear to be at odds with these beliefs about the weight management practices of lightweight jockeys.

Paul's three race-day body weight recordings, illustrated in Figure 5.17, were all above his stated typical riding weight of 53 kg, with a lowest weight of 54.5 kg recorded at the completion of race-day 1 and a highest of 54.7 kg recorded at his post race-day 2 test. Paul's racing weights recorded for this study are also well above his minimum riding weight of 52.5 kg listed in the industry's official periodical (Racing Victoria Limited, 2004b). Independent racing data support Paul's claims to be a middleweight jockey, showing that only 14% of his rides in Australia since 2002 have been at 52 kg or below, and that he has accepted only one ride below 51 kg (Virtual

Formguide, 2006). During this 5-year period Paul has ridden in over 2000 races at weights between 53 and 60 kg, with nearly 40% of these rides being at weights from 55 kg to 56 kg.

Figure 5.17

Paul's Weight in kg on Race-days and Non Race-days



Paul's baseline weight was 55.65 kg, a figure close to that he estimated in his interview as his usual "walking around" or pre-wasting weight. His other non race-day weight was also close to his estimated pre-wasting weight, at 55.6 kg, further validating Paul's estimate as an accurate one.

Extent of wasting. After Paul described his usual weight range, I then asked him to discuss his wasting, including how much weight he typically needs to lose to get down to his riding weight, and the frequency and duration of his weight loss episodes. Paul said that, in general, he prefers to lose weight gradually, but that this tactic is not

always possible. In discussing his dislike for substantial or rapid wasting, Paul remarked:

I think sometimes you're just better off saying, "Oh well, I won't ride quite as light," so that you can get it [weight] back down a bit more gradually, rather than (pause) as soon as you start trying to pull off a lot of weight quick then that's when the weight goes like a yo-yo.

Based on these comments, it appears that the speed of Paul's weight change seems to be more important to him than the magnitude of it. If he wastes too rapidly, Paul finds that his weight quickly rebounds to its pre-wasting level, and sometimes beyond this point.

Next, Paul described a typical week of wasting for him: "I'd lose, say, a minimum of a kilogram every day, every time I go to the races, which is 3 or 4 times a week at the moment." Paul seems to be understating the magnitude, and perhaps the frequency of his usual weight loss, given his previous comments that he usually rides at 53 kg, and that he is riding at least 4 times per week at the moment. A loss of 1 kg from his usual pre-wasting weight of 56 kg equates to a proportional loss of approximately 1.8% of Paul's total body weight. The relative weight loss Paul requires to reach his usual minimum riding weight of 53 kg is more than 5%, assuming the same starting weight. The jockeys surveyed in Study 1 usually lost an average of 2.6% of their total body weight, approximately half the proportion that Paul must lose to ride at his usual weight. Paul stated that most, if not all, of the weight he loses when he wastes is regained in the hours immediately after his race-riding commitments are complete, in the yo-yo manner he described earlier.

Paul reiterated that, although his preference is to lose weight gradually, he occasionally needs to lose more than his usual 2 to 3 kg, or needs to waste more quickly than he would like. While recalling the frequent and substantial wasting episodes of his late teens when he did not have a set weight management routine, Paul made the following comments about lapses in his current regimen:

Even sometimes now, like, I'll go out: I will have been wasting, sweating very hard all weekend for the races, your body is so dry and dehydrated that when you go out, first thing you do is put alcohol into you, and then the next day you're 4 or 5 kg heavier, you know. And then, you might be riding, say, that might be a Sunday night, and then you're riding on a Tuesday, then all of a sudden you've got to pull off [lose] 4 or 5 kg that day. Or get half of it off and get half of it off the next day.

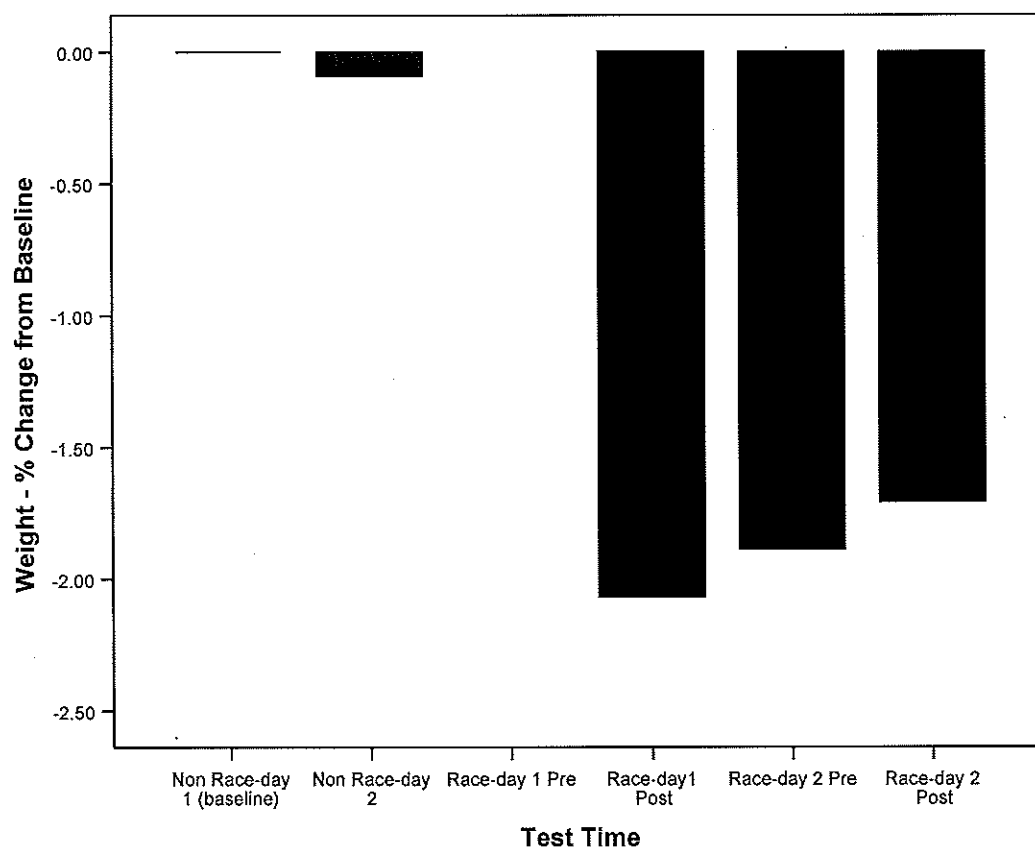
It appears that Paul's occasional habit of social drinking, begun towards the end of his time as an apprentice jockey, can leave him with as much as 5 kg or 10% of his total body weight to lose in only a few days. Paul discussed his proclivity to drinking alcohol as being an outlet for the pressure of life as a professional jockey, and his counterproductive choice of this particular coping strategy seems to be exacerbating one of the key sources of professional stress he experiences rather than reducing it.

Paul reported that he had wasted to a substantial degree in the hours prior to each of the race-days that were part of the current study. Actually, Paul could not participate fully in his race-day 1 test sessions because his wasting activities took precedence over the study and prevented him from doing so. On this occasion, Paul was due to take part in his pre-race-day test session at 10.45 am, but had not reached his minimum riding weight by this time, and used the 45 minutes that he would otherwise have been involved in testing to waste down to his riding weight. Later, at his post race-day 1 session, Paul reported that he had lost approximately 4.5% of his body weight (2.5 kg) in the 18 hours before his first race that day, dropping from 55.5 kg to 53 kg. Paul also lost weight in preparation for his second race-day, this time estimating his weight loss at 3.5% of his total body weight or 2 kg. Although the magnitude of his weight loss was slightly less before race-day 2 than it was before race-day 1, Paul said he lost the weight more rapidly on the second occasion, losing the 2 kg in just the 7 hours before his first race.

Paul's objectively measured race-day weight changes from baseline, illustrated in Figure 5.18, were smaller than those he self-reported on each occasion. This discrepancy may have been because Paul overestimated that amounts of weight he had lost, or because he had consumed some food and drink between making his estimates and being weighed. Regardless, even conservative estimates of his relative weight loss place him close to or beyond the 2% threshold at which physiological and psychological impairments have been observed (Gopinathan et al., 1988; Sharma et al., 1986).

Figure 518

Percent Change from Baseline in Paul's Weight on Race-days and Non Race-days



The patterns of weight loss Paul described in his interview suggest that he prefers a routine involving relatively gradual weight loss, similar to that favoured by Mike, where small amounts of weight are lost progressively as each race-day approaches. This approach contrasts sharply with Paul's two actual accounts of rapid

and substantial pre-competition weight loss during the measurement period of this study. On these two occasions, Paul self-reported losing over 3.5% of his body weight in preparation for each race-day, figures close to the upper limits of wasting reported in previous studies of jockeys (Leydon & Wall, 2002; Moore et al., 2002). Taking Paul's self-reports and objectively measured weight changes into account, it appears that he loses in excess of 2% of his body weight in preparation for most race-meetings, and that he regains much of this weight at the completion of each race-day.

Perceived ease of weight management. The results of Study 1 indicated that the normal body weight of jockeys and the amount of weight loss they undergo to reach their riding weights are both positively correlated to the degree of difficulty that jockeys report in managing their weight. With an un-wasted weight of approximately 56 kg, and a typical requirement of 2.0 to 3.0 kg of weight loss to make his minimum riding weight, it is not surprising that Paul conceded he has difficulty managing his weight most of the time. He remarked that being a jockey would be the "best job in the world" if it was simply a matter of getting up in the morning and riding, but the reality for him is that he battles with his weight almost every day. The toll that his constant struggle with weight takes on him was evident when he stated, "I know that when I'm really light, and when I'm sort of just normal, I can be two different people."

Despite his own weight problems, Paul actually thinks that other jockeys find managing their weight even more difficult than he does. For example, after discussing the difficulty he has maintaining his own minimum riding weight at 53 kg, Paul compared himself to heavier jockeys, and stated, "Then you've got a heavyweight jockey who rides at 56 or 55 [kg], but that's (pause) they're flat out doing that." In general, Paul believes that heavyweight jockeys have the greatest degree of difficulty

with weight management, lightweight jockeys have the greatest ease, and he falls somewhere in between the two extremes.

The most difficult times for Paul in terms of weight management are after he returns to riding from a holiday break or a suspension. As Mike and Bryan reported, Paul's weight quickly increases during these short breaks, but Paul seems to link the weight gain to his extra social activities during his time off:

I find the worse thing is . . . if you've had a break, a holiday, or a break, and your weight has gone up, which it always does, the hardest thing (pause) you've gotta really spend a month, or a month and a half and just do nothing [refrain from socialising]: just sit at home and be a hermit, more or less, to really get you're weight back in check.

Paul does not connect his holiday weight gain with cold weather or an inability to sweat as Mike and Bryan do, but agrees that relaxing his weight management regimen is a major factor. It appears that Paul takes his breaks from riding as an opportunity to enjoy a social life more typical of his non-jockey friends. Paul ruefully added that it always seems to take him longer to lose the weight he gains than it does to gain it in the first instance:

I know that you might get your weight down a bit, and then you'll go out, say once, one night, and you'll spend another week trying to get it [the weight Paul gains] back off. It's a lot easier to put on than what it is to take off.

In Paul's estimation, it takes him most of the following week to lose the weight he gains in one night of drinking with his friends.

Although he finds weight management difficult most of the time, Paul reported that the hectic Melbourne Spring Racing Carnival, with its reduced minimum weights, can actually be beneficial for him in regard to his weight: "Sometimes, over the busier times of the year I'm a lot better [managing my weight]." Paul explained that, rather than being overwhelmed by the constant need to monitor his weight, his schedule in the busy times of the year keeps him focussed on his weight, and he becomes more diligent

with his regimen. In this way, Paul does not allow his pre-wasting weight to get as high as it does at other times of the season, and subsequent wasting does not seem as difficult. This point seems to contradict Paul's earlier comments about how daunting he finds it to waste several times a week when he is only getting a small number of rides. Perhaps the rewards at the end of his wasting, such as the prize money and public acclaim, are stronger determinants of Paul's attitude to weight management than either the frequency or magnitude of his wasting.

Beyond his typical weight range. Like the other two jockeys already discussed in this chapter, Paul will reluctantly drop below his usual minimum riding weight to increase his chances of being engaged for race rides. Paul stated, "I've been riding at 53 kg [recently], and I've been walking around at about 56 kg. But I will take rides in the next month; I'd be confident I could take rides in the next month at 52.5 kg." Paul explained that he will shed the extra 0.5 kg in the coming weeks to ensure he can accept as many rides as possible in the approaching Melbourne Spring Racing Carnival. He thinks most jockeys will do the same, and summed up his attitude to this extra weight loss by stating,

If you can win a Melbourne Cup by being 1 kg lighter then you're going to be 1 kg lighter, you know . . . whether your body should do it or not, you do it. That's part and parcel what you're trying to do.

Like Bryan, Paul's motivation for accepting the risks accompanying exceptional weight loss is the opportunity for success in important races. In other words, for Paul, and other jockeys like him, riding winners is the primary objective, even if the means to this end are also to the detriment of his health and well-being.

Weight-Management Methods

The current jockeys described so far in this chapter indicated that they usually need to use multiple methods to manage their weight effectively. Both Bryan and Mike

use a combination of negative energy balance and dehydration methods on a regular basis to achieve their weight targets. Given his comments about the difficulty he has managing his weight, and the substantial difference between his pre-wasting weight and his riding weight, one could assume that Paul too uses a variety of wasting methods, some drastic, to achieve his weight goals.

In confirmation of this assumption, Paul reported that he has used a wide variety of weight loss tactics in his career to date, and continues to experiment with and combine many different methods. For example, Paul described a recent weight loss episode where he engaged in a number of different wasting activities on the same day to achieve the weight loss he required:

I had to lose 2 kg for the races, and it was the lightest I'd ridden for a while. So, I got up and had a spa for about an hour, and I lost half a kilogram, then I went for about an 8 km run with sweat gear on, and then went for a sauna for (pause) it took me about 2 and a half hours to lose the last kilogram.

Paul thinks his weight-management regimen is idiosyncratic, commenting that the methods he uses may not work for other jockeys. In justifying his eclectic approach, Paul went on to say that the desperation that he and other jockeys feel when they get close to making their target riding weights can lead them to try anything:

A lot of people say, "Oh, you shouldn't do this, you shouldn't do that," but unless you've actually been there, and know what it's like to be just completely stuffed, and had enough, and no fluid or food in your stomach, and be within three ticks of [be very close to] making a weight or not, well . . .

Although Paul did not complete his sentence, he appears to be suggesting again that well-meaning observers who advise jockeys against using rapid or extreme weight-loss techniques simply do not understand the limits of weight loss that can be achieved through gradual methods.

Manipulating energy balance. Like most jockeys, a large part of Paul's weight management plan is related to carefully balancing his energy intake and expenditure.

For example, when I asked him about his current weight-management regimen, the first method Paul discussed was caloric restriction. Paul stated that he has recently begun a calorie-controlled meal-replacement program:

For the last few weeks I've been on a thing called the Herbal Life diet, which you take tablets 3 times a day, with (pause) and two milkshakes, protein milkshakes. And then I'll have, say, some fish or something. I'll have two shakes a day and some fish as a meal.

The program Paul described involves replacing two main meals per day (usually breakfast and lunch) with tablets and low calorie "shakes." The powder that is the basis of these shakes contains protein, dietary fibre, and other essential vitamins and minerals, and is mixed with water to form a healthy beverage. As well as satisfying his nutritional requirements, the shakes are supposed to sate Paul's hunger, but he revealed that he does not always feel replete. After describing his new dietary program, Paul commented, "A lot of the time I find I nibble. I sort of get bored and nibble." It appears that, although these meal replacements may supply many of Paul's nutritional requirements, they do not seem to provide him with the same psychological nourishment or satisfaction that eating a normal meal does. Perhaps the brief act of swallowing a pill or drinking a protein shake happens too quickly to be as intrinsically satisfying as sitting down to eat a meal over a longer period of time.

After his experience of weight gain at the completion of his apprenticeship, Paul knows that high energy expenditure, as well as low energy intake, is essential for him if he is to keep his weight around his desired minimum (53 kg). As a result, Paul jogs two or three times per week, particularly when he has an imminent light ride, and also rides track-work. Paul often covers distances of 8 to 10 km on his non race-day runs, and considers this exercise a gradual weight-loss or weight-maintenance strategy.

Manipulating body fluid balance. A noteworthy feature of both Mike's and Bryan's weight-management regimens is their inclusion of body fluid reduction

methods. For example, both jockeys carefully regulate their drinking, and frequently use dehydrating devices, such as saunas, spas or hot baths, to alter their body fluid levels.

Younger jockey, Bryan, also exercises in sweat gear and drinks herbal diuretic beverages to maintain his light riding weight.

Unlike the other two jockeys who are fastidious about their fluid intake, Paul remarked that he constantly consumes fluid, both on race and non race-days. Perhaps because of this unrestrained fluid intake, Paul reported that he engages in long sweating sessions almost every day, either in a hot spa bath or sauna. Paul reiterated that he typically loses 1 kg or more during each session, and said that his preference was to sweat in the bath at his home over an extended period of time. Paul also revealed something of the unpredictability of this weight-loss technique:

I sweat in the bath a lot, just in a hot bath or a spa. I can put a movie on, and you know, you can probably do 1 kg in an hour, lose 1 kg in an hour. I'll put a movie on or some music, and just lay back and read the paper or something like that. And, sometimes, I can just sit in there for 2 hours, and still only lose 1 kg, but not do it as hard, not having to really rush it. I find I feel a little bit better if I don't have to rush it so much.

So, the rate at which Paul loses weight via dehydration in the bath can vary by as much as 50%, and it must be of some concern to him that this central component of his weight loss routine seems so variable in its effect. Paul also hints that his sweating sessions come at a price, and again suggests that the speed of his weight loss is more important than the amount of weight he has to lose in relation to the effects on his health.

Anecdotally, other jockeys involved in this study reported that they try to minimise the amount of time they spend in saunas and hot baths because prolonged exposure to heat can cause dizziness and fainting, so it was surprising to hear Paul remark that his preference is to spend extended amounts of time in the bath.

Paul's weight-management records provide evidence that he uses other methods to manipulate his body-fluid balance on occasions, over and above his frequent use of

saunas and hot baths. For example, Paul indicated that he wore sweat gear while exercising on the mornings of both of the race-days that were part of this study. Paul walked with his sweats on for approximately 2 hours on race-day 1, and he jogged for about 20 minutes on race-day 2.

Other methods. Past research has revealed that some jockeys resort to using a range of potentially hazardous methods to lose weight, including diuretics, laxatives, appetite suppressants, and self-induced vomiting (Labadarios et al., 1993; Leydon & Wall, 2002; Moore et al., 2002).

Like lightweight jockey Bryan, Paul openly acknowledged that the “right” methods, such as a low calorie diets and physical activity, usually advocated by jockeys and other industry stakeholders do not always provide the weight loss he needs. I asked Paul for his opinion about some of the additional methods that past jockeys had traditionally turned to in these circumstances, such as appetite suppressants and diuretics. Paul responded that he had frequently used the appetite suppressant Duromine, and is disappointed it is now banned in Australian racing:

Duromine, I found to be (cough) I found that when I was really wasting hard, they just gave me a bit of a lift. I could lose more weight on them [Duromine] because I felt like doing more [being more active]. Sometimes, when you're wasting you can't be bothered lifting your head. I thought they did help a lot.

Paul is no doubt referring to the arousing effect that appetite suppressants have on many users because of their SNS stimulating properties (Silverstone, 1992). As well as diminishing his hunger, taking Duromine made Paul feel more energetic, which compensated for the fatiguing effect that his restrictive diet had on him, and also allowed him to remain active and burn further calories. Duromine soon became a cornerstone of Paul's regular weight-management regimen, and he reported that he usually took one tablet every 2 days. Paul commented that he did not experience any negative side effects from his Duromine regimen, but noticed that he would start to

“come down off them” after about 24 hours. He felt that withdrawing in this way was a wise practice because it meant that his tolerance to the drug remained low, unlike other jockeys Paul knew who had to keep increasing their dosages to obtain the same weight-reducing effect.

In contrast to his positive attitude to the appetite suppressant Duromine, Paul is not an advocate of diuretics:

I didn't like diuretics because as soon as you have them, I used to cramp up a lot on them. And as soon as I'd had them, my weight, the next day, my weight would balloon. You take off 1 kg and put two back on. And they used to make me feel really crook [sick].

Paul discussed his experiences with both appetite suppressants and diuretics in the past tense, and confirmed that the close monitoring of jockeys through mandatory drug testing means that these substances are a thing of the past for the vast majority of Australian jockeys. Paul stated, “You have to do swabs [give blood samples] and that sort of thing now, so, I suppose, it's going to happen a little bit [drug use], but I doubt it happens very much.” Paul's statement about the low prevalence among jockeys of drug use for weight control is supported by the results of Study 1, where approximately 12 % of jockeys reported using diuretics and appetite suppressants.

With Duromine now banned, Paul has had to add further weight loss methods to his wasting routine. For example, Paul mentioned that he occasionally purges, also known as *flipping* or *heaving* in horse-racing circles, to induce weight loss. Paul stated that flipping is a “last resort” tactic for him, only used 3 or 4 times a year, and he described the rationale behind this technique as follows:

I know some jockeys that will drink heaps of soda water, or coke, or any of that, and then (pause) its called flipping, they flip it. And it will get them sweating, it will get you sweating while it's there [the liquid is in your stomach], and then you get rid of what you had in your stomach.

Self-induced vomiting is traditionally considered an energy restriction tactic, because food that is swallowed is regurgitated before it has a chance to be digested and stored by the body, but Paul appears to use it for a different reason. As he describes it, Paul uses flipping as an occasional adjunct to his dehydration activities: consuming a large amount of liquid acts as a kind of catalyst, in that it reactivates his sweating response after it has stopped or slowed down. Despite reports of flipping among North American jockeys and wrestlers (Forde, 2002; Schmidt, 2004), only one participant from Study 1 reported using self-induced vomiting for weight control, so this technique may be more common in weight-restricting athletes from the USA.

Paul also stated that he is a heavy smoker, puffing on at least 20 cigarettes a day, and, although smoking was not originally a weight-control tactic, he now finds that he gains weight when he cuts back or stops altogether. Paul thinks that smoking gives him something to do when he is wasting, which takes his mind off his thirst and hunger, and noted that he smokes more on race-days when he is at his lightest weights than he does on non race-days. Clearly then, smoking has inadvertently become an acknowledged part of Paul's regular weight-loss routine.

Psychological Effects of Wasting

Previous research has revealed that athletes in weight-restricting sports, such as jockeys, wrestlers, and boxers, who lose weight substantially, rapidly, or frequently, are at risk of experiencing acute negative psychological side effects related to their wasting, including affective disturbances and problems with short-term memory (Caulfield et al., 2003; Choma et al., 1998; Hall & Lane, 2001; Labadarios et al., 1993). The jockeys surveyed in Study 1 reported experiencing a wide variety of undesirable psychological symptoms associated with wasting. The number of these symptoms jockeys experience

was correlated with both the amount of weight they usually lost ($r = .53, p < .01$), and their perceived difficulty in managing weight ($r = .50, p < .01$).

Paul described weight management as very difficult for him, and remarked that he usually needs to lose a substantial amount of weight to reach his minimum riding weight. Further, Paul engages in regular sweating sessions, involving saunas, hot baths, and sweat gear, all of which could potentially expose Paul to the negative psychological effects associated with rapid weight loss (Armstrong et al., 1985; Cian et al., 2000).

When I asked Paul about how he functions mentally when wasting, he responded that he is not really sure. Paul joked that he is “not the sharpest tool in the shed anyway,” and finds it difficult to talk about functions such as his memory that operate below his conscious awareness most of the time. Paul commented that “it’s a hard question. It’s not something I would [normally] spend time thinking about.” Paul did, however, report some general concerns about his mental function when wasting, stating somewhat ambiguously that “mentally, I suppose you’re a little bit shorter.”

When I commented that I often become forgetful when I am dehydrated, Paul suggested that he too has cognitive difficulties when he wastes, specifically in appropriately maintaining his attention. When describing the relief he feels after completing his lightest ride at a given race meeting, Paul explained the link between wasting and his ability to concentrate during race-days:

A lot of the time a lot of your concentration is taken away from actually riding, and actual race riding, and you think more about whether you’re going to make the weight or not. And I’ve still got so much to lose before you’re halfway through the day, and you’ve still got another half a kilo to lose, another quarter of a kilo. A lot of your concentration is taken away from riding.

In Paul’s opinion, his concerns about his weight and his wasting activities become distractions, and he is less able to focus on other tasks such as his riding.

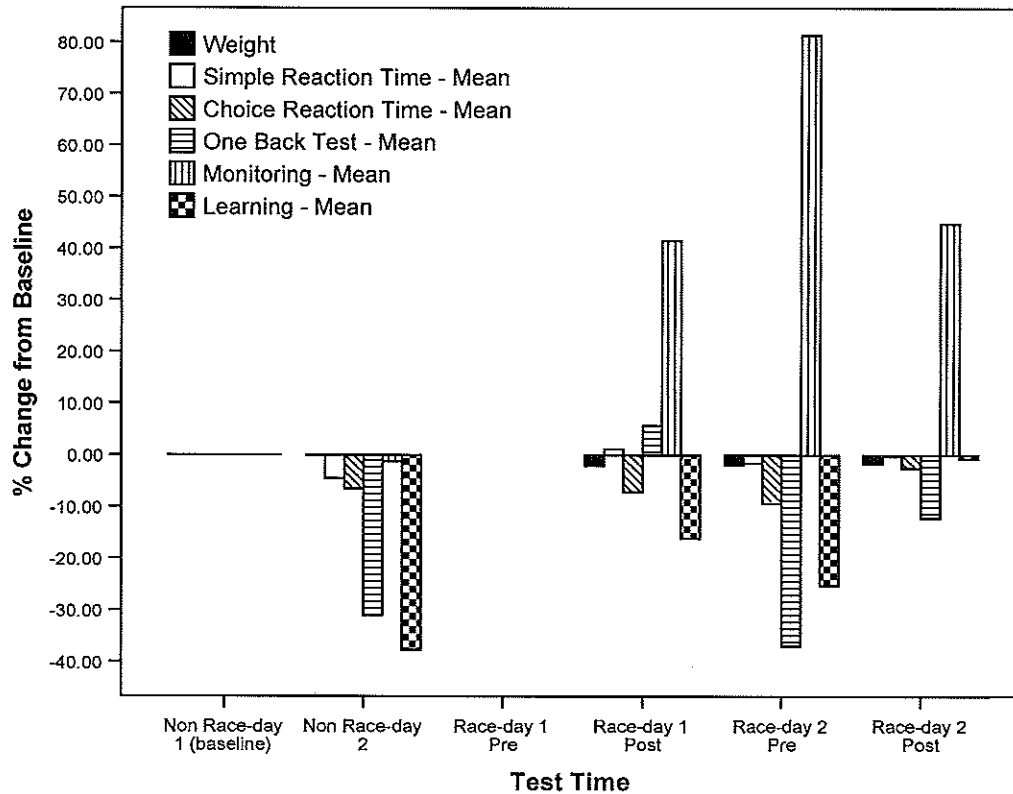
After explaining that he can become pre-occupied with wasting and his weight targets, Paul made an additional comment about his cognitive function. He elaborated: “I suppose you don’t concentrate. You probably have to sit there and think about things a lot more,” which suggests that it is the speed rather than the accuracy of Paul’s processing that is most affected. It may be that Paul’s thoughts about weight are actively competing with other cognitive tasks for his resources, with the overall result of a general slowing of his cognitive functions when he wastes.

Paul underwent serial testing of his cognitive functions on 2 race-days and 2 non race-days, with his cognitive performance at his highest non race-day weight (i.e., non race-day 2) taken as a baseline. The percentage change from baseline in Paul’s scores on each of the subtests of the CogSport test battery at each time point are shown in Figure 5.32. Scores above the horizontal axis of the figure indicate slower (i.e., worse) than baseline processing speeds, and scores below the axis indicate faster than baseline (i.e., improved) processing speeds.

A general analysis of Paul’s cognitive performances, displayed in Figure 5.19, suggests that he functions well on race-days when he is at his lightest weights. The majority of Paul’s race-day subtest scores appear below the horizontal axis, indicating faster than baseline processing. Several of Paul’s fastest cognitive responses occurred on his second non race-day, when his weight was close to its highest level, further evidence that little relationship exists between his weight status and cognitive function. Nevertheless, a number of scores also appear above the horizontal axis, indicating that specific functions may be differentially affected by weight loss and competition.

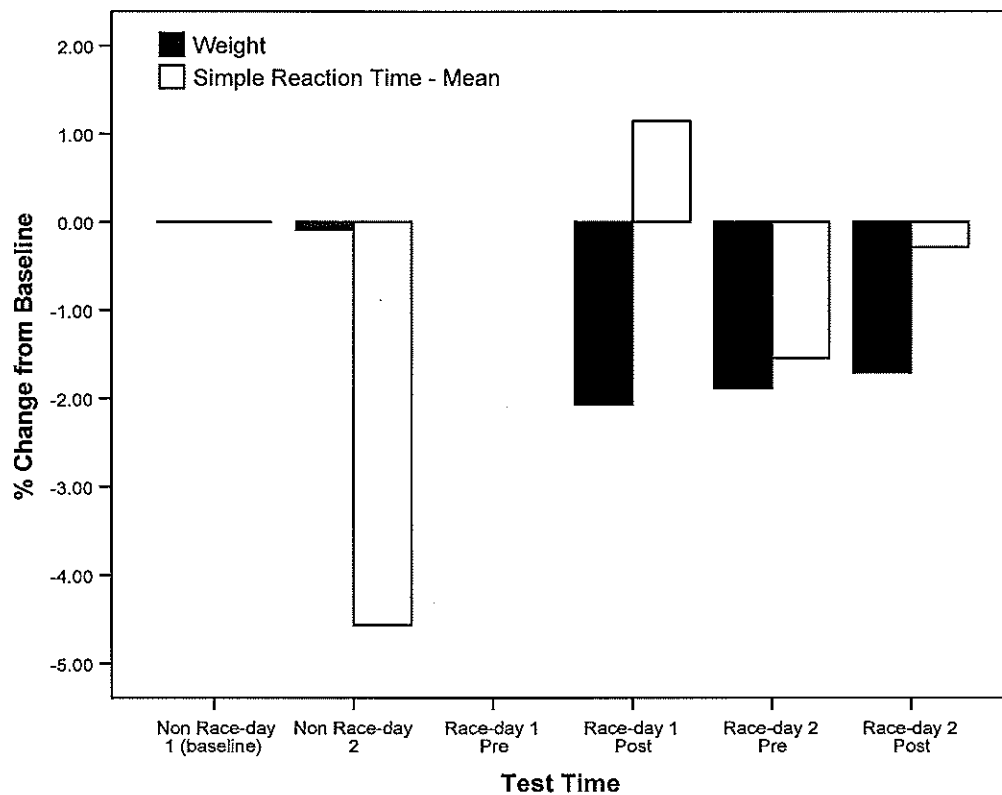
Figure 5.19

Percent Change from Baseline in Paul's Weight and Mean Processing Speed on Five CogSport Subtests



Psychomotor performance. The simple reaction time (SRT) CogSport subtest has participants respond by striking a designated key as soon as a stimulus appears on the computer screen in front of them. The authors of the test considered it to be a measure of basic psychomotor function (Falleti et al., 2003). Figure 5.20 shows the fluctuations in Paul's weight and average speed of simple reaction time, measured serially across 2 race-days and 2 non race-days. The data are expressed as the percentage change from Paul's baseline recordings, defined as those taken on his heaviest non race-day.

Figure 5.20

Percent Change from Baseline in Paul's Weight and Mean Simple Reaction Time

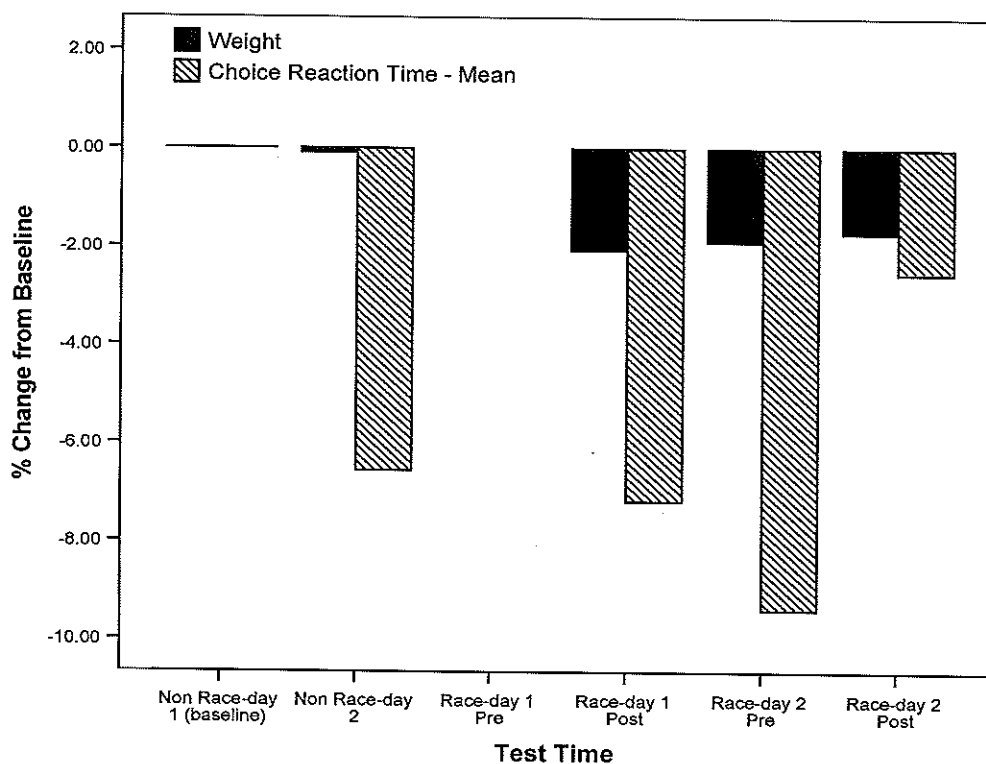
Paul's speed of psychomotor responding, as measured by his responses on the simple reaction time test (SRT), appears to be largely unaffected by changes in his weight. His SRT scores on race-days varied little, from a slowest of 1% greater than baseline recorded at his pre race-day 1 test session, to a fastest of approximately 2% quicker than baseline recorded on race-day 2. In a further indication that Paul's psychomotor function has little relationship with his weight, his non race-day 2 test performance was almost 5% faster than his baseline level, despite the negligible difference in his weight on these two occasions.

Decision-making. The choice reaction time (ChRT) subtest of the CogSport battery measures the speed of decision-making. Participants are faced with a choice between two options and decide as quickly as possible which one is correct. Figure 5.21

shows the percentage change from baseline in Paul's weight and his average speed of decision-making. Again, the figure illustrates a pattern of faster decision making processing when Paul is at his lightest weights. For example, Paul was 2% below his baseline weight at his post race-day 1 session, and his average decision making speed was approximately 7% faster than baseline at this time. At his next race-day session (race-day 2 pre test), Paul weighed 1.9% less than baseline, and his decision making was more than 9% faster than his baseline recording. Paul's decision making speed was also faster than baseline at his second non race-day test session however, so the improvement in processing speed may be related to factors other than his weight status.

Figure 5.21

Percent Change from Baseline in Paul's Weight and Mean Choice Reaction Time

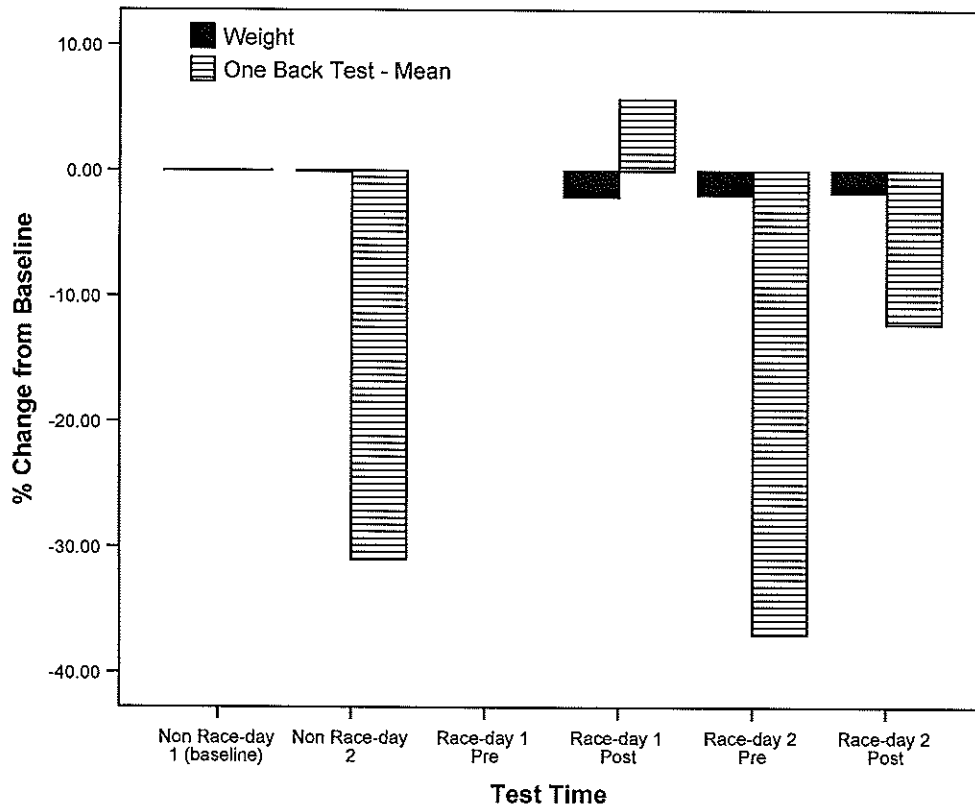


Working memory. The one-back subtest of the CogSport battery assesses working memory by asking participants to recall recently presented, but now obscured stimuli. Figure 5.22 shows the percentage change from baseline levels of Paul's weight

and average speed of working memory. This figure shows no clear pattern of processing speed evident in Paul's scores when comparing his race-day performances with his non race-day performances. For example, Paul's race-day 1 post test score was approximately 5% slower than baseline when his weight was 2% below baseline, but, at his race-day 2 pre test session, his speed of memory processing was over 35% faster than baseline yet his weight is again nearly 2% below his baseline level.

Figure 5.22

Percent Change from Baseline in Paul's Weight and Mean One Back Test Response Speed

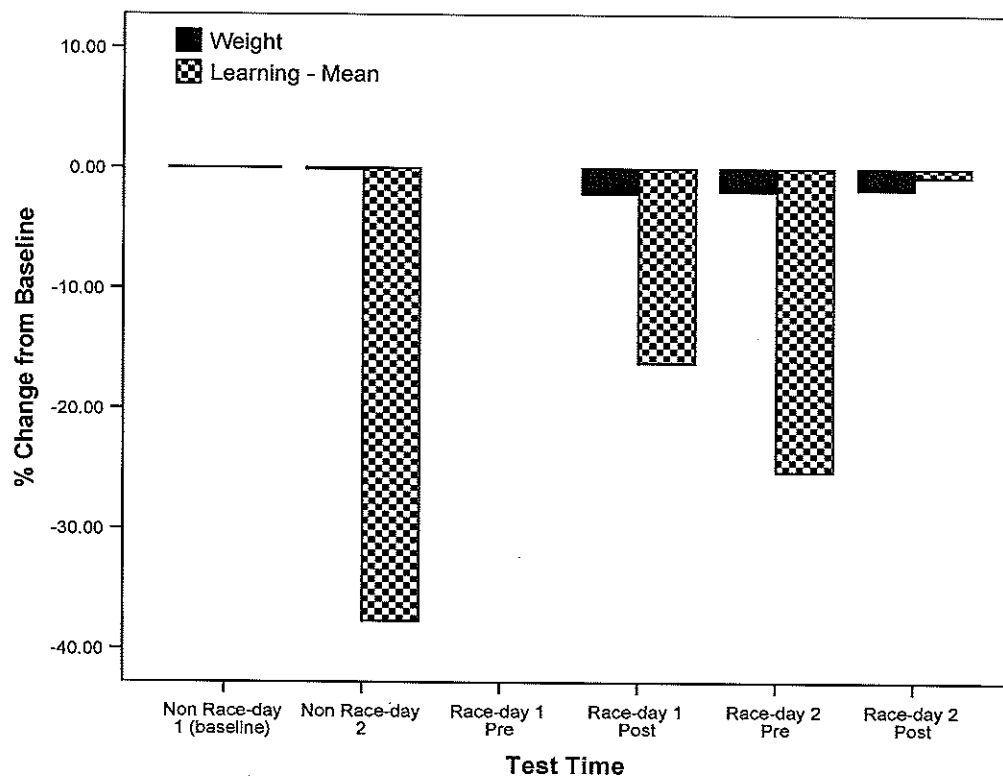


Learning. The CogSport learning subtest asks participants to deliberately develop strategies in order to remember pairs of stimuli for later recall. Figure 5.23 shows the percentage change in Paul's weight and average speed of processing on the learning subtest. This figure shows that there was a general pattern of faster than

baseline processing when Paul was at his lightest weights, clearly evident at two of his three race-day test sessions. The race-day exception to this quicker processing occurred at his race-day 2 post test, when Paul's average speed was approximately 2% faster than baseline. A decrease in processing time means that Paul may have been able to make more efficient use of his tactical planning time for each race, to the point where he may have been able to do his *form* work more thoroughly before each race began. Again, Paul's second non race-day speed of learning score was substantially faster than baseline, suggesting that factors others than weight may have influenced his processing.

Figure 5.23

Percent Change from Baseline in Paul's Weight and Mean Learning Response Speed

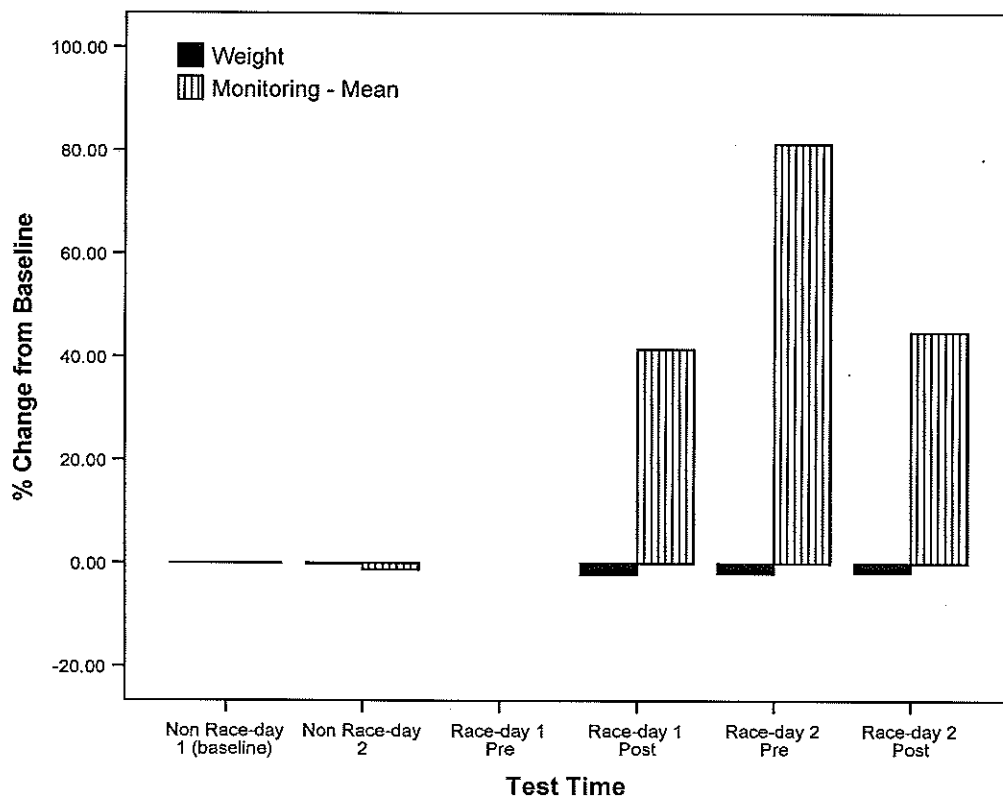


Attentional function. The monitoring subtest of the CogSport test battery requires participants to track a number of randomly and independently moving visual stimuli presented on a computer screen, responding when one or more of the stimuli moves beyond fixed boundaries on the screen. Figure 5.24 shows the percentage change

from baseline levels of Paul's weight and average speed of monitoring. This figure shows a marked and consistent deterioration in Paul's speed of monitoring responses from baseline levels associated with his lightest weights, in line with Paul's comments on his ability to concentrate when he wastes.

Figure 5.24

Percent Change from Baseline in Paul's Weight and Monitoring Response Speed



Paul's average speed of responding was slowed by over 80% at his post race-day 2 session and by greater than 40% at his two other race-day tests. On these race-day occasions, Paul may not have been able to monitor the rapid movement of other horses in a race as efficiently as he was capable of in his pre-wasting state, and may have missed opportunities to move his horse into a more advantageous position through his more sluggish processing. This slowing of monitoring speed was also evident in

Bryan's scores when at his lightest weights, which suggests that the effect may be a function specific rather than idiosyncratic response to weight loss or competition.

Mood. The most consistent finding relating to the negative psychological effects of wasting in weight-restricting athletes is that of mood disturbances. Affective disturbances related to wasting have been found previously in jockeys (Caulfield et al., 2003), and wrestlers (Choma et al., 1998; Landers et al., 2001), and were also prevalent among the jockeys surveyed here in Study 1.

Both Mike and Bryan strongly associate negative moods with their weight loss, and Paul is equally convinced of his emotional reactivity to wasting. With a hint of hyperbole to emphasise his point, Paul stated, "I get very grumpy. Usually, I just sort of joke around, I'm fairly happy. But when I'm wasting, I'm quite miserable, one of the worst people to live with in the world, I reckon." Paul used different labels than those used by Mike and Bryan to describe how he feels emotionally when he wastes, but he seems to be describing a similar increase in negative mood states to the other jockeys.

Paul self-reported that he felt both angry and irritable at his pre race-day 2 test, and remarked that I ". . . wouldn't have wanted to be around" him on the morning of race-day 1, in reference to his terrible emotional state. When I asked him if he could recall another recent example of this moodiness, Paul gave an insight into the causes of his emotional volatility when he is wasting: "Like, I was pretty grumpy last Saturday. You know, I like to have everything sort of spot on. And when I'm wasting I like everything to be (pause) everything has to run smoothly." Paul suggested that he can keep his negative emotions in check if events unfold in line with his expectations, but that he can be quickly overwhelmed if something unexpected occurs. Paul explained that he is often most emotionally vulnerable at the completion of his race-day duties:

A lot of the time, after the races I get really, a bit depressed, I suppose. Like, you've just been riding all day, you've been flat out, you haven't stopped all day,

and then you get home and you sit down and all of a sudden (pause) you've had a bad day, the last 3 days have all been about going to the races, and then all of a sudden you get home, and that's it, you've got nothing to do.

As Paul described it, his affective reactivity increases as he approaches each race-day, particularly when he is wasting, and he experiences an emotional let-down (depression in his words) if the day has not been successful for him. Both Mike and Bryan also reported experiencing a similar effect at the end of some race-days.

In Paul's opinion, there is only one thing jockeys can do when gripped by the negative moods associated with their wasting: isolate themselves. Paul talked of the change in his sociability at work when he is wasting to ride at his lightest:

When I'm riding, and I'm in a good mood, or I'm not riding light, I'll be talking, be pretty talkative. But when I'm really wasting, I try to sit on my own and just not talk. I'll go out [leave the jockeys' enclosure] and have a cigarette and read my *form*, but I just like to sit on my own so I can just relax. But after I'm back [inside the enclosure], I find I'm a bit of a loner, just go and sit on my own.

Paul admitted that his decision to avoid small talk with people when he is wasting is socially restricting, noting that important conversations often start with informal discussions of minor issues.

When he does interact with others at these times, Paul notices that he is more "aggressive" in his communication and his actions. He suggested that this aggression is not intentional, but is perhaps an expression of his desire to conserve his energy, and to ensure that his efforts to waste are worthwhile. In explaining this point, Paul stated: "If you've done so much to get your weight down, well, it may as well be worth it. Sometimes you just take that little extra risk because it [wasting] has been so hard." The extra risk may come in the form of speaking more forcefully and succinctly with other jockeys and industry representatives, ignoring them, or in riding more aggressively in a race.

Physical Effects of Wasting

Several authors have reported that athletes who waste experience serious physiological and physical complications associated with their weight loss, including cramps, dizziness, fatigue, deficits in physical performance, and impaired tissue growth (Fogelholm, 1994; Walberg-Rankin, 2000). During his interview, I asked Paul to describe any acute or chronic physiological side-effects that he has encountered due to his wasting, including the timing and severity of these effects. I also asked Paul to indicate whether he experienced any acute physiological symptoms associated with heat illness during the testing period in this study.

Acute effects. The most noticeable physical effect that wasting has on Paul is physical fatigue, just as it is for Mike and Bryan. For example, when explaining his positive attitude to the SNS stimulant Duromine, Paul stated that, "Sometimes, when you're wasting, you can't be bothered lifting your head." When he feels fatigued in this way, sitting at home and watching television is all Paul can manage. Paul confirmed that he felt tired at all three of his race-day test sessions, and both his non race-day test sessions. On his second non race-day test, Paul also reported that his physical fatigue was accompanied by muscle weakness, a consequence of wasting that Mike and Bryan observed occasionally, especially Bryan.

In addition to physical fatigue, Paul reported that he experiences a number of acute stomach complaints both during and after wasting, including vomiting or dry-retching, and stomach cramps. For example, Paul mentioned that he had suddenly dry-retched while exercising on the morning on race-day 1. On this morning, Paul was trying to lose weight rapidly by jogging in his sweat gear, after waking up heavier than he had intended. According to Paul, his gastric problems can also be initiated by eating or drinking too quickly after he has wasted severely: "Ah, I have, after I've ridden, I've

had something to drink, and I've just thrown up 'cause I couldn't hold it in my stomach." Paul suggests that this reflexive retching is caused by the shrinking of his stomach in response to wasting, a similar explanation to Bryan's account of his gastric symptoms.

Paul also experiences a number of other physical side effects occasionally when he wastes for a light ride. For example, he sometimes experiences cramps in his legs, and has encountered headaches at times. When asked if anything else happens to him physically when he wastes, Paul responded, "I suppose dizziness and that sort of thing," but it was clear from the dismissive way that Paul answered the question that he considers these effects to be insignificant.

When I asked Paul how long it took him to recover physically from an episode of wasting, he visibly winced, before replying, "Oh, if I've really wasted hard, it probably takes me a few days." Paul estimated that it takes him 2 to 3 days to recover physically from a severe episode of wasting, and, with his current schedule of riding 3 to 4 times per week, it is clear that he does not have time to regain his strength and vigour completely after such an episode. Paul added that, after eating and drinking to compensate for his lack of food and water in the preceding days, he quickly moves from being ravenous and thirsty to feeling bloated. In Paul's words, he can go from "one extreme to the other" in a matter of hours.

Weight-Management Advice for Other Jockeys

Next, I asked Paul whether he had any weight-management advice for other jockeys, and in particular young jockeys who were just entering the profession. Initially, he responded that he does not think he is a good role model for young jockeys, commenting, "I'm hopeless really." Despite misgivings about their merit, Paul revealed that he does have opinions about weight management to pass on to other jockeys. For

example, Paul's attitude to weight gain, like Bryan's and Mike's, is that prevention is better than cure:

Ah, I suppose I think apprentice jockeys should start, they should get into a routine even before they have too much trouble with their weight. Because if they don't, then all of a sudden their weight is no good, and they've never had an actual set diet.

Paul's experience of post-apprenticeship weight gain is still relatively recent, and it is clear that he wishes he had been more attentive to his own diet before his weight began to be a problem. Paul made it clear that he did not receive much unsolicited advice about weight management when he was an apprentice, and he seems to resent this lack of pre-emptive support still. He said that much of what he has learned has been gleaned through trial and error and from questioning other jockeys about their practices. Paul said that most jockeys will share their weight-management knowledge, but noted that he had always been the one to make the initial approach: "I've gone and asked jockeys that I've thought to myself are really fit and are probably jockeys who do things the right way, and spoken to them." Paul's comment about doing things the "right way," although not clarified in the context of his statement, is another example of the implicit sanctioning by jockeys of some weight-management methods above others.

Although he is still relatively young and inexperienced compared to the jockeys surveyed here and elsewhere, Paul has several other pieces of advice for aspiring jockeys. With his next suggestion, Paul qualified his earlier statements about the strict routines that jockeys should adopt to keep their weight in check. Paul believes that variation, especially in relation to diet, is vital if jockeys are to adhere to their routines and maintain their weights in the long-term:

And, of course, I think that you should allow one night a week where you can go out and have a nice meal, because it's important to have a good variety. If you're just doing the same thing day after day it just gets repetitive, and it's the same with eating food or whatever. If you can keep a nice and healthy diet that's

changing all the time, you know you can have your little chocolate here and there.

Although Paul's comments explicitly address jockeys' diets, he also means to apply them to other weight-management methods. Paul is suggesting that an element of novelty in jockeys' regimens can be beneficial in overcoming the monotony of continual wasting, and also that a degree of sacrifice can allow jockeys some room for indulgence. For example, Paul's comment that keeping a healthy diet allows jockeys the luxury of eating chocolate on occasions may be applied more generally, to the case where doing some extra exercise may afford them the opportunity to enjoy a social drink with friends.

Paul concluded his advice to other jockeys about weight management with a commentary specifically on the importance of physical activity in a jockey's weight-management plan:

I think exercise is a big thing as well. You know, apprentice jockeys gotta remember that they're . . . working in the stables, they're getting up and working long hours, so it's pretty physically demanding. But when you come out of your time [finish your apprenticeship], you don't have to ride track-work. You might be going to the track [race-riding] or whatever, but that's it. So, you're doing less than what you were as an apprentice. You don't have to be as hard on yourself, but you've gotta try and do something else, like go for a run or go for a walk, or on your days off go and play golf, just to keep active all the time.

Again, it appears that Paul has looked through the harsh lens of his own experience of post-apprenticeship weight gain, and realised that the changing patterns of his physical activity contributed substantially to his problems. Paul understands that many jockeys, once they gain their full licenses, will enjoy being released from the energy sapping daily chores of their apprenticeships, but he implores them to replace these physically demanding tasks with other, perhaps more enjoyable forms of activity.

After talking about the advice he would give to other jockeys, Paul returned to the issue of his own sources of weight-management information. When asked about the

advice that apprentice jockeys currently receive via workshops and seminars on weight management at the RVL Education and Training Centre, Paul commented that few people, including industry-approved experts, know what jockeys must do to manage their weight:

I think [name of RVL staff member] is probably the best at the apprentice thing [helping apprentices manage their weight] . . . he's been there and done it, done everything that a jockey could do wasting-wise, because he was a heavyweight jockey, a jumps jockey. I think it's important that the people who are going to give advice, the people that I get advice from, are always people that know what they're talking about and have been there and done that. In saying that, if [name of RVL staff member] said to me, "Joe Blow from wherever has got this diet, and I'm telling you that it's the best thing since sliced bread," well, I'd listen to [name of RVL staff member].

Paul makes it clear that the opinions he values most about weight management are from those who have wasted themselves (i.e., other jockeys). Further, Paul believes that most others who give jockeys advice about their weight, including dietitians and medical professionals, do not really understand what jockeys need to do to keep their weight at acceptable levels. He confirmed that he will accept the advice of a health professional if a trusted jockey or former jockey verifies it. On one hand, Paul seems discontent with the existing culture of jockey-to-jockey transfer of weight-management knowledge, but on the other hand he does not appear to trust or value the advice of non-jockeys.

The Racing Environment

When Paul was asked what he thinks racing authorities could change about the current racing environment to make weight management safer and easier for jockeys, he again remarked that he does not think he is qualified to comment, referring to his weight-management efforts as "pretty hopeless." After some encouragement, Paul offered his opinions, concurring with the views of many other jockeys that the minimum-weight standards need to be raised. Unlike Mike and Bryan, Paul did not

specify how much he would like to see the minimum weights rise, preferring to simply state that the current levels are inappropriate.

After briefly addressing the minimum-weight issue, Paul quickly moved onto discussing the busy racing schedule in Victoria. Paul expressed a strong opinion about the lack of recovery time available to jockeys, stating that racing authorities should ensure that jockeys:

just have a day off, a Sunday off. Like, not have a meeting in the bush where sometimes you have to go, so . . . you can have a night out, and just have a regular week.

Paul added that the recent proliferation of night and twilight race-meetings in Victoria has compounded the issue of his hectic work schedule, and made weight management even more difficult for him. Paul explained that when a night race-meeting follows a day meeting, he is not able to consume his vital post race fluids until much later in the evening. On such occasions, Paul may not be able to drink or refuel until 10 pm or later, which then reduces the time he has to waste to his riding weight if he is riding again the following day.

Paul had a final idea that he thinks could help jockeys generally, and particularly in relation to their weight management. When discussing his future plans in the industry, Paul suggested that a formal coaching system, similar to those operating in other individual sports, could be beneficial for many current jockeys. Paul believes that many of his peers receive little guidance once they leave the RVL apprentice training program, a point raised by an industry official in Study 2, and remarked that this situation does not exist in other sports:

I think jockeys should have a coach, and probably a personal coach. Greg Norman, who has been one of the greatest golfers ever, still has someone when he goes and practices that tells him he's not getting his backswing high enough. How could you tell Greg Norman what to do? But everyone has a coach, and I think jockeys should be the same.

Paul's desire for a dedicated coach is not surprising given his feelings about the current sources of advice and training available to jockeys, if it is assumed that the coach is to be a former jockey. Paul joked that he would coach his own children so that he could live off their earnings, if he had any and if they became jockeys, but is not seriously contemplating a career as a jockey coach once he retires from riding. The racing industry, in conjunction with the Victorian Jockeys Association, has recently announced plans to start a formal jockey mentoring program, and, although details of this program are not currently available, this initiative will go some way towards filling the void that Paul identified.

It seems that at least some of Paul's current distress is directly related to the harsh racing environment that he perceives. Paul dreams of winning major races such as the Melbourne Cup, but it is unlikely that he will even get a ride in this important race with competition from 250 other jockeys and his current form slump. The gap between his racing dreams and reality seems to have left Paul disillusioned and melancholy, and yet he seems unwilling or unable to leave the industry. Perhaps Paul's incomplete secondary-school education has caused him to doubt his ability to find a fulfilling career and life outside horse-racing. In this light, Paul's desire for guidance (a jockey coach) may be interpreted more generally as a cry for help, or a way out of his current situation, perhaps towards a less restricted life.

Case Summary

Paul described himself as a middleweight jockey, able to ride at lighter weights on occasions, but more comfortable accepting rides at 54 kg or above. Paul loses a minimum of 2% and up to 5% of his pre-wasting total body mass, figures greater than the weight loss achieved by either of the two jockeys discussed previously in this chapter. Paul quickly regains the weight he loses for race-day once his riding

engagements are completed, a cycle that he currently repeats at least four times per week.

Paul's current weight-management regimen consists of a number of complementary methods, including those targeting energy balance and body fluid levels, and some that combine both. Prime among these methods is dietary restriction, and Paul has recently started a low-calorie meal replacement program in an attempt to regulate his energy intake. Paul also relies on daily sweating sessions to reach his usual riding weights. His preference is to spend several hours in a hot bath at his home to lose the last 1.0 to 2.0 kg he requires, but Paul also uses the on-course saunas at race tracks and exercises in sweat gear to waste. In extreme circumstances, Paul will resort to self-induced vomiting, or *flipping* as he refers to it, to assist him to reduce his body fluid levels. It is not surprising, given the substantial amount of weight Paul loses every few days, and the number of methods he must use in order to achieve this weight loss, that he perceives weight management to be difficult most of the time. Paul thinks that, with the exception of current and former jockeys, few people understand how difficult weight management is and the desperate measures that some jockeys take to ensure they meet the strict requirements of their sport.

Paul's response to wasting seems more severe than Mike's or Bryan's, but typical of the jockeys surveyed in Study 1 and interviewed in Study 2. He reported a number of predominantly physical side effects related to his weight-management activities. Chief among these effects is physical fatigue, which can leave Paul so lethargic that all he feels capable of is sitting on his couch at home. Paul also experiences other symptoms, including involuntary vomiting, headaches and dizziness, but seems untroubled by them.

Despite a self-confessed lack of regard for his cognitive function when he wastes, Paul has noticed some deleterious changes to his psychological health and well-being when at his lightest weights. For example, Paul contends that his negative emotions increase as his weight decreases, to the point where he shuns social interaction to avoid conflict with fellow jockeys and racing officials. Paul appears emotionally distressed by his weight loss, reporting that he feels irritable and angry when he is wasting, and depressed after he stops. In relation to his cognitive function, Paul remarked that his ability to concentrate can be compromised by excessive wasting, but he has not noticed any other negative effects related to his weight management. His objective cognitive test results provide evidence of wasting related impairment in his attentional processing, with his monitoring speed slowed by more than 40% on three occasions when Paul was at his lightest weights on race-days.

Paul considers the current minimum-weight scale in Victoria to be too low, but did not specify how much he thought the scale needed to be lifted to make it practicable for jockeys. Instead, Paul focussed his comments regarding the Australian racing environment on the unrelenting calendar of race meetings. Paul stated that the excessive volume of racing in Victoria, exacerbated by the recent proliferation of night and twilight race meetings, made it extremely difficult for jockeys like him who dehydrate and starve themselves prior to a meeting, and need 2 to 3 days to re-hydrate and refuel before they are ready to waste again. In Paul's opinion, a reduction in the overall number of race meetings, and a total ban on Sunday racing, would provide him with the time he needs to recover adequately after a cycle of wasting.

Oliver

Background

Personal profile. Oliver is the final of four jockeys described in this chapter. At 21, he is of a similar age to Bryan and Paul, but 8 years below the average age of the jockeys surveyed in Study 1, and also considerably younger than average age of jockeys studied elsewhere (Leydon & Wall, 2002; Moore et al., 2002). Oliver is a friendly, but quietly spoken, young man with a mid-secondary school education.

Oliver estimated that he is about 1.58 m tall, smaller than Bryan and Paul, but about the same height as Mike. Oliver is approximately 3 to 5 cm shorter than the average height of male jockeys surveyed in other recent jockey studies (Hill & O'Connor, 1998; Hill et al., 1997; Moore et al., 2002). Although Oliver's face is thin with sharp features, his cheeks do not have the gaunt, almost hollow look that some other jockeys' faces have.

Oliver has lived in Melbourne all of his life, and he currently shares a home in the city with his girlfriend, who is also a professional jockey. Speed et al. (2001) stated that unions between members of racing families, and jockeys in particular, are a relatively common occurrence in the Australian industry, and it seems that Oliver is now set to continue this tradition with his partner.

Current riding status. Like the other three professional riders presented in this chapter, Oliver is a fully licensed category "A" jockey in Victoria, working full time in the industry. He has been a professional jockey for more than 5 years in the racing industry, but this span is still considerably below the 12 year average career duration of the jockeys surveyed in Study 1, and also many years less than experienced jockey Mike. Oliver has been in the industry for a similar length of time as Bryan and Paul.

Oliver thinks that his weekly work schedule is lighter than workers that he knows in other industries, and probably less busy than many other current jockeys. When I asked him to quantify the scope of his work schedule, Oliver replied that he has no idea exactly how much time his jockey activities take up each week. Unlike the other jockeys examined in this thesis, Oliver does not ride track-work often, so his schedule is focused almost entirely around wasting and race-riding. At present, he rides at the two major weekly metropolitan race meetings on Wednesdays and Saturdays, and at the occasional provincial or country meeting. Oliver employs an agent to receive and process most of the riding engagement enquiries he receives from horse trainers, which again reduces the demands on his time.

Oliver reported that he often receives a “full book” of riding engagements at the race meetings he attends, meaning that is engaged for between 6 and 8 rides (there are a total of 8 races at most Victorian race meetings). Even though Oliver rides at only two race meetings per week, this estimate is the equivalent of more than 12 race-rides a week, a clear indication of his prominence in the industry, especially considering he does not do track-work to secure rides. The jockeys surveyed in Study 1 averaged approximately 10 race-rides a week in comparison, and even veteran rider Mike averages only 20 rides per week, and this number is derived from attending one more race meeting than Oliver. Clearly then, Oliver is in demand as a jockey. Despite his youth and inexperience, Oliver has already been engaged to ride at several race meetings in New Zealand, and has also had rides in all the major Australian cups and carnivals. For example, he rode in his first Melbourne Cup 3 years ago at just 18 years of age.

Riding history. With no family background in the sport, Oliver’s introduction to horse racing came relatively late in life compared to many other jockeys. In a story

remarkably reminiscent of Bryan's first contact with the racing industry, Oliver was also a keen and talented footballer in his early teenage years, and he too was noticed by a horse trainer because of his small physical stature. In Oliver's case, the uncle of one of his football team mates approached him after a game, telling Oliver he was a horse trainer and that Oliver should consider a career as a jockey: "You've got the right build for it. You should have a go." Oliver remarked that he did not take up the advice immediately, but that the trainer's comments had "started me thinking." Initially, Oliver went to the stables on a weekend for a "browse around" because he was still at school and unsure of his interest in racing, but quickly discovered that he enjoyed working with the horses and the environment at the stables.

Approximately 1 year after his encounter with the trainer at football match, aged 15, Oliver left school and began his formal apprentice training. He appears to have been undaunted by his decidedly urban upbringing and his complete lack of equine experience, quickly learning on the job. For example, Oliver said, "I started from scratch: didn't know nothing about any, like, horses or anything," but he quickly added, "things are going pretty good now." Oliver believes that, with the help of his master, he now feels comfortable taking his place in the ranks of professional jockeys. Critically, Oliver also maintained the emotional and financial support of his immediate family throughout his apprenticeship and chose to remain at home during the difficult first years of his training. Oliver maintained a close connection to his family at this time, and perhaps his living arrangements helped him avoid some of the isolation and loneliness issues that Paul experienced as an apprentice.

When I asked Oliver what his early days as an apprentice were like, he commented that his small stature, a key factor in his entry to the profession, was actually a major occupational handicap for him at first: "Like, I was still pretty small.

When I was 14, I was only like 28 kg or something. So, I really had to mature in my body; I was too small to ride horses, really.” Oliver said that his lack of physical strength meant that he was not able to control the powerful horses, which can weigh over 500 kg when mature. He remarked that it took him a long time to become accustomed to the early mornings and the demanding physical labour required of apprentice jockeys, but Oliver does not appear to bemoan the difficulties he encountered as a trainee. Rather he appreciates how these initial experiences have made him a more physically resilient jockey. For example, when I commented that the hard work must have been a shock to his tiny frame, Oliver replied, “Yeah, that’s right. It was hard, but the body’s adapted to it [physical labour] now, so it’s pretty good.” Incongruously, now that Oliver’s body has grown and adapted sufficiently to cope with the rigours of his occupation, he has stopped riding track-work, and so does not require his hard earned physical strength nearly so often.

After out-riding his apprentice’s weight allowance, Oliver joined the ranks of fully registered jockeys and found the transition challenging. Unlike Bryan and Paul, it was not weight that Oliver found problematic. When I asked him why this transition period is so tough for young jockeys, Oliver was not certain:

I don’t know why it is, but you probably haven’t got your master or someone guiding you in the right directions or whatever. But, yeah, it’s happened to a lot of people. Yeah, you recover after it, and things are going pretty good now [for me].

The only factor that Oliver could attribute his problems to was the sudden absence of his master, and, more precisely, the regular race-rides that the master provided for him. Oliver observed that many ultimately successful jockeys have experienced a similarly difficult transition from apprentice to fully registered jockey, and that he too had passed through this problematic phase.

With a consistent schedule of riding engagements, Oliver is positive about his long-term prospects as a professional jockey. For example, Oliver commented that, “I’m in for the long haul, I think,” in discussing his future plans. When I queried how much longer he intends to stay in racing, Oliver replied, “Well, there’s a lot of blokes still riding at 40 [years of age], and still riding at the top level, so, [another] 20-odd years; no problems.” Oliver made it clear that he enjoys being a jockey and intends to continue riding for another 20 years if possible, but leaving secondary school prematurely also appears to be a factor in his thoughts about the future:

I mean, there’s no point being an apprentice jockey if you haven’t got the (pause) if you haven’t got it in your mind, saying, “Oh, this [being a jockey] is it for me,” because you leave school at such a young age . . . You’ve got to be committed, I think, because if you give up, well, you’ve missed out on your schooling years and you can’t (pause) you can go and try other things, but it’s just going to be a bit hard, I reckon.

Oliver is not suggesting that his lack of education is the reason he is committed to a career as a jockey, but rather implying that he is at a disadvantage compared to other Australians of his age who have completed secondary school. So, Oliver uses his perceived educational disadvantage as additional motivation to make a success of his chosen career path.

Study Participation and Engagement

Oliver participated in four race day test sessions conducted on two separate race-days (two pre race sessions and two post race sessions), and two non race-day sessions. Oliver was unable to attend a pre-study familiarisation session, and unfortunately, a computer malfunction meant that his first set of CogSport race-day test data (his pre race-day 1 test) could not be recorded and analysed. In effect, this first race-day test then became a practice session, and his remaining five sessions went without further mishap. Oliver also engaged in a 1-hour interview about his riding and weight management experiences. The interview was conducted several months after the

quantitative data collection period, and was held in a private office at Victoria University.

My overall impression of Oliver is that he is a young man enjoying life as a jockey and confident about his future. Oliver appeared relaxed and engaged during his interactions with me in both the formal test sessions and the more informal context of the in-depth interview. He gave an early indication of his relaxed attitude when his computer began to malfunction midway through his pre race-day 1 test session. Oliver calmly completed the session, before alerting me to the problem. Further, he was unperturbed when I told him that the results of this session would not contribute to the study, and equally content to return later that day for his post race-day test session. Despite his economy with words, Oliver was friendly, compliant, and polite towards the jockeys, industry personnel, and research staff involved in the study. As an example of his accommodating nature, Oliver made arrangements to take part in his non race-day test sessions only one day after arriving home from a short overseas holiday. When he became unwell on the day of his second such test, he telephoned me and rescheduled the meeting for the following day to ensure that the study did not become unduly delayed.

Current Weight Status

After addressing his riding history, Oliver and I discussed his typical weight range, including his usual riding weight, the extent of his wasting activities, and his perceived ease with weight management, in order to establish his current weight status. Oliver did not label himself in terms of weight the way that the three other jockeys in this study did, but he did comment that he would “probably be a natural lightweight,” if he were more careful with his weight. Presumably then, Oliver considers himself to be a middleweight jockey.

Typical riding weight. First, I asked Oliver to discuss his current weight range, including his typical riding weight and his un-wasted weight to establish the start and finish points of his regular weight management activities. In reply, Oliver stated, "I ride at 52 [kg], that's with a sweat, but I walk around at 54 [kg]." Oliver believes that his riding weight would be even lower if he was more diligent in his weight management efforts. For example, when I asked Oliver how much he would weigh if he was more weight conscious, he suggested, "I'd probably ride at 52 [kg] without having to sweat, I reckon," which would allow him to lower his minimum riding weight even further to 51 or 50 kg with the assistance of a sweating session.

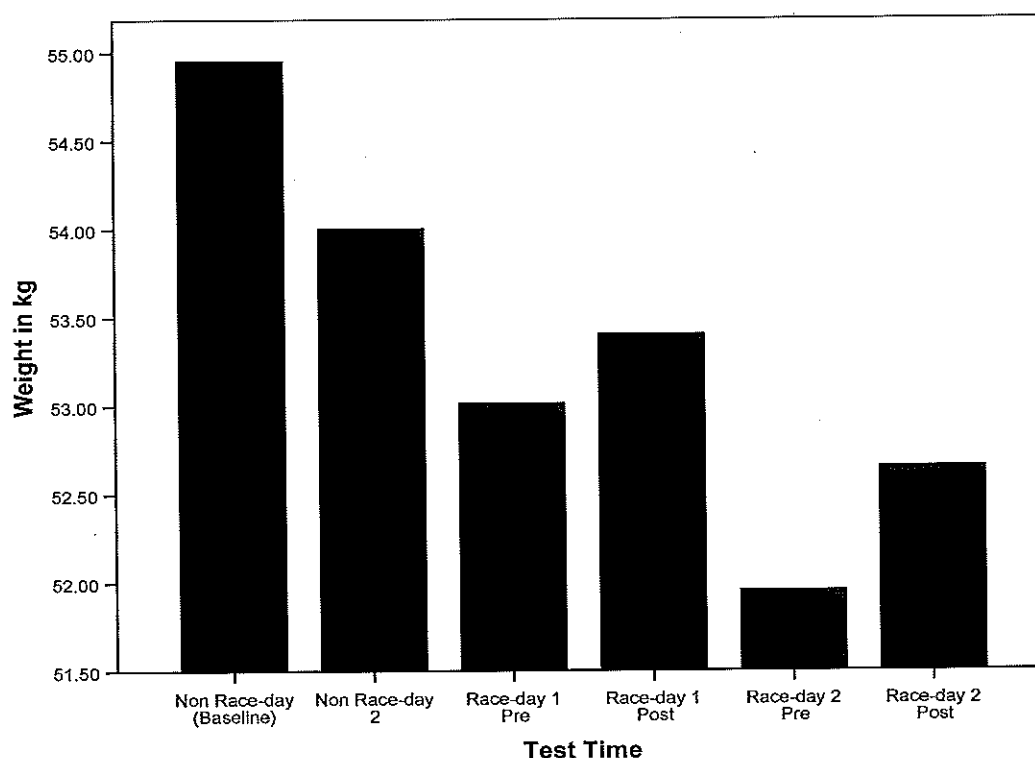
A weight of 52 kg is at the lowest end of the current minimum weight scale for most races in Victoria, but Oliver still does not consider himself a lightweight jockey, even with such a low usual riding weight. Available racing industry information supports Oliver's contention that although he may have been a lightweight jockey in the past, his riding weight now compares unfavourably to bona fide lightweight jockeys such as Bryan. For example, less than 1% of Oliver's rides in Australia since 2001 have been at weights below 51 kg (Virtual Formguide, 2006), compared with 11% for Bryan over the same period. Evidence of the shift in Oliver's riding weight can be seen in the rise in his official Victorian racing industry minimum riding weight, which was listed at just 46 kg approximately 1 year before the commencement of the present study (Racing Victoria Limited, 2003b), but stood at 50 kg 9 months later (Racing Victoria Limited, 2004b). By his own admission, either of these low weights would be difficult for him to achieve now.

Oliver's four objectively measured race-day body weights, illustrated in Figure 5.25, were all close to his stated typical riding weight of 52 kg. With heavier riding engagements on race-day 1, Oliver weighed 53 kg at his pre race test and 53.4 kg at his

post test. Oliver had lighter rides on race-day 2, and weighed 51.95 kg prior to competition and 52.65 kg at his post competition session. Figure 5.25 also shows that Oliver's weight increased over the course of each race-day, rising by 0.4 kg on race-day 1 and 0.7 kg on race-day 2. Based on Oliver's interview comments, his race-day 2 weight measures represent the most typical example of his race-day weights.

Figure 5.25

Oliver's Weight in kg on Race-days and Non Race-days



Oliver's baseline weight was measured at 54.95 kg, almost 1 kg above the figure he mentioned in his interview as his usual "walking around" or pre-wasting weight. This non race-day weight was recorded just after Oliver had returned from a short holiday, so it is not surprising that his weight was higher than the estimate he provided for a typical non race-day. Oliver's second non race-day weight was exactly his estimated pre-wasting weight, at 54 kg.

Extent of wasting. I asked Oliver to discuss his approach to weight loss, and he made it clear that his preference is for last minute wasting over more gradual tactics. Oliver remarked that he is capable of being conscientious with his weight control for several days before a race meeting, but is more likely to think to himself “Oh, stuff it,” and leave all his weight loss until the 24 hours prior to competition. With a grin, Oliver unashamedly remarked, “I don’t like doing it [wasting] the hard way the next day, but I like doing it the good way the day before,” in explaining his approach to balancing wasting and other contrary aspects of his life.

Oliver described the following as a typical episode of wasting for him in preparation for a Saturday race meeting: “You’d be at 55 [kg] on Friday, then have to lose another 3 kg for Saturday’s races, you know.” Oliver’s estimated typical weight loss of 3 kg is well in excess of the average reported by jockeys in Study 1 (i.e., 1.7 kg), and also equal to the maximum amount of weight loss Paul described.

Some of Oliver’s weight loss occurs on the day before a race meeting, but he usually has additional wasting to do on the morning of competition: “If I’ve gotta ride 52 [kg] every day, I would have to probably lose a kilo, a kilo and half in the morning [before his first race].” So, it seems that Oliver’s last minute loss of 1.5 kg in the two to three hours before racing is preceded by at least another 1.5 kg of weight loss on the day before a race meeting, if one accepts that his pre-wasting weight is close to 54 kg.

Oliver stated that he begins to regain the weight he has lost in preparation for racing almost immediately after his lightest ride of the day is complete. He summarised the cycle of wasting, riding, and weight gain in the following quote: “You pull it off, then you drive to the races, ride, put it all back on, and then do the same thing next day.” Oliver made the previous comments without any suggestion of resentment or

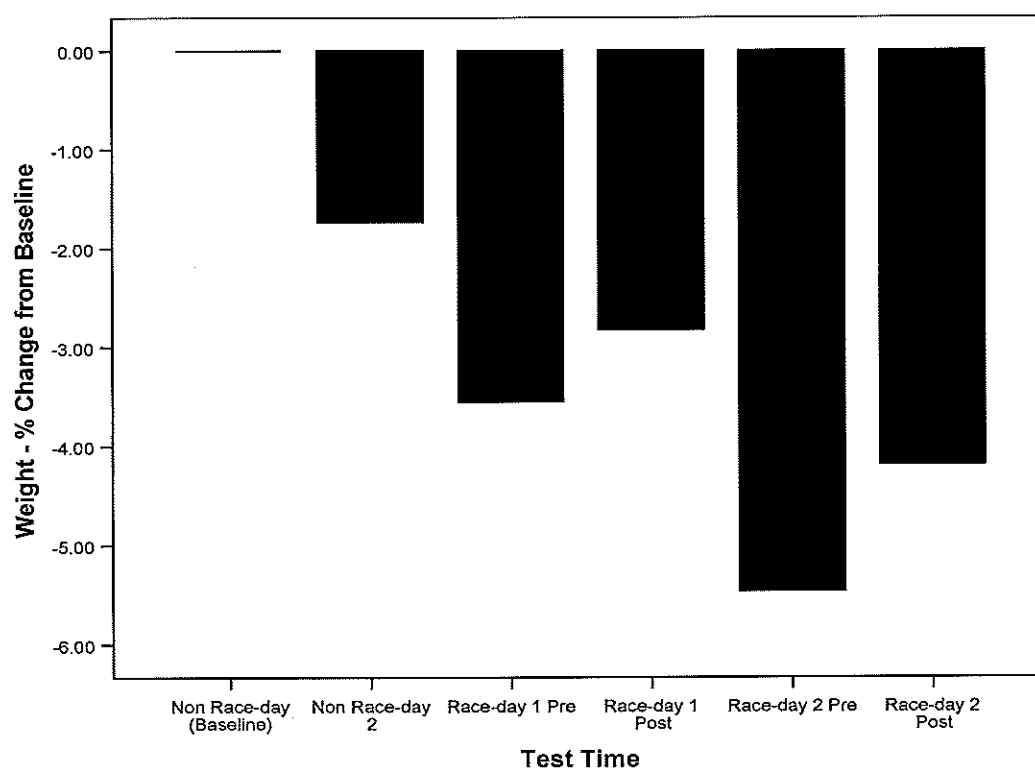
concern, and it appears that he accepts this cycle simply as just a part of his working life.

Oliver reported that he had wasted in the hours prior to each of the race-days that formed part of this study. For example, Oliver stated that he lost approximately 1.5 kg in the 12 hours before his race-day 1 pre test, including 0.5 kg in the morning before arriving at the racecourse. Oliver also lost weight in preparation for his second race-day, this time estimating his weight loss at 2.5 kg. Oliver noted that the 2.5 kg he lost in the 12 hours before his race-day 2 pre test was the most weight he has ever lost in such a short period of time.

The magnitude of Oliver's objectively measured race-day weight changes, illustrated in Figure 5.26, were substantial, and consistent with his own estimates of weight loss on these occasions. His proportional weight losses from baseline ranged from a smallest of approximately 2.8% below his baseline weight recorded on race-day 1, to a largest of 5.5% below baseline recorded on race-day 2. These measures of relative weight loss place Oliver well beyond the 2% threshold at which physiological and psychological impairments have been observed (Cian et al., 2001; Cian et al., 2000), and even his second non race-day weight approached this benchmark.

Figure 5.26

Percent Change from Baseline in Oliver's Weight on Race-days and Non Race-days



The patterns of weight loss described by Oliver in his interview, and observed in his race and non race-day tests, confirm that he follows a routine involving rapid and substantial pre-competition weight loss, similar in magnitude and speed to Paul's routine. Further, Oliver regains much of the weight he loses before race-day at the completion of his lightest riding engagement, just as Paul does. Oliver does not repeat this cycle of weight loss and regain as frequently as Paul, however, who wastes three or four times a week compared to Oliver's twice a week wasting and riding cycle.

Perceived ease of weight management. Oliver appears to be a rarity among the current cohort of young jockeys: He perceives virtually no difficulty at all in managing his weight. For example, when I commented that weight management is one of the most stressful aspects of the job for many jockeys, and asked Oliver whether he experiences this stress, he replied, "No, not really. I don't think so," before suggesting that

performing well in each race is more important and the most challenging part of his working life.

Even though Oliver used the phrase “the hard way” to describe his last minute wasting regimen, he gives the impression that he handles his repeated cycles of short-term weight loss with ease. In further confirmation of his ability to cope with the weight requirements of his profession, Oliver finds managing his weight just as easy in winter as he does at other times of the year. In contrast, Mike, Bryan, and Paul, all find it more difficult to keep their weight in check in the colder months than when the weather is warm.

Although he usually meets his weight targets with ease, Oliver admitted that he had been punished by racing officials for a weight transgression on at least one occasion. I asked Oliver whether he had received any fines or suspensions for weighing-in over his official riding weight, and he replied, “Actually, just recently. Probably only going back 2 months, was my first one [fine]. I’ve come in and they’ve [stewards] given me a couple of hundred fine.” Oliver mentioned that the stewards allow jockeys a small amount of latitude (0.5 kg) when weighing in slightly over their set weights, and that his relatively clean record compared favourably with most jockeys of his age and riding experience.

The only other time that Oliver has found weight management problematic was during a recent unique and exceptionally light riding engagement at 49 kg. Oliver conceded that this particular episode of wasting had overwhelmed him: “It was pretty tough. I’ll probably never do that [ride at 49 kg] again; it was too hard.” Although he stated that riding at lighter than usual minimum weights during the major Australian racing carnivals in Sydney and Melbourne is also challenging for him because he has to

modify his weight management regimen, Oliver discussed these carnival modifications as though they were minor and temporary annoyances.

Beyond his typical weight range. To follow his comment about riding at 49 kg, I asked Oliver to state the lightest weight he would consider attempting at the moment. In reply, Oliver referred again to his recent light ride: “Well, about 6 months ago, at the Brisbane Carnival, I rode 49 [kg], and that was way too light. I rode 51 [kg] all through this [Melbourne Spring] carnival, but I could probably do 50 [kg]. Just 50 [kg].” Oliver does not like to ride at these low weights because they force him to modify his normal weight-loss routine, but it seems he is willing to make the necessary adjustments for short periods of time at the major Australian carnivals.

I asked Oliver to explain the circumstances of the ride that he had accepted at the most recent Brisbane Racing Carnival, to explore the extent of wasting that is necessary for these infrequent but ultra-light rides. The magnitude and speed of his weight loss for this ride quickly became evident: “I took it [accepted the ride] probably a week beforehand, I think it was, and I knew I had to ride it 10 days beforehand. I was 56 [kg] when I got it, so I had 7 kg to lose.” A drop of 7 kg from his initial weight of 56 kg represents a proportional loss of 12.5% of Oliver’s total body mass, a huge loss by any standard. Further, Oliver lost the weight at a rate of 1 kg, or 1.8% of his total body mass, per day for seven consecutive days.

Weight-Management Methods

Oliver agrees with Paul that weight management is idiosyncratic, with individual jockeys discovering routines that works best for them. In making this point, Oliver described a hypothetical exchange among a group of jockeys concerning their weight-management routines: “They’d say, ‘This is what I do,’ [and] another person might say, ‘No, that’s no good at all.’ Everyone’s different.” In regard to his own weight

management regimen, Oliver remarked, "Oh, I'm pretty hopeless with my weight, really." By his own admission, Oliver does not pay much attention to his weight for most of his working week, eschewing gradual weight-loss or weight-maintenance methods in favour or rapid weight-loss techniques applied in the hours before weigh-in. So, Oliver certainly is different in many ways from the other three jockeys described in this chapter.

Manipulating energy balance. Unlike the other three jockeys, Oliver does not have any particular dietary or exercise programs to balance his energy intake and expenditure. In contrast to the other jockeys, who carefully monitor their diets and consciously engage in physical activity, Oliver has a more laissez-faire attitude to his energy balance. Oliver even appears to shun the fruit and brown rice that seem to feature prominently in many jockeys' diets.

In particular, Oliver is dismissive of caloric restriction. Commenting on his unrestricted diet, Oliver remarked, "I don't really look after my weight too well; just eat what ever I want to. It's probably not a good thing, but, yeah, I could be better at managing my weight." I then asked Oliver to describe what a typical meal the night before a race meeting is for him, and he surprised me by stating, "Oh, roast. Friday night, well, just whatever, whatever I feel like. I might get a pizza or something, but, it's whatever I [feel] like [eating]." Oliver suggested that he pays little attention to the meals he consumes less than 24 hours before his weigh-in, eating anything from roast meat and vegetables to fried take-away food depending on his taste. Oliver qualified this initial statement about completely unrestrained eating, conceding that Friday night is the only time he watches what he eats:

Friday nights is probably the biggest night, because you are . . . probably looking after your weight a little bit because of Saturday races: they're the most important. You let yourself go on nights like Thursday and Sunday night where you've got no races the next day. But, yeah, I eat anything really.

Given that he is not careful about the content of his meals, I questioned Oliver about the quantity of food he consumes, and he remarked that “I eat til I’m bloated, which is not really good.”

Despite claims that he eats an unrestricted diet, there was some evidence that Oliver reduces his energy intake on race-days. For example, Oliver skipped breakfast on the morning of both his race-day test sessions, and did not eat at all during the course of race-day 2. Oliver claimed that he fasted on race-day 2 simply because he did not feel hungry, but his lightest riding engagement of the study was on this day, and this ride was in the second last race of the day. The light ride at the end of the day and his abstinence seem an unlikely coincidence. Despite these instances of race-day fasting, diet is clearly not as important a weight management tool for Oliver as it is for the other three jockeys.

In addition to his relatively unrestrained energy intake, Oliver also stated that he does not relish the thought of exercising to boost his energy expenditure and keep his weight down. He mentioned that his girlfriend, also a jockey, frequently jogs and walks to control her weight, but Oliver remarked that he is too lazy to engage in such activities. Despite his protests about physical activity, Oliver does lead an active life, participating in several recreational sports in addition to his regular race-riding: “I play netball Tuesday nights, play indoor footy Wednesday and Thursday nights. But to say that I’m going for a run to lose some weight, well . . . I’d just rather be doing something.” Although Oliver engages in his sporting pursuits for fun and not for weight loss, there is no doubt that these regular aerobic activities contribute substantially to his weekly energy expenditure, and therefore serve a weight management function.

Manipulating body fluid balance. Given his preference for 11th-hour weight loss, it is not surprising that fluid balance methods feature prominently in Oliver’s wasting

regimen. The first method Oliver mentioned when I asked him about his preferred wasting methods was hot baths, and it soon became evident just how extensively he uses this particular strategy: "If you ride light, you're in the bath losing weight right throughout the day." Oliver means that he usually has multiple sweating sessions in the bath on the day prior to a race meeting, with a single session typically lasting about 1 hour. Oliver estimated the amount of weight he typically loses in these sweating sessions in the bath:

If I was sitting in my bath for about 50 to 45 minutes, I could lose 1.2 to 1.4 [kg]. So, probably, if you've gotta lose 2.5 kilos in one morning, it'd be harder to lose that much in the next, sort of, 45 minutes: You would probably only lose 800 grams or something. Like, your body just can't keep it up, really.

By his estimation, Oliver loses over 1 kg in the first hour sitting in the bath, but the amount of weight he loses diminishes in subsequent sessions, and so he has to allow for several returns to the bath until he reaches his target weight.

Oliver also uses saunas to reduce his body fluid levels on occasions, but commented that he prefers the hot bath. He explained his rationale for this preference in the following excerpt:

When I have to sauna, I do; there's no problem with that. But I just find baths easier, and you can pull more off [lose more weight]. You don't have to (pause) not many people have a sauna in their homes. But the sauna, if I have to use the sauna, yeah; no problem. I probably can't sit in there [the sauna] for as long though.

Oliver outlines a number of reasons for choosing hot baths ahead of saunas, including: greater weight loss achieved in baths compared to saunas, and greater access to baths than saunas. Oliver confirmed that he can also spend a greater amount of time in the bath than he can in the sauna, and therefore lose more weight, because baths cause him fewer side effects than saunas do. I also asked Oliver about the traditional jockeys' tactic of exercising in sweat gear to induce sweating, and he stated that he has used this

method in the past but does not like this method because, like saunas, it “takes too much out of you.” Here, Oliver was referring to both mental and physical fatigue.

Oliver appears to be in the fortunate position of being able to drink as much water as he wants. He commented that he cuts down on soft drinks when he has a light ride, but is still able to consume water without concern: “I find water is just unbelievable; just goes straight through you, really. You don’t feel thirsty.” Oliver noted that water is a prudent fluid choice for jockeys because it contributes less to their weight than the sugary soft drinks so readily available in the jockeys’ rooms at most racing venues. The most important benefit of being able to drink water freely, however, is that Oliver does not experience the excruciating thirst that many other jockeys do. More than two thirds of jockeys in Study 1 experienced serious thirst when wasting, and Oliver would surely be the envy of these athletes. Even on race-day 2 when Oliver’s weight was at its lowest point, he was still able to drink liberally, consuming two cups of tea and two 350 ml bottles of soft drink throughout the afternoon, warding off the fluid cravings that could have otherwise beset him.

Other methods. Finally, I addressed the issue of alternative weight-loss methods with Oliver, asking him his opinion of appetite suppressants, diuretics, and any other methods he may have tried. Oliver commented that his girlfriend frequently uses herbal diuretics to remove fluid from her system, but added that he has not needed to use these legal substances. When I followed this comment and asked Oliver whether her success with diuretics had influenced his own wasting activities, he responded, “Yeah, you’d think I’d probably just say, ‘She’s doing all right,’ you know, with her weight, and do it that way. But, I don’t know.” Oliver’s remarks indicate he is ambivalent about his girlfriend’s use of legal diuretics, but one is left with the impression that has not ruled out using them in the future.

In contrast to his open views on herbal diuretics, Oliver is firmly against appetite suppressants and other weight loss methods he perceives to be unnatural. When I specifically asked Oliver whether he had used Duramine before it was banned, he replied, “No, I never did, because early days in my apprenticeship, in my whole apprenticeship, I never really had to waste at all. I was still pretty small so I never had to, you know.” Oliver suggested that he had no need for Duramine during his apprenticeship when it was legal, and has found other methods to lose the weight he needs now that chemical appetite suppressants are illegal. Oliver is adamant that he would not use Duramine now, even if it was legal: “It’s just the person I am. I’d much rather do it [lose weight] the natural way.” Once again, Oliver is implying that there are natural ways to lose weight, presumably via his preferred methods of hot baths and saunas, and unnatural ways, such as through chemical appetite suppressants such as Duramine.

Psychological Effects of Wasting

Many of the jockeys who participated in this research indicated that they experience a range of deleterious psychological effects associated with their wasting activities. For example, mental fatigue, food and fluid cravings, problems with short-term memory, and mood disturbances, were all common among jockeys in Studies 1 and 2. Further, Bryan and Paul both described experiencing attentional difficulties associated with their wasting, and this effect was also observed in objective measures of their cognitive functions taken after a period of weight loss.

I commented to Oliver that being a jockey seemed to be a cognitively demanding occupation, and asked him to reflect on how he functions mentally when wasting. Oliver responded, just as Paul did, that wasting can become a distraction from riding related tasks, such as doing *form*, on race-days. He commented that, “You’re

probably not as focussed in the room [the jockeys' enclosure] as what you normally are, because you're too worried about drinking or eating something." Oliver added that reflecting on the effort that he puts into wasting can have a counterbalancing effect and re-focus his attention again on the immediate task (preparing race tactics, riding), and feels that he still makes "the right decisions in a race."

After discussing the potential for wasting activities to become a distraction, I asked Oliver to consider any past memory problems associated with weight loss. For example, I asked him whether he becomes forgetful when he wastes, and Oliver was initially certain that his memory functions normally. Upon further reflection, however, Oliver's opinion appeared to change, and he conceded that he does have memory problems: "No, or maybe sometimes during a race. Like, not during a race, but when the trainers are saying something to you." Although Oliver discussed this issue in the context of his memory, the cognitive lapses he described could also be explained as problems with his attentional processes. Trainers usually give jockeys specific instructions about how their horses are to be ridden in a race, so even if Oliver is forgetful or distracted only occasionally, a small lapse in his attention or recall could lead to him applying incorrect tactics, which would likely be detrimental to his chances of being engaged again by that trainer.

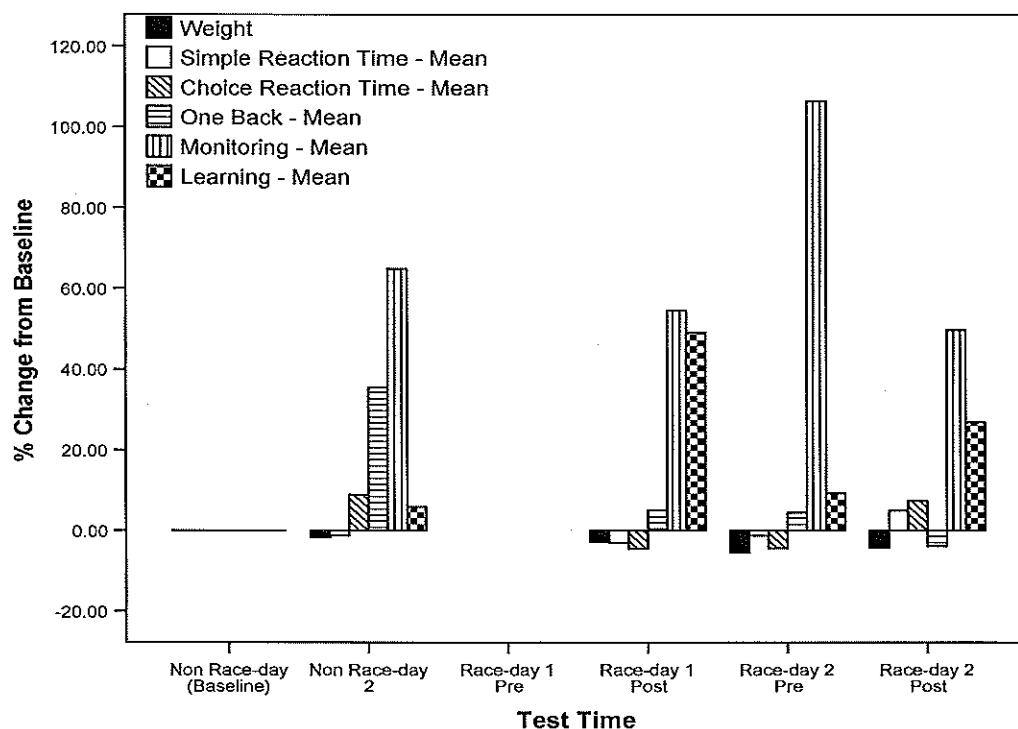
Oliver underwent serial testing of his cognitive functions on 2 race-days and 2 non race-days, with his cognitive performance at his heaviest non race-day weight (i.e., non race-day 1) taken as a baseline. The percentage change from baseline in Oliver's scores on each of the five subtests of the CogSport test battery at each time point are shown in Figure 5.27. Scores above the horizontal axis of the figure indicate slower (i.e., worse) than baseline processing speeds, and scores below the axis indicate faster (i.e., better) than baseline processing speeds. A computer malfunction occurring at the

pre race-day 1 test meant that no scores were recorded for this session, so this section of the figure is blank.

An analysis of Oliver's cognitive performances, displayed in Figure 5.27, suggests that there is no general or overarching relationship between weight and overall cognitive function for Oliver. Several scores appear below the horizontal axis, particularly on race-days, indicating faster than baseline processing, but a number of cognitive function scores also appear above the horizontal axis, reflecting slower than baseline functioning.

Figure 5.27

Percent Change from Baseline in Oliver's Weight and Mean Processing Speed on Five CogSport Subtests

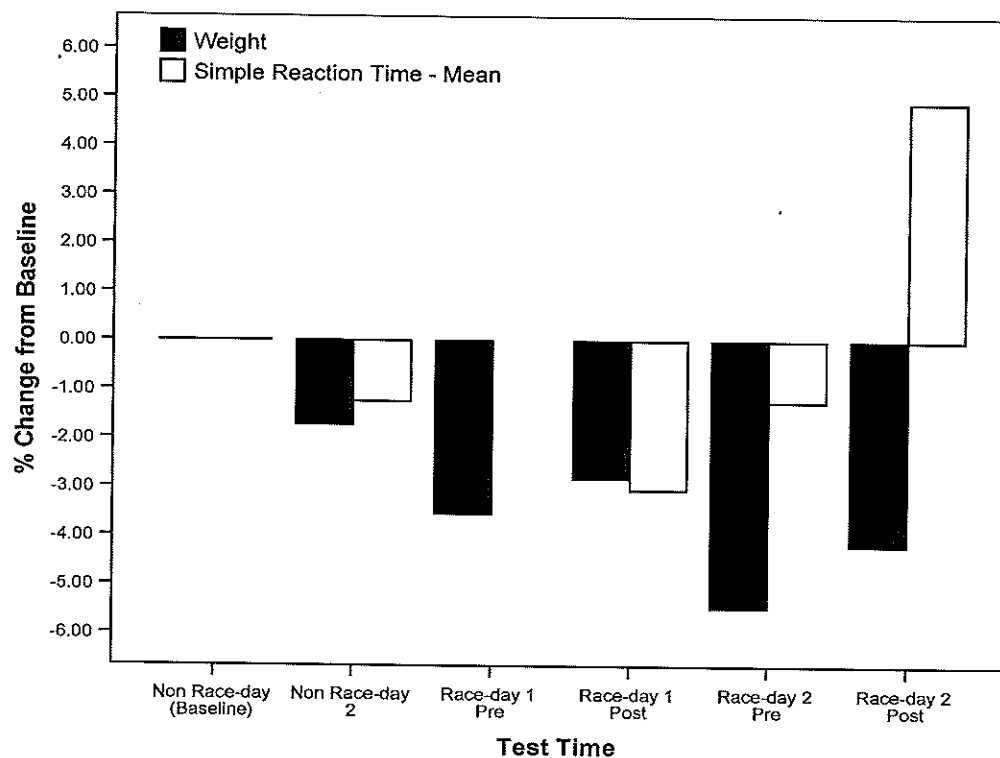


Psychomotor performance. Figure 5.28 shows the fluctuations in Oliver's weight and average speed of simple reaction time, measured serially across 2 race-days

and 2 non race-days. The data are expressed as the percentage change from Oliver's baseline recordings, defined as those taken on his heaviest non race-day.

Figure 5.28

Percent Change from Baseline in Oliver's Weight and Mean Simple Reaction Time



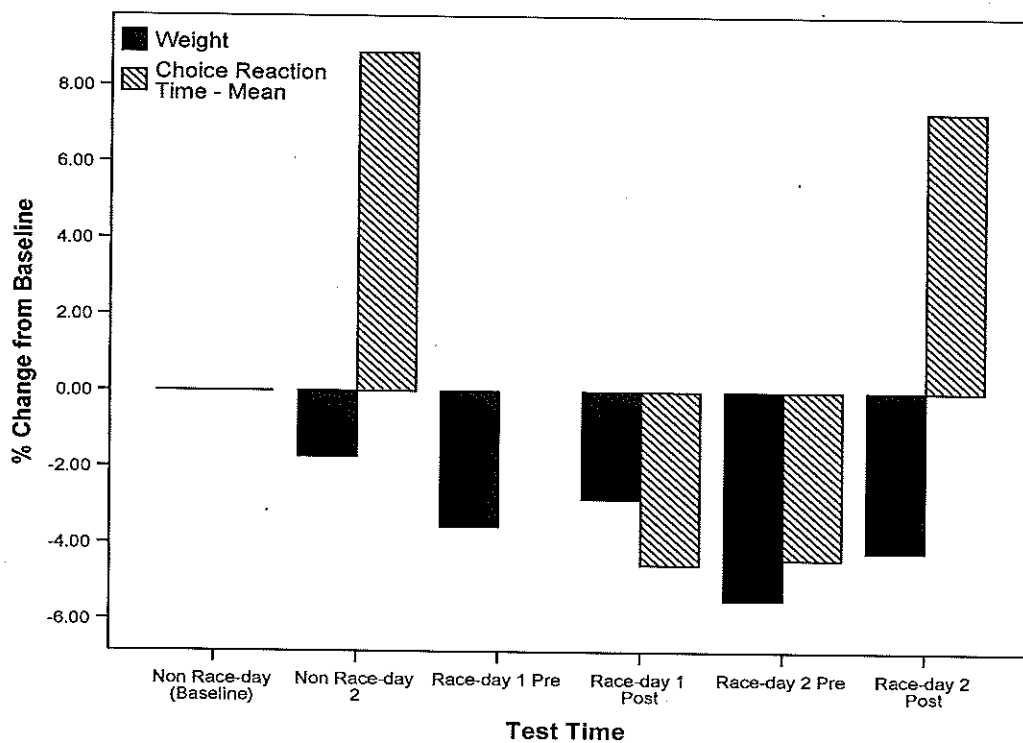
Oliver's speed of psychomotor responding, as measured by his responses on the simple reaction time test (SRT), appears to be largely unaffected by his weight loss. Actually, Oliver's SRT scores were faster than baseline on three of the four occasions when he was below his baseline weight. For example, when Oliver's weight was at its lowest point (5.5% below baseline) at his pre race-day 2 test, his SRT processing speed was 1.25% faster than baseline. The exception to this faster processing occurred at Oliver's race-day 2 post test, when his SRT responses were 4.9% slower than baseline with a weight 4.2% below baseline.

Decision-making. Figure 5.29 shows the percentage change from baseline in Oliver's weight and his average speed of decision-making. Comparing Oliver's two non

race-day tests, it is evident that his non-race-day 2 speed of decision making, recorded when Oliver was 1.7% lighter than his baseline weight, was slower than his baseline speed by almost 9%. There does not appear to be a consistent pattern in Oliver's average race-day decision making scores, indicating that any effect that weight loss has on the speed of this function may be modified by his response to the competitive environment.

Figure 5.29

Percent Change from Baseline in Oliver's Weight and Mean Choice Reaction Time

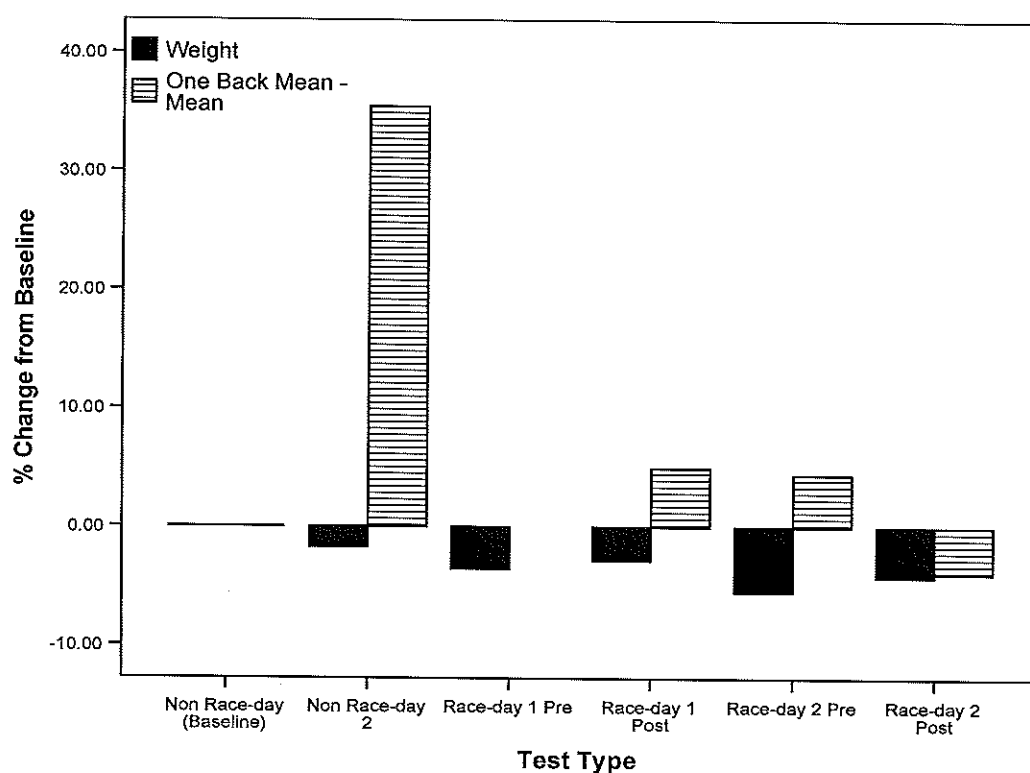


Working memory. Figure 5.30 shows the percentage change from baseline levels in Oliver's weight and average speed of working memory. This figure again shows a deterioration in the speed of Oliver's working memory associated with weight loss when comparing his baseline and non race-day 2 performances. Specifically, Oliver's non race-day 2 score was approximately 35% slower than baseline processing speed when his weight was 1.7% below baseline. As was the case with Oliver's decision

making speed, any effect of weight loss on his working memory appears to be largely negated by the context of race-day. For example, at Oliver's race-day 2 pre test his processing speed was less than 4.5% slower than baseline despite his weight being at its lowest point of the study.

Figure 5.30

Percent Change from Baseline in Oliver's Weight and Mean One Back Test Response Speed

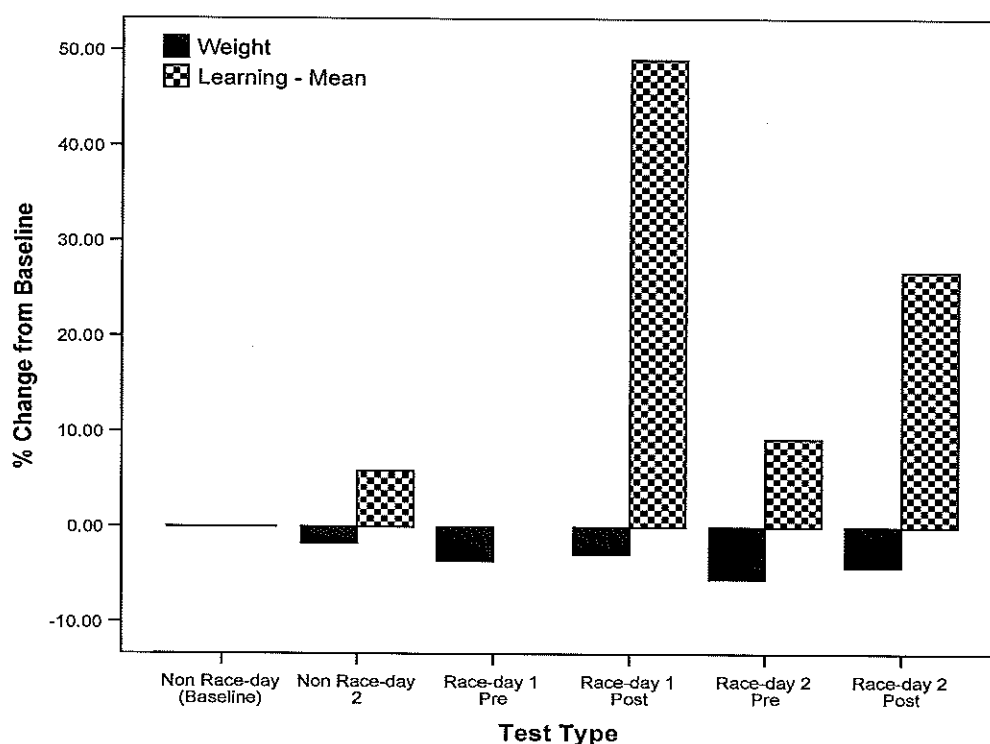


Learning. The CogSport learning subtest asks participants to deliberately develop strategies in order to remember pairs of stimuli for later recall. Figure 5.31 shows the percentage change in Oliver's weight and average speed of processing on the learning subtest. This figure shows that there was a general pattern of slower than baseline processing when Oliver was at his lightest weights, evident on both race and non race-days. The deterioration in processing speed was most pronounced at Oliver's two post race-day test sessions, with a performance 50% slower than baseline on race-

day 1, and 25% slower on race-day 2. An increase in processing time means that Oliver may not have been able to make efficient use of his tactical planning time for each race. Oliver's second non race-day test score was also slower than baseline and coincided with a 1.7% drop in body mass, suggesting that the race-day effects on learning speed were at least partially related to weight loss.

Figure 5.31

Percent Change from Baseline in Oliver's Weight and Mean Learning Response Speed

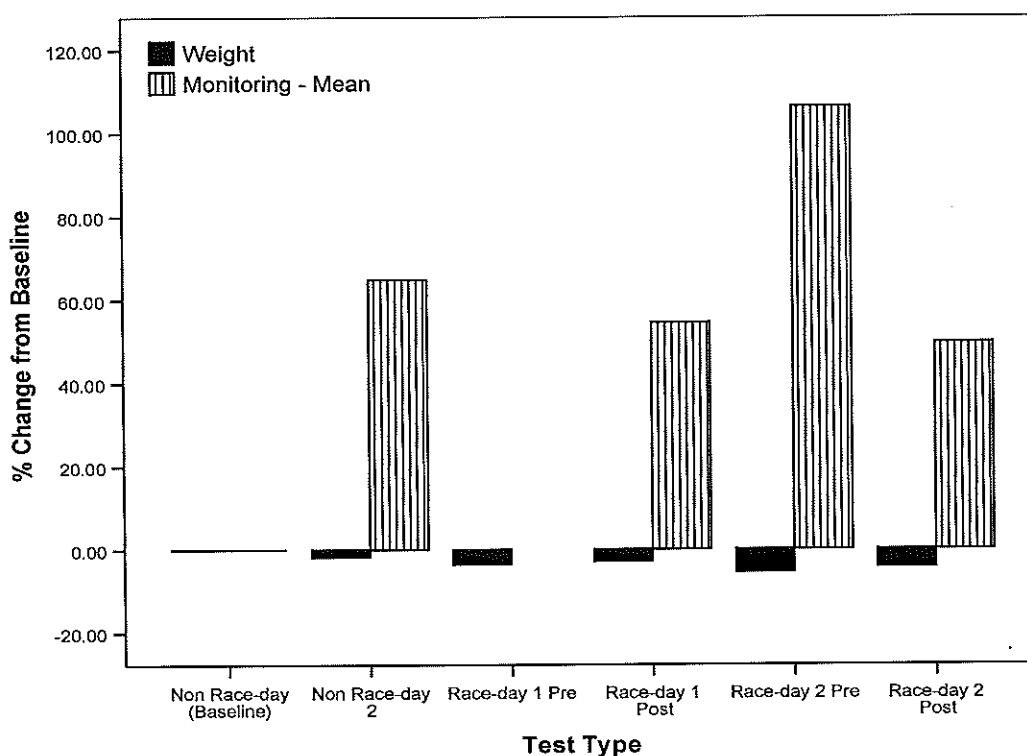


Attentional function. Figure 5.32 shows the percentage change from baseline levels of Oliver's weight and average speed of monitoring. This figure also shows a marked and consistent deterioration in Oliver's speed of processing from baseline levels associated with weight loss. These slower responses are consistent with Oliver's comments that his concentration suffers when he is wasting. Oliver's average speed of responding was slowed by between 40% and 110% at his three race-day sessions compared to baseline, and by greater than 60% at his second non race-day test, all in

concert with weight loss of approximately 2% or greater. On these race-day occasions, Oliver may not have been able to monitor the rapid movement of other horses in a race as efficiently as he was capable of in his pre-wasting state. On non race-days, Oliver may have performed tasks requiring sustained attention more poorly, such as monitoring changing road conditions while driving his car, or concentrating while doing his *form*. This slowing of processing speed was also observed in Bryan's and Paul's monitoring scores when at their lightest weights, suggesting that the effects may be function specific rather than idiosyncratic responses to weight loss and competition.

Figure 5.32

Percent Change from Baseline in Oliver's Weight and Mean Monitoring Response Speed



Mood. Oliver, like all three other jockeys interviewed, is aware that his emotions respond sharply to weight loss. He has no doubt that his mood state is negatively affected by wasting, but is not sure why this is so. For example, when I asked Oliver

what he was like to be around when he wastes, he replied, “Yeah, not good. Yeah, I get real moody when I’m wasting. I don’t know why. It’s probably (pause) there’s probably a reason why.” Oliver did not complete his sentence, and seemed genuinely mystified by the emotional changes that can strike him. He mentioned that his girlfriend tends to avoid him when he is wasting severely, but thinks that his weight loss has not placed any undue strain on their relationship.

Unlike some other jockeys interviewed, Oliver does not feel socially constrained by his wasting activities, or isolated by his emotional reactivity to them. Oliver does not drink alcohol, and with his unrestricted diet, he does not see the need to avoid social functions that are organised around food and drink. He even participates fully in his family’s Christmas celebrations, eating whatever he feels like in spite of his usual participation in Boxing Day race meetings. I mentioned to Oliver that other jockeys bemoaned the proximity of Christmas day and the lucrative Boxing Day races, and tried to accept only heavy rides to avoid the need for substantial wasting, but he does not perceive a problem:

Oh, well, I try to [take heavy rides], but there’s always (pause) Boxing Day, there’s always a couple of races with even lighter than the [usual] minimum. So, yeah, it always stuffs you up somehow; you’ve always got to ride lighter the next day.

Oliver seemed genuinely unperturbed by both the weight gain he commonly experiences after eating a large Christmas meal and having to waste to lose that weight and ride the next day.

Physical Effects of Wasting

During his interview, I asked Oliver to describe any acute and/or chronic physical side-effects that he experiences related to his wasting, including the timing and severity of these effects. Oliver also self-reported any acute physical symptoms

associated with heat illness he experienced during the testing period of this study by checking items on a list of such symptoms.

Oliver thinks he is relatively unaffected by his wasting activities in both the short and long term, having experienced only a few minor acute physical complaints to date. In response to a question about the chronic affects of wasting, Oliver noted that he is still young, but that he has not observed any deleterious long-term effects in the older jockeys he works with.

Oliver does think that others can tell by the way jockeys look whether they have been wasting or not, and he is concerned about what these observers, and trainers in particular, may think of jockeys who have the tell-tale signs:

When you've wasted so hard, people can see it through your face: Your eyes are in the back of your head. I just (pause) I worry about them saying, 'Oh, gee, he doesn't look too well,' you know. Just maybe, then losing confidence [in your ability to ride], and not putting you on [engaging you for rides], you know.

Oliver's comments echo those of the jockey in Study 2 who commented that he or she knows which jockeys have wasted before a race because of their "glassy eyed" appearance. Oliver reiterated that it is only others' perceptions that he is concerned about, because he is certain that his ability to ride remains intact despite the way he may look. The remarks made by Oliver and the Study 2 jockey suggest that judgements about a jockey's fitness to ride are sometimes based simply on his or her appearance, and that such subjective judgements are made by trainers, medical personnel, and jockeys themselves.

Acute effects. After questioning Oliver about the potential for chronic physical effects of wasting, I asked him whether he had noticed any more immediate effects that wasting has on him. In reply, Oliver provided a graphic account of the debilitating short-term effects that substantial weight loss can have, recalling how he felt after wasting for his lightest recent ride:

Oh, during the race I didn't take much notice because it's a Group 1 race [the highest standard race]; the adrenaline is going. But as soon as I pulled up [finished the race], I couldn't breathe properly; my chest felt like someone put a nail through it. You just struggle, you know, and when you hop off the horse you're supposed to talk to the trainer; I couldn't talk. I was in a bad way.

Oliver's account of his light ride has parallels to a story Mike told: Both jockeys were left painfully short of breath after bursts of physical activity lasting no more than a few minutes, and both were so distressed they were unable to provide feedback on their horses' performances in major races. Horse trainers usually seek information about the horse at the completion of a race, the very time when wasting jockeys are at their worst. Oliver thinks that the best way to deal with this situation is to keep his comments brief: "I keep it pretty short and sharp and sweet, sort of thing." He thinks that most trainers accept these brief summaries, and added that those who do not "get over it" in time.

Oliver has noticed several other physical effects associated with wasting, less dramatic than his breathing and communication difficulties, but occurring more frequently. For example, when I asked Oliver if he ever gets muscle cramps when he is dehydrated, he commented that he occasionally gets them in his fingers. He then remarked, "All that really worries me is just having a dry mouth. I just can't stand having a dry mouth." Oliver's dry mouth could be a sign of dehydration related to his sweating sessions, although it may also be the result of SNS activation associated with competition. Whatever the origin, Oliver did not appear to be unduly concerned by his dry mouth, and, with his ability to drink water freely, it seems that this effect need only last until he finds the nearest tap.

Oliver reported several symptoms typical of heat illness on race-day 2, when he had lost approximately 2.5 kg to ride at his lightest weight of the study period. Specifically, Oliver reported feeling dizzy after getting out of the bath, only hours before his pre race-day 2 test. His physical state had deteriorated to include headaches,

nausea, and cramp in his fingers by the time of his post race-day 2 test. Oliver reported no such symptoms at either of his race-day 1 tests, where he had lost only 1.5 kg, or at his non race-day 2 test.

Weight-Management Advice for Other Jockeys

Oliver does not have much advice to offer novice jockeys or those with weight problems about managing their weight. For example, when I asked Oliver what he would say if a 14-year-old apprentice jockey approached him and requested weight-management tips, he offered only vague suggestions:

I'd just say, 'Eat and drink healthy,' I reckon, even though that's not my motto. I reckon if I had have done that early doors [from the beginning] and trained myself to eat and drink healthy (pause) yeah, I reckon that's the best way to do it.

Perhaps, because Oliver's own experience of weight management in his apprenticeship was so trouble-free, all he has to offer trainee jockeys are generalizations about balanced eating and drinking. Oliver's continuing ease with weight management, where he meets his weight targets with little change to his simple regimen, explains why he also finds it difficult to counsel weight-challenged senior jockeys. I probed Oliver further about what healthy eating meant to him, and he elaborated only slightly, stating, "Oh, just not binge eat, and drink just good stuff." Based on his earlier remarks about the contrasting weight contributions of water and soft drinks, it seems that Oliver's comment about drinking "good stuff" is a reference to jockeys relying primarily on water for their fluid requirements.

I asked Oliver about his own sources of weight-management information, and a reason for the limited counsel he offered became apparent. I raised the issue of the RVL Education and Training Centre, and, although Oliver agreed that the weight-management training provided to apprentices at the centre is worthwhile, he admitted that he was not an attentive student: "Oh, I don't know, because if they ever were

talking about weight I always thought, 'I'm not going to get big.' So, I sort of not listened. If they [RVL training staff] did talk about it, I don't know." It appears that his invulnerability beliefs about weight gain influenced Oliver, to the point that he apparently ignored the educational opportunities that he was offered during his apprenticeship. I also questioned Oliver about gathering weight-management advice from other sources, and he remarked that he has learned a great deal just by studying older jockeys. Oliver, however, has little to compare this weight-management information to due to his inattention during his formal industry training.

The Racing Environment

The last topic I addressed with Oliver concerned the current racing environment in Victoria, and whether he would like to see any changes made that could assist jockeys with their weight management. Initially, Oliver was taciturn with his thoughts, perhaps because of his age and lack of industry experience, but when I addressed specific issues with him he was more effusive. For example, when I suggested that some jockeys have called for a rise in the minimum riding weights in Victoria, Oliver made it clear that he does not share this view. He suggested that a rise of 1 kg, as has been proposed by several jockeys and industry stakeholders, would be futile:

No, I don't agree with that, because whatever weight they raise it [the minimum weight] to, there's going to be people sweating anyway. Like, if they raised it another kilo, to 53 [kg], I'd still have to lose a kilo and half the next morning, you know.

Oliver makes the valid point that if the minimum weights are raised by only a kilogram, the majority of jockeys, including him, will still have to waste to reach their riding weights (the average current weight loss of jockeys in Study 1 was 1.6 kg). Oliver continued his commentary on the minimum weight issue, and agreed with Bryan that many jockeys would simply allow their pre-wasting weights to increase rather than take the opportunity to waste less: "All you do is let yourself go more. Instead of walking

around at 54 [kg], I'd be walking around at 55 [kg]. So, I don't think raising the weights would do anything really." Since the time of Oliver's interview, racing authorities in Victoria have raised the minimum-weight scale to 53 kg in the majority of races, in line with standards in other states of Australia (Racing Victoria Limited, 2005d).

After addressing the minimum-weight issue, I asked Oliver to comment on the racing industry's attempts to control the use of saunas by jockeys. After reiterating that he is an infrequent sauna user, Oliver stated that he is not satisfied with the current rules governing on-course saunas. He believes that individual jockeys are the best judges of their responses to the sauna, commenting that "every bloke knows his limit," so jockeys should be allowed to regulate their own sauna use. Furthermore, Oliver argued that the 15-minute per hour time limits imposed by the industry are too short, and may actually have unintended and detrimental effects on the workplace health and safety of jockeys:

It's [the restricted sauna allowance] probably harder on the body because if a bloke has to lose a lot of weight in a short amount of time like that, he tries to do it too quickly, and it gets the body pumping too much.

Oliver remarked that jockeys often jog or skip in the sauna to get the most out of their limited time, which places undesirable strain on their cardio-respiratory systems. In his opinion, an extension of the permissible sauna time to 20 minutes would allow jockeys to sweat normally, or let "the body sweat itself," in his words. Oliver appears to be suggesting that passive dehydration, where sweating is induced solely by the external heat of the sauna, is more tolerable than active dehydration, where sweating is triggered by physical exercise. Fatigue and cognitive impairments occur equally whether induced passively by the heat of the sauna, actively by exercise, or in combination (Cian et al., 2000; Gopinathan et al., 1988), so Oliver's comments appear to be about slowing down the rate of sweating to a level that jockeys can cope with more easily.

Oliver had one final caution for racing industry officials, also related to the industry regulations regarding on-course saunas. Oliver has observed what he thinks is a disturbing trend in current jockeys' sweating practices, and the size of the following excerpt (an uncharacteristic amount of words at once for Oliver) is an indication of how strongly he feels about the issue:

It's [sweating] probably getting more dangerous now because people are sweating in their car, you know, on their way to the races. I don't know, I'm not sure whether jockeys used to do that or not [in the past], but . . . how would you be if someone had a car crash and they had all their sweat gear on? You know, it wouldn't look good at all. And it will happen pretty soon, I'm pretty sure. It won't be a good thing. I tell you, it won't look good for the racing industry.

Oliver thinks that that the practice of sweating in motor vehicles, where jockeys don sweat gear and turn up the car heater, may have increased in response to the limits placed on race-track sauna sessions. He is convinced this wasting practice will lead to an accident and perhaps even a fatality in the near future. Such an incident would not reflect well on the industry, particularly if it became known that the jockey involved was sweating in the car because he or she could not get sufficient access to a supervised sauna at a racecourse.

Case Summary

Oliver is a 21-year-old professional jockey, with a seemingly carefree attitude to weight management. Shorter than the average male jockey, Oliver consistently rides at the lowest end of the weight scale in Victoria, although curiously he does not consider himself to be a lightweight jockey. He reported that his current usual minimum riding weight is 52 kg, although he can ride at 51 kg if required, and has accepted at least one ride at 49 kg in the last 6 months. These low minimum riding weights mean that Oliver must lose 2 to 3 kg from his pre-wasting weight of approximately 54 kg (or 5.5 % of his total body weight) in order to reach his target weights by race-day. This degree of usual weight loss is greater than that reported by Mike (1.5 kg), Bryan (1.0 kg), and is

also well in excess of the average usual weight losses of Australian jockeys reported in Studies 1 and 2, and elsewhere (Hill et al., 1997; Moore et al., 2002). Oliver commented that he loses the majority of this weight in the 24 hours prior to a riding engagement.

Somewhat surprising, considering the substantial amount of weight he loses, Oliver does not follow the multi-method regimens other jockeys favour, and eschews gradual weight-loss methods in particular. Oliver shuns dietary restriction, with the exception of brief fasts on race-days when he has a light ride, and remarked that he avoids many forms of exercise, such as track-work, jogging, and walking that jockeys commonly engage in to augment the energy they expend on everyday activities. Instead, Oliver relies almost exclusively on one body fluid reduction method: hot baths, taken in the 24 hours before a race meeting to achieve the weight loss he requires.

Oliver admits that he has little knowledge of the long-term consequences of his wasting activities, but claims to be largely unaffected by his rapid weight loss in the short term. Physiologically, Oliver reported that he experiences some minor cramps and a dry mouth at times when he is wasting, but these effects do not concern him, nor does he believe they influence his ability to ride. Oliver did report experiencing several symptoms consistent with heat illness and dehydration, such as headaches and nausea during his most substantial episode of wasting of the test period of this study.

Psychologically, Oliver appears to encounter several problems associated with his most substantial episodes of weight loss. For example, he usually experiences increased negative emotions when he is wasting severely. In relation to his cognitive function, Oliver believes that his ability to concentrate is also diminished when he is wasting, and that this problem may affect his recall of the information that trainers communicate to him on race-days. Beyond this attentional deficit, Oliver thinks his other cognitive functions are unaffected by wasting, but objective testing of several

aspects of Oliver's cognitive functioning provides only partial support for his contention. For example, Oliver's speed of monitoring was reduced by approximately 40% in association with a 1.7% reduction in his weight on a non race-day, supporting his remarks about concentration and wasting. This slowing of processing speed was also evident on two race-days. Several other aspects of Oliver's cognitive function appeared to be negatively affected by weight loss on non race-days, however, with slower processing in decision making, working memory, and learning associated with a reduction in weight. These deleterious effects were absent or reduced on race-days, suggesting that competition effects may compensate for or moderate any weight-loss related impairments.

Content with his last-minute weight-management regimen, Oliver had little counsel to offer novice jockeys or those with weight troubles, beyond the customary advice to eat and drink well. Nor does Oliver see the need for much official industry intervention to ease weight-management demands on professional jockeys. Significantly, Oliver does not believe that the minimum weight scale in Victoria should be increased, predicting that many jockeys would then allow their pre-wasting weights to move in direct proportion to any rise. Lightweight jockey Bryan gave only qualified support to a rise in the minimum weight levels, whereas the two heavier jockeys fully supported it, suggesting that a degree of self-interest may be behind all these opinions. The only change to the racing environment that Oliver does believe is necessary is a modification to the current on-course sauna regulations. He thinks that a small increase in the maximum hourly allowance would remove the need for jockeys to raise their heart rates to undesirable levels, and may reverse the recent and risky trend of jockeys sweating while driving motor vehicles.

Summary and Conclusions from Four Case Studies on Wasting and Cognitive Function in Jockeys

In many respects, the four case studies presented here are remarkably similar, despite differences in the ages, physical statures, and riding histories of the jockeys involved, and despite a sampling strategy intended to draw out some variability. All jockeys studied ride either in the lightest or middle-weight brackets of the current Victorian weight scale, and all regularly lose a proportion of their body masses to ride at these weights. Although their riding schedules varied, the jockeys examined here all cut weight at least 2 to 3 times per week, and up to 6 times during the busiest weeks of the racing calendar. Their typical weight losses range from 1.0 to 3.0 kg (or 1.8% - 5.5 % of their total body weights), and all intentionally reserve substantial portions of their total weight losses for the 24 hours prior to a race meeting.

The general weight-loss tactics jockeys use to achieve their weight targets have much in common, with all four jockeys' regimens including both energy balance and body fluid reduction methods. In particular, all the jockeys examined engage in some form of dietary restriction. Oliver, with his race-day only fasts, engages in the least amount of food restriction, and enjoys an unrestricted diet at most other times. At the other extreme, Bryan and Mike routinely practice severe caloric restriction, controlling the size and content of almost every meal they consume.

The content of jockeys' weight-management regimens, however, differs slightly in the areas of physical activity and body fluid reduction. The three younger jockeys engage in structured aerobic-exercise activities, such as jogging and social sport, whereas experienced jockey Mike relies on track-work and incidental physical activity to boost his energy expenditure. All four jockeys also depend on dehydration tactics to provide them with 1 to 2 kg of rapid weight loss immediately before racing, but again

they vary in their choice of methods. For example, Mike and Bryan limit their fluid intake; Bryan and Paul use sweat gear to reduce their body fluids; and Bryan regularly uses the sauna, whereas the other three jockeys prefer hot baths to reduce weight.

The effects of weight loss on some key aspects of health and physical functioning appear nearly as consistent among this group of jockeys as the weight-management tactics they use to achieve their weight losses. The four jockeys studied here all experience acute physical fatigue associated with wasting, although only Bryan and Paul experience other physiologically based symptoms, such as gastric problems and nausea, with any regularity. The jockeys reported other symptoms consistent with heat illness, such as dizziness and headaches, suggesting that these athletes sometimes dehydrate themselves to the point that their thermoregulatory systems are compromised (Coris et al., 2004; Ellis, 1994).

Undesirable psychological sequelae of wasting are also evident in all cases. Mood effects, such as increased irritability and hostility, varied between jockeys in their magnitude and expression, but were universal across all jockeys studied, and unambiguously linked to weight-loss activity. In relation to cognitive processes, jockeys reported one potentially function-specific and a number of idiosyncratic impairments. These deficits also appeared in objective tests of their mental operations. For example, Bryan, Paul, and Oliver all experience transient attentional difficulties when at their lightest weights, suggesting that this function may be more sensitive to changes in weight and physiological status than others. Mike and Oliver recorded slower scores compared to their baseline measures on tests of learning and working-memory, respectively, that coincided with weight loss. The other two jockeys did not show such decreases, indicating that processing speed in these domains may be more closely related to intra-individual factors other than weight status. There is some evidence to

support the suggestion that the arousal effects of competition may have a moderating influence on the relationship between weight loss and cognitive function. Arousal may facilitate faster than baseline processing in the context of race-day, despite weight losses beyond the 2% threshold found to impair cognitive and psychomotor functions in previous studies (Cian et al., 2001; Cian et al., 2000; Gopinathan et al., 1988).

When asked to comment on possible solutions to the weight-management problems faced by jockeys, the four participants in this study offered differing opinions. Two jockeys (Mike and Paul) were strong advocates of increasing minimum-weight levels for races in Victoria by at least 1 kg (to 53 kg). A third jockey (Bryan) expressed cautious support for such an increase, acknowledging that a rise would increase competition for rides, and the final jockey (Oliver) was against any change in minimum weights. The jockeys who support the change most strongly are also those with the heaviest riding weights, although not necessarily those reporting the most serious weight problems. This situation suggests that these jockeys' attitudes to minimum weight may be driven as much by self-interest as by concern for their peers. Each individual's position on the issue has the self-serving bias of maximising the number of rides he is eligible for, without necessarily helping other jockeys. Another more altruistic suggestion the jockeys offered is to alter the busy Australian and Victorian racing calendars to allow jockeys some weekly or annual respite from their weight-management activities.

In conclusion, the four Victorian jockeys described here engage in frequent and repeated episodes of substantial weight loss in order to be eligible for as many rides as possible under the current minimum-weight scale. To achieve their weight targets, these jockeys employ weight-loss regimens similar to those described by jockeys in previous studies (Labadarios et al., 1993; Leydon & Wall, 2002; Moore et al., 2002), and by

other weight-cutting athletes (Degoutte et al., 2006; Sykora et al., 1993), particularly wrestlers (Alderman et al., 2004; Kinningham & Gorenflo, 2001). Combinations of dietary restriction, physical activity, and dehydration achieved through hot salt baths, saunas, and sweat gear, are the most common methods of weight loss, although instances of self-induced vomiting and use of diuretic substances were also reported.

The effects of the weight-loss practices described in these case studies appear to be generally negative but somewhat idiosyncratic, particularly as they relate to cognitive functioning. Although negative mood and physical effects seem almost inevitable consequences of starvation and dehydration, impairments to cognitive processes such as working memory and decision-making are less predictable. Based on the evidence of four case studies of weight management in jockeys presented here, the only aspect of cognitive function that shows a relatively stable and deleterious relationship to weight loss appears to be that of attention.

CHAPTER 6

GENERAL DISCUSSION

The primary objective of the research presented in this thesis was to investigate the issue of weight management, and particularly, wasting, in Australian jockeys. Specifically, the research aimed to provide an overall picture of the wasting practices of jockeys, including the types, prevalence, and timing of the activities jockeys engage in to reach their industry-mandated weight targets. Further, the research was intended to examine the effects of jockeys' weight-management activities on their psychological functioning, with an emphasis on their cognitive processes. The main findings of the research have been addressed in the three preceding chapters, which present the individual quantitative and qualitative studies of the research investigation. This final chapter provides the central concluding arguments of this thesis, developed after an extensive analysis and synthesis of the data that emerged during the course of the research.

The first general conclusions of this thesis are perhaps the most concerning: Most Australian jockeys necessarily waste before race meetings, and do so to a substantial degree. For example, over 70% of the jockeys surveyed in Study 1 reported they had wasted to reach their racing weights in the 7 days prior to their study participation, and the average weight loss of this group was 3.7% of their total body mass. This weight-loss figure is well above the 2% threshold at which physical and psychological impairments have been previously observed (Buskirk & Puhl, 1996; Fogelholm, 1994; Gopinathan et al., 1988). Participants in Studies 1, 2 and 3 reported instances of weight losses greater than 7%, 6%, and 5.5% (Oliver) respectively, suggesting that some Australian jockeys go well beyond the critical limits of

asymptomatic weight loss when the need arises, as often occurs during important racing carnivals.

Furthermore, most jockeys use potentially harmful methods to achieve their weight-loss targets. Medical authorities have warned that rapid dehydration tactics, such as wearing sweat gear and using saunas or other hot environments to induce body fluid loss, carry with them significant health risks for athletes, including impaired muscle function, compromised thermoregulation, and even death (American College of Sports Medicine, 1996; American Medical Association, 1998). Despite these warnings, the majority of jockeys in Study 1 (72% of survey respondents) reported using saunas for wasting, with a similar proportion using sweat gear to reduce their body fluids. Even jockeys selected to take part in Study 3, because of their ease with weight management (e.g., Mike and Bryan), regularly use rapid dehydration methods for weight loss. Moreover, jockeys in the present research indicated that they use these potentially unhealthy weight-loss methods immediately before and on race-days. For example, over 80% of the jockeys in Study 1 who use saunas for weight loss do so on race-days, ensuring that their most potentially harmful wasting activities coincide with other physical and psychological demands of competition.

The previous statements regarding the prevalence, extent, and methods of wasting may be surprising to some jockeys and industry personnel involved in this research, who frequently spoke of “natural lightweights” and jockeys losing weight via “natural methods.” These conclusions on wasting are also drawn in light of recent policy changes in the Victorian racing industry.¹ Those changes have been specifically designed to reduce jockeys’ need to waste (e.g., increases of minimum-weight standards, diet and weight management education), and their ability to do so (e.g., on-course sauna limits, bans on diuretic and appetite suppressing substances). Industry

personnel involved in this research communicated a general belief that the policy initiatives listed have reduced wasting among jockeys, with one racing industry stakeholder commenting that, “We [the Victorian racing industry] don’t have a real big weight problem.” It appears that the problem endures.

The second major conclusions of the current research relate to the frequency of wasting among Australian jockeys, and they are as troubling as the first: The jockeys participating in this research waste up to 6 times per week, and do so indefinitely. The overwhelming majority (80%) of jockeys in Study 1 usually need to lose weight for a race-day, and jockeys in Studies 2 and 3 averaged two to four episodes per week. One jockey interviewed for Study 2 summed up the almost endless cycle of wasting and recovery by stating, “I’ve gotta peak [minimize weight] every single day of me life,” and another remarked, “You’re sorta walkin’ around tryin’ to stay lean every day.” Based on a conservative estimate of two wasting episodes per week of the racing calendar, and two weeks of annual holidays, most jockeys will dehydrate and starve themselves approximately 100 times each year to reach their racing weights. Jockeys and racing-industry participants in Studies 2 and 3 made reference to the busy Australia racing calendar, and the demands such a schedule places on jockeys’ weight-management and recuperative abilities. For example, a racing-industry official remarked that, “It’s...a concern that they’re [jockeys are] riding so many days in a row: 14 or 15 days on the trot [consecutively].” When asked about the likelihood of a reduction in the amount of racing in Australia, both jockeys and industry stakeholders acknowledged the financial incentives of maintaining the current schedule. For example, one experienced jockey stated in Study 2 that the practice of conducting race meetings on public holidays would continue for “public purposes” and “money making” reasons.

The final key conclusion of this thesis is not unexpected, given the previous comments about the ubiquity of wasting: Most Australian jockeys studied here experience a range of adverse side effects they perceive to be directly related to their weight-management activities. For example, many of the jockeys participating in Study 1 reported physical and mental fatigue (experienced by over 75% of participants), cramps and muscular weakness (more than 65%), mood disturbances (more than 80%), and memory and attentional problems (more than 40%) associated with their weight-loss activities. Considering only their psychological responses to wasting, jockeys in this study reported experiencing 10 distinct and adverse symptoms on average. In Study 3, all four jockeys explained that their mood states deteriorate and they experience some degree of physical fatigue after periods of wasting. Five of the jockeys surveyed in Study 1 are so psychologically disturbed during their weight-loss activities that, at times, they contemplate suicide.

Cutting weight is not peculiar to the sport of horseracing, and the findings of this thesis can now be compared with those from sports that place similar weight demands on competitors. The conclusion of the present research regarding the on-going high prevalence of wasting practices in jockeys is consistent with studies of other weight-regulated sports, such as wrestling, which suggest that many athletes in these sports continue to cut weight before competitions via dehydration, in spite of attempts to eradicate this tactic (Alderman et al., 2004; Oppliger et al., 2003). Despite the high prevalence of wasting evident in the Australian jockey population, which is commensurate with rates observed in other groups of weight-regulated athletes, the magnitude of weight loss typical of jockeys actually appears moderate compared to these populations. Estimates from the current research indicate that jockeys usually lose between 2 and 5% of their total body masses, whereas previous research suggests that

weight-cutting athletes in a range of other sports typically lose 5 -10% for competition (Brownell et al., 1987; Buskirk & Puhl, 1996). Although this finding is reassuring for racing industry stakeholders, a major concern regards the high frequency of jockeys' wasting episodes. The high frequency of wasting reported in the present research (2 to 4 times per week), coupled with the absence of an off-season in Australian racing, arguably places jockeys at higher risk of weight-loss related health problems than any other group of weight-regulated athletes. In contrast to jockeys, elite wrestlers in the US may have to cut weight 8 to 15 times per season (Oppliger et al., 2003; Steen & Brownell, 1990), and lightweight rowers even less often (Sykora et al., 1993).

The conclusions regarding the side effects of wasting are largely consistent with previous research findings, which detail a variety of adverse physical, emotional, and cognitive symptoms encountered by other weight-cutting athletes and dehydrated individuals (Choma et al., 1998; Cian et al., 2001; Landers et al., 2001). The finding of attentional deficits related to wasting, consistent in all three studies of this thesis, stands out, however, because such changes have not been reported by previous researchers of cognitive function in weight-cutting athletes (Choma et al., 1998; Landers et al., 2001). One could assume that this unusual finding in the present research was due in part to the measurement tool used. Past research has typically involved the Trail-making Test – B, a pencil-and-paper test providing one overall measure of attentional function, whereas the current investigation used the more sensitive, computer-based CogSport battery, which allows for a series of trials and thus a greater number of observations of functioning. For detailed discussions of the merits of computerised tests refer to Collie et al. (2001) and Collie, Maruff, McStephen, & Darby (2003). The consistency of jockeys' self-reports of attentional dysfunction recorded in the current research suggests the discrepancy with the wrestling studies may be more than a measurement issue.

Other explanations for the divergent findings are not readily apparent, but racing, with the potential for severe injury and death, may place greater attentional demands on jockeys than wrestling does on its participants, and the weight losses jockeys experience may cause their already substantial attentional loads to cross a certain impairment threshold that was not reached in the wrestlers studied.

When discussing the implications of the findings regarding the adverse side effects of wasting, one must consider not only the racing culture of jockeys, but also the standards of the broader sporting and general communities. Jockeys described a number of the negative responses to the weight loss they experience as minor, and deservedly so. For example, acute physical complaints such as cramps and headaches, reported in all three studies of this thesis, are usually temporary, easily remedied, and are common occurrences in many sports without weight regulations, as they are in general daily life. Several jockeys in Studies 2 and 3 also reported muscular weakness associated with wasting, but the majority stated that “adrenaline” helps them overcome this impairment when it matters most: during races. If effects such as these were the only symptoms of rapid or substantial weight loss that jockeys experience, then wasting could be considered no more problematic than the work-related activities of other professional athletes and individuals.

The research presented here, however, suggests that there are psychological correlates of wasting that may be more problematic for jockeys than the short-term physical complaints they encounter, and apparently overcome with ease. For example, five jockeys in Study 1 reported experiencing suicidal ideation associated with wasting. Although the underlying reasons for their troubled mental states are unclear, it could be that acute changes in physiological status caused by starvation and dehydration directly affect these wasting jockeys’ states of mind. Also, it may be that the ubiquity of wasting

has additive and negative effects on their psychological functioning over time. Regardless of their origin, such disturbed cognitions must surely have profound effects on these jockeys at the times they occur. Furthermore, jockeys in all three studies of the present research reported attentional deficits related to wasting, with 49% of Study 1 participants having difficulty concentrating for long periods at some time when they waste. Two jockeys (one in Study 2, one in Study 3), in reference to jockeys' attentional states, made mention of riders looking "glassy-eyed" when wasting. Such cognitive impairments carry the potential to be substantially disruptive to jockeys' professional and personal lives, and can also be precursors to more dramatic events. Whereas a momentary lapse in concentration for a wrestler may result in the loss of an important bout, a similar cognitive slip during competition may lead to death or disablement for a jockey, if it precipitates a race fall.

Despite the apparent seriousness of the psychological symptoms of wasting investigated in this research, at least by community standards, the majority of jockeys labelled the side effects they experience as minor. For example, only 15% of Study 1 jockeys who experience problems maintaining their attention described this impairment as serious, and none of the jockeys in this study who have suicidal thoughts rated these ideations as serious. The only symptoms of wasting that jockeys appear to regard as problematic are recurrent thirst, and, to a lesser extent, mood disturbances. Based on the questionable ratings provided by jockeys of some symptoms of wasting, a culture of denial appears to exist in horseracing, where a problematic aspect of the sport (i.e., wasting) has been suppressed or ignored for some time. The surprise is that jockeys, even now, appear to be complicit in this denial at some level. Perhaps some jockeys fear that racing authorities will prevent them from riding if the full extent of their problems is revealed. In support of this statement, a Study 3 participant who was absent from the

pre-participation briefing session, communicated to a trusted RVL official that some jockeys did not attend the briefing because they feared that their cognitive functions would be tested, and that, affected by wasting, their poor results could lead to suspensions from riding for them.

Horse racing is a dangerous sport, with a long history of death and severe injury (DeBenedette, 1987; Press et al., 1995), so when problems such as those outlined in the preceding paragraphs occur they must not be taken lightly, no matter how dismissive or unaware those jockeys who experience them are. As a near-fatal example of the folly in underestimating the risks of wasting, one Australian jockey recently had a cardiac infarction related to sauna use. He received a legal settlement of \$1 million AUD (Cook v. Australian Capital Territory Racing Club Inc., 2001), and the Victorian racing industry has introduced sauna regulations and other measures to avoid such pay outs in the future (Racing Victoria Limited, 2002). From discussions with participants over the course of the research, it was evident that many jockeys do not look beyond short-term concerns regarding their next ride, and do not fully appraise the effects of their weight-management activities on their overall well-being. In Victoria, RVL has begun to address this issue, providing services such as weight-management education and psychological counselling for jockeys (Racing Victoria Limited, 2003a). Further education about the cognitive risks of wasting appears to be required though. For example, few jockeys in this research appeared to realise or acknowledge that attentional problems related to wasting could interfere with their tactical planning for race meetings, make communication with colleagues and family difficult, and could even make driving their cars more dangerous than usual. The outcome of increased educational efforts may be that jockeys can consider and value a wider perspective on their health and safety, beyond race-riding.

The vast majority of jockeys involved in this research do not wish to waste, or to use potentially dangerous weight-loss methods such as saunas and sweat gear to reach their weight targets. In a clear statement about their aversion to weight loss, nearly half of jockeys surveyed in Study 1 (49%) reported that weight management was difficult for them either *always* or *usually*. Further, the majority of jockeys interviewed in Studies 2 and 3 advised other riders to avoid sauna use and other dehydration tactics, and to rely on energy-balance methods as far as possible. With the exception perhaps of Oliver in Study 3, the jockeys involved in this research feel compelled to waste by the strict weight standards and competitiveness of their industry, and by the limited amount of weight loss possible via “natural” or energy-balance methods. One Study 3 jockey (Paul) went so far as to state ruefully that, “This [being a jockey] would be the greatest job in the world,” if not for the almost daily wasting episodes. For jockeys such as Paul, eliminating 1 - 2 kg of body fluid before each race-day is the only way they can remain within the current weight scale, and so policies that permanently inhibit their ability to use such tactics pose a serious threat to their livelihoods.

Although this research was not intended to be a review of weight-management policies in Australian racing, data were gathered concerning perceptions of the industry responses to wasting. Over the course of the investigation, a number of jockeys expressed displeasure at the current on-course sauna regulations in Victoria, which limit sauna time to 15 minutes per hour, despite acknowledging that saunas are detrimental to their physical and psychological health and well-being. In contrast, Australian jockeys in another recent study expressed gratitude for changes outlawing dangerous weight-loss practices (diuretics), stating that outright bans were the only measure that would stop them using such methods (Speed et al., 2005). Racing-industry decision-makers

will need to be mindful of the “waste to work” beliefs of some Australian jockeys when considering future changes to weight-management policies.

Some of the jockeys and industry participants involved in this research who stated that an increase in the minimum-weight standards in Australia seems inevitable, but that this action also represents only a short-term solution to jockeys’ weight-management problems. Perhaps a more individualised approach is warranted, with each jockey having an objectively determined minimum-weight standard, based on minimum healthy energy intake and hydration criteria. Once these safe or healthy minimum riding weights have been established for each licensed jockey, industry regulators will be able to make a more accurate assessment of the need to modify the current range of set weights that underpin horse-racing. Considering the high frequency of wasting evident in Australian jockeys, it seems that efforts to reduce unhealthy weight-loss practices in this country should also incorporate measures to monitor and limit the number of times each week and each season a jockey wastes. Many other industries have standardised workplace conditions designed to protect employee health and safety, covering areas such as annual leave, holiday pay, and maximum weekly working hours. Enforcing such conditions in the racing industry may help to limit the number of times jockeys can race, and therefore the number of times they must waste. Such regulations may need to be accompanied by wage increases for jockeys, to ensure that they make enough money to survive in their industry in the long term.

Methodological Issues and Implications for Future Research

Several methodological issues from the present research relating to the assessment of cognitive functions warrant brief discussion in this final conclusion. The backbone of this thesis, the cognitive function of wasting jockeys, is primarily formed from jockeys’ self-reports gathered via in-depth interviews and surveys, augmented

with objective data gathered in Study 3. During the course of this investigation, several jockeys remarked that they had difficulty judging their cognitive performances because of the elusive qualities of the processes involved. This issue was particularly evident in Studies 2 and 3, where jockeys were asked to comment on specific domains of cognitive function that may be compromised by dehydration and inadequate dietary intake. These jockeys managed some general and important insights, such as those concerning obvious lapses in their memory and concentration. Many, however, were unable to comment on more subtle changes in the normal speed or operation of their cognitive functions. It is possible that some jockeys experience acute but mild impairments, such as a slowing in the speed of their decision-making, but that these deficits escape their notice. Therefore, the subjective findings from these studies should be considered cautiously, reflecting as they do only participants' observations of gross cognitive impairments. Future researchers must be cognisant of the problems inherent in subjective ratings of cognitive function, and continue attempts to assess via objective means.

A second methodological issue concerns the CogSport test (Collie, Maruff, Makdissi et al., 2003) used to objectively measure the cognitive functions of participants. Because the test is relatively new and research on its use is limited, normative data were not readily available for comparison with jockeys' results. In the absence of such external benchmarks, participants served as their own standards when analysing their serial cognitive performances. The findings of Study 3 would be more compelling, and broader generalisations might be possible, if such external comparisons were available. Further, although the battery provides reliable and valid measures of several cognitive functions (Collie, Maruff, Makdissi et al., 2003), it has not been calibrated against real-world measures of behaviour. Attempts were made in Chapter 5

to link performances on the various subtests to important jockey activities. These ecological interpretations of participants' scores, however, are speculative. CogSport was chosen with full knowledge of these limitations because of the substantial advantages it offers in other areas (e.g., short test duration, multi-function assessments, and motivational qualities). As the scientific literature on the test continues to grow in the future, these issues will no doubt be addressed enabling future researchers to make broader generalisations about cognitive function and performance in response to weight change.

An additional issue for future researchers to examine is that of tracking the changes in cognitive function in direct relation to the changes in physiological status that occur with wasting. The current research used body mass as a marker of physiological change, but hydration and blood glucose status have not been assessed in studies of jockeys. A study concurrently collecting data on cognitive function and these physiological variables would facilitate an examination of the hypothesised mechanisms underlying cognitive impairment in weight cutting athletes.

Two of the three studies (Studies 1 and 3) of this thesis, and especially the focussed study of cognitive function (Study 3), were necessarily snap shots of weight-management experience, with an emphasis on acute responses to weight loss. This information was augmented with some historical data, but the chronic effects of wasting were not investigated here in great detail, and large gaps still exist in the knowledge base in this area. For example, it remains to be seen whether or not jockeys can psychologically adapt, in the long-term, to continual deficits in energy and body fluids caused by years of intentional caloric restriction and dehydration. This question is something that future researchers may wish to investigate by tracking the physiological status and cognitive functioning of jockeys longitudinally. In this way, it may be

possible to draw conclusions about the chronic effects of wasting on cognitive processing, by measuring jockeys in their early teens, establishing baselines when most have not yet begun to use dehydration or extreme starvation tactics, and then re-testing them at regular intervals over the course of their careers.

Concluding Comment

The present research was designed to explore the enduring and sometimes secret practices of weight management and wasting in jockeys. The overwhelming message delivered by the jockeys who participated in this research, and supported by objective measures, is that weight management remains a troubling aspect of their professional and personal lives. Many Australian jockeys routinely starve and dehydrate themselves, and, in doing so, knowingly risk their occupational and personal health and well-being to remain competitive in their chosen career. It is testament to the lure of the racing industry, and to the determination of these athletes, that so many jockeys continue to live and work in this way: figuratively starving vassals in the Sport of Kings.

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APPENDIX A

INFORMATION FOR PARTICIPANTS IN STUDY 1

INVITATION TO PARTICIPATE IN A RESEARCH STUDY (Study 1)
(Jockey/Apprentice)



"The Psychological Effects of Wasting in Jockeys"

During the past decade, researchers have reported that athletes who must lose weight consistently and rapidly can experience difficulties associated with their weight loss, including physical, emotional, psychological, and social problems. The existing research on rapid short-term weight loss (wasting) has focused on athletes from sports with weight divisions, such as Olympic wrestling, rowing and boxing, while surprisingly little research has investigated the experiences of jockeys. This is despite the fact that horseracing has arguably the most demanding weight requirements of all sports.

The physical complications associated with wasting are numerous and have been well documented. Unfortunately, very little is known about the psychological effects of wasting. A recent study of US wrestlers found that athletes who wasted reported increases in tension, anger and depression, and problems with short-term memory and decision-making. Other studies have indicated that an athlete's ability to concentrate may also be adversely affected by wasting, and that athletes who adopt unhealthy weight restrictive practices can develop negative attitudes towards eating and their own body.

We wish to invite you, as a registered Victorian jockey or Apprentice, to participate in our investigation of the effects of weight restriction and wasting on jockeys. The key focus of this study is to explore the current weight management practices of jockeys, and to gather information about the effects of these practices on mood, thought processes and behaviour. Your participation will involve completing a questionnaire of approximately 30 minutes duration, which asks for information in several key areas: your riding career, weight management methods, medical complaints, and psychological problems associated with wasting. There are no "right" or "wrong" answers, and the information you provide will be invaluable in assisting us to develop recommendations for safe weight management, thereby improving the health and well being of all jockeys. It is hoped that the study will help improve both the quality and length of jockeys' careers.

Please note that participation is voluntary and you are free to discontinue at any time, without explanation. No information gained from the questionnaire will enable you to be identified to anyone other than the research team and your responses will only be reported as group information. Participants will be assigned a code that will be kept separately from the questionnaire data, to enable the research team to follow up a small number of willing jockeys for further study. All of the codes and your responses will be kept confidential and stored securely in the office of Dr Harriet Speed at Victoria University.

If you are willing to participate, please tear off this information page for your own reference, complete the attached questionnaire booklet and return it by mail to Victoria University in the reply-paid envelope. Please note that the return of the questionnaire to the researchers indicates your consent to participate in the study.

We thank you in advance for assisting us in our research. Should you have any questions about the research project, please do not hesitate to contact the researchers at the addresses below. If at any stage you have concerns about the conduct of the research project, please contact the University Human Research Ethics Committee, Victoria University, P.O. Box 14428 MCMC, Melbourne, 8001 (Ph 9688 4710).

Dr Harriet Speed
Principal Investigator
Victoria University
ph: (03) 9919 5412

Matt McGregor
PhD Student
Victoria University
ph: 0402 580 449

**SURVEY OF THE WEIGHT MANAGEMENT EXPERIENCES OF
VICTORIAN JOCKEYS**



**VICTORIA UNIVERSITY
& THE VICTORIAN JOCKEYS ASSOCIATION**

Please complete the following questionnaire as honestly as you can, after reading the instructions carefully. Remember, your privacy is assured.

SECTION 1: PERSONAL AND CAREER INFORMATION

The following questions relate to you & your riding career. Please ✓ tick the most appropriate answer.

- 1) Gender: Male Female 2) Age: _____ years
- 3) Marital Status: Single Married
 De-facto Widowed
 Divorced Other (please specify _____)
- 4) Do you have any children? No Yes (how many _____)
- 5) Height: _____ metres/cm or feet/inches
- 4) Usual Weight: _____ kg
- 6) Are you an apprentice jockey? No (go to Q 6) Yes (please tick a box below)
- If you answered *Yes* above, what is your current year level: 1st 2nd 3rd
- 7) Duration of riding career/apprenticeship so far: _____ years
- 8) The average number of races you ride *per week* (over the last 6 months): _____ rides
- 9) The average number of hours you spend per week working as a jockey/apprentice (including all duties):
 _____ hours
- 10) Are you currently not riding for any reason? No Yes

Reason: _____

SECTION 2: WEIGHT MANAGEMENT

- 1) Do you currently have difficulty managing your racing weight?
 1. Never 2. Sometimes 3. Usually 4. Always
- 2) Do you usually have to lose weight to 'make weight' for race-day?
 No Yes (on average how much weight _____ kg)
- 3) During the past 7 days, have you at any time, had to lose weight to 'make weight' for race-day?
 No Yes (how much weight _____ kg)
- 4) At any time in the past have you had any difficulty managing your racing weight?
 No Yes
- 5) Please consider the following **Weight-Management Methods**. Circle the most appropriate response(s) for when you use each weight-loss method. *You can circle more than one response*. Also indicate in the last columns why you use the method (eg. to maintain a constant weight and/or to lose weight rapidly) by ticking the appropriate boxes (if you answer *never* for frequency, leave the last column blank).

Example: if you use food restriction *leading up to* and *on race-day* to lose weight rapidly, you would circle 3 and 4, & place a tick in the last column (lose weight rapidly).

METHODS	WHEN DO YOU USE IT?				REASON FOR USE	
	Never	Between Race-days	Day before race-day	On race-day	maintain constant weight	lose weight rapidly
1. Food restriction	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
2. Fluid restriction	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
3. Sauna	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
4. Self-induced vomiting	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
5. Diuretics	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
6. Amphetamines (eg. cocaine, speed)	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
7. Laxatives	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
8. Appetite suppressants	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
9. Exercise as jockey for weight control - track work, stable work.	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
9. Other exercise for weight control (e.g. jogging, gym, other sport)	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
10. Exercising in hot environment	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
11. Exercising in clothing to produce sweat	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
12. Hot salt bath	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
13. Smoking Cigarettes	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>
13. Other (please specify _____)	1	2	3	4	<input type="checkbox"/>	<input type="checkbox"/>

Any Comments: _____

6) The following table refers to **Physical Effects** you may experience when wasting. Please indicate how often you experience the effects by circling the appropriate response. Also indicate the *severity* of your experience by ticking either **minor** or **serious** in the last columns. If you *never* experience any of the following leave the last columns blank.

Example: if you *often* experience muscular cramps and feel that it is serious, you would circle number 4 (often), and also place a tick in the last column (serious).

PHYSICAL EFFECTS	FREQUENCY					SEVERITY	
	Never	Rarely	Some times	Often	Always	Minor	Serious
1 Muscular cramps	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
2 Fever	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
3 Nausea	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
4 Dizziness	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
5 Fainting	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
6 Upset stomach	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
7 Stomach cramps	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
8 Poor circulation	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
9 Fatigue	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
10 Visual distortion/impairment	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
11 Joint Pain	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
12 Other (please specify _____)	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>

7) Have you been diagnosed with any of the following illnesses *by a doctor/health professional*?

- | | | | | | |
|---------------------------------|-----------------------------|------------------------------|---------------------------|-----------------------------|------------------------------|
| 1. Cardiovascular disease | No <input type="checkbox"/> | Yes <input type="checkbox"/> | 7. Kidney problems | No <input type="checkbox"/> | Yes <input type="checkbox"/> |
| 2. Diabetes | No <input type="checkbox"/> | Yes <input type="checkbox"/> | 8. Dental problems | No <input type="checkbox"/> | Yes <input type="checkbox"/> |
| 3. High blood pressure | No <input type="checkbox"/> | Yes <input type="checkbox"/> | 9. Gastric problems | No <input type="checkbox"/> | Yes <input type="checkbox"/> |
| 4. Low blood pressure | No <input type="checkbox"/> | Yes <input type="checkbox"/> | 10. Reproductive problems | No <input type="checkbox"/> | Yes <input type="checkbox"/> |
| 5. Osteoporosis | No <input type="checkbox"/> | Yes <input type="checkbox"/> | 11. Menstrual problems | No <input type="checkbox"/> | Yes <input type="checkbox"/> |
| 6. Other (please specify _____) | No <input type="checkbox"/> | Yes <input type="checkbox"/> | | No <input type="checkbox"/> | Yes <input type="checkbox"/> |

Any Comments:

- 8) The following table refers to **Psychological Effects** you may experience when wasting. Please indicate how often you experience the effects by circling the appropriate response. Also indicate the *severity* of your experience by ticking either **minor** or **serious** in the last columns. If you *never* experience any of the following leave the last columns blank.

Example: if you *often* have persistent thoughts about thirst, and feel that it is serious, you would circle number 4 (often), and also place a tick in the last column.

PSYCHOLOGICAL EFFECTS	FREQUENCY					SEVERITY	
	Never	Rarely	Some-time	Often	Always	Minor	Serious
1 Persistent thoughts about thirst	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
2 Persistent thoughts about food	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
3 Short term Memory loss (forgetting things that have just happened)	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
4 Long term Memory loss (forgetting things that you know well)	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
5 Mood swings	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
6 Anxiety	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
7 Depressed thoughts & feelings	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
8 Wandering thoughts	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
9 Irritability	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
10 Angry thoughts	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
11 Angry outbursts (behaviour)	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
12 Irrational thoughts	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
13 Sleep disturbance	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
14 Mental fatigue	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
15 Suicidal thoughts	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
16 Slow to make decisions	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
17 Making poor decisions (mistakes)	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
18 Difficulty maintaining concentration for long periods	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
19 Difficulty concentrating on more than 1 thing at a time	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
20 Slow reactions/response times	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>
21 Other (please specify _____ _____ _____)	1	2	3	4	5	<input type="checkbox"/>	<input type="checkbox"/>

Any Comments:

Would you be interested in participating in an interview/follow up to further explore the weight management experiences of jockeys?

No

Yes

If you answered yes please supply:

Name: _____

Contact Ph No: _____

Thank you for your cooperation, your help is greatly appreciated. Please return this questionnaire in the reply-paid envelope provided as soon as possible

APPENDIX B

INFORMATION FOR PARTICIPANTS IN STUDY 2

INVITATION TO PARTICIPATE IN A RESEARCH STUDY (Study 2)
(Jockey/Apprentice)



"The Psychological Effects of Wasting in Jockeys"

During the past decade, researchers have reported that athletes who must lose weight consistently and rapidly can experience difficulties associated with their weight loss, including physical, emotional, psychological, and social problems. The existing research on rapid short-term weight loss (wasting) has focused on athletes from sports with weight divisions, such as Olympic wrestling, rowing and boxing, while surprisingly little research has investigated the experiences of jockeys. This is despite the fact that horseracing has arguably the most demanding weight requirements of all sports.

The physical complications associated with wasting are numerous and have been well documented. Unfortunately, very little is known about the psychological effects of wasting. A recent study of US wrestlers found that athletes who wasted reported increases in tension, anger and depression, and problems with short-term memory and decision-making. Other studies have indicated that an athlete's ability to concentrate may also be adversely affected by wasting, and that athletes who adopt unhealthy weight restrictive practices can develop negative attitudes towards eating and their own body.

We wish to invite you, as a registered Victorian jockey or Apprentice, to participate in our investigation of jockey weight management. The key focus of this study is to explore the current weight management practices of jockeys, and to gather information about the effects of these practices on mental function and behaviour. You are invited to participate in a one on one interview of about 1 hour, discussing your opinions of the weight management experiences of your relative. The information you provide will be invaluable in assisting us to develop recommendations for safe weight management, thereby improving the health and well being of all jockeys. It is hoped that the study will help improve both the quality and length of jockeys' careers.

Please note that participation is voluntary and you are free to discontinue at any time, without explanation. No information gained during the study will enable you or your relative to be identified to anyone other than the research team, and no personally identifying information will be published or communicated to anyone outside the team. Your responses will be kept confidential and stored securely in the office of Dr Harriet Speed at Victoria University.

If you are willing to participate, please read and complete the attached consent form and return it by mail to Victoria University in the reply-paid envelope. Please note that the return of the form to the researchers indicates your consent to participate in the study.

We thank you in advance for assisting us in our research. Should you have any questions about the research project, please do not hesitate to contact the researchers at the addresses below. If at any stage you have concerns about the conduct of the research project, please contact the University Human Research Ethics Committee, Victoria University, P.O. Box 14428 MCMC, Melbourne, 8001 (Ph 9688 4710).

Dr Harriet Speed
Principal Investigator
Victoria University
ph: (03) 9919 5412

Matt McGregor
PhD Student
Victoria University
ph: 0402 580 449



INVITATION TO PARTICIPATE IN A RESEARCH STUDY (Study 2)
(Racing/allied Industry Representative)

“The Psychological Effects of Wasting in Jockeys”

During the past decade, researchers have reported that athletes who must lose weight consistently and rapidly can experience difficulties associated with their weight loss, including physical, emotional, psychological, and social problems. The existing research on rapid short-term weight loss (wasting) has focused on athletes from sports with weight divisions, such as Olympic wrestling, rowing and boxing, while surprisingly little research has investigated the experiences of jockeys. This is despite the fact that horseracing has arguably the most demanding weight requirements of all sports.

The physical complications associated with wasting are numerous and have been well documented. Unfortunately, very little is known about the psychological effects of wasting. A recent study of US wrestlers found that athletes who wasted reported increases in tension, anger and depression, and problems with short-term memory and decision-making. Other studies have indicated that an athlete's ability to concentrate may also be adversely affected by wasting, and that athletes who adopt unhealthy weight restrictive practices can develop negative attitudes towards eating and their own body.

We wish to invite you, as a Racing or allied industry representative, to participate in our investigation of the effects of weight restriction and wasting on jockeys. The key focus of this study is to explore the current weight management practices of jockeys, and to gather information about the effects of these practices on mental function and behaviour. You are invited to participate in a one on one interview of about 1 hour, discussing your opinions of weight management and its effects on jockeys. The information you provide will be invaluable in assisting us to develop recommendations for safe weight management, thereby improving the health and well being of all jockeys. It is hoped that the study will help improve both the quality and length of jockeys' careers.

Please note that participation is voluntary and you are free to discontinue at any time, without explanation. No information gained during the study will enable you to be identified to anyone other than the research team, and no personally identifying information will be published or communicated to anyone outside the team. Your responses will be kept confidential and stored securely in the office of Dr Harriet Speed at Victoria University.

If you are willing to participate, please read and complete the attached consent form and return it by mail to Victoria University in the reply-paid envelope. Please note that the return of the form to the researchers indicates your consent to participate in the study.

We thank you in advance for assisting us in our research. Should you have any questions about the research project, please do not hesitate to contact the researchers at the addresses below. If at any stage you have concerns about the conduct of the research project, please contact the University Human Research Ethics Committee, Victoria University, P.O. Box 14428 MCMC, Melbourne, 8001 (Ph 9688 4710).

Dr Harriet Speed
Principal Investigator
Victoria University
ph: (03) 9919 5412

Matt McGregor
PhD Student
Victoria University
ph: 0402 580 449

Victoria University
School of Human Movement, Recreation and Performance



Statement of Informed Consent (Study 2)

I, _____ of _____

certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in a research on the psychological effects of 'Wasting' in Jockeys being conducted at Victoria University by Dr. Harriet Speed, and Matt McGregor. I have read the plain language statement that outlines the research and understand that the purpose of the research is to gain a better understanding of the weight management experiences of jockeys.

Procedures

Participants will be asked to take part in an interview that will take approximately 1 hour. The interviewer will ask for information on about your weight management methods, and any psychological or cognitive problems you may experience while you are wasting. Participation in the research is completely voluntary and participants are free to withdraw at any time without giving an explanation. If you have any questions please do not hesitate to ask the interviewer or Dr. Harriet Speed on (03) 9919 5412.

I voluntarily agree to provide information on jockey's weight management experiences in the knowledge that all information will be treated in a confidential manner and only summary results will be reported and individual responses will not be released to any person or organisations. I am aware that I may withdraw from the research project at any time and that any information that's been collected will not be used.

Signed: _____ Date: _____

Witness other than the researcher:

Signed: _____ Date: _____

Any queries about your participation in this project may be directed to the Principle Research, Dr. Harriet Speed (phone: (03) 9689 8637). If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University, PO Box 14428 MC, Melbourne 8001 (Phone: (03) 9688 4710).

Victoria University
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Statement of Informed Consent (Study 2 – Industry Personnel)

I, _____ of _____

certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in a research on the psychological effects of 'Wasting' in Jockeys being conducted at Victoria University by Dr. Harriet Speed, and Matt McGregor. I have read the plain language statement that outlines the research and understand that the purpose of the research is to gain a better understanding of the weight management experiences of jockeys.

Procedures

Participants will be asked to take part in an interview that will take approximately 1 hour. The interviewer will ask for information on about jockey weight management methods, and any psychological or cognitive problems jockeys may experience while wasting. Participation in the research is completely voluntary and participants are free to withdraw at any time without giving an explanation. If you have any questions please do not hesitate to ask the interviewer or Dr. Harriet Speed on (03) 9919 5412.

I voluntarily agree to provide information on jockey's weight management experiences in the knowledge that all information will be treated in a confidential manner and only summary results will be reported and individual responses will not be released to any person or organisations. I am aware that I may withdraw from the research project at any time and that any information that's been collected will not be used.

Signed: _____ Date: _____

Witness other than the researcher:

Signed: _____ Date: _____

Any queries about your participation in this project may be directed to the Principle Research, Dr. Harriet Speed (phone: (03) 9689 8637). If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University, PO Box 14428 MC, Melbourne 8001 (Phone: (03) 9688 4710).

INTERVIEW GUIDE - Study 2 (Jockeys)

INTRODUCTION

Recently, some researchers have reported that athletes who waste, such as wrestlers, can experience difficulties associated with their weight loss, including physical, psychological, and social problems. Little is known yet about the weight-management experiences of jockeys.

I am interested in understanding your personal experiences of, and opinions about, weight management as a professional jockey: What you do to manage your weight now, or have done in the past, & how you think it affects you in the short & long term. Please feel free to add anything you believe is important for me to know.

1. RIDING HISTORY/INDUSTRY BACKGROUND

How did you 1st get involved in racing? How old were you?

What factors influenced your decision to become a jockey?

What were your early experiences in racing like?

How did you find the transition from apprentice to senior rider?

2. WEIGHT AND WEIGHT-MANAGEMENT PRACTICES

Can you tell me in as much detail as possible what you're doing now to manage your weight?

- What is your normal riding weight? What is the lightest weight you ride at?
How much weight do you usually have to lose?
- How do you manage that weight? What do you do?
- Please describe a typical week of weight management when you're racing.
- Past vs present methods (does your regimen differ to apprentice/beginning of career)
- How happy are you with your current weight loss methods?

What is the most weight you have ever had to lose? How long did it take you? What did you do to lose it?

3. PSYCHOLOGICAL EFFECTS

In your opinion, how does wasting affect you psychologically?

Please describe what it feels like mentally when you are wasting?

Does the way you think and feel change when you're wasting?

- fatigue, cravings, memory, decision-making, mood?

- Do these side-effects affect your riding?
- Have you sought professional advice?
- What long term consequences on your mental state, if any, do you think will come from your wasting?
- Effect on other activities? Eg. Driving
- How do you cope with food/drink cravings?

4. PHYSICAL EFFECTS

Please describe what it feels like physically for you when you are wasting?

What physical side effects have you noticed associated with your wasting? (e.g., cramps, nausea, painful joints, stomach upsets)

- how does it effect your riding/track work?
- have you sought medical advice?
- do you think there'll be any long term consequences from your weight loss activities?
- Does wasting affect other physical activities? (e.g., exercise, chores)

What is it like when you cramp, feel tired, or physically fatigued?

5. ADVICE FOR OTHERS/SUGGESTED INDUSTRY CHANGES

What advice would you give to young jockeys about managing their weight?

What would you tell a jockey with weight problems?

What can the industry do to make weight management easier for jockeys?

CONCLUDING QUESTIONS

Are you happy/satisfied being a jockey?

What do you see yourself doing after you finish riding?

If there was one key message you would like other people to understand about your weight management, what would it be?

Is there anything you could tell me that I haven't covered?

THANKYOU

INTERVIEW GUIDE - Study 2 (Industry Personnel)**INTRODUCTION**

Recently, some researchers have reported that athletes who waste, such as wrestlers, can experience difficulties associated with their weight loss, including physical, psychological, and social problems. Little is known yet about the weight-management experiences of jockeys.

I am interested in understanding your personal experiences of, and opinions about, weight management for professional jockey: What they do to manage their weights now, or have done in the past, & how you think it affects them in the short & long term. Please feel free to add anything you believe is important for me to know.

1. RIDING HISTORY/INDUSTRY BACKGROUND

How did you 1st get involved in racing?

Please describe your current role?

What were your early experiences in racing like?

2. WEIGHT AND WEIGHT-MANAGEMENT PRACTICES

Can you tell me in as much detail as possible what jockeys do to manage their weights?

- How well do you think most jockeys manage their weights?
- Past vs present methods (do their regimens differ to apprentice/beginning of career, past vs current jockeys)
- How effective are?

3. PSYCHOLOGICAL EFFECTS

In your opinion, how does wasting affect jockeys psychologically?

- fatigue, cravings, concentration, memory, decision-making, mood?
 - Do these side-effects affect their riding ability?
 - What long term consequences on mental state, if any, do you think will come from wasting?
 - Does wasting affect other activities? e.g., Driving
 - How do jockeys cope with food/drink cravings?

4. PHYSICAL EFFECTS

In your opinion, how does wasting affect jockeys psychologically?

What physical side effects have you noticed associated with wasting? (e.g., fatigue, cramps, nausea, painful joints, stomach upsets)

- how does it effect riding/track work?
- do you think there'll be any long term consequences from weight loss activities?
- Does wasting affect other physical activities? (e.g., exercise, chores)

5. ADVICE FOR OTHERS/SUGGESTED INDUSTRY CHANGES

What advice would you give to young jockeys about managing their weight?

What would you tell a jockey with weight problems?

What can the industry do to make weight management easier for jockeys?

CONCLUDING QUESTIONS

Are you happy/satisfied working in the racing industry?

If there was one key message you would like other people to understand about jockey weight management, what would it be?

Is there anything you cantell me that I haven't covered?

THANKYOU

APPENDIX C

INFORMATION FOR PARTICIPANTS IN STUDY 3

INVITATION TO PARTICIPATE IN A RESEARCH STUDY (Study 3)
(Jockey/Apprentice)



"The Psychological Effects of Wasting in Jockeys"

During the past decade, researchers have reported that athletes who must lose weight consistently and rapidly can experience difficulties associated with their weight loss, including physical, emotional, psychological, and social problems. The existing research on rapid short-term weight loss (wasting) has focused on athletes from sports with weight divisions, such as Olympic wrestling, rowing and boxing, while surprisingly little research has investigated the experiences of jockeys. This is despite the fact that horseracing has arguably the most demanding weight requirements of all sports.

The physical complications associated with wasting are numerous and have been well documented. Unfortunately, very little is known about the psychological effects of wasting. A recent study of US wrestlers found that athletes who wasted reported increases in tension, anger and depression, and problems with short-term memory and decision-making. Other studies have indicated that an athlete's ability to concentrate may also be adversely affected by wasting, and that athletes who adopt unhealthy weight restrictive practices can develop negative attitudes towards eating and their own body.

We wish to invite you, as a registered Victorian jockey or Apprentice, to participate in our investigation of the effects of weight restriction and wasting on jockeys. The key focus of this study is to explore the current weight management experiences of jockeys, and to gather information about the effects of these practices on mental function and behaviour. Your participation will involve completing a series of between four and six 20-minute computer based tests measuring reaction times, attention and short-term memory, conducted over a 2 week period. You are also invited to participate in a one-on-one interview about your weight management experiences. The information you provide will be invaluable in assisting us to develop recommendations for safe weight management, thereby improving the health and well being of all jockeys. It is hoped that the study will help improve both the quality and length of jockeys' careers.

Please note that participation is voluntary and you are free to discontinue at any time, without explanation. No information gained during the study will enable you to be identified to anyone other than the research team, and no personally identifying information will be published or communicated to anyone outside the team. Your responses will be kept confidential and stored securely in the office of Dr Harriet Speed at Victoria University.

If you are willing to participate, please read and complete the attached consent form and return it by mail to Victoria University in the reply-paid envelope. Please note that the return of the form to the researchers indicates your consent to participate in the study.

We thank you in advance for assisting us in our research. Should you have any questions about the research project, please do not hesitate to contact the researchers at the addresses below. If at any stage you have concerns about the conduct of the research project, please contact the University Human Research Ethics Committee, Victoria University, P.O. Box 14428 MCMC, Melbourne, 8001 (Ph 9688 4710).

Dr Harriet Speed
Principal Investigator
Victoria University
ph: (03) 9919 5412

Matt McGregor
PhD Student
Victoria University
ph: 0402 580 449

Victoria University
 School of Human Movement, Recreation and Performance



Statement of Informed Consent (Study 3)

I, _____ of _____

certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in a research on the psychological effects of 'Wasting' in Jockeys being conducted at Victoria University by Dr. Harriet Speed, and Matt McGregor. I have read the plain language statement that outlines the research and understand that the purpose of the research is to gain a better understanding of the weight management experiences of jockeys.

Procedures

Participants will be asked to take part in race-day (before and after racing) and non race-day testing sessions that will take approximately 40 minutes. Testing sessions will involve completing a questionnaire and a computer test. The questionnaire will ask for information on your weight management methods, and any psychological or physical problems you may experience while you are wasting. The computer test will assess your cognitive functioning on things such as reaction time. Participants will be invited to take part in an interview that will take approximately 1 hour. The interviewer will ask for information on about your weight-management methods, and any psychological or cognitive problems you may experience while you are wasting. Participation in the research is completely voluntary and participants are free to withdraw at any time without giving an explanation. If you have any questions please do not hesitate to ask the interviewer or Dr. Harriet Speed on (03) 9919 5412.

I voluntarily agree to provide information on jockey's weight management experiences in the knowledge that all information will be treated in a confidential manner and potentially identifying responses will not be released to any person or organisations. I am aware that I may withdraw from the research project at any time and that any information that's been collected will not be used.

Signed: _____ Date: _____

Witness other than the researcher:

Signed: _____ Date: _____

Any queries about your participation in this project may be directed to the Principle Research, Dr. Harriet Speed (phone: (03) 9689 8637). If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University, PO Box 14428 MC, Melbourne 8001 (Phone: (03) 9688 4710).

JOCKEY RECORD SHEET

Name: _____

Date: _____ Time: _____

IN THE LAST 12 HOURS.....

1. How much time have you spent exercising?			
a. Track-work: _____		b. Racing: _____ # of races	
c. Other exercise: _____ hrs _____ (specify activity)			
2. How many hours sleep have you had? _____			
3. If you smoke, how many cigarettes have you smoked? _____			
4. How many sweating sessions have you had? _____			
(circle) Sauna Bath Car Exercise/sweat gear			
Duration of each: _____			
5. How long has it been since you last...			
DRANK _____ (hrs/mins) What/how much? _____			
ATE _____ (hrs/mins) What/how much? _____			
6. Have you experienced any of the following (please tick)?			
a.	Muscle cramps	Yes <input type="checkbox"/>	No <input type="checkbox"/>
b.	Tiredness	Yes <input type="checkbox"/>	No <input type="checkbox"/>
c.	Weakness	Yes <input type="checkbox"/>	No <input type="checkbox"/>
d.	Difficulty sleeping	Yes <input type="checkbox"/>	No <input type="checkbox"/>
e.	Tunnel vision	Yes <input type="checkbox"/>	No <input type="checkbox"/>
f.	Blurred vision	Yes <input type="checkbox"/>	No <input type="checkbox"/>
g.	Other visual disturbance (e.g. white light/stars)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
h.	Dizzy/light-headed	Yes <input type="checkbox"/>	No <input type="checkbox"/>
i.	Loss of consciousness	Yes <input type="checkbox"/>	No <input type="checkbox"/>
j.	Confusion	Yes <input type="checkbox"/>	No <input type="checkbox"/>
k.	Headache	Yes <input type="checkbox"/>	No <input type="checkbox"/>
l.	Nausea	Yes <input type="checkbox"/>	No <input type="checkbox"/>
m.	Vomiting	Yes <input type="checkbox"/>	No <input type="checkbox"/>
n.	Diarrhoea	Yes <input type="checkbox"/>	No <input type="checkbox"/>
o.	Intestinal (stomach) cramps	Yes <input type="checkbox"/>	No <input type="checkbox"/>
p.	Chills	Yes <input type="checkbox"/>	No <input type="checkbox"/>
q.	Aggressive	Yes <input type="checkbox"/>	No <input type="checkbox"/>
r.	Irritable	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7. Current Weight? _____			
8. How much weight have you lost for this race meet? _____			
9. Over what period of time have you lost this weight? _____			

INTERVIEW GUIDE - Study 3

INTRODUCTION

Recently, some researchers have reported that athletes who waste, such as wrestlers, can experience difficulties associated with their weight loss, including physical, psychological, and social problems. Little is known yet about the weight-management experiences of jockeys.

I am interested in understanding your personal experiences of, and opinions about, weight management as a professional jockey. What you do to manage your weight now, or have done in the past, & how you think it affects you in the short & long term. Please feel free to add anything you believe is important for me to know.

1. RIDING HISTORY/INDUSTRY BACKGROUND

How did you 1st get involved in racing? How old were you?

What factors influenced your decision to become a jockey?

What were your early experiences in racing like?

How did you find the transition from apprentice to senior rider?

2. WEIGHT AND WEIGHT-MANAGEMENT PRACTICES

Can you tell me in as much detail as possible what you're doing now to manage your weight?

- What is your normal riding weight? What is the lightest weight you ride at?
How much weight do you usually have to lose?
- How do you manage that weight? What do you do?
- Please describe a typical week of weight management when you're racing.
- Past vs present methods (does your regimen differ to apprentice/beginning of career)
- How happy are you with your current weight loss methods?

What is the most weight you have ever had to lose? How long did it take you? What did you do to lose it?

3. PSYCHOLOGICAL EFFECTS

In your opinion, how does wasting affect you psychologically?

Please describe what it feels like mentally when you are wasting?

Does the way you think and feel change when you're wasting?

- fatigue, cravings, concentration, memory, decision-making, mood?
 - Do these side-effects affect your riding?
 - Have you sought professional advice?
 - What long term consequences on your mental state, if any, do you think will come from your wasting?
 - effect on other activities? Eg. Driving
 - How do you cope with food/drink cravings?

4. PHYSICAL EFFECTS

Please describe what it feels like physically for you when you are wasting?

What physical side effects have you noticed associated with your wasting? (e.g., fatigue, cramps, nausea, painful joints, stomach upsets)

- how does it effect your riding/track work?
- have you sought medical advice?
- do you think there'll be any long term consequences from your weight loss activities?
- Does wasting affect other physical activities? (e.g., exercise, chores)

What is it like when you cramp, feel tired, or physically fatigued?

5. ADVICE FOR OTHERS/SUGGESTED INDUSTRY CHANGES

What advice would you give to young jockeys about managing their weight?

What would you tell a jockey with weight problems?

What can the industry do to make weight management easier for jockeys?

CONCLUDING QUESTIONS

Are you happy/satisfied being a jockey?

What do you see yourself doing after you finish riding?

If there was one key message you would like other people to understand about your weight management, what would it be?

Is there anything you could tell me that I haven't covered?

THANKYOU