

**Pain, depression, anxiety and disability in back pain:
Do people seeking osteopathic treatment fit known profiles?**

Master of Health Science (Osteopathy)

Caroline Delaney

Student number. 3520462

13th December, 2004

Supervisors

Melanie Cameron B.App.Sc (Ost), M.H.Sc. (Research).

Edwina Ryan B.Sc., B.Osteo.Sc., B.App.Sc (Clin Sc.), Grad.Dip.Ex.Rehab.

ABSTRACT

Background and Objectives: Low back pain (LBP) is a common and challenging problems in primary health care. Many people consult osteopaths regarding LBP. The biopsychosocial model is significant in LBP research, highlighting the effects of psychological factors on the development and outcomes of LBP episodes. However to date there have been no studies carried out in osteopathic clinics to investigate these relationships.

Aims: This study aims to establish whether there is an association between length of LBP episode, acute or chronic, the type of pain experience, depression, anxiety and disability in people presenting to a student osteopathic clinic. The associations between dimensions of pain, disability levels, depression and anxiety were also examined.

Procedure: The study took place at the Victoria University Osteopathic Medicine Clinic. Participants were volunteers who presented with acute (n=20) or chronic (n=20) LBP and had received no treatment in the prior 6 months. They completed the Short-form McGill Pain Questionnaire (SF-MPQ), the Hospital Anxiety and Depression Scale (HADS) and the Roland and Morris Disability Questionnaire (RM-24) prior to commencing osteopathic treatment. Differences between the acute and chronic groups were examined via independent-samples *t*-tests. Relationships between dimensions of pain, psychological measures, and disability levels were examined using Pearson correlations.

Results: No significant differences were found between the acute and chronic low back pain groups for the pain (APRI, SPRI, TPI, PPI and VAS), anxiety, depression and disability variables. Correlations were found between all pain dimensions and

disability with all pain dimensions ($r(\text{SPRI}) = 0.492$; $r(\text{APRI}) = 0.569$; $r(\text{TPI}) = 0.568$; $r(\text{PPI}) = 0.595$; $r(\text{VAS}) = 0.511$). Anxiety and depression were strongly correlated ($r = 0.541$) and anxiety and levels of affective pain (APRI) ($r = 0.36$) were also related. Disability was not correlated with anxiety ($r = 0.024$) or depression ($r = 0.1$) and pain dimensions were not correlated with anxiety or depression.

Conclusion: The results suggest that the population attending an osteopathic clinic with LBP do not fit the biopsychosocial model prevalent in current literature. More research is required in the future to confirm these findings.

Keywords: osteopathy, low back pain – acute and chronic, depression, anxiety, disability

(c) 2004
Victoria University

INTRODUCTION

Low back pain (LBP) is one of the most common and challenging problems in primary health care. 79.2% of the Australian population have LBP at some time in their lives, and 2.7% of these people seek care from osteopaths.¹ Low back pain is associated with enormous costs, particularly in the westernized world. In particular, chronic LBP is a major cause of medical expenses, work absenteeism and disability.² Our study investigated which factors may vary between people with acute and chronic low back pain.

Pain perception and responses are extremely subjective and vary widely between individuals, depending upon many different physical and psychological factors. A sound scientific explanation of the aetiology of spine pain, particularly its development into a chronic state, has been elusive. One belief is that pain has many facets and thus cannot be easily explained by simple models.³ Currently a biopsychosocial model is prevalent in research, with psychological factors closely associated with both chronic,^{3,4} and with acute and sub acute pain.^{5,6}

In a recent study of 3000 randomly selected Australian adults, Walker et al.⁷ found that more than 10% of people had a high-disability LBP problem in the 6 months prior to the survey. This high point prevalence demonstrates the importance of understanding disability arising from LBP. It is conventionally accepted that pain produces or motivates disability. However, much evidence indicates that pain is not related to functional capacity in a linear fashion.⁸ In fact people with similar intensities of pain may function at very different levels. For example, some individuals who experience mild pain exhibit significant disability, whereas some that

have high pain demonstrate low levels of disability. This inconsistency means that pain cannot be considered to have a strong correlation with disability.

There is much evidence that psychological profiles are important in the natural history of low back pain.^{3, 9} Various scores produced from psychological questionnaires correlate highly with work absence, claims for financial compensation, and treatment response.^{10, 11, 12, 13} Some questionnaires are useful for predicting the cases of acute back pain that are likely to progress to chronic pain and disability.^{14, 15, 16, 17, 18} Recognition that these are a part of human behaviour and have a strong psychological component is an important part of the recent advance in understanding the aetiology and progression of low back pain.

A review study by Pincus et al.¹⁹ produced strong evidence for the role of distress and depression in acute and sub acute stages of LBP and in the development of long-term disability. However, it has been established that people with chronic pain score higher on depression scales than people with acute pain.²⁰ Most depression scales include somatic items, such as fatigue, weight, and sleep problems, that may muddy the reporting of depression in people with pain.¹⁹ In particular, the impact of pain can cause a heavy endorsement of these somatic items, inflating the overall scores of depression gained on these scales.¹⁹

Persistent LBP is not only determined by clinical factors at the time of onset but by the pre-morbid psychological state. LBP sufferers who show symptoms of depression/distress represent a group in which effective interventions may result in substantially reduced morbidity and healthcare costs.²¹ Disability, including loss of work and reduction in activity, is commonly influenced by a range of psychosocial factors, such as attitudes and beliefs held by the patient, behaviour, emotions, such as

fear and low mood.²² Psychosocial factors appear to be important markers for the risk of developing long-term disability, making it vital to identify at-risk clients early.^{6, 14}

However, the strong associations between psychometric scores and various aspects of behaviour related to back pain do not prove that "abnormal" psychosocial characteristics precede or cause back problems.²³ Further evidence that the psychological condition of a patient prior to the development of symptoms of chronic disability may contribute to its evolution, was explored in a previous study by Linton & Andersson.⁹ In this study, non-symptomatic participants who received cognitive behaviour therapy had significantly fewer days off work and consumed smaller amounts of health care over a 12-month period than a group who received the usual medical treatment. They concluded that early psychological oriented interventions might be helpful in preventing the development of chronic disability. It could actually be argued that depression and antisocial attitudes merely reflect normal human reactions to vague diagnosis, ineffectual treatment, and inconsiderate employers. Further research is required to determine the interaction between psychological characteristics and back pain.

The report of injuries and pain, and the seeking of health care, is usually influenced by a complex interaction of medical, work-related beliefs and behaviour, and other psychosocial factors.^{24, 25} Primary health care practitioners see the majority of acute LBP cases, of which only a very small minority require referral to specialists.²⁴ For this reason, primary health care professionals are in a unique position to identify potential problems in their clients at an early stage, allowing them to modify their management strategies to gain optimal outcomes. Further

understanding, generally, in the manual therapy field, and specifically, in the holistic osteopathic field can only be of benefit to practitioners and patients alike.

As osteopathy is a holistic therapy it should explore the interaction of mood state and the benefits of addressing the patient's psychological state as an adjunct to regular physical therapy. Previous research of this type has been carried out in populations seeking physiotherapy,²⁶ chiropractic^{27, 28} and other forms of manual health care.^{29, 30} To date there have been no studies on this field carried out in osteopathic clinics. In this study we aimed to make a start on filling this gap, generate information that is specific to identifying psychological profiles for LBP patients presenting at a student osteopathic clinic, and provide some data for cross-checking against some of the findings from the research reviewed above. Confirmation of the connection between psychological state and LBP may have a two-fold benefit for the osteopathic profession, firstly it may allow the use of strategies that have been developed in current research to be utilised within the osteopathic field, and secondly it may stimulate the development of specific osteopathic treatment modalities in the treatment of LBP patients.

Specifically, we investigated the extent to which people with acute versus chronic low back pain differ in dimensions of pain, levels of disability and the occurrence of symptoms of depression and anxiety. We also explored the association between dimensions of pain, disability levels, depression and anxiety.

METHODS

Aims

The aims in this study were: a) to identify whether people with acute versus chronic low back pain differ in dimensions of pain, b) to identify whether people with acute versus chronic low back pain differ in their levels of disability, c) to identify whether people with acute versus chronic low back pain differ in the occurrence of symptoms of depression and anxiety, and d) to investigate the association between dimensions of pain, disability levels, depression and anxiety.

Participants

Forty adult volunteers who had not received treatment in the previous 6 months were recruited from the Victoria University Osteopathic Medicine Clinic for this study. After being informed of the nature and purpose of this study written consent was obtained from all participants. All volunteers were within the age range of 18-60 years (average age 27.3 years) and presented with self-reported, uncomplicated LBP. Participants (n=20, male 9, female 11) who presented with LBP of less than 2 weeks duration formed the acute LBP group. Participants (n=20, male 8, female 12) who presented with LBP of 6 months or longer were grouped together as the chronic LBP group. The Human Research Ethics Committee of Victoria University approved the study. Volunteers were excluded from this study if they were experiencing lower limb pain, numbness, tingling or weakness linked to their LBP, or if they had a previous diagnosis of clinical depression.

Procedure

Upon first presentation to the Victoria University Osteopathic Medicine Clinic participants completed the Short-form McGill Pain Questionnaire (SF-MPQ), the

Hospital Anxiety and Depression Scale (HADS) and the Roland and Morris Disability Questionnaire (RM-24). Questionnaires were completed prior to commencing osteopathic treatment.

Measures

Three questionnaires, the Short-form McGill Pain Questionnaire (SFMPQ), the Hospital Anxiety and Depression Scale (HADS) and the Roland and Morris Disability Questionnaire (RM-24) are commonly used in the primary care setting. They were chosen for their relevance to the manual therapy field.

The short-form McGill Pain Questionnaire (SF-MPQ) comprises 15 pain descriptors, which represent the sensory, and the affective dimension of the pain experience. It also includes a visual analogue scale (VAS) and ordinal present pain index (PPI).³¹ The SF-MPQ was developed from the standard McGill Pain Questionnaire. Each pain descriptor is ranked on a four-point intensity scale (0=none to 3=severe). The three items of the SF-MPQ return five scores. A sensory pain rating index (SPRI), an affective pain rating index (APRI), and a total pain index (TPI) are returned from the word list, and the VAS and PPI each return single scores.

The Hospital Anxiety and Depression Scale (HADS) is a reliable tool that measures symptoms of anxiety and depression.³² It is a 14-item scale that establishes the presence and severity of symptoms of anxiety and depression over the previous week. Each item was scored from 0 to 3. A total score of greater than ten is indicative of clinically significant levels of depression and/or anxiety. The HADS has been validated in many clinical and non-clinical populations. It is favoured in clinical populations because the items avoid physical symptoms of psychological distress that

may overlap with medical illnesses. This makes it a suitable instrument to assess psychological state in individuals with co-morbid illnesses, such as LBP.³⁰

The Roland and Morris Disability Questionnaire (RM-24) is a validated scale for measuring disability as it relates to LBP.³³ The scale consists of 24 yes/no statements that represent limitations in different activities of daily living relevant to low back pain. Each statement ticked is worth 1 point, with the scores ranging from 0 (no disability) to 24 (extremely severe disability). It has a scale width appropriate for primary care settings (eg; osteopathic practice) where clients are ambulatory and low levels of disability are expected.

Statistical methods

Raw data was collated using Microsoft Excel and all data were analysed using the statistical package SPSS Version 11. Differences between the acute and chronic groups were examined via independent-samples *t*-tests. A 2-tailed *t*-test was performed to test for non-directional differences between the groups. Relationships between dimensions of pain, psychological measures, and disability levels were examined using Pearson correlations.

RESULTS

As seen in Table 1, the acute LBP population showed normal distribution of results for all pain dimensions measured, with all but VAS producing a trend towards the lower end of mild pain intensity. Anxiety measures were generally within the non-anxious range, with an average of 5.6, with only 10% scoring within the anxious range (>11). None of the acute LBP scored levels of depression that fell within the depressed range. Similarly, most participants recorded low levels of disability, with only 15% registering a disability scoring between 12.5-17.5 out of a possible maximal disability (24).

The chronic LBP group also produced normal distributions for all pain dimensions and showed an average pain intensity that was largely above that recorded by acute sample (see Table 1). Measurements of anxiety levels produced only three participants who recorded clinically significant levels of anxiety (>11). Levels of depression were found to be insignificant in the chronic group, with only one patient scoring at a depressed level (12). Similarly, levels of disability were all markedly lower than the acute group, with a maximum score of 10 and an average of 3.8.

Statistical comparison using a two-tailed independent measures *t*-test showed no significant difference between the acute and chronic low back pain groups in the pain (APRI, SPRI, TPI, PPI and VAS), anxiety, and depression and disability variables. These results are outlined in Table 1.

Table 1. Mean, standard deviation and significance scores (independent samples *t*-test).

characteristic	acute	chronic	significance (2-tailed)
age [mean (SD)] (yr)	25.45 (6.06)	29.15 (12.55)	
variable [mean (SD)]			
SPRI	8.40 (5.99)	9.55 (4.97)	0.513
APRI	1.55 (2.78)	1.60 (1.81)	0.947
TPI	9.95 (8.02)	11.15 (6.09)	0.597
PPI	1.50 (1.15)	1.25 (0.64)	0.4
VAS	3.54 (1.74)	2.54 (1.71)	0.075
anxiety	5.55 (3.69)	7.25 (4.29)	0.187
depression	2.65 (1.93)	3.15 (3.28)	0.56
disability	5.50 (5.25)	3.75 (2.86)	0.201

SPRI = sensory pain rating index; APRI = affective pain rating index; TPI = total pain index; PPI = present pain index; VAS = visual analogue scale

Table 2. Pearson correlation (r) of total population (N=40) for dimensions of pain, psychological measures and disability level:

	SPRI	APRI	TPI	PPI	VAS	Anxiety	Depression	Disability
SPRI	1							
APRI	0.574**	1						
TPI	0.963**	0.773**	1					
PPI	0.251	0.435**	0.337*	1				
VAS	0.360*	0.456**	0.429**	0.599**	1			
Anxiety	0.064	0.360*	0.168	-0.027	0.051	1		
Depression	0.039	0.097	0.062	-0.026	-0.03	0.541**	1	
Disability	0.492**	0.569**	0.568**	0.595**	0.511**	0.024	0.1	1
**	Correlation is significant at the 0.01 level (2-tailed).							
*	Correlation is significant at the 0.05 level (2-tailed).							

SPRI = sensory pain rating index; APRI = affective pain rating index; TPI = total pain index;

PPI = present pain intensity; VAS = visual analogue scale.

Exploratory analysis of pain dimension, mood states and disability levels were then performed (see Table 2). It can be seen that the pain dimensions are all correlated with each other as expected. Disability was found to correlate highly with all pain dimensions, showing a strong relationship between pain dimensions and disability in the population measured. The measurements of psychological distress, namely anxiety and depression are strongly correlated with each other. A significant relationship between symptoms of anxiety and levels of affective pain (APRI) were found. An interesting finding was that disability was not correlated with measurements of mood (anxiety and depression). Another significant finding is that pain was not correlated with anxiety or depression.

Further analysis was performed to determine how much variance was shared between pain dimensions, mood states and disability. This was achieved by calculating the coefficient of determination (r^2) as seen in Table 3. The values of pain dimensions contributed between 11% and 93% in their relationships with each other. The highest level was produced by the relationship between sensory pain (SPRI) and total pain (TPI), as one would expect when the SPRI contributed a possible 11 out of the highest possible TPI (15). A weak relationship exists between anxiety and affective pain (APRI), with only 13% of variance shared. Disability and pain shared a variance of between 24% and 35%, representing a moderately strong relationship. Anxiety and depression shared a variance of 29%.

Table 3. Coefficient of determination (r^2) of total population (N=40) for dimensions of pain, psychological measures and disability level

	SPRI	APRI	TPI	PPI	VAS	Anxiety	Depression	Disability
SPRI	0	0	0	0	0	0	0	0
APRI	0.329	0	0	0	0	0	0	0
TPI	0.927	0.598	0	0	0	0	0	0
PPI	0	0.189	0.114	0	0	0	0	0
VAS	0.13	0.208	0.184	0.359	0	0	0	0
Anxiety	0	0.13	0	0	0	0	0	0
Depression	0	0	0	0	0	0.293	0	0
Disability	0.242	0.324	0.327	0.354	0.261	0	0	0

SPRI = sensory pain rating index; APRI = affective pain rating index; TPI = total pain index;

PPI = present pain intensity; VAS = visual analogue scale

DISCUSSION

Psychological profiles are known to differ between the acute and chronic LBP states. People with chronic back pain usually score higher on depression scales than their acute LBP counterparts.²⁰ Functional capacity is not linearly related to the report of pain.⁸ Axis I psychopathologies (DSM4-TM), such as anxiety and depression, are evident in people with acute, subacute, and chronic LBP.¹⁹ The acute and chronic LBP samples tested in our study showed no differences in their pain dimensions, mood states, or disability levels. Anxiety and depression were found to have only very small correlation with disability levels or pain dimensions, contrary to our expectations based on the available literature. Some less expected associations between variables were found in the current research, including, a strong relationship between pain and disability, and a weak relationship between anxiety and levels of affective pain. The mood states (anxiety and depression) were predictably correlated with each other in both samples.

One explanation of the insignificant levels of anxiety and depression in this study is that clients at the osteopathic teaching clinic self select when they attend. Put bluntly, people with LBP they perceive to be severe or dangerous may choose to seek care from “qualified professionals” rather than students. Care seeking decisions are motivated by medical beliefs and a variety of other psychosocial factors such as health locus of control^{24, 25} as well as market forces such as cost of care, and practical considerations like travel and parking arrangements. Once a person makes a decision to self-refer, they generally become proactive to seek a remedy. The morose nature of severely depressed people means that they may not seek care at all, particularly at a

student osteopathic clinic. Similarly, anxious people are unlikely to seek care from students.

Health locus of control (HLC) is a construct widely used in health research. It refers to an individual's belief in his or her control over illness.³⁴ In general, lifestyle based outcomes are more positive in people who strongly believe in their internal control over illness,³⁵ but practitioner-driven interventions may be most powerful in people who believe strongly in the control of healthcare professionals over disease (i.e., powerful-others locus of control).³⁶ Although HLC was not specifically measured in this study, the psychological domains of anxiety and depression may be evidence of participants' health beliefs as well as responses or antecedents to the condition of LBP. We are unsure whether people with strong powerful-others HLC are likely to seek care for their LBP from student osteopaths. Osteopathy is somewhat known for being a holistic therapy which uses lifestyle-type interventions (e.g., nutrition, exercise, and other "wellness" interventions),³⁷ and thus may also be an appealing therapy option for people with strong internal health loci of control. It is probable that the participants in this study displayed a range of health beliefs, some of which influenced their decision to seek osteopathic care. Follow-up research could include the investigation of HLC to investigate its influence on people who attend a student osteopathic clinic.

Although counter-intuitive, some epidemiological studies have shown that disc degeneration and other causes of LBP may develop because of the personal characteristics of a person, rather than any exposure to physical activities.^{25, 38} These characteristics may be genetic or acquired from a person's life experience, and are intrinsically related to the psychological make-up of the individual. Many studies

have recognised the effects of psychosocial factors (such as depressive tendencies) on all aspects of LBP behaviour, including reporting and response to treatment.^{10, 12, 25, 39,}

40

LBP is a condition in which pain is episodic, thus the level of pain at any single point in time doesn't indicate where the patients are in relation to their characteristic pain level. In health care, patients with pain tend to seek care when there is a flare-up in the level of pain or when their level of pain is no longer tolerable.⁴¹ Generally, people seek treatment when they are at their worst. Over time it is likely their presenting symptoms will improve, treatment or no treatment, because all extreme states seek equilibria. This phenomenon is known as 'regression to the mean'.⁴² In this study, we assessed patients who had not received treatment for at least 6 months, and their care seeking was likely to have been driven by pain. Depression and anxiety may have been somewhat overshadowed by the more predominant feature of pain. This hypothesis could reasonably be explored in a future controlled clinical trial to plot the psychological profiles of people with LBP over a course of treatment or no treatment.

There is some question as to why the patients had not received treatment for 6 months, particularly the chronic LBP group. This lack of treatment seeking may have been driven by pain, however it may be due to individual personality differences or simply due to their financial situation (i.e. patients attending a student clinic may be driven by the low costs involved, as they probably cannot afford to pay to see a qualified practitioner). Further examination of this may be beneficial in future research.

Some studies of people with LBP have used psychological scales that include somatic items that may inflate the overall scores. It is possible that the current study did not find significant levels of anxiety and depression because the scale used (HADS) removed the somatic items that may inflate the overall scores. Recent research in the LBP population have suggested that psychological instruments that do not include somatic items should be utilised.¹⁹

This study describes a subset of people that attend a student osteopathic clinic, in particular people who attend a student osteopathic clinic. The results may have a contribution to treatment within this clinic, and in osteopathic clinics treating an Australian population. For instance, the mild, but positive relationship between affective pain and anxiety will be useful in clients who present with pain symptoms described as ‘tiring/exhausting’, ‘sickening’ or ‘punishing’. These symptoms, if reported, can indicate an anxious person, which in turn should be considered and managed when treating.

The findings of this study suggest the population attending an Australian student osteopathic clinic with LBP do not fit the biopsychosocial model prevalent in current literature. More research is required to confirm these findings.

CONCLUSION

The study found that a sample of LBP population attending a student osteopathic clinic in Australia show no differences in levels of pain, depression, anxiety and disability between those presenting with acute or chronic pain. Some of the correlations indicated by previous research were not found, with no relationship apparent between depression levels and severity of pain. However, links were found between disability and pain dimensions and between levels of anxiety and the presence of affective pain. This is potentially useful information for student practitioners who treat LBP clients in teaching clinic settings, however, follow-up research, involving a larger number of participants, is required to validate these preliminary findings and determine whether they are translatable to non-student osteopathic clinics and similar health care settings.

(c) 2004
Victoria University

Acknowledgments

The authors would like to acknowledge Luke and Sandy Delaney for their constructive comments during the preparation of this manuscript.

I would also like to acknowledge the support my family, particularly my parents, have provided during the completion of my studies.

(c) 2004
Victoria University

REFERENCES

1. Walker, B.F. (8-5-2003: Written personal communication) Low Back Pain in Australian Adults (research data), James Cook University, Paper under review.
2. van Tulder MW, Ostelo R, Vlaeyen JWS, Linton SJ, Morley SJ, Assendelft WJJ. Behavioural treatment for chronic low back pain - a systematic review within the framework of the *Cochrane Back Review Group*. 2000; 26 (3): 270-281.
3. Waddell G. Biopsychosocial analysis of low back pain. *Baillieres Clinical Rheumatology*. 1992; 6: 523-557.
4. Gatchel RJ, Turk DC Ed. *Psychological Approaches to Pain Management: A Practitioner's Handbook*, Volume 1. New York: Guildford Press; 1996.
5. Croft PR, Rigby AS. Socioeconomic influences on back problems in the community in Britain. *Journal of Epidemiological Community Health*. 1994; 48: 166-170.
6. Linton SJ, Hallden K. Can we screen for problematic back pain? A screening questionnaire for predicting outcome in acute and subacute back pain. *Clinical Journal of Pain*. 1998; 14: 209-215.
7. Walker BF, Muller R, Grant WD. Low back pain in Australian adults, prevalence and associated disability. *Journal of Manipulative and Physiological Therapeutics*. 2004; 27 (4): 238-244.
8. Lackner JM, Carosella AM. The relative influence of perceived pain control, anxiety, and functional self efficacy on spinal function among patients with chronic low back pain. *Spine*. 1999; 24 (21): 2254-2261.

9. Linton SJ, Andersson T. Can Chronic Disability be Prevented? A randomized trial of a cognitive-behaviour intervention and two forms of information for patients with spinal pain. *Spine*. 2000; 25 (21): 2825-2831.
10. Greenough CG, Fraser RD. The effects of compensation on recovery from low-back injury. *Spine*. 1989; 14: 947-955.
11. Greenough CG, Fraser RD. Comparison of eight psychometric instruments in unselected patients with back pain. *Spine*. 1991; 16: 1068-1074.
12. Coste J, Delecoeuillerie G, Cohen de Lara A, Le Parc JM, Paolaggi JB. Clinical course and prognostic factors in acute low back pain: an inception cohort study in primary care practice. *British Medical Journal*. 1994; 308: 577-580.
13. Williams MM, Grant RN, Main CJ. The distress and risk assessment method (DRAM) as a predictor of outcome in chronically disabled workers attending a physical rehabilitation programme, Presented to the *International Society for the Study of the Lumbar Spine*, Helsinki, Finland, June 18-21, 1995.
14. Main CJ, Wood PLR, Hollis S, Spanswick CC, Waddell G. The distress and risk assessment method: A simple patient classification to identify distress and evaluate the risk of poor outcome. *Spine*. 1992 17: 42-52.
15. Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. *Pain*. 1993; 52: 157-168.
16. Hasenbring M, Marienfeld G, Kuhlendahl D, Soyka D. Risk factors of chronicity in lumbar disc patients. *Spine*. 1994; 19: 2759-2765.
17. Burton AK, Tillotson KM, Main CJ, Hollis S. Psychosocial predictors of outcome in acute and subchronic low back trouble. *Spine*. 1995; 20: 722-728.

18. Gatchel RJ, Polatin PB, Mayer TG. The Dominant Role of Psychosocial Risk Factors in the Development of Chronic Low Back Pain Disability. *Spine*. 1995; 20 (24): 2702-2709.
19. Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. *Spine*. 2002; 27: E109-120.
20. Pincus T, Williams A. Models and measurements of depression in chronic pain. *Journal of Psychosomatic Research*. 1999; 47 (3): 211-219.
21. Thomas E, Silman AJ, Croft PR et al. Predicting who develops chronic low back pain in primary care: a prospective study. *British Medical Journal*. 1999; 318: 1662-1667.
22. Kendall NAS. Psychosocial approaches to the prevention of chronic pain: the low back pain paradigm. *Baillieres Clinical Rheumatology: Best Practice and Research*. 1999; 13: 545-554.
23. Magni G. Chronic low-back pain and depression: an epidemiologic survey. *Acta Psychiatrica Scandinavica*. 1984; 70: 614-617.
24. Kendall NAS. Manual therapy rounds – low back pain: treatment and prevention. *Journal of Manual and Manipulative Therapy*. 1997; 5: 134-139.
25. Bigos SJ, Battie MC, Spengler DM. et al. A prospective study of work perceptions and psychosocial factors affecting the report of back injury. *Spine*. 1991; 16: 1-6.
26. Pengel LHM, Refshauge KM, Maher CG. Responsiveness of pain, disability, and physical impairment outcomes in patients with low back pain. *Spine*. 2004; 29 (8): 879-883.

27. Haas M, Jacobs G, Raphael R, Petzing K. Low back pain outcome measurement in chiropractic teaching clinics: responsiveness and applicability of two functional disability questionnaires. *Journal of Manipulative & Physiological Therapeutics*. 1995; 18 (2): 79-87.
28. Haas M, Nyiendo J, Aickin M. One-year trend in pain and disability relief recall in acute and chronic ambulatory low back pain patients. *Pain*. 2002; 95: 83-91.
29. Kovacs FM, Abaira V, Zamora J, Gil del Real MT, Llobera J, Fernandez C et al. Correlation between pain, disability, and quality of life in patients with common low back pain. *Spine* 2004; 29 (2): 206-210.
30. Dickens C, Jayson M, Creed F. Psychological correlates of pain behavior in patients with chronic low back pain. *Psychosomatics*. 2002; 43: 42-48.
31. Melzack R. The short-form McGill Pain Questionnaire. *Pain*. 1987; 30: 191-197.
32. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*. 1983; 67: 361-370.
33. Roland M, Morris R. A study of the natural history of back pain. *Spine*. 1983; 8: 141-150.
34. Härkäpää K, Järvikoski A, Mellin G, Hurri H, Luoma J. Health locus of control beliefs and psychological distress as predictors for treatment outcome in low-back pain patients: results of a 3-month follow-up of a controlled intervention study. *Pain*. 1991; 46: 35-41.
35. Wallston KA, Wallston BS. Health locus of control scales. In: Lefcourt HM. ed. *Research with the Locus of Control Construct*. Volume 1. Assessment Methods. New York. Academic Press; 1981: 189-243.

36. Norman P, Bennett P, Smith C, Murphy S. (1998). Health locus of control and health behaviour. *Journal of Health Psychology*, 3(2), 171-180.
37. www.osteopathic.com.au. website accessed 12-12-2004.
38. Battie MC, Videman T, Gibbons LE, et al. Determinants of lumbar disc degeneration: a study relating lifetime exposures and MRI findings in identical twins. *Spine*. 1995; 16: 1-12.
39. Croft PR, Papageorgiou AC, Ferry S, Thomas E, Jayson MIV, Silman AJ. Psychologic distress and low back pain: Evidence from a prospective study in the general population. *Spine*. 1995; 20: 2731-2737.
40. Mannion AF, Dolan P, Adams MA. Psychological questionnaires: Do "abnormal" scores precede or follow first-time low back pain? *Spine*. 1996; 21: 2603-2611.
41. Von Korff M, Wagner EH, Dworkin SF, Saunders KW. Chronic pain and use of ambulatory health care. *Psychosomatic Medicine*, 1991; 53: 61-79.
42. Whitney CW, Von Korff M. Regression to the mean in treated versus untreated chronic pain. *Pain*. 1992; 50: 281-285.

Appendix A. Information to participants form

INFORMATION TO PARTICIPANTS

We invite you to be a part of a study investigating low back pain and the interaction of psychological factors and disability. This study will involve three short questionnaires (approximately 15 minutes completion time), which will examine factors such as levels of pain, anxiety, depression and ability to perform general daily activities.

This study aims to identify possible issues facing people with low back pain. The outcomes of this study may influence the treatment of people with low back pain in osteopathic practice, highlight potential developmental and maintaining factors of low back pain and form a greater understanding of issues effecting people with low back pain. Further understanding of the interactions between pain, depression and disability may be of benefit to practitioners and patients alike. In the event that any potential issues of concern arise, participants will be provided with written feedback from the investigator. The data from this research may be published. In this case, your confidentiality will be protected by the use of an alphanumerical coding system.

In addition to this information leaflet you will find an informed consent form, which must be filled out in pen and returned to the student investigator. Completion of this form implies consent to participation in this study. The researchers will in NO way identify individual participants. Participation in this study is voluntary.

Procedures:

Three questionnaires regarding low back pain are to be undertaken. They include a pain questionnaire, a psychological questionnaire and a survey about general daily activities. Each volunteer will be screened to ensure that his or her low back pain is uncomplicated.

The following eligibility and exclusion criteria shall be observed:

1. Participants must be between the ages of 18-60 years.
2. Each participant must have uncomplicated low back pain. Any presence of lower limb pain, numbness, tingling or weakness linked to the low back pain will exclude participation.
3. Participants must not have a previous diagnosis of clinical depression.
4. Each participant must sign an informed consent for before participation in this study.

If participants have any queries regarding the study then they can forward any question to the researchers at Victoria University City Flinders Campus on (03) 9248 1111 or to Melainie Cameron (Principal Investigator), on (03) 9248 1149.

<p>Any queries about your participation in this project may be directed to the researcher Melainie Cameron (Principal Investigator) (03) 9248 1149. 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 of Technology, PO Box 14428 MCMC, Melbourne, 8001 (telephone no: 03-9688 4710).</p>

Appendix B. Informed consent form

CERTIFICATION BY PARTICIPANTS

I,
of

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the research entitled:

Pain, depression, anxiety and disability in back pain: Do people seeking osteopathic treatment fit known profiles?

being conducted at Victoria University of Technology by:

Melainie Cameron – B.App.Sc (Ost), M.H.Sc. (Research)
Edwina Ryan – B.Sc., B.Osteo.Sc., B.App.Sc (Clin Sc.), Grad.Dip.Ex.Rehab
Caroline Delaney – BSc (Clinical Sciences), BSc

Participation in this study will involve the completion of three questionnaires regarding low back pain, they include a pain questionnaire, a psychological questionnaire and a survey about general daily activities.

I certify that the objectives of the research, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me and that I freely consent to participation involving the use on me of these procedures.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this research at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the data from this research may be published and that the information I provide will be kept confidential.

Signed: }

Witness other than the researcher: }

Date:

.....}

Any queries about your participation in this project may be directed to the researcher Melainie Cameron (Principal Investigator) (03) 9248 1149. 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 of Technology, PO Box 14428 MCMC, Melbourne, 8001 (telephone no: 03-9688 4710).
--

Appendix C. SF-MPQ, HADS and RM-24 questionnaires

Age = Sex (please tick) - Male
 Female

Please tick the box that best describes the duration of your low back pain:

- <2 weeks
 >6 months

SFMPQ

Please read each word below, and decide whether it describes what your pain feels like. If a word *does not* describe your pain tick none, and go on to the next item. If a word does describe your pain, then rate how strongly you have felt that sensation by ticking the mild, moderate or severe box.

My pain felt like it was

	None	Mild	Moderate	Severe
1. THROBBING	0)	1)	2)	3)
2. SHOOTING	0)	1)	2)	3)
3. STABBING	0)	1)	2)	3)
4. SHARP	0)	1)	2)	3)
5. CRAMPING	0)	1)	2)	3)
6. GNAWING	0)	1)	2)	3)
7. HOT-BURNING	0)	1)	2)	3)
8. ACHING	0)	1)	2)	3)
9. HEAVY	0)	1)	2)	3)
10. TENDER	0)	1)	2)	3)
11. SPLITTING	0)	1)	2)	3)
12. TIRING-EXHAUSTING	0)	1)	2)	3)
13. SICKENING	0)	1)	2)	3)
14. FEARFUL	0)	1)	2)	3)
15. PUNISHING-CRUEL	0)	1)	2)	3)

Please put a mark on the scale to show how bad your *usual* pain has been *these* days.

NO PAIN | _____ | WORST POSSIBLE PAIN

How bad is your pain *now*?

- 0 NO PAIN _____
- 1 MILD _____
- 2 DISCOMFORTING _____
- 3 DISTRESSING _____
- 4 HORRIBLE _____
- 5 EXCRUCIATING _____

Melzack, R. (1987) The short-form McGill Pain Questionnaire, Pain, 30, 191-197.

HADS

Please read each item and tick the reply which comes closest to how you have been feeling in the PAST WEEK.

1. I feel tense or 'wound up':

- Most of the time
- A lot of the time
- From time to time, occasionally
- Not at all

2. I still enjoy the things I used to enjoy:

- Definitely as much
- Not quite as much
- Only a little
- Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen:

- Very definitely and quite badly
- Yes, but not too badly
- A little, but it doesn't worry me
- Not at all

4. I can laugh and see the funny side of things:

- As much as I always could
- Not quite so much now
- Definitely not so much now
- Not at all

5. Worrying thoughts go through my mind:

- A great deal of the time
- A lot of the time
- From time to time but not too often
- Only occasionally

6. I feel cheerful:

- Not at all
- Not often
- Sometimes
- Most of the time

7. I can sit at ease and feel relaxed:

- Definitely
- Usually
- Not often
- Not at all

8. I feel as if I am slowed down:

- Nearly all the time
- Very often
- Sometimes
- Not at all

9. I get a sort of frightened feeling like 'butterflies' in the stomach:

- Not at all
- Occasionally
- Quite often
- Very often

10. I have lost interest in my appearance:

- Definitely
- I don't take so much care as I should
- I may not take quite as much care
- I take just as much care as ever

11. I feel restless as if I have been on the move:

- Very much indeed
- Quite a lot
- Not very much
- Not at all

12. I look forward with enjoyment to things:

- As much as I ever did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

13. I get sudden feelings of panic:

- Very often indeed
- Quite often
- Not very often
- Not at all

14. I can enjoy a good book or radio or TV program:

- Often
- Sometimes
- Not often
- Very seldom

Zigmond, A.S., Snaith, R.P. (1983). The Hospital Anxiety and Depression Scale, Acta psychiatrica scandinavica, 67, 361-370.

RM-24

When your back hurts, you may find it difficult to do some of the things you normally do.

This list contains some sentences that people have used to describe themselves when they have back pain. When you read them, you may find that some stand out because they describe you **today**. As you read the list, think of yourself **today**. When you read a sentence that describes you today, fill the box to the left of the sentence. If the sentence does not describe you, then leave the box blank and go on to the next one. Remember, only mark the sentence if you are sure that it describes you **today**.

- 1. I stay at home most of the time because of my back.
- 2. I change positions frequently to try and get my back comfortable.
- 3. I walk more slowly than usual because of my back.
- 4. Because of my back, I am not doing any of the jobs that I usually do around the house.
- 5. Because of my back, I use a handrail to get upstairs.
- 6. Because of my back, I lie down to rest more often.
- 7. Because of my back, I have to hold on to something to get out of an easy chair.
- 8. Because of my back, I try to get other people to do things for me.
- 9. I get dressed more slowly than usual because of my back.
- 10. I only stand up for short periods of time because of my back.
- 11. Because of my back, I try not to bend or kneel down.
- 12. I find it difficult to get out of a chair because of my back.
- 13. My back is painful almost all the time.
- 14. I find it difficult to turn over in bed because of my back.
- 15. My appetite is not very good because of my back pain.
- 16. I have trouble putting on my socks (or stockings) because of the pain in my back.
- 17. I only walk short distances because of my back pain.
- 18. I sleep less well because of my back.
- 19. Because of my back pain, I get dressed with help from someone else.
- 20. I sit down for most of the day because of my back.
- 21. I avoid heavy jobs around the house because of my back.
- 22. Because of my back pain, I am more irritable and bad tempered with people than usual.
- 23. Because of my back, I go upstairs more slowly than usual.
- 24. I stay in bed most of the time because of my back.
- I am no longer employed or am no longer able to perform my usual daily duties (eg home based activities).

Roland M, Morris R. (1983) A study of the natural history of back pain, Spine, 8: 141-150.

Appendix D. Victoria University Faculty of Human Research Ethics Committee

Approval

Faculty Human Research Ethics Committee

MEMORANDUM

TO: Melainie Cameron, Edwina Ryan (Caroline Delaney)
Principal Investigators
Education

FROM: Prof Colin Torrance
Acting Chair
Human Research Ethics Committee
Faculty of Human Development

DATE: January 29, 2008

SUBJECT: **Approval of application involving human subjects**

Thank you for your submission detailing amendments to the research protocol for the project titled, ***Pain, depression, anxiety and disability in back pain: Do people seeking osteopathic treatment fit known profiles?*** (HRETH.FHD.097/03).

The proposed amendments have been accepted by the Faculty Human Research Ethics Committee and approval for application HRETH.FHD.097/03 has been granted from 5/2/04 to 5/2/06.

Please note that, the Faculty Human Research Ethics Committee must be informed of the following: any changes to the approved research protocol, project timelines, any serious or unexpected adverse effects on participants, and unforeseen events that may effect continued ethical acceptability of the project. In these unlikely events, researchers must immediately cease all data collection until the Committee has approved the changes.

If you have any queries, please do not hesitate to contact me on ext 4486.

The Committee wishes you all the best for the conduct of the project.

Prof Colin Torrance
Acting Chair
Human Research Ethics Committee
Faculty of Human Development

Appendix E. Raw data - acute group

participant	Age	sex	sensory	affective	total	PPI	VAS	anxiety	depression	disability	unemployed
A1	27	1	7	0	7	2	5.1	3	3	1	
A6	28	1	7	7	14	5	6.8	8	3	15	
A7	33	1	22	6	28	3	5.6	9	6	18	
A8	23	2	7	0	7	1	5.7	9	1	6	
A10	26	2	5	0	5	2	1.9	4	1	4	
A12	23	2	9	0	9	0	3.3	5	3	0	
A13	28	2	23	9	32	2	5.5	7	3	13	
A15	28	2	3	0	3	0	0.7	2	2	2	
A17	23	2	15	0	15	2	4	5	2	8	
A21	23	1	3	0	3	2	3	2	0	6	
A22	23	2	12	1	13	2	4.3	3	1	0	
A23	22	2	5	1	6	1	2	16	7	2	
A25	21	1	6	0	6	1	3.8	3	4	1	
A26	33	2	5	1	6	1	0.9	2	4	6	
A27	44	2	7	1	8	1	4.2	5	4	11	
A29	24	1	14	0	14	2	2.9	2	1	8	
A32	18	1	2	0	2	1	3.2	5	1	3	
A33	19	2	2	0	2	1	1.2	5	5	3	
A34	25	1	6	0	6	1	1.9	4	0	0	
A35	18	1	8	5	13	0	4.8	12	2	3	

Appendix F. Raw data - chronic group

participant	Age	sex	sensory	affective	total	PPI	VAS	anxiety	depression	disability	unemployed
C1	23	2	12	7	19	2	2.9	11	3	8	
C4	30	2	10	2	12	1	1.2	5	0	3	
C6	19	2	4	0	4	1	0.8	8	1	4	
C7	22	2	11	3	14	2	5.2	9	1	4	
C8	27	1	18	3	21	2	5.3	8	8	8	y
C9	23	2	5	0	5	1	0.5	5	0	1	
C10	21	1	8	1	9	2	4.8	12	4	7	
C14	32	2	6	0	6	2	5.4	1	4	2	
C15	24	2	7	2	9	1	1.9	10	1	1	
C16	57	1	4	0	4	1	1.8	0	2	4	
C17	18	2	15	3	18	1	3.1	9	1	4	
C21	21	1	13	0	13	2	2.2	5	0	2	
C24	26	2	11	2	13	1	4.2	11	5	5	
C25	20	1	6	0	6	1	0.4	15	12	1	
C26	56	2	6	1	7	2	3.9	1	1	8	
C30	30	2	6	2	8	1	0.9	13	9	2	
C31	20	1	3	0	3	0	1.1	10	5	0	
C33	56	2	18	0	18	0	0.9	2	3	9	
C35	35	1	19	4	23	1	2	5	2	1	
C38	23	1	9	2	11	1	2.3	5	1	1	

Appendix G. SPSS output Pearson correlations - acute group

					P	X				
B	B	1	.0	.0	.0	.0	.0	.0	.0	.0
	S	.0	.0	.0	.0	.0	.0	.0	.0	.0
	N	.0	.0	.0	.0	.0	.0	.0	.0	.0
A	B	.0	1	.0	.0	.0	.0	.0	.0	.0
	S	.0	.0	.0	.0	.0	.0	.0	.0	.0
	N	.0	.0	.0	.0	.0	.0	.0	.0	.0
D	B	*	*	1	.0	*	.0	.0	.0	*
	S	.0	.0	.0	.0	.0	.0	.0	.0	.0
	N	.0	.0	.0	.0	.0	.0	.0	.0	.0
P	B	.0	*	.0	1	*	.0	.0	.0	*
	S	.0	.0	.0	.0	.0	.0	.0	.0	.0
	N	.0	.0	.0	.0	.0	.0	.0	.0	.0
X	B	.0	.0	.0	.0	1	.0	.0	.0	*
	S	.0	.0	.0	.0	.0	.0	.0	.0	.0
	N	.0	.0	.0	.0	.0	.0	.0	.0	.0
N	B	.0	*	.0	.0	.0	1	*	.0	.0
	S	.0	.0	.0	.0	.0	.0	.0	.0	.0
	N	.0	.0	.0	.0	.0	.0	.0	.0	.0
B	B	.0	.0	.0	.0	.0	*	1	.0	.0
	S	.0	.0	.0	.0	.0	.0	.0	.0	.0
	N	.0	.0	.0	.0	.0	.0	.0	.0	.0
D	B	*	.0	.0	.0	.0	.0	.0	.0	1
	S	.0	.0	.0	.0	.0	.0	.0	.0	.0
	N	.0	.0	.0	.0	.0	.0	.0	.0	.0

* .0
* .0

e

Appendix H. SPSS output Pearson correlations - chronic group

					P	X			
B	B	1	*	*					
	N	.0	.0	.0	.0	.0	.0	.0	.0
E	B	*	1	*					
	N	.0	.0	.0	.0	.0	.0	.0	.0
D	B	*	*	1				.9	
	N	.0	.0	.0	.0	.0	.0	.0	.0
P	B				1	*			
	N	.3	.3	.3	.0	.0	.2	.3	.3
X	B				*	1			
	N	.0	.0	.3	.0	.0	.0	.0	.6
N	B		.0	.0			1	.3	
	N	.0	.0	.0	.0	.0	.0	.0	.0
B	B						*	1	
	N	.0	.0	.0	.0	.0	.0	.0	.0
D	B		.0	.0					1
	N	.0	.0	.0	.0	.0	.0	.0	.0

* .0
* .0

Appendix I. SPSS output Pearson correlations - total population

		N			P	X			
B	B	1	*	*		*			*
	S	.							
	N	0	0	0	0	0	0	0	0
E	E	*	1	*	*	*	*	*	*
	S		.						
	N	0	0	0	0	0	0	0	0
D	D	*	*	1	*	*			*
	S	0	0	.	0				
	N	0	0	0	0	0	0	0	0
P	P		*	3	1	9	7	6	*
	S				.				
	N	0	0	0	0	0	0	0	0
X	X	*	5	2	9	1	0	0	*
	S					.			0
	N	0	0	0	0	0	0	0	0
H	H		*				1	*	
	S						.		
	N	0	0	0	0	0	0	0	0
B	B						*	1	
	S							.	
	N	0	0	0	0	0	0	0	0
D	D	*	5	5	*	*	0	0	1
	S								.
	N	0	0	0	0	0	0	0	0

* . 0
* . 0

r
r

Appendix J. SPSS output descriptive statistics

Group Statistics

	LBP GROUP	N	Mean	Std. Deviation	Std. Error Mean
SENSORY	1.00	20	8.4000	5.98595	1.33850
	2.00	20	9.5500	4.96806	1.11089
AFFECTIV	1.00	20	1.5500	2.78104	.62186
	2.00	20	1.6000	1.81804	.40653
TOTAL	1.00	20	9.9500	8.01627	1.79249
	2.00	20	11.1500	6.08946	1.36165
PPI	1.00	20	1.5000	1.14708	.25649
	2.00	20	1.2500	.63867	.14281
VAS	1.00	20	3.5400	1.74459	.39010
	2.00	20	2.5400	1.70862	.38206
ANXIETY	1.00	20	5.5500	3.69174	.82550
	2.00	20	7.2500	4.29044	.95937
DEPRESSI	1.00	20	2.6500	1.92696	.43088
	2.00	20	3.1500	3.28113	.73368
DISABILI	1.00	20	5.5000	5.24655	1.17316
	2.00	20	3.7500	2.86310	.64021

* LBP group 1 – acute group
 LBP group 2 – chronic group

Appendix K. SPSS output - Independent samples *t*-test

S

		F	t	df				b)	
B	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 1467 1468 1469 1470 1								