Understanding and Treating Eating Disorders from a Traditional Chinese Medicine Perspective.

Sarah Fogarty, M.Acup

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Doctor of Philosophy

School of Biomedical and Health Sciences, Faculty of Health,
Engineering and Science,
Victoria University, Melbourne, Australia.

Abstract

Eating disorders are a common disease predominately affecting young women. A multidisciplinary approach is the most commonly prescribed form of treatment for those with eating disorders. Despite the best practice biomedical approach, individuals with an eating disorder are known to seek help from complementary and alternative therapies (CAM).   There is no scientific evidence investigating the role of acupuncture as a CAM treatment in eating disorders. The aim of this thesis is to provide a scientific evaluation of Traditional Chinese Medicine (TCM) in the area of eating disorders encompassing both treatment and presentation. To meet this aim, three studies were undertaken. The first study analyses the TCM diagnostic concepts underlying eating disorders in a large sample of people suffering an eating disorder (n= 142) or no eating disorder (n= 54). Statistically significant differences were found between many of the TCM patterns. An extension of this study includes the development of a predictive model to assist in determining the probabilities of a possible eating disorder according to TCM principles. The second study evaluates the effectiveness of TCM acupuncture when used as an adjunctive therapy in the treatment of Anorexia Nervosa and Bulimia Nervosa. Nine eating disorder sufferers' participated in the open label randomised cross-over study. There was evidence that acupuncture improved the participants' Quality of Life and decreased anxiety and perfectionism. The third study appraises the effect of acupuncture in promoting weight loss and mental health

in overweight and obese individuals participating in a weight loss program with particular reference to individuals who have elevated eating and weight concerns. Thirty five overweight and obese males and females participated in the single blinded randomised cross-over study. TCM acupuncture was found to have beneficial effects on the mental health of overweight women with an elevated risk of eating and weight concerns.

Student Declaration

Doctor of Philosophy Declaration

"I, Sarah Fogarty, declare that the PhD thesis entitled Understanding and Treating Eating Disorders from a Traditional Chinese Medicine Perspective is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, 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

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List of Publications and Awards

Papers

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Conferences

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Chapter 1 Introduction

1.1   Summary of the research project

According to the Diagnostic and Statistical Manual of Mental Disorders-IV (American Psychiatric Association, 2009) eating disorders are characterised by severe disturbances in eating behaviour.   Images of waif like, starved girls with bones protruding hideously through the skin are commonly recalled by the general public when eating disorders are mentioned (Berkman et al., 2007; Bowman, 2006; Bulik et al., 2007; Crewe, 2006; Cullis & Bibb, 2004). However, eating disorders encompass not just those who are extremely underweight but individuals of all sizes and shapes.   Thus eating disorders covers a wide range of formally identified and non-formally identified severe disturbances in eating behaviour.

Eating disorders are a significant illness for sufferers and their families with poor recovery rates and while health restoration is common there are some possible long-term serious side effects such as osteoporosis (Duker & Slade, 2003; Fichter et al., 2006; Simmons, 2006; Tozzi et al., 2003; Wagner et al., 2006).   Eating disorders are difficult to treat with many remissions and recurrences of the eating disorder and in those that don't recover there is the potential for the eating disorder to become severe and enduring (American

Psychiatric Association, 2009; Berkman, et al., 2007; Bulik, et al., 2007; Robinson, 2009; Shapiro et al., 2007).

The treatment of individuals with an eating disorder can be challenging with clinical trials not always addressing the multidisciplinary therapeutic approaches used in the community (Berkman, et al., 2007; Brownley et al., 2007; Bulik, et al., 2007; Shapiro, et al., 2007). A multidisciplinary approach is the most commonly prescribed form of treatment for those with eating disorders, frequently involving psychologists, dietitians and general practitioners (Andersen & Mehler, 1999; Anorexia Nervosa and Related Eating Disorders Inc, 2005b; Fairburn & Harrison, 2003). Individuals with an eating disorder are known to seek help from complementary and alternative therapies (CAM) including acupuncture (Brooke, 2008; Hay et al., 2007; Mirasol, 2009; University of Maryland Medical Center, 2009). There is currently no peer reviewed evidence investigating the use of acupuncture as an adjunct therapy in the treatment of eating disorders.

Recent research has determined that greater knowledge of eating disorders improves clinical care (Currin et al., 2009). As such it is important that complementary and alternative (CAM) healthcare professionals have a good understanding of eating disorders both from a biomedical viewpoint and within

their own paradigm. TCM does not have a comprehensive understanding of how individuals with an eating disorder present according to TCM principles.

Eating, weight and shape concerns including general concern and worry about eating, weight and shape, dissatisfaction with weight and shape and the undue influence of weight or shape on self-evaluation (Mond et al., 2006) have serious risks for mental health and well being problems (Linde et al., 2004; Polivy & Herman, 1985; Sands, 2000; Vogeltanz-Holm et al., 2000; Vollrath et al., 1992). At risk individuals include those of all shapes and sizes however those who frequently diet or weight cycle are at increased risk due to the effects of repeated failed diets (Brownell & Rodin, 1994; Kenardy et al., 2001). There is much research on weight loss methods, including acupuncture; however this research generally does not address mental health in those trying to lose weight. (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu et al., 2006; Hsu et al., 2005a; Hsu et al., 2005b, 2005c; Lacey et al., 2003; Lei, 1998; Myeong et al., 2006; Richards & Marley, 1998; Shafshak, 1995; Wilson, 2003; Zhao et al., 2000). There is also limited research on the treatment available for those that frequently diet or weight cycle who have elevated eating and weight concerns (Werrija et al., 2009).

1.2   The goals and aim of the thesis

This thesis covers a number of different areas within the vast spectrum of eating disorders; none of which are closely related except that they all fall under the heading of eating disorders or elevated eating and weight concerns.   Thus, this thesis is presented in three distinct parts, with each part addressing an area of importance in TCM and eating disorders/eating and weight concerns.

This thesis looks at the following three areas of TCM and eating disorders/eating and weight concerns:

i) understanding eating disorders from the TCM perspective,

ii) the use of TCM acupuncture as an adjunct by sufferers of eating disorders and

iii) the effect of TCM acupuncture for weight loss and mental health in those enrolled in a weight loss program.

By addressing these areas it is anticipated that TCM practitioners will have a better understanding of eating disorders and elevated eating and weight concerns from a TCM perspective and change the way TCM practitioners treat and view eating disorder/weight loss patients. It is also expected that this thesis will provide evidence of acupuncture's potential as an adjunct therapy and the areas for which acupuncture can be most effective.

This thesis presents the findings from three studies. The first study (TCM Patterns of Disharmony and Eating Disorders) analyses the TCM diagnostic concepts underlying eating disorders based on the collection of signs and symptoms obtained from a large sample of people suffering an eating disorder. An extension to this study is the application of the data to develop a predictive model specifically to try and identify the core patterns of disharmony in eating disorders. The second study (Acupuncture as an adjunct therapy in the treatment of eating disorders: A randomised cross-over pilot study) evaluates the effectiveness of TCM acupuncture when used as an adjunct therapy in the treatment of Anorexia Nervosa and Bulimia Nervosa. The third and final study (Does acupuncture promote weight loss and mental health in overweight and obese individuals participating in a weight loss program? A randomised cross-over study) appraises the effect of acupuncture in promoting weight loss and improvements in mental health in overweight and obese individuals participating in a weight loss program. As these are three separate studies, each section is presented independently with its own distinct introduction, literature review, methods, results, discussion and conclusion.

The *Background information* (Chapter 2) has two parts. One part briefly describe the background of TCM. The second part is a descriptive section explaining for TCM readers some background information on eating disorder so they can better appreciate and understand this thesis. For those readers that

have experience dealing with eating disorders please feel free to skip this part of the section.

The *Overview* section (Chapter 8) presents a synopsis of the results of each of the sections and an overview of where to now.

1.2.1 The aim of the thesis

The overall aim of this thesis is to initiate the investigation and enquiry into better understanding eating disorders and elevated eating and weight concerns from a TCM perspective.

1.3 Summary of the studies

TCM Patterns of Disharmony and Eating

This study has two parts. The first presents the results of an online survey that collected the TCM signs and symptoms of a sample of participants who self identified as either having an eating disorders or not. One hundred and ninety six female participants (142 with a self-reported eating disorder and 54 with no eating disorder) completed the online survey, which was designed to collect data on their current general health and, where relevant, their eating disorder. The methodology previously used by Berle et al (2010) was used to

identify the TCM patterns expressed by the individuals who reported an eating disorder by tabulating and scoring the number of signs and symptoms experienced by both groups.

Statistically significant differences were found between many of the TCM patterns, the number of symptoms presenting and the four types of eating disorders. Whilst presenting similarly, there were differences in the TCM patterns featured strongly in Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Eating Disorder Not Otherwise Specified (EDNOS) and those with Binge Eating Disorder (BED).

To my knowledge, this is the first study where there is evidenced-based research to classify the TCM patterns involved in AN, BN, EDNOS and BED. Evidence is given to support the anecdotal theories of TCM patterns involved in eating disorder presentation. These results have relevance on how eating disorders are treated and viewed by TCM practitioners.

The second part is an extension of the first part which is detailed in Chapter 4. It involves determining whether there are any predictive indicators to assist TCM diagnosis of eating disorders. This study presents the results of the

development of a predictive model. The data from the 196 individuals who completed the survey in Chapter 4 was used to construct a model to determine any predictive indicators for assessing an eating disorder according to TCM principles. The pattern severity's (Pattern Severity Index (PSI)) for all 196 individuals were used to create the model. The models selected were tested on predictive accuracy both in-sample (using the 196 individuals who created the model) and out of sample (using 35 individuals whose data was collected but not used in the development of the model). The out of sample predictions provide a test of the possible performance of these models in a clinical setting. The ordered logit model that was determined to predict best, both in and out of sample, was the model with the grouping of [(NoED), (EDNOS) (BN or AN)] with BED dropped from the model. Further research and more testing on this model is needed before it can be used in a clinical setting but the initial results prove promising for use in a clinical setting.

The adjunctive treatment of AN and BN with TCM acupuncture; a randomised cross-over pilot study.

Patients receiving treatment at a private multi-disciplinary outpatient eating disorder facility in Melbourne, Australia were asked to participate in the study. Nine consenting women (5 with Anorexia Nervosa, 4 with Bulimia Nervosa), aged (mean and SD) 23.7 (9.6) years, participated in the study.

A randomised cross-over study was used in this study. The two treatments phases were the private multi-disciplinary outpatient eating disorder facility in Melbourne, Australia, only (referred to as their treatment as usual) and a continuation of their treatment as usual supplemented by acupuncture.

The main outcome measure was the Eating Disorder Inventory-3 (Garner, 2004). Secondary outcome measures were the Becks Depression Inventory-2, State Trait Anxiety Inventory and the Eating Disorder Quality of Life Scale (Beck et al., 1996; Engel et al., 2005; Spielberger, 1983).

There was evidence that acupuncture improved the participants' Quality of Life as measured by the physical/cognitive and psychological components of the Eating Disorder Quality of Life scale. There was also evidence of decreases in anxiety (both State and Trait as measured by the State Trait Anxiety Intervention) and perfectionism (as measured by the Eating Disorder Inventory-3).

The role of TCM weight loss acupuncture in the treatment of obese and overweight individuals.

This study investigated the effect of Traditional Chinese Medicine (TCM) acupuncture on the mental and physical health of individuals undertaking a weight loss program, with particular reference to individuals who have eating and weight concerns.

Thirty five consenting overweight and obese males and females participated in a weight loss study. A single blinded randomised cross-over study design was used. The two intervention phases were i) nutritional and lifestyle counselling plus TCM acupuncture and ii) nutritional and lifestyle counselling plus sham acupuncture.

The outcome measures were the EDI-3 Eating Disorder Risk Composite, the Becks Depression Inventory, the State-Trait Anxiety Inventory, the SF-36v Health Survey (physical and mental quality of life) and body weight change (Beck, et al., 1996; Garner, 2004; QualityMetric, 2010 -a; Spielberger, 1983).

TCM acupuncture was found to have beneficial effects on the mental health (depression, anxiety, and quality of life) of overweight women with elevated eating and weight concerns only. These are important findings because these individuals are at greater risk for possible poorer weight loss, decreased self-efficacy, eating more, greater likelihood of BED status, greater risk of concurrent depression, psychological distress, distorted body image, excessive exercise, self-starvation and or compulsive overeating and lowered self-esteem (Linde, et al., 2004; Polivy & Herman, 1985; Sands, 2000; Vogeltanz-Holm, et al., 2000; Vollrath, et al., 1992).

Chapter 2 Background Information

2.1   Traditional Chinese Medicine (TCM)

According to the World Health Organsiation (WHO) (World Health Organsiation, 2007) Traditional Chinese Medicine (中醫學;中醫) originated in China, and is characterised by holism and treatment based on pattern identification differentiation.   TCM is based strongly on both the essential *Qi* theory and the *yin-yang* theory (World Health Organsiation, 2007).   The essential *Qi* theory (精氣學說) revolves around *Qi* which is proposed to be essential to life and maintains all activities related to life such as visceral function and metabolism (World Health Organsiation, 2007). The *yin-yang* theory which is widely applied to TCM is an ancient Chinese philosophical concept involving two opposite facets of nature which are interrelated (World Health Organsiation, 2007).   According to TCM un-healthiness or disease, results from an imbalance of *yin* and *yang* or a disruption of *Qi*. TCM aims to remedy these imbalances via the use of herbal medicine, acupuncture (鍼; 鍼法) and other methods.   This thesis incorporates technical TCM terms, concepts and theories. A glossary of terms is provided at the back of the thesis, however, some concepts and ideas might be difficult to grasp by those without TCM training. Eating disorders are not comprehensively described from a TCM

perspective in the literature so a biomedical approach will be used to define and understand them.

2.2   Biomedicine Review

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), an eating disorder is defined as 'a severe disturbance in eating behaviour' (American Psychiatric Association, 2009).

Whilst there is still debate over what constitutes an eating disorder, the four eating disorders that are the subject of this study have been selected according to the DSM-IV classification of Eating Disorders. They are

- Anorexia Nervosa (AN),

- Bulimia Nervosa (BN),

- Eating Disorders otherwise not Specified (EDNOS) and

- Binge Eating Disorder (BED), a sub-category of EDNOS.

The diagnostic criteria for all four eating disorders are listed in Appendix 1 (at the end of the thesis). The new DSM-5 is to be released shortly with some proposed changes to these criteria. The main changes include BED being recognised as a separate stand alone category, not part of EDNOS (American Psychiatric Association, 2010b; Hartney, 2010). Also the diagnostic criteria for

both AN and BN have been altered slightly with amenorrhea being removed from AN and the frequency of binging reduced from twice per week to once a week in BN. Appendix 2 lists the proposed changes.

2.2.1 What is Anorexia Nervosa (AN)?

The diagnostic criteria for AN consists of the refusal to maintain minimal healthy body weight, an intense fear of gaining weight, a distorted body image and, where relevant, amenorrhea (American Psychiatric Association, 2009). Weight loss is accomplished primarily through a reduction in food intake (American Psychiatric Association, 2009). This fear of gaining weight is not eased by weight loss (American Psychiatric Association, 2009).

The distorted body image involving disturbances in the perception, experience or over-evaluation of weight or shape is believed to represent the specific psychopathology of eating disorders (Grilo, 2006). Sufferer's of AN commonly judge their self-worth on their perception of their weight and eating and how well they feel they are able to control them (Grilo, 2006). Weight loss and control over eating are important achievements and the ability to severely restrict food is seen a sign of self-discipline and positive control. The positive control offers an increase in self-worth however a loss of control can lead to emotional distress and poor self-esteem (Grilo, 2006).

2.2.2 What is Bulimia Nervosa (BN)?

BN is characterised by recurrent episodes of binge eating with inappropriate weight compensatory behaviours and feelings of guilt and self disgust (American Psychiatric Association, 2009). BN is also characterised by over-evaluation of weight and shape like that seen in those suffering from AN (Grilo, 2006). Again weight and shape unduly influence self-evaluation and self-worth (Grilo, 2006). BN sufferers place excessive focus and emphasis on body shape and weight for determining their self-worth and self-esteem (Grilo, 2006). Unlike AN sufferers they do not severely restrict (to the point of low body weight) as a means of increasing self-esteem.

2.2.3 What is Eating Disorder Otherwise not Specified (EDNOS)?

EDNOS is characterised by pathological abnormal eating. This commonly includes meeting most of the criteria of either AN or BN but missing one crucial criterion that would lead to a DSM diagnosis of either AN or BN. It can also include recurrent episodes of binge eating with inappropriate weight compensatory behaviours and feelings of guilt and self disgust (American Psychiatric Association, 2009). EDNOS is also characterised by over-evaluation of weight and shape like that seen in those suffering from AN or BN (Grilo, 2006). Again weight and shape unduly influence self-evaluation and self-worth (Grilo, 2006).

2.2.4 What is Binge Eating Disorder (BED)?

BED is characterised by frequently eating excessively amounts of food, often when not hungry. Binging leads to feelings of guilt and self disgust (American Psychiatric Association, 2009). There are no inappropriate weight compensatory behaviours as seen in BN (American Psychiatric Association, 2009).

2.2.5 What are SEED (Severe and Enduring Eating Disorders)?

This is a category for chronically ill patients with a long history of AN with physical and social complications (Robinson, 2009). Although no number defines enduring, the 10 year mark has been recommended for use to determine chronic and enduring (Robinson, 2009). The severe aspect of SEED is defined as symptoms of an eating disorder which interfere substantially with quality of life (Robinson, 2009).

Patients can recover despite having SEED, however the recognition of SEED implies a different management and type of care than those without SEED (Robinson, 2009). Although more commonly seen in those with AN, it can occur in BN, EDNOS and BED and is referred to as SEED-AN, SEED-BN, SEED-EDNOS and SEED-BED (Robinson, 2009).

2.2.6   What are eating and weight concerns?

Eating, weight and shape concerns including general concern and worry about eating, weight and shape, dissatisfaction with weight and shape and the undue influence of weight or shape on self-evaluation (Mond, et al., 2006) have serious risks for mental health and well being problems (Linde, et al., 2004; Polivy & Herman, 1985; Sands, 2000; Vogeltanz-Holm, et al., 2000; Vollrath, et al., 1992).   Eating and weight concerns are evaluated in this thesis by the Eating Disorder Inventory-3 (EDI-3) Questionnaire categories of Drive for Thinness (DT), Bulimia (B) and Body Dissatisfaction (BD) (Garner, 2004).

Elevated Drive for Thinness (DT), Bulimia (B) and Body Dissatisfaction (BD) scores have a precise explanation regarding the psychopathology.   An elevated Drive for Thinness score indicates terror about gaining weight, preoccupation with a desire to be thinner and spending inordinate amounts of time thinking about dieting.   An elevated Bulimia score indicates engaging very frequently in thoughts and behaviours consistent with binge eating and an elevated Body Dissatisfaction score indicates extreme disparagement of body size or shape as well as extraordinary discontentment with body weight.

2.2.7 What is Obesity?

Simple obesity is not classified as a mental disease (American Psychiatric Association, 2009). Those who are overweight or obese can present with an eating disorder and or with elevated eating and weight concerns. Individuals with AN present as underweight, individuals with BN can present in the normal weight range or overweight, individuals with EDNOS can present in the underweight, normal or overweight or obese range, individuals with BED can present as normal, overweight or obese. Those who are obese often have elevated eating and weight concerns which are a risk factor for the development of serious mental health issues (Bosmans et al., 2009; Burrows & Cooper, 2002; Chugh & Puri, 2001).

2.2.8 The effect of an eating disorder on the sufferer

Having an eating disorder presents serious health risk. This includes both physical and mental health (Abraham & Llewellyn-Jones, 2001; Grilo, 2006; Woolsey, 2002). The consequences of an eating disorder are varied with common co-occurring conditions including depression, personality disorders and anxiety disorders (Abraham & Llewellyn-Jones, 2001; American Psychiatric Association, 2009).   Individuals who exhibit binge-eating and purging eating subtypes are more likely to have impulse control problems such as smoking, drug and or alcohol abuse and have a greater frequency of suicide attempts

(American Psychiatric Association, 2009; Anzengruber et al., 2006; Franko & Keel, 2006; Pompili et al., 2006).

2.2.9   The physical effect of AN

The physical effects of having AN include emaciation, slow heart beat and pulse, low blood pressure, bloating, constipation, swelling of the hands and feet, dry scaly skin, lanugo (fine facial and body hair), some head hair loss, feeling of being cold, amenorrhea, mild anaemia, dehydration, renal and electrolyte problems, cardiac abnormalities, osteopenia, tiredness, brittle nails, hypothyroidism, hyperactivity, and insomnia (Abraham & Llewellyn-Jones, 2001; Grilo, 2006).

2.2.10 The physical effect of BN

The physical effects of having BN include fatigue, lethargy, abdominal discomfort, constipation, menstrual irregularity and dry skin. For those that vomit or use laxative the effects can include calluses on the back of the fingers, dental enamel erosion, dehydration, swollen salivary glands, disturbances in electrolyte imbalances, cardiac arrhythmias, renal problems, weakness, gastritis, esophagitis, increased risk of miscarriage and obstetrical problems,

and babies with low birth weight (Abraham & Llewellyn-Jones, 2001; Grilo, 2006).

2.2.11 The physical effect of EDNOS

EDNOS has similar physical effects to that of AN and BN depending on whether the EDNOS sufferer binges, purges or restricts.

2.2.12 The physical effect of BED

The physical effects of BED can also include some of the symptoms included above but it is also associated with increased BMI (Body Mass Index) and obesity and future weight gain (Grilo, 2006). Thus the physical effects of being obese are also applicable here which include high blood pressure (hypertension), high cholesterol, heart disease, type II diabetes mellitus, stroke, dyslipidemia, some cancers and arthritis (Grilo, 2006).

2.2.13 The Mental effect of an eating disorder - Psychological Changes

Irritability, confusion, depressed mood (feeling hopeless, guilty, worthless), insomnia, perfectionism and obsessive-compulsive behaviour (particularly about

food) are psychological changes that may accompany an eating disorder (Abraham & Llewellyn-Jones, 2001; Grilo, 2006).

2.2.14 The Mental effect of an eating disorder - Starvation

Biomedical research shows that a reduced intake of food leads to both psychological changes that are directly related to the lack of food (Abraham & Llewellyn-Jones, 2001; Grilo, 2006). These changes can occur in conditions such as eating disorders and famine victims (Abraham & Llewellyn-Jones, 2001). Psychological changes include obsession, confusion, depression, irritability and insomnia (Abraham & Llewellyn-Jones, 2001). These changes are additional to psychological changes seen in those with an eating disorder and are specific to those who restrict food to the point of starvation (Abraham & Llewellyn-Jones, 2001).

2.2.15 Who is affected by an eating disorder - Gender

Eating disorders especially AN and BN predominantly affect women (90%) however men can also be affected (10%) American Psychiatric Association, 2009; Ballas, 2006; Birmingham & Beumont, 2004; Fairburn & Harrison, 2003; Golden, 2003; Grilo, 2006; Rastam et al., 2004; Treasure, 2004; Williams, 2006. In BED this gender difference is not present with men and

women having an equal number individuals affected (American Psychiatric Association, 2009; Ballas, 2006; Birmingham & Beumont, 2004; Fairburn & Harrison, 2003; Golden, 2003; Grilo, 2006; Rastam et al., 2004; Treasure, 2004; Williams, 2006).

2.2.16 Who is affected by an eating disorder - Age

The typical age of onset of AN is early to late teenage years (American Psychiatric Association, 2009; Ballas, 2006; Doyle & Bryant-Waugh, 2000; Fairburn & Harrison, 2003; National Women's Health Information Centre, 2004; Palmer, 2001; Simpson, 2002). In BN the typical age of onset is young adulthood (American Psychiatric Association, 2009). Despite these typical ages of onset both AN or BN can occur at any age. There is no *typical* age of onset for EDNOS or BED (American Psychiatric Association, 2009) with EDNOS or BED besetting women/men of all ages.

2.2.17 Who is affected by an eating disorder - Culture

With reported incidences cross-culturally (Lee & Lock, 2007) particularly from 'Westernised' cultures both AN and BN generally presents physically and diagnostically similarly across cultures, although an intense fear of fatness is frequently reported as absent in Asian patients (Bosmans, et al., 2009; Celio et

al., 2006; Mond, et al., 2006; Ramacciotti et al., 2008; Roehrig et al., 2009; Werrija, et al., 2009).

2.2.18 Who is affected by an eating disorder - Prevalence

The reported incidence of individuals afflicted by AN in 'Westernized' countries varies from 0.01- 5.7% (American Psychiatric Association, 2009; Anorexia Nervosa and Related Eating Disorders Inc, 2005a; Ballas, 2006; Birmingham & Beumont, 2004; Fairburn et al., 2003; Finfgeld, 2002; Golden, 2003; le Grange & Lock, 2005; Makino et al., 2004; Rastam, et al., 2004; Treasure, 2004; Williamson et al., 2001) with the most commonly cited figures ranging from 0.05-1%. The average incidence of BN is between 1-4.2% (Birmingham & Beumont, 2004; Grilo, 2006; Rastam, et al., 2004). A recent Australian study reported prevalence rates of 1.9% for AN, 2.4% for partial AN (absence of amenorrhea), 2.9% for BN, 2.9% for BED and 5.3% for EDNOS (Wade et al., 2006). Wade et al., (2006) highlights the difficultly in determining prevalence rates given the diagnostic criteria, in particular the DSM-IV criteria for EDNOS.

Refer to the eating disorder aspect of the Glossary at the back of the thesis for eating disorder terminology, disorders and definitions

Section 1

TCM Patterns of Disharmony and Eating Disorders

Chapter 3 Development of a Chinese Medicine Pattern Severity Index for Understanding Eating Disorders

3.1. Introduction

Chinese Medicine has a rich history of treating patients as individuals that reflect the universe around them (Schnyer & Allen, 2001). Thus no Western disease exists, instead there are patterns of disharmony (Maciocia, 1989; Schnyer & Allen, 2001). TCM does recognise and categorise biomedical mental health disorders such as depression, obsessive compulsive disorder, anxiety etc through an established set of patterns of disharmony (Flaws & Lake, 2003; Maciocia, 2009; Schnyer & Allen, 2001). Currently no DSM-IV eating disorder is recognised in TCM through an established/proposed set of patterns of disharmony.

Recent research has determined that greater knowledge of eating disorders improves clinical care (Currin, et al., 2009). As such it is important that complementary and alternative (CAM) healthcare professionals have a good understanding of eating disorders both from a biomedical viewpoint and within their own paradigm. Traditional Chinese Medicine (TCM) does not have a comprehensive understanding of how individuals with an eating disorder present according to TCM principles. A beginning point to better understanding

eating disorders from a TCM perspective is to determine if there are a set of TCM patterns that characterize DSM-IV eating disorders.

This study presents the results of an online survey that collected the signs and symptoms of a sample of participants who self identified as either having an eating disorders or not. One hundred and ninety six female participants (142 with a self-reported eating disorder and 54 with no eating disorder) completed the online survey, which was designed to collect data on their current general health and, where relevant, their eating disorder. The methodology previously used by Berle et al (2010) was used to identify the TCM patterns expressed by the individuals who reported an eating disorder by tabulating and scoring the number of signs and symptoms experienced by both groups.

Statistically significant differences were found between many of the TCM patterns, the number of symptoms presenting and the four types of eating disorders. Whilst presenting similarly, there were differences in the TCM patterns featured strongly in Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Eating Disorder Not Otherwise Specified (EDNOS) and those with Binge Eating Disorder (BED).

To my knowledge, this is the first study where there is evidenced-based research to classify the TCM patterns involved in AN, BN, EDNOS and BED. Evidence is given to support the anecdotal theories of TCM patterns involved in eating disorder presentation. These results have relevance on how eating disorders may be treated and viewed by TCM practitioners.

3.2   Goals and Aims

Understanding TCM diagnostic concepts underlying eating disorders based on a collection of signs and symptoms obtained from a large sample of people suffering an eating disorder.

3. 3.   Literature Review

3.3.1   Biomedicine Review

Understanding eating disorders - How they relate to each other

Considerable research has addressed what an eating disorder is and how the categories of eating disorders are related and the diagnostic criteria and sub-typing for each eating disorder (Strober, 2009; Walsh, 2009).

According to Western Medicine research, there are two different theories of how the categories of eating disorders relate to each other. One is that eating disorders are on a continuum and the second is that they are set categories. The continuum perspective suggests that eating disorders occur along a continuum which individuals vary in degree but not in kind (Peck & Lightsey, 2008; Perosa & Perosa, 2004). The category perspective sets eating disorders as distinct (i.e. qualitatively different) from normal development and from each other (Peck & Lightsey, 2008). Opinion is divided on which theory is the 'correct' one (Strober, 2009; Walsh, 2009). It is possible that theory is incorrect and that the 'truth' lies somewhere in the middle.

Currently BED is a sub-category of EDNOS (American Psychiatric Association, 2009). Some authors suggest that BED should be a stand-alone eating disorder category having distinctively different psychopathology,

development, course and outcomes from other eating disorder groups (Grilo, 2006; Grilo et al., 2009). The proposal for the new DSM-V is to have BED as a stand-alone eating disorder category (Hartney, 2010). See Appendix 2 for the proposed DSM-V criteria.

Whilst research suggests BED presents differently (Grilo, 2006; Grilo, et al., 2009), some research suggests that AN, BN and EDNOS share similarities in psychopathology, development and presentation (Agras et al., 2009; Grilo, 2006). Figure 3.1 represents a possible interaction of the two theories and how the four eating disorders may relate to each other.

Figure 3.1. Understanding Eating Disorders. A theory of how Western Medicine understands eating disorders and their relationship to each other.
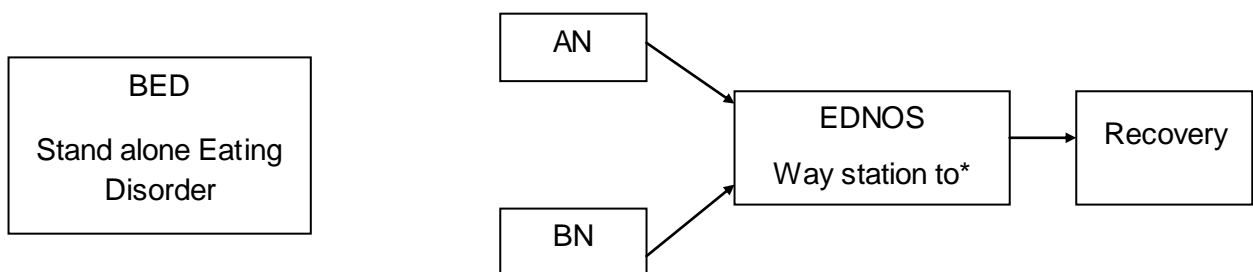
* This process, although less common can occur in the opposite direction from recovery (e.g. from 'healthy' to having an eating disorder, either AN or BN) (Agras, et al., 2009)

The theories above suggest a fusion of the continuum theory and the set categories theory.   The categorical approach is applied with BED as a stand-alone eating disorder category (Grilo, 2006; Grilo, et al., 2009) and the

continuum approach with AN, BN and EDNOS that share similarities in psychopathology, development and presentation (Agras, et al., 2009; Grilo, 2006). This idea is not shared universally by all eating disorder practitioners, researchers and experts. More research into how they all relate is needed and ongoing.

Recent research has determined that a greater knowledge of eating disorders is related to clinical behavoiur in primary care professionals (Currin, et al., 2009). A greater knowledge of eating disorders improves clinical care (Currin, et al., 2009). An important part of understanding eating disorders is accurate diagnosis and assessment of eating disorder outcomes (Engel et al., 2009). Eating disorder diagnosis, treatment decisions and patient outcomes are most commonly assessed via self-report questionnaires, semi-structured interviews and clinical interviews (Engel, et al., 2009). Clinically there are many well validated tools to assist clinicians in measuring, identifying and treating eating disorders such as the Eating Disorder Inventory (EDI) (Garner, 2004), the Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn et al., 2008), the Eating Disorder Quality of Life questionnaire (EDQoL) (Engel, et al., 2009) and SCOFF Questionnaire (Morgan et al., 1999). Some of these questionnaires however are only available to registered psychologists or medical doctors and thus inaccessible to TCM practitioners. Thus it is important

that TCM must determine within its paradigm how to be assess, identify,

measure and understand those individuals who present with an eating disorder.

3.3.2 Traditional Chinese Medicine Review

3.3.2.1   Understanding eating disorders

The current notion of eating disorders is a modern concept and there is no critically appraised research on how Traditional Chinese Medicine (TCM) conceives of, or treats, eating disorders.   There is no consensus regarding the status of eating disorders as an autonomous disease in TCM. Eating disorders have been considered a symptom with the subsequent classification being based on the primary symptom of the disease such as weight loss (Rossi, 2007).   Others disagree with this approach, and have attempted to classify and define eating disorders according to TCM principles and philosophies (Kraft, 2003; Ross, 1995).

Ancient texts mention the effect of starvation on both the physical body and the mind. No ancient text or modern publication however captures both the psychological presentation (i.e. body dissatisfaction and drive for thinness, obsession, bulimia, insomnia, depression) and the physical effects (emaciation, bloating, constipation, coldness, anaemia, head hair loss, slow blood pressure) of eating disorders (Abraham & Llewellyn-Jones, 2001).   Nor does the current theory that eating disorders should be based on the primary symptom (e.g. weight loss) capture both the psychological and physical presentation of eating disorders.   A limitation of the primary symptom theory is the conundrum the

TCM practitioner faces when seeing an eating disorder patient and having to determine what is the 'primary symptom'. There are no tools for determining in AN if the primary symptom is weight loss or self evaluation unduly influenced by body shape and weight or in BN if binging or vomiting is more important (Rossi, 2007). There is also no indication of the consequences of not diagnosing the primary symptom correctly.

Whilst there has been no critical evaluation of eating disorders in a rigorous scientific manner, several Chinese Medicine text books and anecdotal journal articles have attempted to identify possible TCM patterns in those with an eating disorder (Flaws, 2001; Flaws & Lake, 2003; Gasgcoigne, 1994; Kraft, 2003; Munir, 2007; Ross, 1995). The information on eating disorders gathered from these text books and non-peer reviewed articles highlights the lack of understanding of eating disorders from a TCM perspective. The TCM patterns of disharmony that have been suggested as representing eating disorders are often listed generally under the umbrella term of 'eating disorders' (Fletcher, 2002-2005; McIntire, 2006; Meyers, 2009; nhi Professional Data, 2003; Ross, 1995). There are only a few authors that separate the patterns according to AN or BN and none that address BED or EDNOS specifically (Kraft, 1999, 2003; Wimmer, 2003).

Given the gravity of eating disorders, it is important that more TCM knowledge is gained about eating disorders in general and the patterns of disharmony that these patients present with.

3.3.2.2   How eating disorders present - Generally

Simplistically, eating disorders are presented more as Yin deficient conditions (Ross, 1995; Wimmer, 2003) with much emphasis given to Yin deficiency in terms of mental health (Maciocia, 2009).

For those that have attempted to classify eating disorders, the Zang organs of the Spleen, Heart and Liver (Deadman, 2007; Fletcher, 2002-2005; Gasgcoigne, 1994; Mahoney, 1989; Munir, 2007; Ross, 1995; Scott, 2007) are most frequently mentioned although there is no clinical research or case series to provide evidence that these organs and their respective patterns are seen specifically in people with an eating disorder.

3.3.2.3   How eating disorders present - Anorexia Nervosa (AN)

Within the small amount of evidence available there is a consensus that AN is a deficient condition involving Sp*leen Qi Deficiency* patterns and *Heart*

deficient patterns (Eating Disorder Resource Centre of BC, 2006; Fletcher, 2002-2005; Gasgcoigne, 1994; Kraft, 2003; Munir, 2007; Smith, 1993; Wimmer, 2003). Some authors go as far as to say that an imbalance of the Spleen is a key factor in eating disorder disharmony (Clarke, 2009). However this is disputed by others who believe that the presenting patterns of disharmony in eating disorders to be more complex than simply *Spleen and Stomach deficiency* (Kraft, 2003)*.*

The most important function of the Spleen is to *transport and transform* (運化) food and drink into *essence* and *Qi* (Maciocia, 1989; World Health Organsiation, 2007). When the Spleen is deficient the symptoms include no appetite, abdominal distension after eating, dizziness, tiredness, lassitude, sallow complexion, weakness of the limbs, and loose stools (Maciocia, 1989; World Health Organsiation, 2007). The correlating biomedical **physical** symptoms of those suffering from AN include emaciation, bloating and tiredness (Abraham & Llewellyn-Jones, 2001; Grilo, 2006). Given the similarities of the *Spleen Qi deficiency* symptoms to those of AN it is easy to see how practitioners could, without difficulty, assign *Spleen Qi deficiency* to represent AN. The similarities in symptoms between *Spleen Qi deficiency* and AN is persuasive by itself but the addition of 'no appetite' as a symptom of *Spleen Qi deficiency* may be the conclusive corroboration that causes practitioners to

assign AN sufferers to be *Spleen Qi deficient.*   The lack of appetite would account for the refusal to eat seen in AN (American Psychiatric Association, 2009).   However it is a misnomer that those who suffer from AN have no appetite, in fact they are often hungry if not starving, they just choose not to eat (Abraham & Llewellyn-Jones, 2001).   Whether it is the similarity between the wording of '*anorexia' (which means no appetite ("Dorland's Pocket Medical Dictionary," 1995))* and Anorexia Nervosa or the sufferers refusal to eat that leads to this misinterpretation, it is unknown, however it is a mistake that is commonly made by those unfamiliar with AN.   This mistake along with the physical symptoms of AN may be misleading practitioners to the involvement of *Spleen Qi deficiency* in AN.   Even if the *Spleen Qi deficiency pattern* was predominately involved in AN, this pattern does not account for the psychological symptoms seen in AN.

The most important function of the *Heart* is to '*govern blood and house the mind'* (Maciocia, 1989; World Health Organsiation, 2007). The addition of *Heart* patterns by authors and practitioners may help to explain the psychological aspects of AN (Fletcher, 2002-2005; Kraft, 2003; Munir, 2007; Ross, 1995; Wimmer, 2003).

Proposed heart patterns include *Heart* or *Heart fire deficiency.* The symptoms of *Heart* or *Heart fire deficiency* include palpitations, shortness of breath on exertion, sweating, pallor, tiredness and listlessness, feeling of stuffiness or discomfort in the heart region, bright-pale face and cold limbs (Maciocia, 1989; World Health Organsiation, 2007). While a few of these symptoms correspond to the physical symptoms seen in AN, none address the psychological aspects of AN such as low self esteem, distorted body image and depression (Grilo, 2006; Treasure et al., 2003). While it could be argued that low self esteem, distorted body image and depression have lead to *Heart* pattern problems, the symptoms mentioned don't correlate well with those seen in sufferer's of AN. More evidence is needed to determine the role *Heart* patterns play in presentation of AN.

3.3.2.4   *How eating disorders present - The maintenance of AN*

Woods (2008) suggests the maintenance of AN is caused by insufficient eating which leads to a deficiency of *Qi* and *Blood,* which compromises the transporting and transforming function of the Spleen (Wood, 2008). Over a period of time this leads to malnourishment (due to a failure of the Spleen to absorb what is eaten) which damages the *Shen* (Wood, 2008). Thus what is eaten is not absorbed and more weight is lost. This idea is refuted by Kraft (Kraft, 2003) who believes that sufferers of AN are able to absorb the food that

is eaten until the later stages of malnutrition and starvation. Kraft (2003) is suggesting the malnutrition comes first then the lack of absorption, not the converse where the lack of absorption (from Spleen weakness) leads to malnutrition. There is no conclusive evidence to determine which theory is accurate. Determining which occurs first may be helpful when practitioners treat those who are not yet severely malnourished and or being reefed.

3.3.2.5 *How eating disorders present - Bulimia Nervosa (BN)*

Within the small amount of evidence available there is a consensus that BN is often represented by the patterns of *Stomach Heat* or *Liver Qi Stagnation* (Flaws, 2001; MacLean & Lyttleton, 2002; Wimmer, 2003) although again there is no evidence to substantiate these diagnostic concepts. *Stomach Heat* is often caused by overeating and manifests with the following symptoms: thirst, foul breath, hyperorexia (excessive appetite ("Dorland's Pocket Medical Dictionary," 1995)), oliguria with dark urine, constipation and ulceration of the mouth or gingivitis (World Health Organsiation, 2007). The correlating biomedical **physical** symptoms of those suffering from BN include swollen salivary glands (Abraham & Llewellyn-Jones, 2001; Grilo, 2006). Although presenting with few similarities in symptoms between *Stomach Heat* and BN, the addition of 'hyperorexia (excessive appetite)' as a symptom of *Stomach Heat,* along with the causative factor being over eating, may be the reasoning

that causes practitioners to assign BN sufferers to the *Stomach Heat pattern.* This, once again may be a case of mistaken understanding by those unfamiliar with BN. Excessive appetite is not a specific symptom of BN despite sufferers of BN consuming large amounts of food (Abraham & Llewellyn-Jones, 2001; Grilo, 2006). Binging is a defining feature of BN (American Psychiatric Association, 2009) but excessive hunger is not a major precursor or cause of the binge. Only a third of women state that hunger precipitates their binge where-by three-quarters of women say loneliness or boredom precipitates a binge (Abraham & Llewellyn-Jones, 2001). This suggests that the causes of the binging are more complex than excessive appetite alone and more evidence is needed to determine the role that *Stomach Heat* plays in the presentation of BN. Even if the *Stomach Heat pattern* is predominately involved in BN, this pattern does not account for the psychological symptoms seen in BN.

The main function of the *Liver* is to ensure the smooth flow of *Qi.* The addition of *Liver* patterns by authors and practitioners may explain the psychological aspects of BN (Fletcher, 2002-2005; Munir, 2007; Ross, 1995; Wimmer, 2003).

When there is *Liver Qi Stagnation* the symptoms include depressed mood, frequent sighing, hypochondriac or lower abdominal distension or moving pain, irregular menstruation, moodiness, melancholy, fluctuation of mental state, unhappiness, and irritability (Maciocia, 1989; World Health Organsiation, 2007). A large number of these symptoms do relate to the psychological symptoms seen in those with BN such as irritability, confusion and depressed mood (feeling hopeless, guilty, worthless) (Abraham & Llewellyn-Jones, 2001; Grilo, 2006). While showing promise in representing some of the psychological aspects of BN, more evidence is needed to determine the role *Liver* patterns play in BN and possibly the other eating disorders of AN, EDNOS and BED.

3.3.2.6 *How eating disorders present - EDNOS and BED*

There is no literature at all on how these two eating disorder sub-categories present according to TCM principles.

While it is important in treating those with an eating disorder that the physical and psychological presentation of eating disorders are understood according to TCM principles understanding the psychopathological core of eating disorders is also extremely important. Undue influence of weight or shape on self-evaluation is the psychopathological core of eating disorders (Fairburn, et al., 2003; Mond, et al., 2006). Although perhaps not represented in the TCM presentation of an eating disorder, any TCM understanding of the

mechanisms of disease (pathogenesis) of an eating disorder needs to comprehensively address this core psychopathology. Although patterns of the *Spleen*, *Liver, Heart* and *Stomach* do possibly play a role in eating disorder presentation, it is clear that these organs do not definitively define the mechanisms of disease (pathogenesis) involved in eating disorders. Given that a greater knowledge of eating disorders improves clinical care (Currin, et al., 2009) and the reported difficulty that acupuncturists describe in treating those with eating disorders (Clarke, 2008; Deadman, 2007), it is imperative that there is a greater knowledge and understanding of eating disorders according to the TCM paradigm.

3.4. Subjects and Methods

3.4.1 Subjects

Survey participants were recruited via invitation. This was achieved by contacting several international and national eating disorder organisations and treatment clinics (Beating Eating Disorders UK, Eating Disorder Foundation of Victoria, Centre for Excellence for Eating Disorders, Australia) and either placing an advertisement on their website, or by the organisation inviting participation through its database. Two hundred and ten participants suffering with a self-reported eating disorder filled in the online survey. The same method was used to recruit participants without an eating disorder who would act as a control group. National clubs such as Step into Life and Skiing Club (Australia) and the use of referral saw 123 non-eating disorder healthy participants complete the online survey.

A questionnaire was designed to collect signs and symptoms associated with eating disorders from a TCM perspective. It included questions on the individual's age and gender as well as questions on general health (e.g. sleep, menstruation, bowel movements, headaches etc). Where relevant specific eating-disorder questions were included relating to the Western Medicine diagnosis and treatment of their eating disorder and specific signs and symptoms related to their eating disorder. (See Appendix 3 for a copy of the

eating disorder questionnaire and Appendix 4 at the end of this thesis for the questionnaire for those with no eating disorder). The questionnaire was administered online via Survey Monkey ("Survey Monkey," 2009). Prior to commencing the study ethics approval was obtained from the Human Research Ethics Committee of Victoria University (HRETH07/241). Data was collected on the respondents emotions and feeling however it was used only when the WHO mentioned a specific emotion as part of a pattern of disharmony. Many of the WHO defined patterns did not include emotions or feelings thus it was decided not to include this data in the analysis.

Of the total of 333 respondents, 137 were excluded because they completed less than half of the survey or because they were male, giving an effective response rate of 60%. Being male was not initially one of the exclusion criteria. However, only 1.5% of the respondents were males, and although males with eating disorders present similarly to females, there are some differences in depression and alcohol dependency (Woodside et al., 2001). Therefore it was reasoned that there was insufficient data to retain males in the sample. The remaining 196 female respondents included 142 with an eating disorder and 54 without an eating disorder. Table 3.1 and 3.2 show the characteristics of the 196 participants. The 54 respondents who did not have an eating disorder were used as a comparison group.

Table 3.1. Respondent Age. A list of the age groups (and percentages) for the 196 participants (both those with and without an eating disorder) who completed the survey.

Respondent Age							
18-25 years	26-33 years	34-41 years	42-49 years	50-57 years	58-63 years	64-71 years	71+ years
n = 101 (51.5%)	n =47 (24.0%)	n = 22 (11.2%)	n = 16 (8.2%)	n = 7 (3.6%)	n =2 (1.0%)	n = 0 (0.00%)	n =1 (0.5%)

Table 3.2. Respondents and their Self-reported Eating Disorder classification and history.   A list of participants eating disorder status (n = 196). Also included, for those with an eating disorder (n= 142), is their diagnosis, history and length of time they have had their eating disorder and their treatment history.

Respondents and their Eating Disorder				
No Eating Disorder	n =54 (27.5%)			
Eating Disorder Respondents n= 142 (72.5%)	BED	EDNOS	BN	AN
	n =13 (6.6%)	n =26 (13.3%)	n =36 (18.4%)	n =67 (34.2%)
Eating Disorder Respondents and Formal Diagnosis(n=142)				
Eating Disorder Respondents	Formal Diagnosis		Non-formal Diagnosis	
	n =96 (67.6%)		n =46 (32.4%)	
Eating Disorder Respondents and History of Diagnosis (n=142)				
Eating Disorder Respondents	0-1 years	2-5 years	6-10 years	11-15 years	15+ years
	n = 35 (24.5%)	n = 55 (38.6%)	n= 22 (15.3%)	n= 15 (10.5%)	n = 16 (11.1%)
Eating Disorder Respondents and Treatment (n=142)				
Eating Disorder Respondents	Receiving Treatment		Not Receiving Treatment	
	n =67 (47.2%)		n =75 (52.8%)	
Eating Disorder Respondents and History of Treatment (n=67)				
Eating Disorder Respondents Receiving Treatment	0-3 months	4-6 months	7-9 months	10-12 months	12+ months
	n = 15 (22.4%)	n = 9 (13.4)	n = 5 (7.5%)	n = 6 (9.0%)	n = 32 (47.7%)

3.4.2 *Methodology*

This study follows the Berle et al (2010) methodology for data collection and analysis. This methodology highlights the importance of pattern identification in diagnosis, treatment prescription and treatment effectiveness. For a particular disease, the first step of this methodology involves using the published literature to identify the various TCM patterns associated with that disease, and then identifying the signs and symptoms that are associated with each of these patterns.

For eating disorders, a total of 26 TCM patterns were identified via hand search and an electronic search (Deadman et al., 1998; Fletcher, 2002-2005; Gasgcoigne, 1994; Mahoney, 1989; Munir, 2007; Ross, 1995; Scott, 2007; Wimmer, 2003) (Table 3.3)[1]. The terms 'anorexia', 'bulimia', 'eating disorders', TCM, and acupuncture were used. The patterns were broken up into two sub-groups, specific patterns (first six columns of the table) and general patterns (the seventh column of the table).

[1].This list excludes the specific pattern Phlegm Clouding the Heart Spirit, for which no respondent reported any signs or symptoms.

Table 3.3. Patterns of Disharmony Relevant to Eating Disorders

	Heart patterns	Stomach patterns	Spleen patterns	Liver patterns	Kidney patterns	Combined patterns	General patterns
Yang Conditions	Heart Yang deficiency		Spleen Yang Deficiency		Kidney Yang Deficiency	Spleen and Kidney Yang Deficiency	Yang Deficiency
Yin Conditions	Heart Yin Deficiency	Stomach Yin Deficiency			Kidney Yin Deficiency with Fire Effulgence		Yin Deficiency
Qi Conditions	Heart Qi Deficiency	Stomach Qi Deficiency	Spleen Qi Deficiency	Liver Qi Depression Liver Qi Invading the Stomach		Liver Qi Stagnation and Stomach Heat	Qi Deficiency
Blood Conditions	Heart Blood Deficiency					Qi and Blood Deficiency	Blood Deficiency
Heat Conditions		Stomach Heat		Liver Fire Flaming Upwards			
Other	Heat Harassing the Heart Spirit	Food Accumulation Food Damage				Spleen and Stomach Deficiency Cold Stomach-Spleen Disharmony	

Signs and symptoms for each TCM pattern were then identified according to the World Health Organisation standard terminology text (World Health Organsiation, 2007), Deng's diagnostic text (Deng, 2000) and Wiseman's Practical Dictionary (Wiseman & Ye, 1998). For each TCM pattern, a checklist of these signs and symptoms was tabulated. Table 3.4 shows a copy of the Stomach Heat Pattern Checklist Tabulation which is out of 12 points. (See Appendix 5 for all Checklists).

Table 3.4. Stomach Heat Check List.

Stomach Heat pattern Checklist	Presence of symptom
Thirst	
Foul Breath	
Hyperorexia (over stimulation of the appetite)	
Oliguria with dark urine (diminished urine)	
Constipation	
Ulceration of the mouth or gingivitis	
Scorching pain of the stomach that refuses pressure	
Preference for cold fluids	
Acid up flow regurgitation	
Rapid hungering	
Swelling and pain of the teeth	
Scorched lips	
Total:	**x /12**

In the second step of the Berle methodology, each respondent was asked to fill out a questionnaire to indicate which of these tabulated signs and symptoms they experienced. Each respondent's completed questionnaire was used to ascertain the number of signs and symptoms present for each TCM pattern. Similarly to the Berle methodology (Berle et al., 2010), we define a Pattern Severity Index (PSI) according to the following formula:

$$PSI = \frac{\text{Number of symptoms/sign expressed by the individual}}{\text{Total number of symptom/signs associated with the specific TCM pattern}}$$

See Table 3.5 for one participants PSI for the Pattern Stomach Heat

Table 3.5. TCM Pattern Stomach Heat Completed Checklist for a participant.

Stomach Heat pattern Checklist	Presence of symptom
Thirst	**Yes**
Foul Breath	No
Hyperorexia (over stimulation of the appetite)	**Yes**
Oliguria with dark urine (diminished urine)	No
Constipation	**Yes**
Ulceration of the mouth or gingivitis	**Yes**
Scorching pain of the stomach that refuses pressure	No
Preference for cold fluids	**Yes**
Acid up flow regurgitation	No
Rapid hungering	**Yes**
Swelling and pain of the teeth	No
Scorched lips	No
Total:	**6 /12**

This particular individual has a Stomach Heat PSI of 0.5.

3.5   Statistical Analysis

The PSI data for each pattern is summarised as a mean and standard error (SE) for each of the 26 patterns of the four eating disorder categories and

for those with no eating disorder.   The PSI means were calculated using statistical software E-views (Quantitative Micro Software, 2007).

A regression model was computed to determine if there were any significant differences between the means for each pattern of disharmony between the eating disorder sub-groups.   Significance was measured at $p = < 0.05$.

The model was

$$PSI_i = \beta_0 NoED_i + \beta_1 BED_i + \beta_2 EDNOS_i + \beta_3 BN_i + \beta_4 AN_i + U_i$$

where PSI_i is the PSI score for individual i for a particular pattern of disharmony and BED_i, $EDNOS_i$, BN_i and AN_i are indicator variables for the eating disorder and $NoED_i$ is the indicator variable for no eating disorder. The indicator variables take the form

$AN_i = 1$ if individual i has AN, and 0 otherwise

$BN_i = 1$ if individual i has BN, and 0 otherwise

$EDNOS_i = 1$ if individual i has EDNOS, and 0 otherwise

$BED_i = 1$ if individual i has BED, and 0 otherwise

$NoED_i = 1$ if individual i has no eating disorder, and 0 otherwise

The coefficients in the regression model have the simple interpretations

β_0 is the average PSI_i for those with no eating disorder

β_1 is the average PSI_i for those with BED,

β_2 is the average PSI_i for those with EDNOS,

β_3 is the average PSI_i for those with BN,

β_4 is the average PSI_i for those with AN.

If any of the coefficients are equal then the regression model can be simplified. For example, if $\beta_1 = \beta_2$ then the model simplifies to

$$PSI_i = \beta_0 NoED_i + \beta_1(BED_i + EDNOS_i) + \beta_3 BN_i + \beta_4 AN_i + U_i,$$

This would imply that individuals with BED and EDNOS have the same average PSI's, while those with BN and AN have different PSI's.

There are 52 possible patterns of equality in the coefficients. Each of the 52 implied regression models was estimated, the preferred model was chosen to be the one with the optimal HQ (Hannan-Quinn) criterion, which provides a trade-off between goodness of fit and model simplicity (a model with fewer coefficients is simpler).

For example, the best regression for Stomach Heat was found to have $\beta_1 = \beta_2 = \beta_4$, with β_0 and β_3 being distinct. The implication is that the average PSI for Stomach Heat does not differ significantly between BED, EDNOS or AN.

However, the average PSI's for No ED and BN differ significantly from each other and from the other three conditions.

It was not only the patterns that were expressed strongly that were of interest but also how the pattern severity compared amongst those with and without an eating disorder. To determine this, the PSI's for those with no eating disorder was subtracted from the PSI means for BED, EDNOS, BN and AN individually to report the difference from those without an eating disorder. Given this is an extrapolation from the above data, the significances found are the same as the above model, however, the standard errors differ slightly (slightly bigger).

A regression analysis was used to determine if age, history of eating disorder, length of eating disorder or eating disorder diagnosis had explanatory power for the PSI's for each pattern, controlling for eating disorder.

3.6 Results

Table 3.6 and 3.7 show the *mean* PSI scores for each of the specific and general patterns separately for each of the four eating disorders and for those with no eating disorder. Statistically significant differences between the means for each pattern are represented by superscripts.

For those without an eating disorder, the most strongly expressed patterns were *Liver Qi Depression, Spleen and Kidney Yang Deficiency* and *Liver Qi invading the Stomach.*

For those with an eating disorder of any type, *Liver Qi Depression*, followed by *Spleen and Stomach Deficiency Cold,* were the two most strongly expressed TCM patterns. The general TCM pattern of *Qi deficiency* was the most strongly expressed pattern for those with an eating disorder. In all cases participants presented on average, with more Yang deficiency then Yin deficiency.

Table 3.6 shows generally, but not uniformly, the trend for an increase in severity of symptoms from non eating disorder to BED, to EDNOS, to BN and finally AN, with AN ranking as the most severe eating disorder in 19 of 21 patterns. The two exceptions are *Stomach Heat* and *Kidney Yang deficiency*, which are both most severe for BN.

Table 3.6. PSI Results. Mean PSI results (standard errors are in brackets below) are shown for those with and without an eating disorder for the specific patterns.

TCM Pattern	Mean PSI scores (standard error)				
	No eating disorder	BED	EDNOS	BN	AN
Stomach Heat	0.15[a] (0.018)	0.24[b] (0.037)	0.23[b] (0.026)	0.30[c] (0.022)	0.25[b] (0.016)
Liver Qi Depression	0.28[a] (0.023)	0.38[b] (0.046)	0.37[b] (0.033)	0.49[c] (0.028)	0.54[c] (0.020)
Heart Yin Deficiency	0.14[a] (0.017)	0.20[b] (0.035)	0.19[b] (0.025)	0.29[c] (0.021)	0.30[c] (0.015)
Stomach Yin Deficiency	0.09[a] (0.014)	0.20[a] (0.029)	0.17[a] (0.021)	0.24[b] (0.018)	0.30[c] (0.013)
Heart Yang Deficiency	0.19[a] (0.018)	0.21[a] (0.036)	0.26[b] (0.025)	0.34[c] (0.022)	0.39[d] (0.016)
Spleen Qi Deficiency	0.16[a] (0.019)	0.22[b] (0.039)	0.28[b] (0.028)	0.39[c] (0.023)	0.49[d] (0.017)
Stomach Qi Deficiency	0.072[a] (0.012)	0.094[a] (0.024)	0.13[b] (0.017)	0.20[c] (0.015)	0.26[d] (0.011)
Heat Harassing the Heart Spirit	0.14[a] (0.016)	0.17[a] (0.033)	0.18[a] (0.023)	0.23[b] (0.020)	0.24[b] (0.015)
Liver Qi Stagnation and Stomach Heat	0.15[a] (0.024)	0.24[b] (0.048)	0.30[b] (0.046)	0.43[c] (0.036)	0.42[c] (0.025)
Food Damage	0.14[a] (0.019)	0.22[b] (0.038)	0.24[b] (0.027)	0.36[c] (0.023)	0.42[d] (0.017)
Food Accumulation	0.07[a] (0.015)	0.15[b] (0.031)	0.13[b] (0.022)	0.22[c] (0.018)	0.24[c] (0.014)
Liver Fire Flaming Upwards	0.06[a] (0.016)	0.11[a] (0.032)	0.16[b] (0.023)	0.26[e] (0.020)	0.35[d] (0.014)
Stomach-Spleen Disharmony	0.20[a] (0.019)	0.25[b] (0.039)	0.26[b] (0.027)	0.27[b] (0.023)	0.35[c] (0.017)
Heart Qi Deficiency	0.14[a] (0.018)	0.24[b] (0.036)	0.25[b] (0.025)	0.36[c] (0.021)	0.44[d] (0.016)
Kidney Yin Deficiency with fire effulgence	0.20[a] (0.026)	0.20[a] (0.053)	0.25[a] (0.037)	0.34[b] (0.032)	0.038[b] (0.0023)
Kidney Yang Deficiency	0.04[a] (0.009)	0.07[b] (0.018)	0.03[a] (0.013)	0.07[b] (0.011)	0.06[b] (0.008)
Spleen & Kidney Yang Deficiency	0.28[a] (0.022)	0.23[a] (0.044)	0.30[a] (0.031)	0.38[b] (0.027)	0.48[c] (0.020)
Heart Blood Deficiency	0.14[a] (0.014)	0.17[a] (0.030)	0.24[b] (0.020)	0.30[c] (0.017)	0.39[d] (0.013)
Spleen Yang Deficiency	0.17[a] (0.024)	0.10[a] (0.048)	0.22[a] (0.034)	0.31[b] (0.029)	0.39[c] (0.021)
Spleen & Stomach Deficiency Cold	0.22[a] (0.020)	0.26[a] (0.040)	0.36[b] (0.028)	0.44[c] (0.024)	0.54[d] (0.018)
Liver Qi Invading the Stomach	0.23[a] (0.018)	0.21[a] (0.037)	0.28[b] (0.026)	0.33[b] (0.022)	0.41[c] (0.016)

Means in the same row with different superscript are significantly different ($p < 0.05$). For example the Stomach Heat row shows that No ED is significantly different from BED, EDNOS, BN and AN. BN is significantly different from No ED, BED, EDNOS and AN. BED, EDNOS and AN are not significantly different from each other.

Table 3.7. PSI Results. Mean PSI results (standard errors are in brackets below) are shown for those with and without an eating disorder for the general patterns.

TCM Pattern	Mean PSI score (standard error)				
	No Eating Disorder	BED	EDNOS	BN	AN
Yin Deficiency	0.10[a] (0.013)	0.12[a] (0.026)	0.15[b] (0.018)	0.20[c] (0.016)	0.21[c] (0.011)
Yang Deficiency	0.22[a] (0.020)	0.25[a] (0.040)	0.30[b] (0.028)	0.37[c] (0.024)	0.42[c] (0.018)
Qi Deficiency	0.19[a] (0.024)	0.26[b] (0.049)	0.33[b] (0.035)	0.43[c] (0.029)	0.51[d] (0.021)
Blood Deficiency	0.15[a] (0.021)	0.09[a] (0.043)	0.23[b] (0.030)	0.27[b] (0.026)	0.39[c] (0.019)
Qi and Blood Deficiency	0.14[a] (0.023)	0.12[a] (0.047)	0.20[b] (0.033)	0.31[c] (0.028)	0.41[d] (0.021)

Means in the same row with different superscript are significantly different ($p < 0.05$). For example the Yin Deficiency row shows that No ED is not significantly different from BED but significantly different from EDNOS, BN and AN. EDNOS is significantly different from No ED, BED, BN and AN. BN is significantly different from No ED, BED, EDNOS but not AN. AN is significantly different from No ED, BED, EDNOS but not BN.

The results also show that in four instances not having an eating disorder presents equally or more severe than having an eating disorder (*Kidney Yin deficiency with fire effulgence*, *Spleen and Kidney Yang deficiency, Spleen Yang deficiency* and *Liver Qi invading the Stomach*).

The results from the tables have also been presented graphically (minus the standard errors) to give a better visual comparison between all the patterns. See Figures 3.2-3.22 and 3.23-3.27 in Appendix 6 and Appendix 7.

For all twenty-one patterns listed, the mean PSI's for both AN and BN were significantly different from those with no eating disorder. For BED and EDNOS, there were respectively eleven and sixteen patterns whose differences from no eating disorder were significant. In ten of the twenty-one patterns all four eating disorder severities were statistically significantly different from those without an eating disorder.

It is of interest to determine those TCM patterns whose PSI's differ most between those with and without an eating disorder. For each TCM pattern in Tables 3.6 and 3.7, the difference is computed as the mean PSI for those with the eating disorder of interest minus the mean PSI for those with no eating disorder. See Table 3.8 and 3.9 for these results. The top three patterns for which there are the largest differences in mean PSI scores from those with no eating disorder are:

- AN: *Spleen Qi deficiency, Spleen and Stomach Deficiency Cold, Heart Qi Deficiency*

- BN: *Liver Qi Stagnation and Stomach Heat, Spleen Qi Xu, Heart Qi Deficiency*

- EDNOS: *Spleen and Stomach Deficiency Cold, Liver Qi Stagnation and Stomach Heat, Spleen Qi Xu*

- BED: *Stomach Yin Xu, Liver Qi Depression, Heart Qi Deficiency*

Table 3.8. Difference in Mean PSI scores comparing those with and without an eating disorder for the specific patterns.

Patterns Of Disharmony	Difference in Mean from those with no Eating Disorder(standard error)			
	BED	EDNOS	BN	AN
Stomach Heat	0.09 (0.042)	0.08 (0.032)	0.15 (0.029)	0.10 (0.025)
Liver Qi Depression	0.10 (0.052)	0.09 (0.040)	0.21 (0.036)	0.28 (0.031)
Heart Yin Deficiency	0.06 (0.039)	0.05 (0.030)	0.15 (0.027)	0.16 (0.023)
Stomach Yin Deficiency	**0.11 (0.032)**	0.08 (0.025)	0.15 (0.023)	0.21 (0.019)
Heart Yang Deficiency	0.03 (0.040)	0.08 (0.031)	0.15 (0.023)	0.21 (0.024)
Spleen Qi Deficiency	0.06 (0.043)	0.12 (0.034)	0.23 (0.039)	**0.33 (0.026)**
Stomach Qi Deficiency	0.02 (0.027)	0.06 (0.021)	0.13 (0.019)	0.19 (0.016)
Heat Harassing the Heart Spirit	0.03 (0.037)	0.04 (0.028)	0.09 (0.026)	0.10 (0.022)
Liver Qi Stagnation and Stomach Heat	0.09 (0.054)	0.13 (0.042)	**0.28 (0.037)**	0.29 (0.032)
Food Damage	0.08 (0.042)	0.10 (0.033)	0.21 (0.030)	0.28 (0.025)
Food Accumulation	0.07 (0.034)	0.05 (0.026)	0.14 (0.024)	0.16 (0.020)
Liver Fire Flaming Upwards	0.05 (0.037)	0.10 (0.028)	0.20 (0.025)	0.29 (0.022)
Stomach-Spleen Disharmony	0.05 (0.043)	0.06 (0.033)	0.07 (0.030)	0.15 (0.026)
Heart Qi Deficiency	0.09 (0.040)	0.11 (0.031)	0.22 (0.028)	0.39 (0.024)
Kidney Yin Deficiency with fire effulgence	0.00# (0.060)	0.05 (0.045)	0.14 (0.041)	0.018 (0.027)
Kidney Yang Deficiency	0.03 (0.020)	-0.01^ (0.016)	0.03 (0.014)	0.02 (0.012)
Spleen and Kidney Yang Deficiency	-0.05^ (0.049)	0.02 (0.038)	0.10 (0.034)	0.20 (0.029)
Heart Blood Deficiency	0.02 (0.032)	0.09 (0.025)	0.15 (0.022)	0.24 (0.019)
Spleen Yang Deficiency	-0.07^ (0.053)	0.05 (0.041)	0.14 (0.037)	0.22 (0.032)
Spleen and Stomach Deficiency Cold	0.04 (0.044)	**0.14 (0.034)**	0.22 (0.031)	0.32 (0.026)
Liver Qi Invading the Stomach	-0.02^ (0.041)	0.06 (0.032)	0.10 (0.028)	0.18 (0.026)

Bolding indicates it is the pattern with the greatest difference in PSI scores from those with no eating disorder.
^ indicates where not having an eating disorder presents as more severe than having an eating disorder
# indicates that having an eating disorder and not having an eating disorder present with the same severity.

Table 3.9. Mean Difference in Mean PSI scores comparing those with and without an eating disorder for the general patterns.

Patterns Of Disharmony	Difference in Mean from those with no Eating Disorder(standard error)			
	BED	EDNOS	BN	AN
Yin Deficiency	0.02 (0.029)	0.05 (0.022)	0.10 (0.020)	0.11 (0.017)
Yang Deficiency	0.03 (0.044)	0.07 (0.034)	0.14 (0.031)	0.19 (0.026)
Qi Deficiency	0.07 (0.055)	**0.13 (0.042)**	**0.24 (0.038)**	**0.32 (0.032)**
Blood Deficiency	**-0.07^ (0.048)**	0.08 (0.037)	0.11 (0.033)	0.23 (0.028)
Qi and Blood Deficiency	-0.02^ (0.052)	0.07 (0.040)	0.17 (0.036)	0.28 (0.031)

Bolding indicates it is the pattern with the greatest difference in PSI scores from those with no eating disorder.
^ indicates where not having an eating disorder presents as more severe than having an eating disorder

For each pattern, regression analysis showed that, once type of eating disorder was controlled for, the PSI scores did not co-vary significantly with the participant's age, the duration of their eating disorder, the duration of their treatment or whether their eating disorder was formally diagnosed.

3.7   Discussion

In TCM there exists a school of thought that suggests that eating disorders are not considered an autonomous illness (Rossi, 2007). The evidence of the significant differences in severity presentation between those with and without an eating disorder, particularly in AN and BN, suggests that eating disorders can be identified and characterised as separate autonomous TCM patterns of disharmony.

Given the premise that eating disorders can be differentiated into several primary TCM patterns, conclusions about the presentation of eating disorders in general and of BED, EDNOS, BN and AN specifically, are given below. Contrary to the suggestion that eating disorders generally present as Yin deficiency patterns, the current study demonstrates that eating disorders are more likely to present as yang deficient patterns. There is a scarcity of literature on the concept of Yang deficiency and its relationship to mental health, with only a suggestion by one author that the Yang aspect of the *Essence (Jing)* when depleted, can affect mental health (Maciocia, 2009). In addition, both *Liver Qi Depression* and *Spleen and Stomach Cold deficiency* patterns were found to be strongly exhibited by sufferers of eating disorders of any type (the two most strongly expressed TCM patterns in all four of the eating disorders categories). Whilst *Liver Qi stagnation pattern* is intermittently mentioned as

being involved in eating disorder presentation, *Spleen and Stomach Cold deficiency* pattern has not been identified as a primary pattern for eating disorders prior to this research.   Further investigation into the role Yang deficiency patterns contribute to mental health and why the two above patterns present so strongly in those with an eating disorder may help to provide more effective treatments and a better understanding of the causes, pathogenesis and evolution of eating disorders from a TCM perspective.

Specifically with the sub-categories of an eating disorder, AN and BN present similarly but what seems to differentiate AN from BN is the ordering of the patterns that differ most from those with no eating disorder. AN has a stronger representation of Spleen and Stomach and deficiency patterns suggesting that the Spleen and Stomach play an important differential role in AN presentation. In BN, however, there is a greater prominence of *Stomach Heat* and *Liver Qi stagnation* patterns in addition to the familiar Spleen and Stomach patterns. This implies that *Liver Qi stagnation* has a more differential role in the presentation of BN than in AN. This understanding of the intricacies of presentation of the TCM patterns seen in AN and BN may help practitioners specifically address treatment of AN and BN and increase the effectiveness of their treatment.

Spleen Qi deficiency and *Heart Qi deficiency* patterns have been identified by anecdotal evidence as patterns being involved in individuals with AN. The findings comparing those without an eating disorder to those with AN provide some preliminary evidence that both of these patterns are involved. The *Spleen and Stomach Deficiency Cold* pattern however is not mentioned as being involved in AN and perhaps the addition of moxibustion which promotes warmth and generation of yang Qi for this pattern would yield better clinical results than treating the pattern of *Spleen Qi deficiency* alone.

Stomach Heat has been put forward as a presenting pattern in BN in many texts (Flaws, 2001; Fletcher, 2002-2005; MacLean & Lyttleton, 2002; Munir, 2007; Wimmer, 2003) yet evidence has been lacking. This study provides evidence to partially support this theory suggesting that *Stomach Heat* in combination with *Liver Qi Stagnation* is a better representation of BN than the pattern of *Stomach Heat* alone. A treatment protocol that addresses both *Stomach Heat and Liver Qi Stagnation* patterns may provide more efficacious results than treating *Stomach Heat* pattern alone.

The results from this study support the theory that EDNOS is a way station from either AN or BN. This statement is based on the evidence that compared to those with no eating disorder to those with an eating disorder. The four patterns that present with the strongest pattern differences in EDNOS are a

combination of the top three patterns in both AN and BN (e.g. *Spleen and Stomach Cold deficiency pattern*, *Liver Qi Stagnation and Stomach Heat pattern, Spleen Qi deficiency* pattern and *Heart Qi deficiency pattern*). This finding suggests that the TCM presentation of EDNOS corresponds in the same way as the Western medicine theory. Relapses back into full blown BN or AN from EDNOS are common in the treatment of eating disorders (Abraham & Llewellyn-Jones, 2001), acupuncturists using the differential findings mentioned above could modify and tailor their treatments, where appropriate, to maintain recovery and to help prevent relapses.

Compared to those with no eating disorder, BED presents very different TCM patterns from those with EDNOS, BN and AN. Again our findings support the western medicine theory that BED is a separate and stand alone eating disorder category (Grilo, 2006; Grilo, et al., 2009). An overview of the BED TCM patterns with the greatest variation from those with no eating disorder, show a predilection for patterns involving both hot and replete conditions (replete and empty heat patterns and stagnation patterns). This is in stark contrast to the overview of EDNOS, BN and AN, which had a stronger representation of deficiency and cold patterns especially involving the Spleen, Stomach and Heart and Cold deficiency. This implies that BED needs to be treated and understood as being a separate syndrome from EDNOS, BN and AN.

Eating disorders are complex diseases and they are often further complicated by co-occurring (co-morbid) psychological disorders such as depression, anxiety, obsessive compulsive disorder (OCD) which are secondary to the eating disorder (Andersen & Mehler, 1999; Anderson & Paulosky, 2004; Birmingham & Beumont, 2004; Bryant-Waugh, 2000; Lask, 2000; Schmidt & Treasure, 2005; Treasure, et al., 2003).

The benefit of TCM is that it treats and assess' the individual as a whole and thus treats any secondary co-occurring issues as part of that whole. The disadvantage to TCM is that it treats and assess' the individual as a whole and therefore it is difficult to isolate the core TCM feature of eating disorders (which is currently unknown) from the treating of the consequences/co-morbidities of an eating disorder. For research purposes, this is disadvantage but in practice, it is less so. This author would never advocate treating a patient with an eating disorder without best practice biomedical care. The author believes that TCM treatment should be an adjunct to other treatment. The perceived strength of TCM in treating those with an eating disorder is the ability to treat the individual as a whole and to help facilitate a shorter, easier, less stressful treatment course.

Given the possibility of this survey capturing symptoms of the co-occurring disorders (such as anxiety, depression and OCD), the patterns with the

strongest representation in eating disorders were compared to those patterns seen in anxiety, depression and OCD. While having some similarities (Liver Qi stagnation, Heart Blood deficiency, Spleen Qi deficiency, Spleen Yang deficiency and Kidney Yang deficiency), there are also noteworthy differences (such as Lung patterns, Phlegm patterns, Damp patterns and Kidney Yin patterns) (Flaws & Lake, 2003; Maciocia, 2009; Schnyer & Allen, 2001). This suggests that the eating disorder component is represented in the patterns of disharmony in this research. For a primary investigation into TCM and eating disorders, it provides the building blocks or further more detailed investigation and research.

The findings and interpretation of the results of this study indicate a proposed treatment approach, informed by this analysis. The proposed treatment approach is based on evidence-based research to help guide practitioners treatment principles and acupuncture point selection. The suggested approach has both a pragmatic and prescriptive aspect. The pragmatic aspect suggests using the PSI scores of an individual to determine which TCM patterns to focus on in treatment. Those patterns with the highest PSI scores would be the focus of treatment. The prescriptive aspect suggests, that in addition to focusing on an individuals' highest PSI scored TCM patterns, the patterns that have the greatest difference from those with no eating disorder should also be treated (see the list of patterns in the results section). These

patterns, although differing between eating disorders, would not differ amongst individuals with the same eating disorder. Acupoints or herbal prescriptions would be formulated to address both aspects of this treatment approach.

Advantages to this approach are that it is easy to administer and understand and does not require an extensive knowledge of eating disorders, especially from a psychological viewpoint. The proposed approach allows the TCM practitioner to continue to treat the sufferer as an individual, something that is highly valued in TCM (Shanghai College of Traditional Medicine, 1981) and the treatment approach is based on evidence-based research to focus treatment for a disease that is both difficult and overwhelming to treat (Clarke, 2008). The model also allows reassessment throughout the course of an individuals' treatment so that treatment can be adjusted as an individual progresses or regresses.

3.7.1 Limitations to the online surveys

A limitation of self reported surveys is that some respondents may have under- or over-reported their symptoms. Also, due to individual interpretation of some of the signs seen in the patterns (e.g. pale face) and the Chinese expression of symptoms (e.g. scorched lips), the survey may not have captured all relevant data for each respondent. A limitation specific to online surveys is

the possibility of multiple responses from a single individual (although this is restricted somewhat by an individual being able to fill in the survey on one computer only, so multiple responses would require multiple computers). Additionally the issue surrounding cross-validation and reliability of the current survey in different patient cohorts and settings is beyond the scope of the current project.

3.8   Conclusion

This study addresses the lack of information regarding TCM pattern presentation and understanding of eating disorders, specifically AN, BN, EDNOS and BED.   Whilst there has been anecdotal evidence suggesting possible pattern involvement, there has been no systematic approach to investigating TCM patterns and relevance for eating disorders.   Using the methodology to systematically quantify the TCM patterns of disease, this study evaluated the extent to which the symptoms of AN, BN, EDNOS and BED present as TCM patterns.

The results showed, for the TCM patterns, statistically significant differences between presentation severity across the four eating disorders. This implies that eating disorders can be identified as a separate, autonomous

syndrome in TCM. The results also provided some evidence on the TCM patterns involved in eating disorder presentation, supporting the anecdotal evidence. *Liver Qi Depression* and S*pleen and Stomach Cold deficiency patterns* were strongly expressed by those with an eating disorder of any type. Compared to those with no eating disorder, the TCM patterns S*pleen Qi deficiency*, *Liver Qi Stagnation and Stomach Heat,* S*pleen and Stomach Cold deficiency* and H*eart Qi deficiency* feature strongly in AN, BN and EDNOS. In contrast S*tomach Yin deficiency*, *Liver Qi Depression* and *Heart Qi deficiency* feature strongly in BED. These results have the potential to impact how eating disorders are diagnosed and treated by TCM practitioners.

These findings indicate a treatment approach informed by the results of the study. Perceived advantages to the proposed treatment approach are the ease of administration and the ability to treat eating disorders from a TCM perspective without requiring extensive psychological training. With the identification of TCM patterns involved in the four eating disorder categories it is expected that TCM practitioners will be able to understand eating disorders more effectively. The proposed treatment approach of treating the most severely presenting patterns alongside those which differ most from those with no eating disorder, it is envisaged that TCM practitioners will be more adequately equipped to treat those with an eating disorder. Future research to

evaluate this treatment model to determine its efficacy, and to help examine relapses when treating those with EDNOS is warranted.

Chapter 4 A Predictive Method for Identifying Categories of Eating Disorders in Chinese Medicine

4.1   Introduction

As seen in the chapters, there is no peer-reviewed research on TCM Patterns of Disharmony associated with eating disorders, although many practitioners and authors have proposed hypotheses (Flaws, 2001; Flaws & Lake, 2003; Gasgcoigne, 1994; Jarrett, 1995; Kraft, 2003; MacLean & Lyttleton, 2002; Ross, 1995; Rossi, 2007; Smith, 1993).   As there is a limited understanding of eating disorders from a Chinese Medicine perspective it is not unexpected that there is no formal questionnaire or inventory available to TCM practitioners to access or help ascertain the presence of an eating disorder. There are many biomedical assessment tools available to measure eating disorders such as the Eating Disorder Inventory (EDI) (Garner, 2004), the Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn, et al., 2008), the Eating Disorder Quality of Life questionnaire (EDQoL) (Engel, et al., 2009) and SCOFF Questionnaire (Morgan, et al., 1999).   Some of these questionnaires are only available to registered psychologists or medical doctors and thus inaccessible to most TCM practitioners. Others such as the EDE-Q are free to use by anyone however this author found it difficult to access a copy, difficult to understand how to use it and score it.   In addition the results of the EDE-Q represent the psychological aspects of eating disorders. It is unclear how TCM

practitioners would interpret or understand these psychological aspects within a TCM paradigm. The psychopathology of eating disorders is important in both understanding and treating those with an eating disorder (Cooper & Fairburn, 1993; Cooper & Fairburn, 1987). There are both specific and general components to this complex psychopathology (Cooper & Fairburn, 1987). There is psychopathology involved specifically with an eating disorder and psychopathology comprising features found in co-morbid psychological disorders (Cooper & Fairburn, 1987). Restraint, eating concerns, shape concerns and weight concerns are all possible features in an eating disorder however the core feature is self evaluation unduly influenced by body shape and weight (American Psychiatric Association, 2009; Cooper & Fairburn, 1993; Cooper & Fairburn, 1987). While the previous research findings of Chapter 4 indicatse possible patterns of disharmony represented in those with an eating disorder, these findings do not indicate which patterns of disharmony reflect the biomedical psychopathology of eating disorders particularly the core feature of self evaluation unduly influenced by body shape and weight.

One method of determining which symptoms/patterns of disharmony are 'core' to eating disorders from a TCM perspective would be to try to separate the patterns of disharmony in the previous study that present in co-morbid conditions such as depression/anxiety etc. The disadvantage with this approach is the lack of similar methodology used in determining the patterns of

disharmony seen in each disorder. This makes comparison and analysis of patterns of disharmony across disorders very difficult. Another method is to analyse the data collected in the study presented in Chapter 3 to try to determine the patterns that influence (predict) eating disorder outcome.

Thus our survey data, (see Chapter 3), can be used to construct a statistical model to predict which eating disorder an individual is most likely to have, based solely on TCM diagnostic principles. The model can assess marginal effects (possible eating disorder features) and also may have benefit as an assessment tool for TCM practitioners to assess their treatment of those with an eating disorders. Therefore the aim of this chapter is to identify whether there are any predictive indicators for determining whether an individual has no eating disorder, BED, EDNOS, BN or AN using the results from the eating disorder survey in Chapter 3.

4.2.   Methodology

4.2.1   The Data

The data that are being used in this study were obtained via a survey that was designed specifically to understand eating disorders from a TCM perspective. The survey was designed to be answered by eating disorder and non eating disorder sufferers. It was administered online via Survey Monkey

("Survey Monkey," 2009). It contained questions on the individual's age and gender, questions on their general health (e.g. sleep, menstruation, bowel movements, headaches etc.) and where relevant on the diagnosis and treatment of their eating disorder and specific signs and symptoms related to their eating disorder.

The data from the196 female respondents analysed in Chapter 3 was used as the in-sample cohort. This included 142 participants with an eating disorder* and 54 without an eating disorder. An additional 35 surveys, including 32 with an eating disorder and three without, were used as the out of sample cohort. The data for the additional 35 surveys was collected in the same way as the 196 participants (see page 60).

Following the methodology of Berle et al (2010) for each pattern a score was defined as the proportion of reported signs and symptoms taken as a fraction of the total possible signs and symptoms. We referred to this as the Pattern Severity Index (PSI). See Chapter 3 for a more detailed explanation of this process.

* All 142 participants were analysed in this study regardless of whether they had received a formal or non formal diagnosis. This is due to the analysis in Chapter 3 which showed that having a formal or non formal diagnosis had no explanatory power over the TCM patterns of disharmony seen in each eating disorder.

The resulting PSI scores from the checklist for each pattern of disharmony were averaged across the 196 in-sample participants and 35 out of sample participants specific to each eating disorder and those with no eating disorder. For analysis purposes these averages will be referred to as μPoDs.

4.2.2 Statistical Methodology

According to biomedical research, there are two different theories of how the categories of eating disorders relate to each other. One is that eating disorders are on a continuum and the second is that they are set categories. The continuum perspective suggests that eating disorders occur along a continuum which individuals vary in degree but not in kind (Peck & Lightsey, 2008; Perosa & Perosa, 2004). The category perspective sets eating disorders as distinct (i.e. qualitatively different) from normal development and from each other (Peck & Lightsey, 2008).

Some authors suggest both theories are involved with the categorical approach having BED as a stand-alone eating disorder category (Grilo, 2006; Grilo, et al., 2009) and the continuum approach having AN, BN and EDNOS sharing similarities in psychopathology, development and presentation (Agras, et al., 2009; Grilo, 2006).

4.2.3 The Predictive Models

A range of logit models is considered that predicts the *probabilities* that an individual with observed PSI's has each of the possible eating disorders. There are two approaches to the type of model to be selected for the predictive model; one is the ordered logit model and the other is the unordered logit model. The ordered model approach imposes an ordering on the eating disorders from least severe, no eating disorder (No ED) to most severe (AN). The unordered model approach imposes no ordering.

Current literature offers mixed support for both approaches. Mortality, prevalence and severity of presentation of the four eating disorder types and the continuum theory supports the use of the ordered model (Button & Chadalavada, 2009; Klump et al., 2009; Peck & Lightsey, 2008; Perosa & Perosa, 2004; Shisslak et al., 1995). AN, BN and EDNOS share similarities and would perhaps best fit this ordered model. However research on the psychopathology, development and course of eating disorders suggests BED presents differently from other eating disorder groups which supports the use of categorical approach and thus the un-ordered model (Grilo, 2006; Grilo, et al., 2009; Hartney, 2010; Strober, 2009; Walsh, 2009).

Given there is no clear-cut research to support choosing one model over another, it was decided that both the ordered and un-ordered models would be

run to determine the model that predicts best. To ensure the best predictive model, both models were run with a mixture of combinations of groupings of the eating disorders. These groupings were based on the literature regarding eating disorder psychopathology, and the continuum and category theories.

The groupings are

- *All categories [no eating disorder (No ED), (BED), (EDNOS), (BN), (AN)].*

- *No BED. The removal of BED only with No ED, EDNOS, BN and AN still included. [(No ED), (EDNOS), (BN), (AN)].* This was based on the theory that BED is viewed as a distinctly different to AN, BN and EDNOS (Agras, et al., 2009; Grilo, 2006; Grilo, et al., 2009; Hartney, 2010; Strober, 2009; Walsh, 2009) .

- *No BED, AN and BN combined in one group with No ED and EDNOS still included [(BN or AN), (No ED), (EDNOS)].* The rationale behind this grouping is the possible difficulty of this survey differentiating AN sufferers who binge and purge (AN-B/P) and those with BN who binge, purge and restrict (American Psychiatric Association, 2009).

- *No BED and one group of an eating disorder of any type with No eating disorder still included. [(EDNOS, BN or AN) (NoED)].*

4.2.4 The ordered model

The *ordered logit* model (Wooldridge, 2002) was used for the probability that an individual has a particular eating disorder. To describe this model, the variable C_i is defined as follows:

$C_i =$ 0, if individual i has NoED

1, if individual i has BED

2, if individual i has EDNOS

3, if individual i has BN

4, if individual i has AN.

The ordered logit model has the general form

$$\Pr\left(C_i = 0\right) = \Lambda\left(\gamma_0 - \left(\beta_1 X_{1,i} + \ldots + \beta_{21} X_{21,i}\right)\right),$$
$$\Pr\left(C_i = j\right) = \Lambda\left(\gamma_j - \left(\beta_1 X_{1,i} + \ldots + \beta_{21} X_{21,i}\right)\right) - \Lambda\left(\gamma_{j-1} - \left(\beta_1 X_{1,i} + \ldots + \beta_{21} X_{21,i}\right)\right), \ j = 1, 2, 3,$$
$$\Pr\left(C_i = 4\right) = 1 - \Lambda\left(\gamma_3 - \left(\beta_1 X_{1,i} + \ldots + \beta_{21} X_{21,i}\right)\right),$$

where $X_{1,i}$ ... $X_{21,i}$ are the μPoD measurements for individual i and $\beta_1,\ldots,\beta_{21}$ measure the importance of each of μPoD to the probability of eating disorder j. The function Λ is the logistic distribution function $\Lambda(x) = 1 / (1 + e^{-x})$ (chosen to ensure all probabilities lies between 0 and 1) and the parameters γ_j are threshold parameters that determine the transitions between eating disorders.

Of interest are the $\beta_1,...,\beta_{21}$ coefficients, since they determine which μPoD's are useful predictors for the type of eating disorder. These coefficients are themselves not directly interpretable so we calculate the marginal effects to provide a convenient interpretation of the results.

The marginal effect of a particular μPoD $X_{h,i}$ for any $h = 1,...,21$ is given by

$$\frac{\partial \Pr(C_i = 0)}{\partial X_{h,i}} = -\lambda\left(\gamma_0 - \left(\beta_1 X_{1,i} + ... + \beta_{21} X_{21,i}\right)\right) \cdot \beta_h,$$

$$\frac{\partial \Pr(C_i = j)}{\partial X_{h,i}} = \left(\lambda\left(\gamma_{j-1} - \left(\beta_1 X_{1,i} + ... + \beta_{21} X_{21,i}\right)\right) - \lambda\left(\gamma_j - \left(\beta_1 X_{1,i} + ... + \beta_{21} X_{21,i}\right)\right)\right) \cdot \beta_h, \; j = 1,2,3,$$

$$\frac{\partial \Pr(C_i = 4)}{\partial X_{h,i}} = \lambda\left(\gamma_3 - \left(\beta_1 X_{1,i} + ... + \beta_{21} X_{21,i}\right)\right) \cdot \beta_h.$$

The marginal effect measures the expected change in probability of a particular condition for a 1 unit increase in $X_{h,i}$, holding constant all other conditions. Each marginal effect is rescaled by dividing it by the maximum number of symptoms possible for that pattern. This ensures the marginal effects reported correspond to the expected change in probability of condition j for one extra symptom in pattern h. Thus the marginal effects report the predicted changes to the probabilities that would result from the addition of one extra symptom for a particular pattern of disharmony while leaving all other patterns of disharmony unchanged.

4.2.5 The un-ordered model

The *multinomial logit* model (Wooldridge, 2002) was used for the probability that an individual has a particular eating disorder. The model is defined as follows:

$$\Pr(C_i = j) = \frac{\exp(\beta_{j,0} + \beta_{j,1}X_{1,i} + \ldots + \beta_{j,21}X_{21,i})}{1 + \sum_{k=1}^{4}\exp(\beta_{k,0} + \beta_{k,1}X_{1,i} + \ldots + \beta_{k,21}X_{21,i})}, \quad j = 1,2,3,4,$$

and $\Pr(C_i = 0) = 1 - \sum_{j=1}^{4}\Pr(C_i = j)$.

Like the ordered logit model, the β coefficients are of interest but they are not directly interpretable. The marginal effects can be calculated by the following formulae:

$$\frac{\partial \Pr(C_i = 0)}{\partial X_{h,i}} = -\frac{\sum_{j=1}^{4}\exp(\beta_{j,0} + \beta_{j,1}X_{1,i} + \ldots + \beta_{j,21}X_{21,i}) \cdot \beta_{h,j}}{\left(1 + \sum_{j=1}^{4}\exp(\beta_{j,0} + \beta_{j,1}X_{1,i} + \ldots + \beta_{j,21}X_{21,i})\right)^2}$$

and for *k* = 1,2,3,4:

$$\frac{\partial \Pr(C_i = k)}{\partial X_{h,i}} = \frac{\exp\left(\beta_{k,0} + \beta_{k,1}X_{1,i} + \ldots + \beta_{k,21}X_{21,i}\right) \cdot \beta_{h,k}}{1 + \sum_{j=1}^{4}\exp(\beta_{j,0} + \beta_{j,1}X_{1,i} + \ldots + \beta_{j,21}X_{21,i})}$$
$$- \frac{\exp\left(\beta_{k,0} + \beta_{k,1}X_{1,i} + \ldots + \beta_{k,21}X_{21,i}\right)\sum_{j=1}^{4}\exp(\beta_{j,0} + \beta_{j,1}X_{1,i} + \ldots + \beta_{j,21}X_{21,i}) \cdot \beta_{h,j}}{\left(1 + \sum_{j=1}^{4}\exp(\beta_{j,0} + \beta_{j,1}X_{1,i} + \ldots + \beta_{j,21}X_{21,i})\right)^2}.$$

These marginal effects are also suitably rescaled to measure the predicted changes to the probabilities that would result from the addition of one extra symptom for the significant patterns of disharmony.

All the above formulas (both ordered and un-ordered) represent the equations for the inclusion of all categories e.g. (No ED), (BED), (EDNOS), (BN), (AN). The above formulas were altered slightly to accommodate the different groupings but the fundamentals of the formulas remain the same.

4.2.6 The binary model

This model does not fall under either the category of ordered or un-ordered models but is a special category of its own differentiating only a binary outcome, either an eating disorder or no eating disorder. A logit model is used to predict the probability that an individual has an eating disorder (EDNOS, BN or AN) or no eating disorder (noED). The model is defined as follows.

The binary dependent variable D_i is defined as

$$D_i = \begin{cases} 1, & \text{if individual } i \text{ has AN, BN or EDNOS,} \\ 0, & \text{otherwise.} \end{cases}$$

The logit model takes the form

$$\Pr(D_i = 1) = \Lambda\left(\alpha_0 + \alpha_1 X_{1,i} + \ldots + \alpha_{21} X_{21,i}\right)$$

The marginal effects for this model are calculated using the following formulae:

$$\frac{\partial \Pr(D_i = 1)}{\partial X_{j,i}} = \lambda\left(\alpha_0 + \alpha_1 X_{1,i} + \ldots + \alpha_{21} X_{21,i}\right) \cdot \alpha_j$$

for any $j = 1, \ldots, 21$.

4.2.7 Model Selection

Prior to the calculation of marginal effects and predictions, all models include a model selection procedure to identify the significant coefficients which occurs prior to the computation of the marginal effects and predictions. The model selection procedure identifies the patterns of disharmony which are significant predictors for the type of eating disorder. An initial search is carried out with all 21 μPoD's. The model then identifies insignificant predictors and progressively drops them out of the model until a final model is obtained with only significant predictors.

4.2.8 Evaluation of Predictions

All of the predictive models work by taking the participants' individual PSI scores and substituting those values into the model (the $X_{1,i} \ldots X_{21,i}$ values) and then computing the probabilities of each eating disorder. A prediction for

that individual's eating disorder status is found by selecting the category of eating disorder or no eating disorder with the highest probability.

The efficacy of the model can be assessed in two ways. Eating disorders or no eating disorder can be predicted for each of the 196 individuals in the sample used to estimate the model. These are called the *in-sample* predictions. Eating disorders or no eating disorder can also be predicted for the 35 individuals that were not used for estimating the model. These are called the *out of sample* predictions. The out of sample predictions provide a test of the possible performance of these models in a clinical setting. The proportion of correct predictions in each case (in sample or out of sample) can be computed for each category (no eating disorders, BED, EDNOS, BN and AN).

4.3 Results

4.3.1 The Ordered Model - All categories, [(NoED), (BED), (EDNOS), (BN), (AN)]

The final model identified 7 significant predictors – Heart Yang deficiency, Heart Harassing Heart Spirit, Heart Qi deficiency, Food Accumulation, Stomach Yin deficiency, Spleen and Stomach deficiency cold and Spleen Qi deficiency. The estimated probabilities of correctly predicting the eating disorders both *in-sample* and *out of sample* are reported in Table 4.1.

The estimated marginal effects for each of the seven significant patterns are also reported in Table 4.1.

The predictive estimates can be interpreted in the following way. Consider first the in-sample results. For those individuals included in the estimation without an eating disorder, the model correctly predicts their status 93% of the time. For those with AN, the model predicts correctly 84% of the time. The other categories are less accurately predicted, i.e. BN (44%), EDNOS (15%) and BED (0%). The out of sample results are interpreted similarly but apply to those 35 individuals not included in the model estimation.

The marginal effects can be interpreted in the following way. An increase of one symptom for the patterns of Heart Yang deficiency, Stomach Yin deficiency, Food Accumulation and Spleen Qi deficiency increases the probability of having either AN or BN and decreases the probability of having no eating disorder, BED or EDNOS.

For example, the addition of one extra symptom associated with Stomach Yin deficiency is predicted to increase the probabilities of AN by 9.3 percentage points and BN by 2.7%, and decrease the probabilities of No ED, BED and EDNOS by 7.6%, 2.0% and 2.4% respectively.

Table 4.1 Predictive estimates and marginal effects for all eating disorders and no eating disorders for the ordered model. Standard errors in brackets.

Predictive Estimates	No ED	BED	EDNOS	BN	AN
In Sample	0.93 (0.05)	0.00 (0.10)	0.15 (0.07)	0.44 (0.06)	0.84 (0.04)
Out of Sample	1.00 (0.27)	0.00 (0.18)	0.22 (0.15)	0.36 (0.13)	0.50 (0.13)
Marginal Effect	No ED	BED	EDNOS	BN	AN
Heart Yang deficiency	-0.080	-0.021	-0.025	0.028	0.100
Heart Harassing Heart Spirit	0.700	0.018	0.022	-0.024	-0.085
Heart Qi deficiency	0.066	0.017	0.021	-0.023	-0.081
Stomach Yin deficiency	-0.076	-0.020	-0.024	0.027	0.093
Food Accumulation	-0.081	-0.021	-0.026	0.27	0.100
Spleen and Stomach deficiency cold	0.076	0.020	0.024	-0.027	-0.093
Spleen Qi deficiency	-0.073	-0.020	-0.023	0.026	0.090

4.2   The Ordered Model - No BED [(NoED), (EDNOS), (BN), (AN)]

The final model identified 8 significant predictors – Heart Yin Deficiency, Heart Yang deficiency, Heart Harassing Heart Spirit, Heart Qi deficiency, Stomach Yin deficiency, Spleen and Stomach deficiency cold, Spleen Qi deficiency and Spleen and Kidney Yang deficiency.   Table 4.2 shows the estimated probabilities of correctly predicting each eating disorder (*in-sample* and *out of sample)* and the estimated marginal effects for each of the eight significant patterns.

Table 4.2 Predictive estimates and marginal effects for No ED, EDNOS, BN and AN for the ordered model.

Predictive Estimates	No ED	EDNOS	BN	AN
In Sample	0.91 (0.06)	0.31 (0.08)	0.44 (0.07)	0.76 (0.05)
Out of Sample	1.00 (0.27)	0.22 (0.15)	0.45 (0.14)	0.25 (0.13)
Marginal Effect	No ED	EDNOS	BN	AN
Heart Yin deficiency	-0.034	-0.004	-0.001	0.039
Heart Yang deficiency	-0.046	-0.005	-0.028	0.052
Heart Harassing Heart Spirit	0.080	0.010	0.002	-0.095
Heart Qi deficiency	0.046	0.005	0.001	-0.052
Stomach Yin deficiency	-0.095	-0.011	-0.003	0.109
Spleen & Stomach deficiency cold	0.065	0.008	0.002	-0.074
Spleen Qi deficiency	-0.044	-0.005	-0.001	0.050
Spleen & Kidney Yang deficiency	-0.041	-0.005	-0.001	0.046

4.3   The Ordered Model – <u>No BED and BN and AN pooled [(NoED), (EDNOS), (BN or AN)]</u>

The final model had 7 significant predictors – Heart Yin Deficiency, Heart Yang deficiency, Heart Harassing Heart Spirit, Heart Qi deficiency, Stomach Yin deficiency, Spleen and Stomach deficiency cold and Spleen Qi deficiency. Table 4.3 shows the estimated probabilities of correctly predicting each eating disorder (*in-sample* and *out of sample)* and the estimated marginal effects for each of the seven significant patterns.

Table 4.3 Predictive estimates and marginal effects for No ED, EDNOS, (BN and AN) for the ordered model.

Predictive Estimates	No ED	EDNOS	BN or AN
In Sample	0.91 (0.04)	0.27 (0.06)	0.94 (0.03)
Out of Sample	1.00 (0.20)	0.11 (0.11)	0.87 (0.07)
Marginal Effect	No ED	EDNOS	AN
Heart Yin deficiency	-0.063	-0.003	0.066
Heart Yang deficiency	-0.057	-0.003	0.060
Heart Harassing Heart Spirit	0.130	0.006	-0.136
Heart Qi deficiency	0.067	0.003	-0.069
Stomach Yin deficiency	-0.106	-0.005	0.111
Spleen & Stomach deficiency cold	0.076	0.004	-0.080
Spleen Qi deficiency	-0.084	-0.004	0.088

4.4   The Un-ordered Models - All categories, [(NoED), (BED), (EDNOS), (BN), (AN)]

The final multinomial logit model has 8 significant predictors – Heart Yin deficiency, Heat Harassing Heart Spirit, Stomach Yin deficiency, Stomach Heat, Liver Qi Stagnation and Stomach Heat, Liver Fire Flaming Upwards, Spleen and Kidney Yang deficiency and Spleen Qi deficiency.   The estimated probabilities of correctly predicting the self reported eating disorder both in sample and out of sample is shown in Table 4.4.   The estimated marginal effects for each of the eight significant patterns are also reported in Table 4.4.

The predictive estimates can be interpreted in the following way. Consider first the in-sample results. For those individuals included in the estimation without an eating disorder, the model correctly predicts their status 89% of the time. For those with AN, the model predicts correctly 84% of the time. The other categories are less accurately predicted, i.e. BN (50%), EDNOS (4%) and BED (0%). The out of sample results are interpreted similarly but apply to those 35 individuals not included in the model estimation.

The marginal effects can be interpreted in the following way. An increase of one symptom for the patterns of Heat Harassing Heart Spirit, Liver Qi Stagnation and Stomach Heat and Liver Fire Flaming Upwards increases the probability of having no eating disorder and decreases the probability of having

no eating disorder for the patterns Heart Yin deficiency, Stomach Yin deficiency, Stomach Heat, Spleen and Kidney Yang deficiency and Spleen Qi deficiency.

For example, the addition of one extra symptom associated with Stomach Yin deficiency is predicted to increase the probabilities of AN by 8.7 percentage points and BED by 2.9%, and decrease the probabilities of No ED, BED and EDNOS by 6.1%, 4.8% and 0.7% respectively

Table 4.4 Predictive estimates and marginal effects for all eating disorder and no eating disorder for the un-ordered model.

Predictive Estimates	No ED	BED	EDNOS	BN	AN
In Sample	0.89 (0.05)	0.00 (0.10)	0.04 (0.07)	0.50 (0.06)	0.84 (0.04)
Out of Sample	1.00 (0.22)	0.00 (0.16)	0.00 (0.13)	0.36 (0.12)	0.58 (0.11)
Marginal Effect	No ED	BED	EDNOS	BN	AN
Heart Yin deficiency	-0.037	-0.016	-0.034	0.065	0.023
Heat Harassing Heart Spirit	0.062	0.027	0.057	-0.100	-0.087
Stomach Yin deficiency	-0.061	0.029	-0.048	-0.007	0.087
Stomach Heat	-0.012	-0.005	-0.009	0.052	-0.0027
Liver Qi Stagnation and Stomach Heat	0.013	0.06	0.015	0.039	-0.073
Liver Fire Flaming Upwards	0.014	0.005	0.011	-0.062	0.032
Spleen and Kidney Yang deficiency	-0.014	-0.007	-0.017	-0.043	0.081
Spleen Qi deficiency	-0.061	-0.021	0.015	0.035	0.031

4.5   *The Un-ordered Models - No BED [(NoED), (EDNOS), (BN), (AN)]*

The final model identified six significant predictors – Heart Yin deficiency, Heat Harassing Heart Spirit, Stomach Yin deficiency, Stomach Heat, Spleen and Kidney Yang deficiency and Spleen Qi deficiency. Table 4.5 shows the estimated probabilities of correctly predicting the self reported eating disorder (*in-sample* and *out of sample)* and the estimated marginal effects for each of the six significant patterns.

Table 4.5 Predictive estimates and marginal effects for No ED, EDNOS, BN, and AN for the un-ordered model.

Predictive Estimates	No ED	EDNOS	BN	AN
In Sample	0.91 (0.05)	0.08 (0.07)	0.39 (0.06)	0.85 (0.04)
Out of Sample	1.00 (0.25)	0.00 (0.14)	0.45 (0.13)	0.58 (0.12)
Marginal Effect	No ED	EDNOS	BN	AN
Heart Yin deficiency	-0.090	-0.043	0.061	0.031
Heat Harassing Heart Spirit	0.092	0.079	-0.127	-0.044
Stomach Yin deficiency	-0.134	0.014	0.014	0.105
Stomach Heat	-0.012	-0.009	0.048	-0.027
Spleen Qi deficiency	-0.010	-0.008	0.040	-0.023
Spleen & Kidney Yang deficiency	-0.020	-0.020	-0.060	0.099

4.6   The Un-ordered Models - No BED and BN and AN pooled [(NoED), (EDNOS), (BN or AN)]

The final model identified four significant predictors – Heart Yin deficiency, Heat Harassing Heart Spirit, Stomach Yin deficiency and Spleen Qi deficiency. Table 4.6 shows the estimated probability of correctly predicting the self reported eating disorder (*in-sample* and *out of sample)* and the estimated marginal effects for each of the four significant patterns.

Table 4.6 Predictive estimates and marginal effects for No ED, EDNOS, (BN and AN) together for the un-ordered model.

Predictive Estimates	No ED	EDNOS	BN or AN
In Sample	0.87 (0.05)	0.15 (0.08)	0.24 (0.04)
Out of Sample	1.00 (0.25)	0.11 (0.15)	0.35 (0.09)
Marginal Effect	No ED	EDNOS	AN
Heart Yin deficiency	-0.032	-0.053	0.086
Heat Harassing Heart Spirit	0.059	0.098	-0.157
Stomach Yin deficiency	-0.125	-0.012	0.137
Spleen Qi deficiency	-0.049	0.007	0.042

4.7 The Binary Model - No BED and EDNOS, BN and AN pooled [(NoED), (EDNOS,BN or AN)]

The final model identified 7 significant predictors – Heart Yin deficiency, Heat Harassing Heart Spirit, Kidney Yang deficiency, Stomach Yin deficiency, Spleen and Stomach deficiency cold, Spleen Qi deficiency and Spleen Yang deficiency. Table 4.7 shows the estimated probabilities of correctly predicting the self reported eating disorder (*in-sample* and *out of sample)* and the estimated marginal effects for each of the seven significant patterns.

Table 4.7 Predictive estimates and marginal effects for either having or not having an eating disorder using a logit model.

Predictive Estimates	No ED	(EDNOS, BN or AN)
In Sample	0.70 (0.04)	0.95 (0.03)
Out of Sample	0.33 (0.22)	0.84 (0.07)
Marginal Effect	Having an eating disorder (EDNOS, BN or AN)	
Heart Yin deficiency	0.06	
Heat Harassing Heart Spirit	-0.13	
Kidney Yang deficiency	-0.07	
Stomach Yin deficiency	0.09	
Spleen and Stomach deficiency cold	-0.13	
Spleen Qi deficiency	0.10	
Spleen Yang deficiency	0.06	

To make comparisons easier a summary of the estimated probability of correctly predicting the self reported eating disorder both *in-sample* and *out of sample* for all models and groupings is shown in Table 4.8 and a summary of the marginal effects for all models and grouping is shown in Tables 4.9, 4.10 and 4.11.

Table 4.8 A summary of the predictive outcomes for all model types.

Ordered Models						Unordered Models (Multi-Nomial)					Binary Model	
All ED's						**All ED's**					**No ED or an eating disorder (EDNOS, BN or AN)**	
Predictive Estimates	No ED	BED	EDNOS	BN	AN	No ED	BED	EDNOS	BN	AN	No eating disorder	An eating disorder
In Sample	0.93	0.00	0.15	0.44	0.84	0.89	0.00	0.04	0.50	0.84	0.70	0.95
Out of Sample	1.00	0.00	0.22	0.36	0.50	1.00	0.00	0.00	0.36	0.58	0.33	0.84
No BED						**No BED**						
Predictive Estimates	No ED		EDNOS	BN	AN	No ED		EDNOS	BN	AN		
In Sample	0.91		0.31	0.44	0.76	0.91		0.08	0.39	0.85		
Out of Sample	1.00		0.22	0.45	0.25	1.00		0.00	0.45	0.58		
No BED and BN and AN grouped together						**No BED and BN and AN grouped together**						
Predictive Estimates	No ED		EDNOS		BN or AN	No ED		EDNOS		BN or AN		
In Sample	0.91		0.27		0.94	0.87		0.15		0.24		
Out of Sample	1.00		0.11		0.87	1.00		0.11		0.35		

Table 4.9 A summary of the marginal effects for the ordered model.

Ordered Model												
All ED's						No BED				No BED and BN and AN grouped together		
Marginal Effects	No ED	BED	EDNOS	BN	AN	No ED	EDNOS	BN	AN	No ED	EDNOS	BN and AN
Heart Yin deficiency						-0.034	-0.004	-0.001	0.039	-0.063	-0.003	0.066
Heart Yang deficiency	-0.080	-0.021	-0.025	0.028	0.100	-0.046	-0.005	-0.028	0.052	-0.057	-0.003	0.060
Heat Harassing Heart Spirit	0.700	0.018	0.022	-0.024	-0.085	0.08	0.010	0.002	-0.095	0.130	0.006	-0.136
Heart Qi deficiency	0.066	0.017	0.021	-0.023	-0.081	0.046	0.005	0.001	-0.052	0.067	0.003	-0.069
Stomach Yin deficiency	-0.076	-0.020	-0.024	0.027	0.093	-0.095	-0.011	-0.003	0.109	-0.106	-0.005	0.111
Food Accumulation	-0.081	-0.021	-0.026	0.270	0.100							
Spleen and Stomach deficiency cold	0.076	0.020	0.024	-0.027	-0.093	0.065	0.008	0.002	-0.074	0.076	0.004	-0.080
Spleen Qi deficiency	-0.073	-0.020	-0.023	0.026	0.090	-0.044	-0.005	-0.001	0.050	-0.084	-0.004	0.088
Spleen and Kidney Yang deficiency						-0.041	-0.005	-0.001	0.046			

Table 4.10 A summary of the marginal effects for the unordered model.

	Unordered Model											
All ED's						No BED				No BED and BN and AN grouped together		
Marginal Effects	No ED	BED	EDNOS	BN	AN	No ED	EDNOS	BN	AN	No ED	EDNOS	BN and AN
Heart Yin deficiency	-0.037	-0.016	-0.034	0.065	0.023	-0.090	-0.043	0.061	0.031	-0.032	-0.053	0.086
Heat Harassing Heart Spirit	0.062	0.027	0.057	-0.100	-0.087	0.092	0.079	-0.127	-0.044	0.059	0.098	-0.157
Stomach Yin deficiency	-0.061	0.029	-0.048	-0.007	0.087	-0.134	0.014	0.014	0.105	-0.125	-0.012	0.137
Stomach Heat	-0.012	-0.005	-0.009	0.052	-0.0027	-0.012	-0.009	0.048	-0.027			
Spleen Qi deficiency	-0.061	-0.021	0.015	0.035	0.031	-0.010	-0.008	0.040	-0.023	-0.049	0.007	0.042
Spleen &Kidney Yang deficiency	-0.014	-0.007	-0.017	-0.043	0.081	-0.020	-0.020	-0.060	0.099			
Liver Qi Stagnation & Stomach Heat	0.013	0.006	0.015	0.039	-0.073							
Liver Fire Flaming Upwards	0.014	0.005	0.011	-0.062	0.032							

Table 4.11 A summary of the marginal effects for the binary model.

Binary Model	
Either having an eating disorder or not	
Marginal Effects	An eating disorder (EDNOS, BN or AN)
Heat Yin deficiency	0.06
Heat Harassing Heart Spirit	-0.13
Kidney Yang deficiency	-0.07
Stomach Yin deficiency	0.09
Spleen and Stomach deficiency cold	-0.13
Spleen Qi deficiency	0.10
Spleen Yang deficiency	0.06

Table 4.11 A summary of the marginal effects for the binary model.

4.4 Discussion

Traditional Chinese Medicine does not have a formal questionnaire or inventory available to TCM practitioners to assess or help ascertain the presence of an eating disorder in particular the 'core' feature of an eating disorder.

The results of this study show two modeling approaches used to determine if a predictive model can be constructed to model the eating disorder status of an individual, based solely on TCM diagnostic principles.

The efficacy of correctly predicting the self reported eating disorders, both *in-sample* and *out of sample,* is one way to determine the best model to select for future research and possible clinical application. Table 5.8 shows a comparison of the probabilities of correctly predicting the eating disorder status. While the in-sample predictions are interesting, given the potential application of these models to clinical use, the out of sample predictions are the most relevant.

The model that was determined to predict best was the ordered model with the grouping of [(NoED), (EDNOS) (BN or AN)] with BED dropped from the model. This model correctly predicted No ED 100% of the time, EDNOS 11% of

the time and BN or AN 87% of the time. Of note this model had the highest degree of in and out of sample predictive accuracy.

The binary model was seriously considered as it fits well in sample correctly predicting no eating disorder 70% of the time and an eating disorder 95% of the time. It was deemed to be ineligible for use in a clinical setting due to its poor out of sample predictive properties for those with no eating disorder. Out of sample this model only correctly predicted no eating disorder 33% of the time. This means on average for every 100 people you use this model on, 67 people are being told they have a possible eating disorder when they don't. This degree of incorrectness is not desirable in a clinical setting.

4.4.1 Marginal effects discussion

The interpretation of the marginal effects is at least qualitatively similar across all models, with just one or two minor exceptions. Heat Harassing Heart Spirit, Spleen Qi Deficiency and Stomach Yin deficiency were identified in all models and Heart Yin Deficiency was also identified in all models and groupings except the ordered all categories group.

The model that was determined to predict best was the ordered model with the grouping of [(NoED), (EDNOS) (BN or AN)] with BED dropped from the

model. It is important that this model has marginal effects that make sense in TCM terms.

The marginal effects for this model indicate that an increase of *Heart Yin deficiency* by one symptom is predicted to <u>increase</u> the probability of AN/BN by 6.6% (0.066) and <u>decrease</u> the probability of EDNOS and No ED by 0.3% and 6.3% respectively. An increase of *Heart Yang deficiency* by one symptom is predicted to increase the probability of AN/BN by 6.0% and decrease the probability of EDNOS and No ED by 0.3% and 5.7% respectively. An increase of *Stomach Yin deficiency* by one symptom is predicted to increase the probability of AN/BN by 11.1% and decrease the probability of EDNOS and No ED by 0.5% and 10.6% respectively. An increase of *Spleen Qi deficiency* by one symptom is predicted to increase the probability of AN/BN by 8.8% and decrease the probability of EDNOS and No ED by 0.4% and 8.4% respectively.

Conversely, an increase *Heat Harassing Heart Spirit* by one symptom is predicted to decrease the probability of AN/BN by 13.6% and increase the probability of EDNOS and No ED by 0.6% and 13.0% respectively. An increase *Heart Qi deficiency* by one symptom is predicted to decrease the probability of AN/BN by 6.9% and increase the probability of EDNOS and No ED by 0.3% and 6.7% respectively. An increase *Spleen and Stomach deficiency cold* by one

symptom is predicted to decrease the probability of AN/BN by 0.4% and increase the probability of EDNOS and No ED by 7.6% and 6.5% respectively

4.4.1.1 *Patterns where an increase of one symptom increases the probability of AN/BN*

It is hypothesised that *Stomach Yin deficiency* and *Spleen Qi deficiency* are associated more with the presentation of AN/BN due to the etiology of both patterns, which include a diet lacking in nourishment and protein, under-eating, consumption of cold food (which is common in those dieting) or irregular eating, skipping meals and eating late at night (Maciocia, 1989), reflecting the deficiency associated with both AN and BN. In addition the mental/emotional aspects of *Stomach Yin deficiency* and *Spleen Qi deficiency* include obsessive thinking, phobias, feelings of guilt, feeling overwhelmed, shame, worry, sadness, lack of confidence and a lack of physical and psychological nourishment (Maciocia, 2009; Schnyer & Allen, 2001).

It is hypothesised that *Heart Yin deficiency* and *Heart yang deficiency* are associated more with the presentation of AN/BN due to the level of dysfunction of the heart. The heart and mind represent the state of the blood, yin and yang and vise a versa. It also represents the spirit and the emotional health (Maciocia, 2009). If there is yin and or yang deficiency then the mind will suffer, conversely if the mind is disturbed then the heart-yin and the heart-yang will be

affected (Maciocia, 1989). Psychological symptoms of *Heart Yin deficiency* and *Heart yang deficiency* include lack of drive, everything feels like a struggle, anxiety, lack of identity and altered perception (Maciocia, 2009; Schnyer & Allen, 2001).

These findings suggest that the deep emotional problems seen in AN/BN are being reflected in these marginal effects of *Stomach Yin deficiency*, *Spleen Qi deficiency, Heart Yin deficiency* and *Heart yang deficiency*. Although there is no way to test conclusively if these patterns reflect the core features of an eating disorder from a TCM perspective, these findings offer future researchers and practitioners some ideas and findings to investigate and cogitate on regarding the core features of an eating disorder.

4.4.1.2   Patterns where an increase of one symptom decreases the probability of AN/BN

It is hypothesised that *Heat Harassing Heart Spirit* is associated less with the presentation of AN/BN due to the full and hot nature of this pattern (Deng, 2000; Maciocia, 1989; World Health Organsiation, 2007). AN and BN have been shown to be represented by deficiency and cold patterns especially involving the Spleen, Stomach and Heart (See page 80 of this thesis). This pattern does not imply that one is 'healthy'-, only that this pattern is far removed

from those associated with BN/AN, thus the more symptoms of this pattern you have the less likely you are to have AN/BN.

It is hypothesised that *Heart Qi deficiency* is associated more with the presentation of No ED and EDNOS due to the less severe level of dysfunction of the heart. *Heart Qi deficiency* is associated with a less severe level of dysfunction than *Heart Yin and Yang deficiency*. Therefore the more *Heart Qi deficiency* symptoms the individual has, the less severe the dysfunction (eating disorder in this case) one has. Hence the individual is less likely to have AN/BN.

At first it may appear that the marginal effects for *Spleen and Stomach deficiency cold* have a contradictory interpretation to the results given in Chapter 3, which suggest that *Spleen and Stomach deficiency cold* is strongly involved in both AN and EDNOS and less so in those with No ED. However, given that marginal effects for a pattern are computed by holding all other patterns constant, the interpretation in this case is more subtle. In particular, the patterns of *Spleen Qi deficiency* and *Spleen and Stomach deficiency cold* are very closed related. This can be seen both from the respective symptom lists (See Appendix 5) and statistically from the correlation of 0.80 between the PSI's for these two patterns in the sample. From the perspective of the symptom list, it can be seen that holding *Spleen Qi deficiency* constant implies also holding

constant many of the symptoms of *Spleen and Stomach deficiency cold*. The only possible symptoms of *Spleen and Stomach deficiency cold* that can change while holding *Spleen Qi deficiency* constant are coldness, chronic diarrhoea and vomiting thin fluid. Nobody in the sample reported vomited thin fluid, so this symptom is not relevant in this case. An increase in coldness would be hypothesised to increase the probability of AN in particular, so this symptom does not explain the observed effects. The most relevant symptom is chronic diarrhoea, which is less likely to be exhibited by AN sufferers since a medical side effect of AN is constipation. It is therefore hypothesised that the marginal effect of *Spleen and Stomach deficiency cold* in this model is representing the effect of an increase in chronic diarrhoea.

Statistical support for this hypothesis can be provided by estimating some simplified models. Estimating the ordered logit model with only *Spleen and Stomach deficiency cold* included as an explanatory variable (i.e. not controlling for any other pattern) yields marginal effects of -0.18 (No ED), 0.06 (EDNOS) and 0.11 (AN/BN), which are now consistent with the findings in Chapter 3. Including only Spleen Qi deficiency with *Spleen and Stomach deficiency cold* in the model reverses these marginal effects to 0.08 (No ED), 0.00 (EDNOS) and -0.08 (AN/BN), which are very similar to the results from the full model. This serves to support our hypothesis about the close relationship between the effects of these two patterns on type of eating disorder.

4.4.1.3 Clinical Application

Sufferers of eating disorders commonly seek out complementary therapies, including Chinese medicine, to aid their recovery (Birmingham & Sidhu, 2007a; Steffen et al., 2006; Tsai, 2005). Our predictive model may prove useful to a TCM practitioner dealing with an eating disorder patient. In particular, it would allow the practitioner to use TCM methods to assess the effect of their treatment of patients with an eating disorder based on a predictive model. This may be useful in situations where a practitioner doesn't have a comprehensive understanding of eating disorders from a biomedical perspective and wants to assess the effectiveness of their treatment from a TCM perspective but with a focus on the important patterns of disharmony that predict eating disorders. Further research into the 'core' TCM feature of an eating disorder may help refine this model and its effectiveness as an assessment tool. It is hoped that this model may provide practitioners with a method to assess their treatment of eating disorder patients.

To implement our model the practitioner would administer our survey on their first vist and calculate the *PSI's*. To illustrate, suppose a hypothetical patient returns *PSI*'s of

Heart Yin Deficiency	0.33
Heart Yang deficiency	0.57

Heat Harassing Heart Spirit	0.38
Heart Qi deficiency	0.67
Stomach Yin deficiency	0.27
Spleen and Stomach deficiency cold	0.38
Spleen Qi deficiency	0.50

Based on these PSI's the predictive model provides the following probabilities:

No ED:	3.9%
EDNOS:	13.2%
BN/AN:	82.9%*

The TCM practitioner would then treat the patient for their eating disorder. They would then re-administer the survey and re-compute the probabilities. Ideally the probability of AN/BN, the most severe of the eating disorders, would be reduced.

*This patient is highly likely to have AN or BN and should be referred to an eating disorder specialist if they are not currently under such care. This author does not advocate TCM treatment as the sole treatment for those with an eating disorder.

The predictive model that was chosen is potentially applicable in a clinical setting. The predictive model predicts reasonably well for NoED and BN/AN. If the probability predicted on re-administration in the BN/AN category was increasing then the practitioner could refer the patient to the appropriate specialised practitioners or consult their treatment team about their possible deterioration. Appendix 8 shows how this model would be applied and used in a clinical situation.

4.5   LIMITATIONS AND FURTHER RESEARCH

A limitation of self reported surveys is that some participants may under- or over-report their symptoms. Also, due to individual interpretation of some of the signs seen in the patterns (e.g. pale face) and the Chinese expression of symptoms (e.g. scorched lips), the survey may not have captured all relevant data about the participant. Further research could address the reliability and validity of this survey.

This study did not include any questions on the survey to identify any other conditions or diseases in which *Heart Yin Deficiency*, *Heart Yang deficiency*, *Heat Harassing Heart Spirit, Heart Qi deficiency, Stomach Yin deficiency*, *Spleen and Stomach deficiency cold* and *Spleen Qi deficiency* exist.

Therefore it should be emphasised that this model is useful only for distinguishing *between* no eating disorder and eating disorders, and not for the diagnosis of other diseases in which *Heart Yin Deficiency*, *Heart Yang deficiency*, *Heat Harassing Heart Spirit*, *Heart Qi deficiency, Stomach Yin deficiency*, *Spleen and Stomach deficiency cold* and *Spleen Qi deficiency* are common (e.g. *Stomach Yin deficiency* from gastritis). This is important in TCM as one pattern of disharmony can represent many diagnosed biomedical diseases.

In addition, this method of trying to predict the specific features of eating disorders doesn't allow for co-occurring co-morbid disorders. As mentioned in Chapter 3 the patterns of disharmony represented in eating disorders do differ from those presented in depression, anxiety and OCD however further research is needed where patterns of disharmony can be compared and analysed.

The model chosen for possible clinical use does not predict EDNOS well. Consequently you would use this model with caution to determine the suspicion of EDNOS. It does predict much better for AN/BN so a suspected eating disorder involving either AN/BN is more likely to be detected. The use of this model should not replace clinical knowledge, skill, interaction and practice of TCM and the conclusions determined from these processes. This model is a tool to help aid practitioners in determining a suspected eating disorder and as

such the results gained via in the implementation of the model should not be viewed as a conclusive conclusion.

4.6   Conclusion

It is important that the specific features (and core feature) of an eating disorder are able to be identified from a TCM perspective. Understanding these features could potentially help TCM practitioners understand and better treat eating disorder patients. Although these findings are no way conclusive in determining the specific features or patterns of disharmony in eating disorders, they offer some starting point for further research and investigations.

Currently there are no assessment tools for TCM practitioners to help identify whether there are any predictive indicators for determining whether an individual has an eating disorder or no eating disorder.   Our survey data from Chapter 3 was used to construct a statistical model to predict which eating disorder an individual is most likely to have, based solely on TCM diagnostic principles. The efficacy of correctly predicting the self reported eating disorders, both in-sample and out of sample, was used to determine the best model to select for future research and possible clinical application.   The results show that an ordered logit model assessing NoED, EDNOS and (BN/AN) was the most accurate both in and out of sample. Further research and more testing on

this model is required before it can be used in a clinical setting but the initial results prove promising for future use in a clinical setting.

Section 2.

Acupuncture as an adjunct therapy in the treatment of eating

disorders: A randomised cross-over pilot study

Chapter 5   Acupuncture as an adjunct therapy in the treatment of eating disorders: A randomised cross-over pilot study**.

5.1   Introduction

Eating disorders, in particular, Anorexia Nervosa (AN) and Bulimia Nervosa (BN) are a major health problem commonly affecting women of early teenage years to young adulthood (Abraham & Llewellyn-Jones, 2001; Birmingham & Beumont, 2004; Grilo, 2006; Treasure, et al., 2003).   The reported incidence of individuals afflicted by AN in 'Westernized' countries varies from 0.01- 5.7 percent (American Psychiatric Association, 2009; Anorexia Nervosa and Related Eating Disorders Inc, 2005a; Ballas, 2006; Birmingham & Beumont, 2004; Makino, et al., 2004; Rastam, et al., 2004; Treasure, 2004; Williamson, et al., 2001) with the most commonly cited figures ranging from .05-1 percent. The average incidence of BN is between 1-4.2 percent (Birmingham & Beumont, 2004; Grilo, 2006; Rastam, et al., 2004)

AN is characterized by determined attempts to lose weight or avoid weight gain (American Psychiatric Association, 2006). This is achieved through

food avoidance, self-induced vomiting, laxative abuse, excessive exercising, or a combination of one or more of these (Ballas, 2006; Birmingham & Beumont, 2004; Bryant-Waugh, 2000; Treasure, 2004). There are two types of AN, restricting (AN-R) and binge-eating/purging type (AN-BP) (American Psychiatric Association, 2009). See Appendix 1 for full diagnostic criteria.

BN is characterized by recurrent episodes of binge eating with inappropriate weight compensatory behaviours and feelings of guilt and self disgust (American Psychiatric Association, 2009). There are two types of BN, purging subtype and non-purging subtype (American Psychiatric Association, 2009). See Appendix 1 for full diagnostic criteria.

Recovery rates for those afflicted by AN are low with elevated levels of mortality reported in young females (Fichter, et al., 2006; Finfgeld, 2002; Nielsen et al., 1998). Recovery rates for BN are more positive (between 30-80%) than those of AN and BN is not associated with elevated rates of mortality (Grilo, 2006).

Treatment for those with AN and BN can be challenging, a multidisciplinary approach is the most commonly prescribed form of treatment (Andersen & Mehler, 1999; Anorexia Nervosa and Related Eating Disorders Inc, 2005b; Fairburn & Harrison, 2003). Individuals with an eating disorder are

known to seek help from complementary and alternative therapies (CAM) (Hay, et al., 2007). Research into CAM, particularly within the field of acupuncture is limited and given that patients seek CAM treatment despite best practice medical intervention being available, more research into the effectiveness of alternative therapies seems warranted.

This chapter aims to investigate the effect of acupuncture as an adjunct therapy in treating patients with an eating disorder.

5.2   Literature Review

Recovery rates for those afflicted by AN are low (Birmingham et al., 2005; Fairburn & Harrison, 2003; Grilo, 2006; le Grange & Lock, 2005; Treasure, 2004). Between 20-30 percent of sufferers never recover from AN and between 5 and 15 percent don't survive (Birmingham & Beumont, 2004; Fairburn & Harrison, 2003; Grilo, 2006; le Grange & Lock, 2005; Treasure, 2004). AN has the highest reported mortality rate of any psychiatric disorder in young females (Fichter, et al., 2006; Finfgeld, 2002; Nielsen, et al., 1998). Recovery can take anywhere from one to 20 years, although three to seven years is average (Anorexia Nervosa and Related Eating Disorders Inc, 2005b; Treasure, 2004; Wagner, et al., 2006). Those afflicted for a longer time period display diminished probability of improvement (Grilo, 2006; Treasure, 2004). Severe

and enduring eating disorder (SEED) is a category for chronically ill patients with a long history of an eating disorder with physical and social complications (Robinson, 2009). Although no number defines enduring, the 10 year mark has been identified to determine chronic and enduring (Robinson, 2009). The severe aspect of SEED is defined as a patient with symptoms of an eating disorder which interfere substantially with quality of life. The recognition of SEED highlights the destructive, unrelenting nature that an eating disorder can take (Robinson, 2009).

Recovery rates for BN are more positive than those of AN with reported recovery rates as high as 74% (Grilo, 2006) and BN is not associated with elevated rates of mortality (Grilo, 2006). However irreversible side effects can occur in those with BN (Duker & Slade, 2003).

Individuals who exhibit binge-eating and purging eating subtypes, (as can occur in AN-BP and BN purging subtype), are more likely to have impulse control problems such as smoking, drug and or alcohol abuse and have a greater frequency of suicide attempts (American Psychiatric Association, 2009; Anzengruber, et al., 2006; Franko & Keel, 2006; Pompili, et al., 2006)

Treatment for those with AN and BN can be challenging, sufferers rarely seek treatment voluntarily although their reasons for avoiding treatment are different (Fairburn & Harrison, 2003; Grilo, 2006; Pike et al., 2004; Treasure, 2004). Family-based therapy for adolescents with AN has demonstrated moderate beneficial effects however this has not been matched in effectiveness in adults (Fairburn & Harrison, 2003; le Grange & Lock, 2005; Lock, 2004). Cognitive behavioral therapy (CBT) has strong evidence for effectiveness in the treatment of Bulimia Nervosa (BN) but the effectiveness has not been reproduced in research of those afflicted with AN (Halmi, 2006; Pike, et al., 2004).

Eating disorders are difficult to treat with many remissions and recurrences of the eating disorder and they can become chronic e.g. SEED-AN or SEED-BN (American Psychiatric Association, 2009; Berkman, et al., 2007; Bulik, et al., 2007; Robinson, 2009; Shapiro, et al., 2007). A multidisciplinary approach is the most commonly prescribed form of treatment for those with eating disorders, frequently involving psychologists, dietitians and general practitioners (Andersen & Mehler, 1999; Anorexia Nervosa and Related Eating Disorders Inc, 2005b; Fairburn & Harrison, 2003). An evidence review looking at research on the treatment of AN has found that clinical trials do not always address the multidisciplinary therapeutic approaches used in the community

(Berkman, et al., 2007; Brownley, et al., 2007; Bulik, et al., 2007; Shapiro, et al., 2007).

Complementary therapies, such as art and dance therapy, are often used as an adjunct in eating disorder treatment (Brooke, 2008) and many treatment centres are offering a range of holistic services including acupuncture and yoga (Mirasol, 2009; University of Maryland Medical Center (UMMC), 2009). Individuals with an eating disorder are known to seek help from complementary and alternative therapies (CAM) (Hay, et al., 2007).

There has been no critically reviewed evidence to date on the effectiveness of TCM treatment and eating disorders (Birmingham & Sidhu, 2007b). In order to establish the current status of evidence of the use of acupuncture in the field of eating disorders a systematic search was undertaken using the following databases: Medline via Pub Med, Cinahl, Blackwell Synergy (Wiley Interscience), Academic Search Premier (Ebscos Host), Science Direct and SpringerLink. A search was undertaken on Thursday the 19th of February, 2008 and updated on Thursday the 1st of July, 2010. The following search terms were used: acupuncture and eating disorders, acupuncture and anorexia, acupuncture and anorexia nervosa, acupuncture and bulimia nervosa, acupuncture and binge eating, acupuncture and EDNOS and acupuncture and weight concerns. See Table 5.1
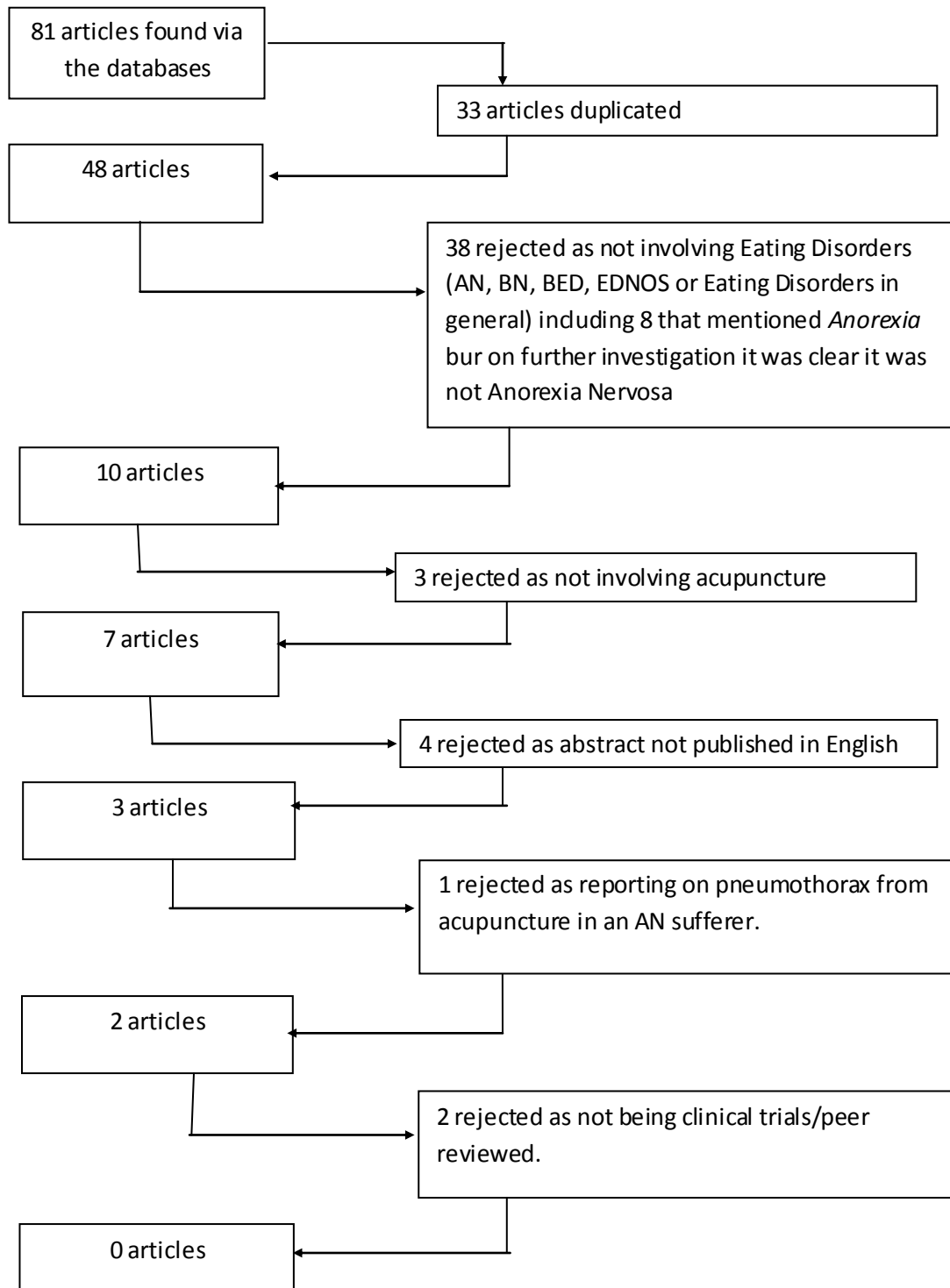
Table 5.1. Results of the database searches for terms related to acupuncture and eating disorders.

Databases and dates	Search of the databases for the following terms acupuncture plus...........						
	eating disorders	anorexia	anorexia nervosa	bulimia nervosa	binge eating	EDNOS	Weight concerns
Medline via PubMed							
1st July 2010	10	16	5	2	3	0	0
Cinahl							
1st July 2010	5	2	1	0	0	0	0
Blackwell Synergy (Wiley Inter Science)							
1st July 2010	6	7	3	1	1	0	6
Academic Search Premier (EBSCOS Host)							
1st July 2010	1	2	0	0	0	0	2
Science Direct (Limit to abstract, title or keyword)							
1st July 2010	2	3	0	0	0	0	3

A total of 81 articles were found. Articles were removed from the search results for the following reasons:

- if they had nothing to do with eating disorders (either AN, BN, EDNOS, BED) or if they mentioned *anorexia* in the context of no appetite (not the disease AN),

- if the papers did not have acupuncture as an intervention,

- if the abstracts were not in English although an attempt was made to obtain and have translated the abstracts to determine their relevance. This process did however uncover one Swedish written article that appeared relevant. The article was sourced and translated into English (see Appendix 9). Unfortunately this article was also not a peer reviewed report.

- if the intervention (acupuncture) was not related to eating disorder treatment. In this case the acupuncture was the cause of the problem in a sufferer of an eating disorder.

- If the articles were not randomised controlled trials. The search did however uncover one Swedish written article that had an English abstract that appeared relevant but as it was in Swedish it was not possible to determine its relevance. The article was sourced and translated into English (see Appendix 9).

Figure 5.1. Results of the database search for critically reviewed research on acupuncture and eating disorders.

81 articles found via the databases

33 articles duplicated

48 articles

38 rejected as not involving Eating Disorders (AN, BN, BED, EDNOS or Eating Disorders in general) including 8 that mentioned *Anorexia* bur on further investigation it was clear it was not Anorexia Nervosa

10 articles

3 rejected as not involving acupuncture

7 articles

4 rejected as abstract not published in English

3 articles

1 rejected as reporting on pneumothorax from acupuncture in an AN sufferer.

2 articles

2 rejected as not being clinical trials/peer reviewed.

0 articles

Thus to date there is no critically reviewed literature on TCM and eating disorders. The search did however find anecdotal evidence, dissertations, several theses and informal theories as to the presentation, mechanism of disease, pattern identification and treatment of eating disorders which has been sourced in this thesis.

Despite there being no peer reviewed research, there is some non peer reviewed work including some theses and anecdotal evidence. Research published by Clarke (2009) discusses the perception of both the acupuncturist and sufferers of eating disorders who have used TCM acupuncture but her research does not quantitatively measure effectiveness. Whist her study reported beneficial effects (from both the acupuncturists and patients point of view) her study also reported that sufferers who sought acupuncture treatment did so less than half the time for treatment of the symptoms of their eating disorder with the most popular reasons for having acupuncture being to relax and to help physical aches and pains (Clarke, 2009). Given that less than half the patients were seeking acupuncture for other reasons than their eating disorder it is unknown if the beneficial effects she reports are relevant to specific eating disorder improvement or improvements for the other symptoms they were seeking treatment for.

The Acupuncturists in Clarke's study (2009) reported predominately treating the signs and symptoms related to the eating disorder rather than the eating disorder itself (Clarke, 2009). Emotional and mental issues and menstrual irregularities were the most commonly treated symptoms with practitioners commonly focusing their treatments on providing emotional support (Clarke, 2009). The Acupuncturists in Clarke's study (2009) report that the greatest barrier to successful treatment was that acupuncture alone will not solve an eating disorder. There seems to be some possible confusion in Clarke's study about what 'recovered' is amongst the acupuncturists and also possible confusion about what exactly successful treatment is. Although 'acupuncture alone will not solve an eating disorder' was reported as the greatest barrier to successful treatment, Clark also reported on findings that suggested that if acupuncture was administered in a certain way then it would result in 'successful' treatment. These findings include reports that an insufficient frequency and or dose (of acupuncture) are a barrier to successful treatment (Clarke, 2009) and that treating a patient's emotional disharmonies alongside their physical condition is essential to recovery (Clarke, 2009). Given the responses from the Acupuncture practitioners, it seems clear that they were not predominately treating the eating disorder so it is debatable if they can say that treating a patient's emotional disharmonies with acupuncture alongside their physical condition is essential to recovery (Clarke, 2009), nor accurately report the barriers to treatment in terms of the eating disorder.

Acupuncture is a commonly used CAM therapy that is purported to provide benefit in conditions such as depression, anxiety, insomnia and headache (Huang et al., 2009; Leo & Ligot Jr, 2007; Melchart et al., 1999; Vickland et al., 2009; World Health Organisation, 2003b). The research on the benefits of acupuncture has been primarily evaluated in a non-eating disorder population, thus it is not known if its effectiveness extends to those with an eating disorder.

The effect of acupuncture for the treatment of eating disorders, has not been previously researched, although one un-reviewed study by Apostolos and Militiades (1996) found some evidence of a beneficial effect from auricular acupuncture (a system of acupuncture practised on the ear) in BN (Apostolos & Miltiades, 1996).   A 1998 correspondence article presented a case-series of 21 females with either AN or BN who were treated with electro-acupuncture (Hogberg, 1998). Beneficial effects were reported with 21 of the 26 participants stating that they were free from their eating disorder. A recommendation was made for clinical research with randomised control groups.

A number of unpublished works have expressed concern over the effectiveness of acupuncture treatment, given that dietary advice is part of the acupuncture treatment (Clarke, 2009; Wood, 2008).   Given a good

understanding of eating disorders (particularly AN and BN) and a sound methodology using specific eating disorder assessment tools (such as the Eating Disorder Inventory (Garner, 2004) and the Eating Disorder Quality of Life Scale (Engel, et al., 2009) this researcher hypothesises that acupuncture can be beneficial and can be administered effectively and separately from dietary advice.

Sufferer's of AN are seeking CAM treatment despite the best practice medical intervention being available and notwithstanding the limited research of CAM's efficacy as an adjunct treatment for eating disorders (Birmingham & Sidhu, 2007b).   Given that AN sufferer's are seeking CAM treatment, particularly acupuncture, and the poor recovery rates for those with AN with current best practice medical intervention more research into the effectiveness of alternative therapies seems warranted.

5.3   Methods

5.3.1 Participants

Participants receiving psychological and nutritional treatment at a private Eating Disorder Treatment Facility in Melbourne, Australia, were invited, via mail, to enrol in the study (see Appendix 6.3 for the enrolment letter). The multi-

disciplinary outpatient facility provides best practice recovery programs for sufferers of eating disorders. For adults, each program is individually tailored, with most programs including psychological and nutritional advice. Participants were aged over 17 years who had received an initial diagnosis of either Anorexia Nervosa (AN) or Bulimia Nervosa (BN) (as diagnosed by clinical assessment by a senior psychologist), when commencing treatment at the clinic. Participants seeking treatment often, as they are recovering, move from one eating disorder diagnostic category to another (e.g. from AN to Eating Disorder Not Otherwise Specified). So as not to exclude participants on the basis of recovery, participants were permitted to be at various stages of recovery during the trial. Participants were however, excluded from the study if they were unable to give informed consent, sought other treatment outside the facility or required hospitalisation during the study period.

Eleven women enquired about the study. Ten agreed to participate. Nine consenting women, aged (mean and Standard Deviation) 23.7 (9.6) years, completed the study. See Figure 5.1 on page 147 for a CONSORT diagram explaining the enrolment process. Four participants had BN (three using vomiting, laxatives and exercise as a compensatory means and one using exercise and diet pills) and five had AN (four who had AN-R subtype and one AN-BP subtype). Four participants had their eating disorder for less than a year, three for two-to-five years and two for greater than six years. Seven

participants had been undertaking their current treatment for less than six months and two participants had been receiving treatment for greater than seven months. Researcher SF enrolled the participants into the study. SF was blind to the allocation of the treatment as a supervisor did all the randomisation. The research protocol was approved by the Victoria University Human Research Ethics Committee (No. HRETH 07/241) prior to initiating the study.

5.3.2 Experimental Design

An open label randomised cross-over study design was used. Crossover trials are suited to investigate treatments for ongoing or chronic disease and therefore, eating disorders. Given the difficulty of recruiting participants with AN or BN, a crossover study gives an improved chance of identifying any benefit/effect with a smaller sample size. The two groups/phases were;
i) Treatment as usual (TAU) only which incorporated current best practice medical management at the eating disorder treatment facility and ii) a continuation of the participants eating disorder treatment supplemented by acupuncture.

Two BN and four AN sufferers were randomly allocated to the acupuncture supplementation phase first, while two BN and two AN sufferers were randomly allocated to the best practice medical management (TAU) phase. Participants were allocated to each group using a random number

generator. The allocation sequence was not concealed from Sarah Fogarty (SF) who enrolled the participants as it was felt it would be better for the participants to know which phase they were starting with when they enrolled. One participant dropped out after the first session of acupuncture due to being overwhelmed with all her treatments (both her best practice appointments and the acupuncture appointments).

Following completion of the first phase, participants were then reassigned to the other phase. Whilst the existing eating disorder treatment was never halted, a two-week no acupuncture "wash-out period" occurred between the phases. This was to allow the treatment effect of the acupuncture to abate in those participants who received the acupuncture supplementation phase first and to obtain baseline measures for the TAU phase (Figure 5.2).

The CONSORT (Pragmatic) Statement is an evidence-based tool developed by a group of professionals who wanted to improve the quality of reporting in clinical trials (Zwarenstein et al., 2008). Since its inception, it has gained widespread recognition in research reporting (Zwarenstein, et al., 2008). STRICTA (STandards for Reporting Interventions in Controlled Trials of Acupuncture) was designed as a supplement to the CONSORT Statement to improve standards or reporting controlled acupuncture trials (STRICTA, 2007).

This study uses both the CONSORT (Pragmatic) and STRICTA criteria for the reporting of the trial.

Figure 5.2. CONSORT 2010 Flow Diagram of the Trial
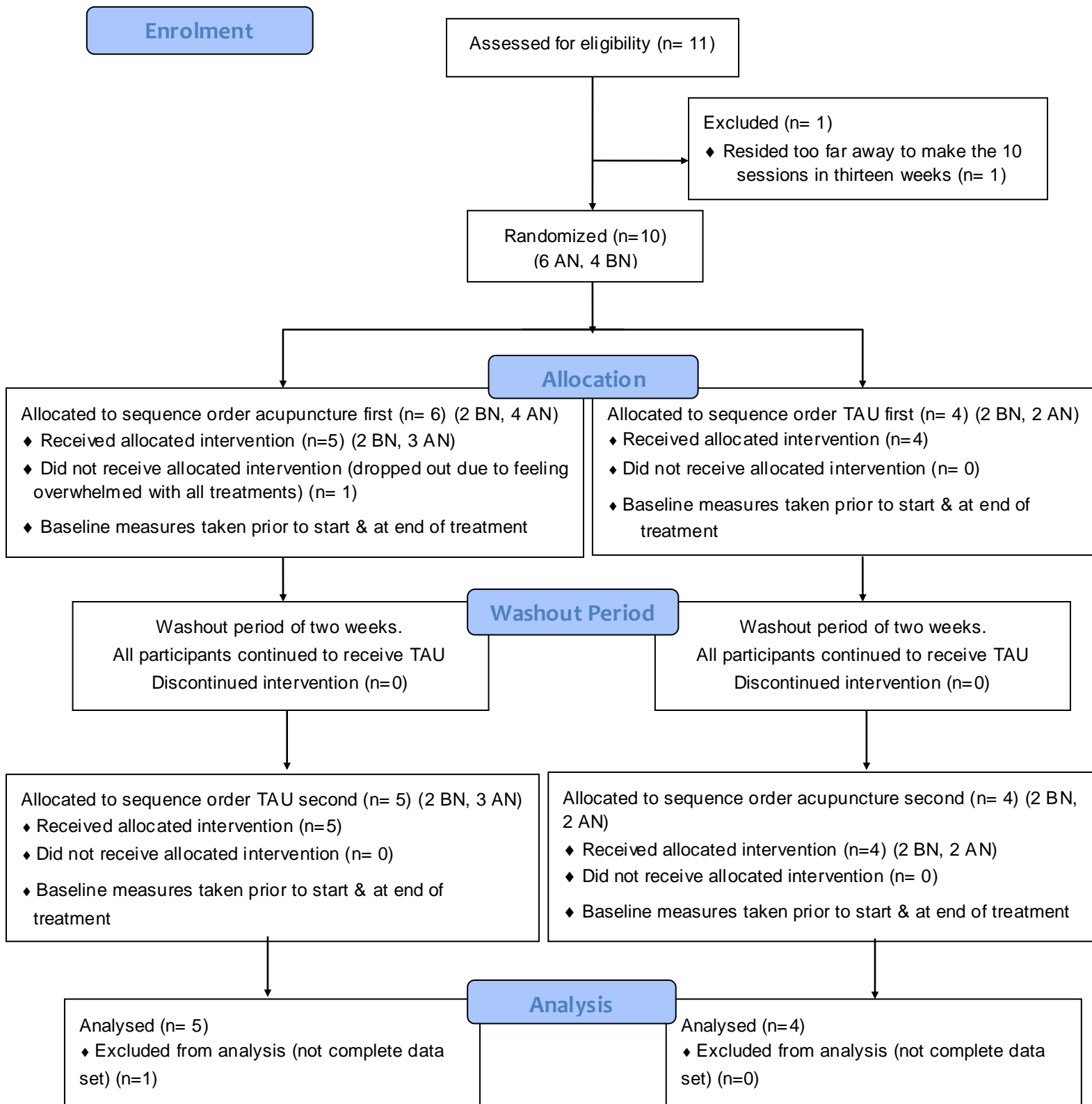
5.3.3 Treatment

Testimony from sufferers' of an eating disorder reflects the importance of feeling understood and being treated as in individual particularly as part of recovery (Bowman, 2006; Crewe, 2006; Gottlieb, 2001; Hendricks, 2003; Kingsley & Kingsley, 2005; Palmer, 2001; Shelly, 1997). While there are similarities between those suffering from an eating disorder, patients do vary in their clinical presentation (Garner, 2004), enforcing the need for individualised treatment. It was, therefore, important that all the treatment administered in this trial be pragmatic. That is both the acupuncture and the best practice medical management delivered at the eating disorder facility were individualised according to the participants' medical condition and progress status.

The outpatient clinic where this study was conducted treats the patient holistically, treating the emotional, psychological and physical aspects of the disorders. The major focus of the clinic is to meet every client "where they are at". Thus the frequency and type of treatment administered by the eating disorder facility staff was individual and was determined for each patient by their psychologist. The treatment involved dietary consultation as well as advice and psychological counselling. Treatment frequency varied for each individual ranging from two sessions a week to one session each fortnight. Patients also had access to the day program if it was recommended as part of their

treatment.   The day program involved art therapy, meal supervision and monitored eating, crafts and education sessions.

The acupuncture supplementation treatment consisted of ten sessions of acupuncture in a maximum of thirteen weeks in addition to the best practice medical management at the facility. The choice of ten sessions was determined by consultation with the head psychologist at the treatment clinic, the researcher and an experienced acupuncturist (Dr Damien Ryan), given the chronic nature of eating disorders and the expected slower changes in outcomes than in acute conditions. The timeframe; a maximum of thirteen weeks, was again determined by the head psychologist, myself and the research team. This time frame allowed patients to miss a week of treatment if they were unwell, had other medical appointments or experienced a setback.

TCM style acupuncture with diagnosis primarily based on viscera and bowel pattern identification (Deng, 2000) was used in the study. There is no peer reviewed research or historical context to guide the style of acupuncture in the treatment of eating disorders, however, TCM acupuncture is useful in the treatment of complex diseases (Deng, 2000). The method of examination to determine the viscera and bowel patterns involved included the techniques of inquiry and inspection (Deng, 2000). The treatment method and point selection for each individual is based on the identification of the viscera and bowel

patterns most predominately involved each session. Functional Magnetic Resonance Imaging (fMRI) research conducted on a non eating disorder population has shown evidence that acupuncture can decrease the signal limbic system which can be important in depression and mood disorders (Hui et al., 2000; Hui et al., 2009; Hui et al., 2010; Lewith et al., 2005; Yun et al., 2002). These findings generally occurred with the generation of *de Qi* (defined as a feeling of heaviness around the acupuncture point (Wiseman & Ye, 1998)) (Hui, et al., 2009; Hui, et al., 2010) . While not disregarding the value of these neurological findings, it was decided that point selection be based on TCM principles as the sensation of *de Qi* was not specifically sought. The practitioner administering the treatments (the author) was instructed to provide treatments she would normally in a clinical setting with the restriction of shallow and light needling.

The acupuncture supplementation treatment consisted of ten sessions of acupuncture in a maximum of thirteen weeks in addition to the best practice medical management at the facility. All participants who completed the study received the ten sessions of acupuncture. The treatment was administered by an experienced and registered acupuncturist (the author-8 years). Fine disposable needles (Serin brand, either 0.20 or 0.25 gauge) were used. The average number of needles used per session was 11 (Range 6-15) with the majority of the points being needled bilaterally. Shallow and light manual

stimulation was used given the extreme thinness of the participants (Kraft, 2003) and thus *de Qi* was not obligatory. Following insertion, the needles were manipulated using a combination of lift and thrust and rotation, which according to Chinese acupuncture theory has a supplementing effect (Deng et al., 1996). The needles were left *in situ* for 20 minutes after which they were removed. No other interventions were used by the acupuncturist. The main patterns of disharmony treated over the duration of the 10 sessions for each patient are listed in Table 5.2. The points used over the course of the 10 sessions for each patient are listed in Table 5.23. There was only one adverse event encountered by one participant. She felt faint and nauseous on needle insertion, so the needles were removed and her legs elevated. She recovered quickly and was happy for treatment to recommence. There were no adverse effects when treatment resumed.

Table 5.2. Main patterns of Disharmony treated for each participant over the duration of the 10 sessions

Participant	Eating Disorder	Main patterns of Disharmony treated for each patient
1	AN	*Liver Qi depression, Spleen Qi deficiency, Stomach Spleen Disharmony*
2	AN	*Spleen Yang deficiency, Liver Qi Depression, Stomach Spleen Disharmony*
3	BN	*Liver Qi depression, Heart Yin deficiency, Heart Qi deficiency*
4	AN	*Heart Yang deficiency, Kidney Yang deficiency, Spleen and Stomach deficiency Cold*
5	BN	*Liver Qi depression, Spleen Qi deficiency, Liver Qi Stagnation and Stomach Heat*
6	BN	*Liver Qi depression, Spleen Qi deficiency, Liver Qi Stagnation and Stomach Heat*
7	AN	*Liver Qi depression, Spleen Qi deficiency, Liver Qi Stagnation and Stomach Heat*
8	BN	*Stomach Heat, Stomach Yin deficiency, Heart Yin deficiency*
9	AN	*Liver Qi depression, Spleen Yang deficiency, Liver Qi Stagnation and Stomach Heat*

Table 5.3. Points used for each participant over the duration of the 10 sessions.

Participant	Eating Disorder	Points used over the duration of the 10 sessions
1	AN	*Hégǔ* (LI 4), *Qūchí* (LI 11), *Tiānshū* (ST 25), *Zúsānlǐ* (ST 36), *Gōngsūn* (SP 4), *Sānyīnjāo* (SP 6), *Shénmén* (HT 7), *Táixī* (KI 3), *Néiguān* (PC 6),*Táichōng* (LR 3), *Guānyuán* (CY 4).
2	AN	*Hégǔ* (LI 4), *Zúsānlǐ* (ST 36), *Fēnglóng* (ST 40), *Táibái* (SP 3), *Sānyīnjāo* (SP 6), *Xuéhǎi* (SP 10), *Táixī* (KI 3), *Zháohǎi* (KI 6), *Néiguān* (PC 6), *Táichōng* (LR 3), *Guānyuán* (CY 4), *Qíhǎi* (CY 6).
3	BN	*Hégǔ* (LI 4), *Qūchí* (LI 11), *Tiānshū* (ST 25), *Zúsānlǐ* (ST 36), *Fēnglóng* (ST 40), *Nèitíng* (ST 44), *Sānyīnjāo* (SP 6), *Chōngmén (SP 12), Dáhéng (SP 15), Zháohǎi* (KI 6), *Shéncáng* (KI 25), *Xíngjiān* (LR 2), *Táichōng* (LR 3).
4*	AN	*Zúsānlǐ* (ST 36), *Sānyīnjāo* (SP 6), *Xuéhǎi* (SP 10), *Táixī* (KI 3), *Zháohǎi* (KI 6), *Táichōng* (LR 3).
5	BN	*Lièquē* (LU 7), *Hégǔ* (LI 4), *Tiānshū* (ST 25), *Zúsānlǐ* (ST 36), *Sānyīnjāo* (SP 6), *Xuéhǎi* (SP 10), *Dáhéng* (SP 15), *Táixī* (KI 3), *Zháohǎi* (KI 6), *Zhīgoū* (TE 6),*Táichōng* (LR 3), *Qíhǎi* (CY 6).
6	BN	*Lièquē* (LU 7), *Hégǔ* (LI 4), *Qūchí* (LI 11), *Zúsānlǐ* (ST 36), *Sānyīnjāo* (SP 6), *Táixī* (KI 3), *Táichōng* (LR 3). Ear points: Shenmen, Stomach and Hungry.
7	AN	*Hégǔ* (LI 4), *Zúsānlǐ* (ST 36), *Tiáokǒu* (ST 38), *Sānyīnjāo* (SP 6), *Xuéhǎi* (SP 10), *Hóuxī* (SI 3), *Táixī* (KI 3), *Wáiguān*(TE 5), *Jiānjǐng* (GB 21), *Yánglíngquán* (GB 34), *Táichōng* (LR 3). EX-1 (M-HN-3) *Yíntāng*.
8	BN	*Hégǔ* (LI 4), *Zúsānlǐ* (ST 36), *Sānyīnjāo* (SP 6), *Shénmén* (HT 7), *Néiguān* (PC 6), *Wáiguān* (TE 5), *Zhīgoū* (TE 6), *Yánglíngquán* (GB 34), *Táichōng* (LR 3). EX-1 (M-HN-3) *Yíntāng*.
9	AN	*Hégǔ* (LI 4), *Zúsānlǐ* (ST 36), *Sānyīnjāo* (SP 6), *Hóuxī* (SI 3), *Táixī* (KI 3), *Néiguān* (PC 6), *Wáiguān*(TE 5), *Xíngjiān* (LR 2), *Táichōng* (LR 3).

*note this participant disliked needles so points were chosen where she couldn't see them when she was prone (e.g. below her waist).

5.3.4 Measures

The primary outcome measure was the Eating Disorder Inventory (EDI-3). The EDI-3 is a validated 91-item, 12 scaled self-reported measure of eating related behaviours and attitudes/traits that are relevant to eating disorders (Garner, 2004). In addition to the 12 scaled measures, an additional 6 aggregated measures were also calculated. The EDI-3 is a commonly used tool in research to assess improvement in an eating disorder, measuring both attitude to eating and physiological maintenance factors (Garner, 2004).

Secondary outcome measures were the Becks Depression Inventory (BDI-2), the State-Trait Anxiety Inventory (STAI) and the Eating Disorder Quality of Life Scale (EDQoL). The BDI-2 is a 21-item, self-reported instrument for measuring the severity of depression in those aged 13 years and over (Beck, et al., 1996). The STAI consists of two separate 20-item self-report scales measuring STAI-State (an individual's current anxiety level) and STAI-Trait (an individual's general anxiety level) (Spielberger, 1983). The EDQoL scale is a 25-item, self-reported instrument for measuring the quality of life specifically in those with an eating disorder. It measures four domains; psychological, physical/cognitive, financial and work/school. The psychological domain covers aspects of how the eating disorder is making the sufferer 'feel'. The physical/cognitive aspect covers physical symptoms such as cold hands and

feet and also cognition in terms of concentration and thinking. The four domains are averaged to give a single aggregate EDQoL score (Engel, et al., 2005).

Each questionnaire was administered prior to randomisation, at the completion of the first phase of treatment and at the beginning and end of the second phase of treatment.

Due to the philosophy of the treatment facility, a measure of body weight was only taken infrequently and when taken, concealed from the patients. As part of the collaborative undertaking of this study, weight was not to be self-reported nor measured by the researchers, thus weight was unable to be measured as an outcome for the study.

5.3.5 Statistical Analysis

All data, except for the mean age of the participants, is expressed as the mean and standard error (SE). All analysis is carried out in the package E-views (Quantitative Micro Software) (Quantitative Micro Software, 2007). The approach detailed in section 2.3 of Jones and Kenward was followed (Jones & Kenward, 1989). This approach consists of first performing a t test for the presence of a carry-over effect in those whose who received acupuncture in the

first phase of the trial. This approach caters for random effects. If no significant carry-over is found, then, another t test is performed for period effect. If no significant period effect is found then the effectiveness of the acupuncture can be tested using a paired t test. If the period effect is significant then a two-sample t test is used.

Analysis was undertaken for significant differences between the two treatments and was measured by the change in outcome after each phase.

Due to our small sample size in this pilot study, we make note of results that are statistically significant in the range $p < 0.10$. We adopt the commonly used terminology that p between 0.5 and 0.10 is *weakly* significant, p between 0.01 and 0.05 is *strongly* significant and p less than 0.01 is *very strongly* significant (Wasserman, 2004). This terminology clarifies the significance of our findings.

5.4   Results

The analysis was carried out following the intention to treat philosophy. All participants satisfied the inclusion criteria for the duration of the trial and all treatments proceeded as per the protocols set out in the Methods section. As shown in Figure 5.1, one participant did not receive the allocated treatment in the first phase of the trial. This participant dropped out of the trial after receiving one acupuncture treatment (out of a prescribed ten treatments). There were no measurements available for this participant and therefore they could not be included in the analysis.

No evidence of significant carry over or period effects were found in any outcome measures therefore all tests reported in this section are paired t tests.

A paired t test was used to determine if base line measures were similar. All measures were found to be similar except for the EDQoL Physical/Cognitive measure which was higher for the acupuncture group (*weakly* significant p = 0.081). However, as shown above no carry over effect was found and thus the ordering of the treatment did not significantly affect the results.

Tables 5.4 and 5.5 show the results for within treatment effects and between the treatment effects.

5.4.1 Within Treatment Effects

Twelve EDI-3 items showed significant within treatment benefit (from weak to strong), three for the TAU only and nine for the acupuncture supplementation plus TAU. Low self-esteem (p=0.054), interpersonal alienation (p= 0.077) and the interpersonal composite (p= 0.094), showed weak significant benefit from the TAU only treatment. Low self-esteem (p= 0.058) and personal alienation (p= 0.060) showed weak benefit with acupuncture supplementation treatment. Bulimia (p=0.044), body dissatisfaction (p= 0.038), maturity fears (p= 0.030) and the composites: eating disorder risk (p= 0.047), ineffectiveness (p= 0.043), interpersonal problems (p= 0.032) and general psychological maladjustment (p= 0.041) all showed strong evidence of benefit.

Neither of the treatment groups showed any significant effects for depression as measured by the BDI-2.

Three items on the EDQoL scale showed very strong evidence of benefit with acupuncture supplementation treatment; the psychological (p= 0.0025) and physical/cognitive (p= 0.0056) subscales and the overall score (p= 0.0008). There was no significant benefit for the TAU group for the EDQoL scores.

TAU only, showed a weak benefit in Trait anxiety (p= 0.098). Both State (p= 0.070) and Trait (p= 0.030) showed a significant improvement (weak and strong respectively) with acupuncture supplementation.

Table 5.4. Mean scores for the individual domains of the EDI-3 questionnaire (standard error in brackets) for the two treatment phases.

Measure	Acupuncture + Treatment as usual (TAU)		P-values for significance within treatments	Treatment as usual (TAU)		P-values for significance within treatments	P-values for significance differences between treatments
	Baseline mean (n=9)	Baseline mean (n=9)		Baseline mean (n=9)	Baseline mean (n=9)		
EDI-3							
Drive for Thinness	17.9 (2.9)	13.7 (3.1)	0.140	17.8 (3.1)	16.3 (3.1)	0.760	0.1891
Bulimia	8.2 (1.6)	4.7 (0.7)	**0.044**[##]	7.7 (2.5)	6.7 (1.7)	0.143	0.1169
Body Dissatisfaction	23.0 (2.2)	18.7 (2.9)	**0.038**[##]	21.6 (2.7)	19.0 (2.1)	0.225	0.5814
Eating Disorder Risk Composite	137.3 (6.8)	119.4(10.7)	**0.047**[##]	130.7(9.4)	130.7 (7.9)	1.000	0.1122
Low Self-Esteem	11.2 (2.3)	8.3 (2.5)	**0.058**[#]	10.9 (2.5)	8.8 (2.2)	**0.054**[#]	0.5721
Personal Alienation	11.3 (1.9)	8.4 (2.5)	**0.060**[##]	10.8 (2.5)	9.9 (2.2)	0.478	0.2995
Interpersonal Insecurity	11.3 (1.2)	9.9 (1.7)	0.391	9.6 (1.9)	9.1 (1.2)	0.779	0.7264
Interpersonal Alienation	8.1 (1.2)	6.8 (1.5)	0.312	7.6 (1.5)	6.0 (1.1)	**0.077**[#]	0.8933
Introspective Deficits	14.4 (2.3)	12.1 (3.1)	0.344	13.2 (3.4)	11.3 (3.3)	0.239	0.8674
Emotional Disregulation	8.4 (1.2)	7.1 (2.3)	0.482	7.8 (1.6)	8.0 (1.8)	0.852	0.4057
Perfectionism	11.1 (1.6)	9.0 (1.9)	0.153	9.6 (1.7)	10.6 (1.7)	0.108	**0.0597**[#]
Asceticism	9.2 (1.8)	7.8 (2.1)	0.324	8.2 (1.6)	9.8 (2.1)	0.164	0.1988
Maturity Fears	10.6 (1.9)	8.3 (1.6)	**0.030**[##]	10.4 (1.4)	9.7 (2.0)	0.376	0.3404
Ineffectiveness Composite	89.4 (7.0)	79.1 (8.6)	**0.043**[##]	88.0 (8.8)	81.9 (8.0)	0.138	0.4663
Interpersonal Problems Composite	91.1 (4.1)	85.9 (6.0)	**0.032**[##]	86.9 (6.2)	82.9 (4.3)	0.351	0.8793
Affective Problems Composite	93.9 (4.2)	87.3 (8.3)	0.303	94.9 (8.3)	87.7 (6.1)	**0.094**[#]	0.9325
Overcontrol Composite	91.7 (5.4)	84.3 (6.3)	0.143	87.8 (5.4)	91.3 (5.8)	0.139	0.1023
General Psychological Maladjustment Composite	413.7 (18.0)	376.4 (27.3)	**0.041**[##]	403.9 (27.5)	382.3 (26.0)	0.126	0.4966

# Denotes weak evidence p=0.05-0.1   ## Denotes strong evidence p=0.01-0.05   ### Denotes very strong evidence p= <0.01

Table 5.5. Mean scores for the individual domains of the three questionnaires (EDQoL, BDI-2 and STAI) (standard error in brackets) for the two treatment phases.

Measure	Acupuncture + Treatment as usual (TAU)		P-values for significance within treatments	Treatment as usual (TAU)		P-values for significance within treatments	P-values for significance differences between treatments
	Baseline mean (n=9)	Baseline mean (n=9)		Baseline mean (n=9)	Baseline mean (n=9)		
EDQoL							
Psychological	22.3 (1.9)	16.6 (3.1)	**0.0025**[###]	19.2 (3.1)	19.3 (3.3)	0.941	**0.0557**[##]
Physical/Cognitive	14 (1.5)	8 (1.8)	**0.0056**[###]	9.7 (2.1)	9.7 (2.3)	1.000	**0.0009**[###]
Financial	3.0 (1.6)	1.2 (0.7)	0.150	2.0 (1.2)	2.2 (1.2)	0.738	0.195
Work/School	3.7 (1.5)	2.3 (1.3)	0.267	3.1 (1.3)	1.7 (1.0)	0.272	0.9426
Overall Score	43 (3.7)	28.1 (5.2)	**0.0008**[###]	34 (6.6)	32.9 (6.5)	0.693	**0.0076**[###]
Physical Domain Only	6.8 (1.0)	4.1 (0.89)	**0.016**[#]	4.4 (0.96)	4.4 (1.1)	1.000	**0.0165**[##]
Cognitive Domain Only	7.0 (0.88)	4.0 (1.1)	**0.047**[#]	5.3 (1.3)	5.2 (1.5)	0.824	**0.0316**[##]
BDI-2							
BDI-2 Score	20.9 (4.8)	15.2 (5.2)	0.132	19.6 (5.5)	17.6 (5.0)	0.507	0.4691
STAI							
State	47 (5.3)	37.6 (5.9)	**0.070**[#]	42.7 (6.7)	46.3 (5.8)	0.380	**0.0172**[##]
Trait	52.9 (5.2)	45.2 (5.2)	**0.030**[##]	51.1 (5.9)	50.1 (5.9)	**0.098**[#]	**0.092**[#]

# Denotes weak evidence p=0.05-0.1

Denotes strong evidence p=0.01-0.05

Denotes very strong evidence p= <0.01

5.4.2 Comparison Between the two Treatments

There were significant between treatment improvements across the outcome measures. The EDI-3 perfection measure showed a weakly significant improvement as a result of the acupuncture and TAU ($p = 0.060$). The BDI-2 depression measure showed no significant improvement for either the acupuncture supplementation and TAU or TAU only. The acupuncture supplementation phase showed strongly significant improvement ($p = 0.017$) for the STAI-State measure while the STAI-Trait measure showed weakly significant improvement ($p = 0.092$). The acupuncture supplementation phase showed very strong significant improvement ($p = 0.0009$) for the Physical-Cognitive domain of the EDQoL scale while the Psychological domain showed weakly significant improvement ($p = 0.056$). These results contributed to a very strongly significant improvement in the overall EDQoL aggregate score ($p = 0.008$).

The Physical-Cognitive domain is evaluated by six questions, three of which relate to physical aspects (coldness, headaches, weakness) and three of which relate to cognitive aspects (concentration, attentiveness and comprehension). Analysis was undertaken to see if there was any significant differences between these two aspects. Therefore the outcomes for each of these sub-domains were tested separately. The results (seen in Table 5.5 rows labelled "Physical" and "Cognitive" respectively) show strong significant

improvements for both sub-domains (Physical ($p= 0,016$) and Cognitive ($p= 0.047$). The results show that both aspects (the physical and the cognitive) are contributing to the overall strong benefit seen with acupuncture supplementation.

5.5   Discussion

The results of this study indicate that participants having acupuncture treatment, in addition to their TAU, reported a significant improvement in quality of life (QoL) and a reduction in anxiety and the expression of perfectionism.   To the best of our knowledge, this is the first study to investigate the effect of acupuncture as an adjunct treatment for eating disorders. Given research in a non eating disorder population found that acupuncture was successful in treating depression, anxiety, insomnia and headache, it was hypothesised that these conditions and symptoms, in patients with an eating disorder, may respond positively to acupuncture treatment.

Quality of life in patients with an eating disorder has become a focus of research with the recognition of a need for evidence on the impact of treatment on QoL (Bamford & Sly, 2010). The addition of acupuncture to the participants' existing treatment found significant improvements in QoL, particularly within the Physical-Cognitive and Psychological domains. The results for enhancing QoL

with acupuncture in other populations have had mixed responses varying from significant improvement (Maa et al., 2003; Vas et al., 2004) to little or no effect (Gosman-Hedström et al., 1998; Stavem et al., 2000). Improved QoL was reported for patients who receive treatment for their eating disorder but the differing scales used makes comparisons difficult (de la Rie et al., 2006; Engel, et al., 2009). Our findings suggest that the addition of acupuncture improves QoL beyond that which occurs when patients receive best practice treatment. QoL is negatively associated with the severity of an eating disorder (de la Rie et al., 2005; Pandierna et al., 2002) and positively associated with changes in eating behaviour (de la Rie, et al., 2006). The addition of acupuncture may enhance changes related to QoL, aiding in the improvement of eating disorder severity and positive changes in eating behaviours and as such deserves further investigation.

The participants in the study had significantly less STAI-State anxiety after receiving acupuncture. This agrees with previous acupuncture and anxiety findings, which show an improvement in STAI-State anxiety (Chae et al., 2008; Vickland, et al., 2009). Similar eating disorder studies with two or more, non pharmaceutical interventions measuring anxiety have noted significant changes with both interventions but no significant difference between the treatments (Carei et al., 2010; Carter et al., 2003). This suggests that engaging in treatment may decrease anxiety for those with an eating disorder. The

significant differences between the treatments in the study may indicate that acupuncture is beneficial in reducing anxiety beyond that of a potential treatment effect. Recent research has shown that there is a negative correlation between pre-meal anxiety and energy intake at mealtimes for those with AN (Attia, 2010). Given that malnutrition intensifies anxiety, this seems to be a self-reinforcing cycle of anxiety and malnutrition (Pollice et al., 1997). The addition of acupuncture to a sufferer's existing treatment may help reduce anxiety and thus increase energy intake particularly if the treatment was given prior to meal times.

A link between perfectionism and poor treatment outcome and a greater risk of relapse has been established (Bardone-Cone et al., 2007; Garner, 2004; Garner et al., 1990), thus there is a greater need to understanding how perfectionism responds to treatment. The findings of a weak decrease in EDI-3 measured perfectionism while receiving acupuncture implies that perfectionism can change as a result of treatment. The EDI-3 perfectionism measure is sensitive to illness status (Sutandar-Pinnock et al., 2003) therefore a decrease in EDI-3 perfectionism may indicate a decrease in the illness status. The parameters of this study do not allow an extrapolation of the findings to indicate whether our decrease in perfectionism had an effect on the eating disorder, its symptoms or its outcome. In light of the gravity of high perfectionism scores in

those with an eating disorder, the weak reduction in perfectionism is important, particularly for sufferers with an interest in CAM therapies.

Anxiety is a common co-morbid condition in those with an eating disorder (Grilo, 2006; Kaye et al., 2004). A weak significant reduction in STAI-Trait anxiety was found in the present study. These findings accord with other acupuncture STAI-Trait research which finds weak significant improvements in 'healthy patients' (Chae, et al., 2008; Vickland, et al., 2009). A reduction in Trait anxiety is beneficial given that elevated Trait scores predict a reduction in the chances of remission (Yackobovitch-Gavan et al., 2009).

Given the design of this study, the significant within-treatment findings are unable to be directly attributed to the treatments given within each phase. However, it is of interest that there were fourteen items out of the four self-report measures (EDI-3, BDI-2. EDQoL scale and STAI) that were found to be significantly beneficial (from weak to very strong) for those that received acupuncture supplementation and only three (all weak) for those that received TAU only. These findings are of interest and hopefully stimulate interest into further acupuncture for eating disorder research.

Our preliminary results identify areas for further acupuncture research within the field of eating disorders. Future acupuncture research could

investigate the role of acupunctures effect on QoL and consequently its effect on eating disorder severity and behaviour.   The role of acupuncture in decreasing pre-meal anxiety and its outcome on weight restoration in AN sufferers is relevant given its potential for reducing anxiety. Given the decrease in perfectionism and Trait anxiety, a comparison study looking at acupuncture's effect on both perfectionism and Trait anxiety relative to other effective treatments in terms of time, cost and remission rates would be beneficial. Future research could also look at the therapist- patient interaction to the outcome.

5.6   Conclusion

The findings of this study indicate that acupuncture, as an adjunct therapy, has a beneficial effect on patients with an eating disorder, with a specific effect on QoL and State anxiety with strongly significant results found, and a weaker effect on Trait anxiety and perfectionism. The results of this study raise important research questions involving the timing of treatment for those with pre-meal anxiety, the effect of improved quality of life on eating disorder severity and the effect of acupuncture on remission and treatment outcome. This preliminary study has a small sample size, but its significant findings suggest that replication of the study with a larger sample size would be valuable.

Section 3.

Does acupuncture promote weight loss and mental health in overweight and obese individuals participating in a weight loss program? A randomised cross-over study.

Chapter 6. Does acupuncture promote weight loss and mental health in overweight and obese individuals participating in a weight loss program? A randomised cross-over study.

6.1   Introduction

Obesity is a major health concern, with prevalence rates increasing to what is reported as epidemic proportions (Abraham & Llewellyn-Jones, 2001; Australian Institute of Health and Welfare, October 2004; Biggs, 5 October 2006; Cabroglu & Ergene, 2007; Grilo, 2006).   It increases the risk of high blood pressure, heart disease, atherosclerotic disease, certain types of cancer, diabetes and sleep apnoea (Grilo, 2006).   There has been much research published over the last two decades investigating acupuncture and electro-acupuncture for weight loss in the overweight and obese (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005c; Lacey, et al., 2003; Lei, 1998; Myeong, et al., 2006; Richards & Marley, 1998; Shafshak, 1995). The World Health Organisation (WHO) has listed obesity as a "disease, symptom or condition for which the therapeutic effect of acupuncture has been shown but for which further proof is needed" (World Health Organisation, 2003a).

More recently, Western medical research has investigated both eating psychopathology (binge eating, weight, shape and eating concerns) and general psychopathology (depression, low self-esteem) in overweight and obese individuals (Bosmans, et al., 2009; Celio, et al., 2006; Mond, et al., 2006; Ramacciotti, et al., 2008; Roehrig, et al., 2009; Werrija, et al., 2009). Current research findings highlight the importance of investigating eating disorder psychopathology when dealing with obese and overweight patients (Ramacciotti, et al., 2008).

Elevated eating, weight and shape concerns including general concern and worry about eating, weight and shape, dissatisfaction with weight and shape and the undue influence of weight or shape on self-evaluation (Mond, et al., 2006), as well as dietary restraint are all risk factors for depression, anxiety, binge eating (not meeting the DMS criteria for BED) and increased eating disorder psychopathology e.g. intense dieting or fasting to control weight and shape (Bosmans, et al., 2009; Burrows & Cooper, 2002; Chugh & Puri, 2001; Linde, et al., 2004; Mazzoni et al., 1999; Polivy & Herman, 2002; Stice, 2001; Vogeltanz-Holm, et al., 2000; Vollrath, et al., 1992). Overweight and obese individuals who have elevated eating and weight concerns may therefore be at increased risk of developing the above mentioned deleterious mental health problems when they commence a weight loss program (Celio, et al., 2006; Chugh & Puri, 2001; Roehrig, et al., 2009).

Despite the research into the use of acupuncture for weight loss, there are few acupuncture studies which evaluate the psychological health of those trying to lose weight (Cabroglu & Ergene, 2007; Mazzoni, et al., 1999). It is therefore unknown if people who have eating psychopathology respond to acupuncture, as part of a weight loss program, in the same way as those with healthy eating behaviours and weight concerns. This study therefore sought to investigate the benefit of acupuncture in assisting weight loss and the role it may play in supporting the mental and physical health of those undergoing a weight loss program.

This study aims to investigate the benefit of acupuncture in assisting weight loss and the role it may play in supporting the mental and physical health of those undergoing a weight loss program.

6.2   Literature review

Being overweight or obese is not yet classified as a mental disease (in particular an eating disorder) (American Psychiatric Association, 2009). Consistent association with a psychological or behavioural disorder has not yet been established (American Psychiatric Association, 2009). Nevertheless it

does not stop those who are overweight or obese from presenting with an eating disorder or disordered eating.   It is feasible that eating, weight and shape concerns including general concern and worry about eating, weight and shape, dissatisfaction with weight and shape and the undue influence of weight or shape on self-evaluation (Mond, et al., 2006) can be present in those who are overweight and or obese (either as a consequence of a DSM recognised eating disorder such as BN, EDNOS or BED or as a result of being overweight or obese). It must be noted that not all individuals who are overweight or obese have an eating disorder or pathological/elevated eating and weight concerns. However for those that do, there is serious risk to their mental health and well being (Cooper & Fairburn, 1993; Cooper & Fairburn, 1987; Linde, et al., 2004; Vogeltanz-Holm, et al., 2000; Vollrath, et al., 1992).   While individuals of all shapes and sizes can be at risk of having elevated eating and weight concerns those who frequently diet or weight cycle compound this risk due to the effects of repeated failure (Brownell & Rodin, 1994; Kenardy, et al., 2001).   Studies have found that frequent dieters start binge eating at an earlier age, have higher rates of weight cycling, greater weight suppression, poorer physical and mental health, increased risk of depression and general health problems, and greater eating disorder pathology (more disorganised eating (binging and purging) and more extreme weight and shape dissatisfaction) than infrequent dieters (Brownell & Rodin, 1994; Kenardy, et al., 2001). Weight cycling specifically has been shown to lead to depression and demoralization due to recurring failures

(Brownell & Rodin, 1994). Commonly overweight or obese individuals are frequent dieters (Kenardy, et al., 2001; Roehrig, et al., 2009) placing them at risk for the development of elevated eating concerns.

For individuals who are overweight or obese, the combination of the risk factors of depression, anxiety, frequent dieting and elevated eating and weight concerns may possibly lead to a self-sustaining cycle of depression, weight cycling and elevated eating and weight concerns. Once entrenched in frequent dieting or weight cycling these individuals are more likely to be depressed and have elevated levels of eating and weight concerns (disorganised eating (binging and purging) and more extreme weight and shape dissatisfaction) than those who don't frequently diet (Brownell & Rodin, 1994; Kenardy, et al., 2001; Roehrig, et al., 2009). This self reinforced cycle of disordered eating and pathological eating issues has important mental health implications (Brownell & Rodin, 1994; Kenardy, et al., 2001).

While individuals with elevated eating concerns are commonly identified in research studies, little has been done regarding effectively treating them (Bosmans, et al., 2009; Burrows & Cooper, 2002; Celio, et al., 2006; Chugh & Puri, 2001; Mond, et al., 2006; Ramacciotti, et al., 2008). In particular there has not been much done to address the psychopathology of frequent dieters who commence weight loss programs. Werriji et al (2008) found that treating obese

individuals with Cognitive Behavioural Therapy (CBT) as well as dietary advice for weight loss produced more lasting weight loss and beneficial changes in eating psychopathology than those that received only dietary and exercise advice. This research suggests that more than dietary and exercise advice is needed to address the eating psychopathology of those trying to lose weight and stop the weight cycling.

Over the last two decades considerable research has been published, both out of China and Western countries, concerning the use of acupuncture and electro-acupuncture for weight loss in those who are overweight and obese (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005c; Lacey, et al., 2003; Lei, 1998; Myeong, et al., 2006; Richards & Marley, 1998; Shafshak, 1995). The results of this research indicate that acupuncture has a therapeutic effect on weight loss but further proof is needed (World Health Organisation, 2003a).

The research on the use of acupuncture for weight loss is addressed in this work in two ways due to the differing research approaches used by both groups. Research predominately conducted in China is one category and research predominately conducted in Western countries is another category. Both categories conduct and report research differently making comparisons between the two difficult.

6.2.1. Research out of China

Cohort Researched:

Gender: Much of the research out of China involves both men and women in their studies (Cao et al., 2007; Li, 2005; Liu, 2007; Mu & Yuan, 2008; Shan, 2006; Shang & Shang, 2003; Sun, 2005; Zhang, 2005). Whilst this might not specifically be an issue for weight loss, where there are elevated eating and weight concern it might become difficult to separate the differing motivations and possible failure or success such as 'thinness' for women and lean muscle mass (the stature of 'David' psychic) for men.

Weight: The majority of studies involved participants who were classified as obese (a note must be made that obesity was most often defined by a percentage of body fat not BMI) ranging from 20 percent body fat to 50 percent (Cao, et al., 2007; Li, 2005; Liu, 2007; Mu & Yuan, 2008; Shan, 2006; Shang & Shang, 2003; Sun, 2005; Zhang, 2005). This is not how obesity is defined in WM (BMI of >30) thus comparison between TCM and Western Medicine studies on weight loss is limited.

Participant numbers: Large participant number are generally reported and the studies are usually uncontrolled (Cao, et al., 2007; Li, 2005; Liu, 2007; Mu & Yuan, 2008; Shan, 2006; Shang & Shang, 2003; Sun, 2005; Zhang, 2005).

The uncontrolled nature of the studies makes it difficult to isolate the contributing factors to the weight loss success or failure.

Acupuncture styles used: Many different styles of acupuncture are used including TCM acupuncture, electro-acupuncture, tuina-acupuncture, auricular-acupuncture etc.) (Cao, et al., 2007; Li, 2005; Liu, 2007; Mu & Yuan, 2008; Shan, 2006; Shang & Shang, 2003; Sun, 2005; Zhang, 2005).

Acupuncture Prescription and frequency: Set acupuncture formulae with the option of adding points to treat the diagnosed pattern of disharmony dominated acupuncture treatments (Liu, 2007; Mu & Yuan, 2008; Shan, 2006; Shang & Shang, 2003; Sun, 2005; Zhang, 2005). The frequency of treatment most commonly used was daily with a range of 15-30 treatments administered (Li, 2005; Liu, 2007; Mu & Yuan, 2008; Shang & Shang, 2003; Zhang, 2005). There was no study with which frequency of treatment was less than every 2-3 days (Cao, et al., 2007; Shan, 2006; Sun, 2005).

Additional treatment: The majority of studies did not report on the inclusion (or exclusion) of any other treatment given such as lifestyle advice or nutritional advice(Cao, et al., 2007; Li, 2005; Liu, 2007; Mu & Yuan, 2008; Shan, 2006; Shang & Shang, 2003; Sun, 2005; Zhang, 2005). Once again this makes it

difficult to isolate the contributing factors in weight loss success or failure and comparison to Western Medicine studies difficult.

Outcomes: Most studies reported high levels of success (the criteria for success is not predominately accessed by statistical means but by ranges in weight lost or body fat lost) (Cao, et al., 2007; Li, 2005; Liu, 2007; Mu & Yuan, 2008; Shan, 2006; Shang & Shang, 2003; Sun, 2005; Zhang, 2005). This is contrary to Western Medicine scientific protocol and makes interpretation of results complex at times.

6.2.2   Research out of the West

Cohort Researched

Gender: Much of the research out of the West involves women only (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Lacey, et al., 2003; Richards & Marley, 1998; Wilson, 2003).   Single sex studies have the capacity to assess the success of the therapy for weight loss specifically for the needs of the sex. A limitation with many of these studies is that they do not identify participants with elevated eating and weight concerns, which restricts the knowledge of how these therapies specifically affect this dysfunction.

Weight: The majority of studies involved participants who were classified as obese (as defined by a BMI of 30 or greater) (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Mazzoni, et al., 1999; Shafshak, 1995). As mentioned this is different to how TCM classifies overweight and obese thus making systematic reviews and comparisons of research problematic.

Participant numbers: The majority of the studies have sample size numbers between 30 and 60 (Cabroglu & Ergene, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Mazzoni, et al., 1999; Richards & Marley, 1998; Shafshak, 1995; Wilson, 2003). There are a small number of trials where the sample size has been over 150 (Cabroglu & Ergene, 2005; Lacey, et al., 2003). Many of the studies are controlled with the control group including a mixture of diet only, placebo acupuncture, herbal supplements, sham acupuncture, behaviour modification or wait list (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Lacey, et al., 2003; Mazzoni, et al., 1999; Richards & Marley, 1998; Wilson, 2003). These studies provide a good foundation of the use of TCM in weight loss treatment.

Acupuncture styles used: Many different styles of acupuncture are used including TCM acupuncture, electro-acupuncture, auricular-acupuncture etc.) (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al.,

2005a; Hsu, et al., 2005b; Lacey, et al., 2003; Mazzoni, et al., 1999; Richards & Marley, 1998; Shafshak, 1995; Wilson, 2003).

Acupuncture Prescription and frequency: Set acupuncture formulae with dominated acupuncture treatments (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Lacey, et al., 2003; Mazzoni, et al., 1999; Richards & Marley, 1998; Shafshak, 1995; Wilson, 2003). The frequency of treatment most commonly used was mixed between daily and twice to three times per week with the studies lasting from 20 days to 12 weeks (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Lacey, et al., 2003; Mazzoni, et al., 1999; Richards & Marley, 1998; Shafshak, 1995; Wilson, 2003)

Additional treatment: Many of studies reported on the inclusion (or exclusion) of other treatments given such as lifestyle advice or nutritional advice (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Lacey, et al., 2003; Mazzoni, et al., 1999; Richards & Marley, 1998; Shafshak, 1995; Wilson, 2003). In many instances the other treatments were part of the controlled study such as restricted calorie intake dietary programs and exercise programs (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Lacey, et al.,

2003; Mazzoni, et al., 1999; Richards & Marley, 1998; Shafshak, 1995; Wilson, 2003) .

Outcomes: The outcomes of the studies was mixed with some studies reporting no significant weight loss with the use of acupuncture (Lacey, et al., 2003; Mazzoni, et al., 1999; Wilson, 2003) and others reporting significant weight loss with acupuncture (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Shafshak, 1995).

Despite plentiful research from both China and out of the West on the use of acupuncture for weight loss, there are only a limited number of acupuncture studies evaluating the psychological health of those trying to lose weight (Cabroglu & Ergene, 2007; Mazzoni, et al., 1999). Mazzoni et al. (1999) found that obese individuals with an eating disorder, including binge eating disorder, receiving 'real' weight loss acupuncture had significant decreases in depression and State anxiety. Cabroglu & Ergene (2007) also found significant decreases in anxiety and depression with electro-acupuncture compared to those receiving placebo elector-acupuncture. The findings of both these studies indicate that acupuncture specifically designed for weight loss can improve the psychological status of overweight/obese individuals (Cabroglu & Ergene, 2007; Mazzoni, et al., 1999). These findings support the fact that acupuncture is a commonly used CAM therapy that is purported to provide benefit in mental health

conditions such as depression and anxiety, (Huang, et al., 2009; Leo & Ligot Jr, 2007; Melchart, et al., 1999; Vickland, et al., 2009; World Health Organisation, 2003b). The research on the benefits of acupuncture for weight loss and mental health such as anxiety and depression has been primarily evaluated in a non-eating disorder population/non elevated eating and weight concerned population, thus it is not known if its effectiveness extends to those with eating disorder psychopathology. Indeed it appears that there is no research that addresses specific eating psychopathology. It is therefore unknown if people who have elevated eating and weight concerns respond to acupuncture, as part of a weight loss program, in the same way as those with healthy eating behaviours and weight concerns.

6.3   Methods

6.3.1   Participants

Healthy men and women who were overweight or obese (defined by the Body Mass Index (BMI) (weight (kgs)/height (m)^2) were recruited via an internal mail release at Victoria University, Melbourne, Australia between June 2008 to June 2009. The research protocol was approved by the Victoria University Human Research Ethics Committee (No. HRETH 08/85) prior to initiating the study.

Ten men and thirty-six women agreed to participate in the study. Nine women and two males dropped out, citing reasons shown in the participant flow chart (Figure 6.1). Thirty-five participants completed the study. The characteristics of those that completed the study are shown in Table 6.1a, Table 6.1b and 6.2.

Table 6.1a. Gender of the participants who completed the study (n=35). The participants according to weight, being overweight (n = 18) or obese (n =17)

	Overweight (BMI ≥25<30)	Obese (BMI ≥ 30<40)
Male	4 (22.2%)	4 (23.5%)
Female	14 (77.8%)	13 (76.5%)

Table 6.1b. Gender of the participants who completed the study (n=35). The participants according to whether they had eating concerns (n =7) or not (n =28) (eating and weight concerns and no eating and weight concerns subgroups were classified according to EDI scores)

	Eating & weight concerns	No Eating & weight concerns
Male	0 (0.0%)	8 (28.6%)
Female	7 (100%)	20 (71.4%)

Table 6.2. Age, weight and BMI of the participants who completed the study (n=35). Data is presented as the mean and standard deviation (SD). The participants were grouped according to weight, being overweight (n = 18) or obese (n =17) and whether they had eating and weight concerns (n =7) or not (n =28) as classified according to EDI scores

	Age (Years)		Weight (Kgs)		BMI	
	Mean	SD	Mean	SD	Mean	SD
Overweight (BMI ≥25< 30	46.9	10.3	79.3	11.5	28.1	1.2
Obese (BMI ≥ 30< 40)	46.1	10.6	92.1	15.0	34.0	2.7
Those with eating & weight concerns	44.1	13.9	84.0	10.0	31.4	3.5
Those without eating & weight concerns	47.1	9.4	85.9	14.6	30.9	3.7

Inclusion criteria included: a BMI of 25 or greater at enrolment of the study (all participants' commenced treatment within four weeks of enrolling); stable body weight over the three months prior to enrolling in the study and the ability to give written informed consent.

Participants were excluded if they were: less than 18 years of age; unable to give informed consent; were seeking other weight loss treatment outside the study (excluding psychological treatment if there were elevated weight and eating concerns); had any serious concomitant illness such as heart disease, endocrine disease etc; a BMI over 40; pregnant or had given birth within the last six months; diagnosed with Polycystic Ovarian Syndrome or provided with medical treatment that may have had nutritional implications on weight or appetite or their ability to comply with the study.

6.3.2. *Experimental Design*

A blinded randomised cross-over study design was used. The two groups/phases were;

a) Nutritional counselling plus TCM acupuncture

b) Nutritional counselling plus sham acupuncture (acupuncture at non-acupuncture sites in close proximity to the acupuncture points used for weight loss).

Each treatment phase was six weeks in duration with each participant receiving weekly nutritional counselling and twice weekly acupuncture (either sham or TCM acupuncture). There was a two week wash-out period between the two treatment phases (Figure 6.1).

Figure 6.1. CONSORT 2010 Flow Diagram
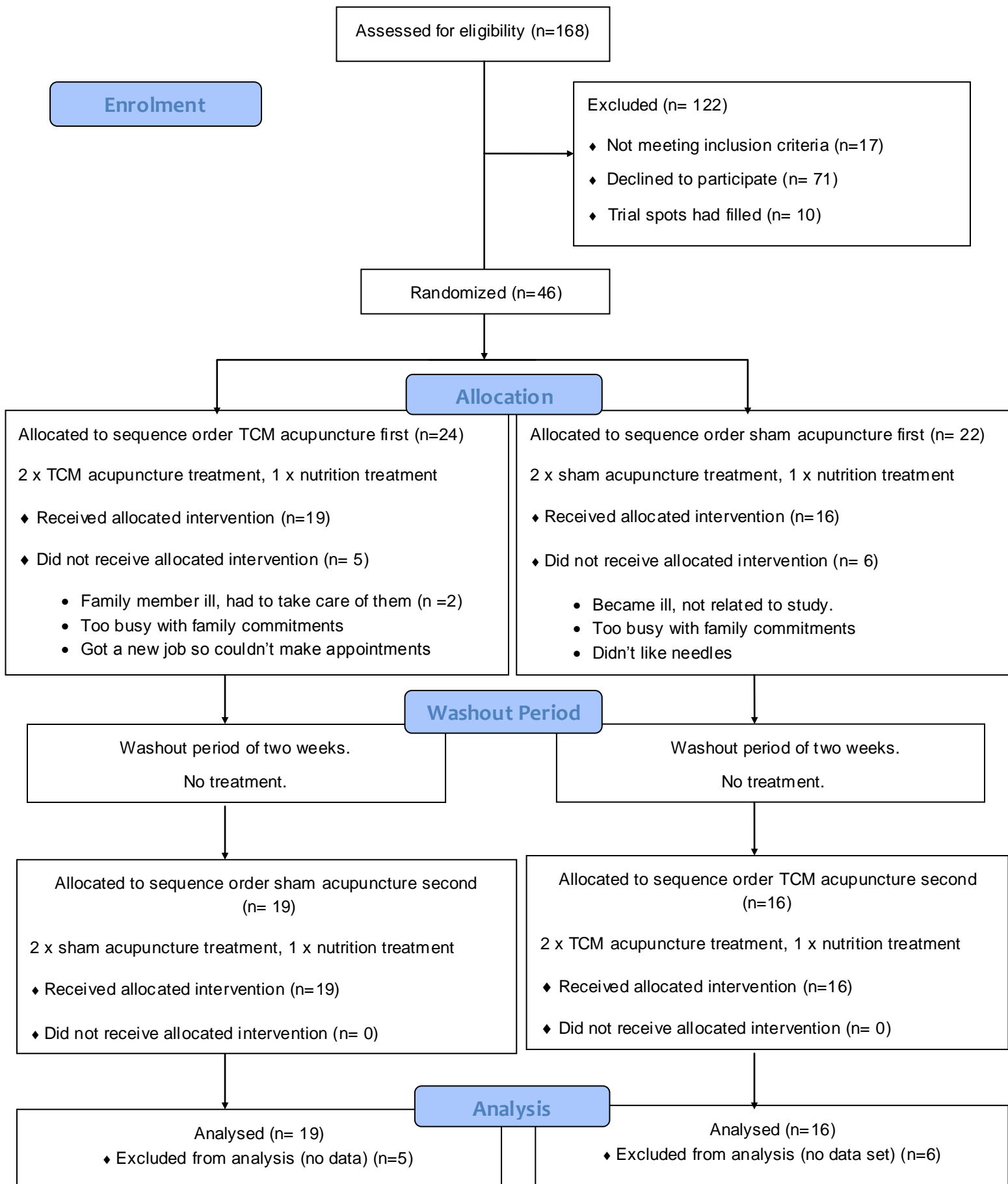
A randomised number table was used to assign the order with which the participants received treatment. Participants were randomised by a researcher associated with the study but not involved with enrolment or treatment. All treatment providers and the researcher enrolling the participants into the study (Sarah Fogarty) were blind to the assignment of ordering of the participants. SF was blind to the allocation of the treatment as a supervisor did all the randomisation.

Participants were classified as having elevated eating and weight concerns if they scored in the elevated range of any of the three sub categories of the Eating Disorder Inventory-3 (EDI-3) Eating Disorder Risk Composite (EDRC) scale. These three categories include drive for thinness (DT) bulimia (B) and body dissatisfaction (BD) (Garner, 2004).

6.3.3. Treatment

Nutritional Counselling

Participants were provided with weekly lifestyle counselling during both phases of treatment. Nutritional counselling was provided by final year undergraduate nutrition students at the Victoria University nutrition teaching clinic at St Albans, Melbourne. The nutrition teaching clinic was supervised by

an experienced dietitian (Dr Andrew J McAinch) and nutritionist (Dr Michael L Mathai).

The treatment provided was tailored in such a way that participants were encouraged to follow the Australian Healthy Dietary guidelines (National Health and Medical Council, 2003). This entailed a moderate carbohydrate diet (approximately 55% total energy), low fat (approximately 25-30%) and moderate protein (approximately 15-20%). All the treatment providers for the nutritional counselling were blinded as to the type of acupuncture the participants were receiving.

Acupuncture

TCM style manual acupuncture was used in the study (Deng, 2000). Point selection was based on a list of points that has been previously reported as being effective in weight loss (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Hsu, et al., 2005c; Richards & Marley, 1998) and mental health (Deadman, et al., 1998; Lade, 1989; Maciocia, 1989; Wiseman & Ye, 1998). All participants received the same sham and TCM treatments.

The TCM Acupuncture Points

All participants received needling at the same prescribed acupoints at each TCM acupuncture session; Bilateral *Hégǔ* (LI 4), *Qūchi* (LI 11), *Zúsānlǐ*

(ST 36), *Néitíng* (ST 44), *Táichōng* (LR 3).   All acupoints were located according to *A Manual of Acupuncture* (Deadman, et al., 1998). In addition three auricular acupoints were needled; Unilateral *Hungry*, *Stomach* and *Shen Men (*the ear needled alternated between appointments).

Sham Acupuncture

All participants received bilateral needling at the same sham acupoint sites at each sham session.   These sites were located close to the TCM acupuncture points listed above. Pseudo *Hégǔ* (LI 4) was located on the ulna side of the dorsal aspect of the thumb at the distal end of the first metacarpal joint (See Figure 6.2, pseudo *Qūchi* (LI 11) was located one cun lateral to *Qūchi* (LI 11) (See Figure 6.3), pseudo *Zúsānlǐ* (ST 36) was located 3-4 cun below *Yánglíngquán (GB 34)* on the anterior border of the fibula (See Figure 6.4), pseudo *Néitíng* (ST 44) was located at the proximal medial aspect of the fourth tarsal bone (See Figure 6.5), pseudo *Táichōng* (LR 3) is located on the medical aspect of the Extensor Halicus Longus muscle, level with *Táichōng* (LR 3) (See Figure 6.5).   In addition three auricular acupoints were needled; External Nose for *Hungry*, Thorax (chest) for *Stomach* and Hip joint for *Shen Men (*the ear needled alternated between appointments).

Participants were provided with twice weekly acupuncture (either sham or TCM acupuncture) sessions during both six week phases of the study. The

treatment was administered by one of the researchers, an experienced registered acupuncture practitioner in Australia (Sarah Fogarty-8 years). The depth of the needle insertion varied with thickness of the skin and subcutaneous fatty tissue at the site of the acupuncture (sham and TCM) points; it was usually 0.5-1.5cm. Fine disposable needles (AcuGlide brand, 40 mm (0.20 or 0.25mm) were used for the body and 10 mm (0.16mm) for the ears. Participants received the acupuncture in a supine position while on a treatment couch. Following insertion, the needles were manipulated using a gentle lift and rotation, which according to Chinese acupuncture theory has a homeostatic/supplementing effect (Deng, et al., 1996). The needles were left *in situ* for 30 minutes after which they were removed. In an attempt to conceal the TCM acupuncture from the sham vigorous manipulation was not employed in order to elicit *de qi*. No other interventions were used by the acupuncturist. A small number of participants (less than 10 percent) encountered a small amount of pain on needle insertion and mild bruising after the acupuncture session.

M-UE-22 *Baxie*

Pseudo- *Hégǔ* (LI 4)

Yanglingquan GB-34
Dannagxue (M-LE-23)
Pseudo- *Zúsānlǐ* (ST 36)
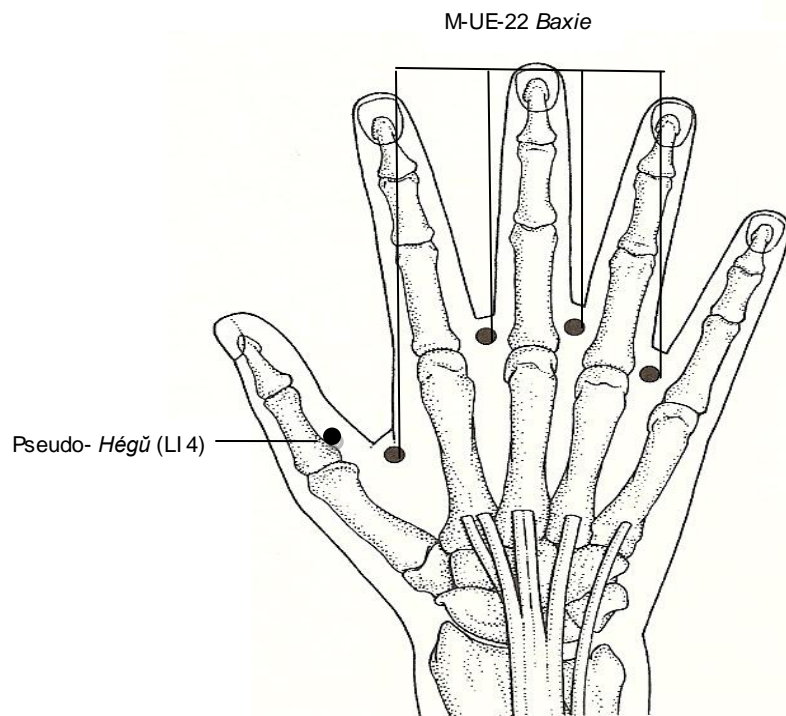
Figure 6.2. Diagram of location of Pseudo- *Hégǔ* (LI 4)
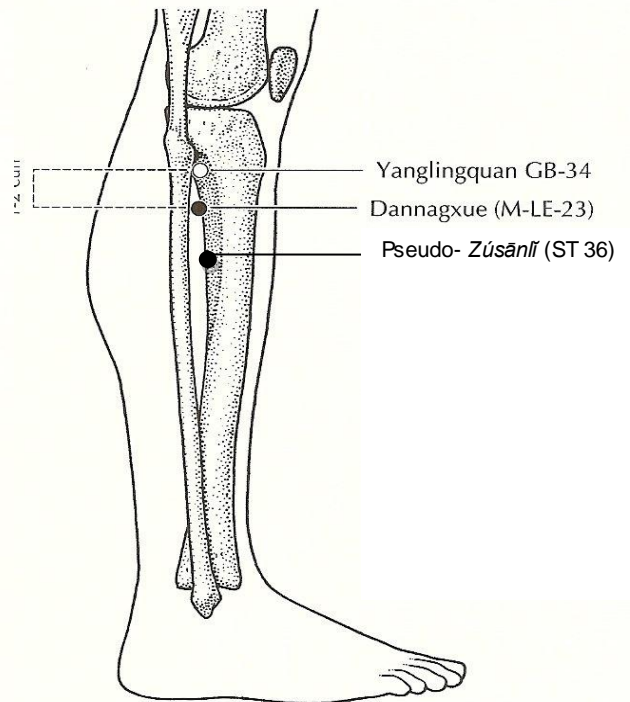
Figure 6.3. Diagram of location of Pseudo- *Zúsānlǐ* (ST 36)

Binao L.I.-14
in the depression between the distal insertion of the
deltoid muscle and the brachialis muscle

Xiaoluo SJ-12
4 cun proximal to Tianjing SJ-10 and 6 cun distal to Jianliao SJ-14

Naohui SJ-13
where the line drawn between Tianjing SJ-10 and Jianliao SJ-14
meets the posterior border of the deltoid muscle, approximately one
third of the distance between these two points

Shouwuli L.I.-13
3 cun proximal to Quchi L.I.-11

Quchi L.I.-11
at the lateral end of the cubital crease

Jianliao SJ-14
in the depression posterior and inferior
to the lateral tip of the acromion

Tianjing SJ-10
one cun proximal to the olecranon

Pseudo- *Qūchi*

(LI 11)

Tianfu LU-3
nferior to the axillary fold between the lateral
of biceps brachii and the shaft of the humerus

Jianyu L.I.-15
in the depression anterior and inferior
to the lateral tip of the acromion

Jianquan (M-UE-48)
midway between the anterior
axillary crease and Jianyu L.I.-15

Figure 6.4. Diagram of location of Pseudo- *Qūchi* (LI 11)

M-LE-8 *Bafeng*

Pseudo
Néitíng
(ST 44)

Táichōng (LR 3)

Pseudo-
Táichōng (LR 3)
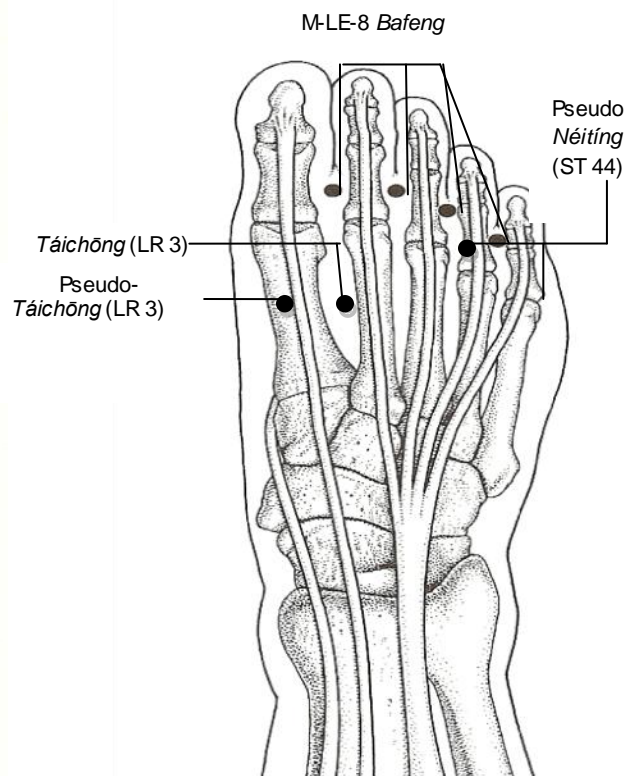
Figure 6.5. Diagram of location of Pseudo-*Táichōng* (LR 3) and
Pseudo *Néitíng* (ST 44)

All diagrams taken with permission from A Manual of Acupuncture (World
Health Organsiation, 2007).

6.3.4. Outcome measures

The primary outcome measures were the EDI-3 Eating Disorder Risk Composite (EDRC) (Garner, 2004) and body weight change (kg and percentage). The EDRC is a composite of drive for thinness (DT), bulimia (B) and body dissatisfaction (BD) (Garner, 2004). The EDRC is a 25-item, self-reported instrument, commonly used in research as a global measure of eating and weight concerns (Garner, 2004).

The secondary outcome measures were the Becks Depression Inventory (BDI-2) (Beck, et al., 1996), the State-Trait Anxiety Inventory (STAI) (Spielberger, 1983), the SF-36v Health Survey (physical and mental quality of life). The BDI-2 is a 21-item, self-reported instrument for measuring the severity of depression in those aged 13 years and over (Beck, et al., 1996). The STAI consists of two separate 20-item self-reported scales measuring STAI-State anxiety (an individual's current anxiety level) and STAI-Trait anxiety (an individual's general anxiety level) (Spielberger, 1983).

The SF-36v2 health survey is a 36 item self-reported instrument for measuring Quality of Life (QoL) from the patient's point of view (QualityMetric, 2010 -a). It measures two components; physical and mental. The physical component assesses physical health via function and evaluation of one's ability

to perform physical activity. The mental component measures mental health by assessing psychological distress, well-being, social and role functioning and overall vitality (QualityMetric, 2010 -a). Scoring software was used to evaluate the participants responses (QualityMetric, 2010 -b).

Each questionnaire was administered prior to randomisation, at the completion of the first phase of treatment and at the beginning and end of the second phase of treatment. Body weight was measured weekly from week 1-6 and then week 8-14, on digital scales (Model HD-351Tanita brand, Tanita Corporation) in kilograms with 0.1kg graduations.

6.4 Analysis

The mean age, gender, weight and BMI of the participants are expressed as the mean and standard deviations (SD).

6.4.1 Comparing TCM Acupuncture and Sham Treatments

Three characteristics were identified as important in affecting weight loss and/or mental health — gender (Roehrig, et al., 2009), body weight (Ramacciotti, et al., 2008; Roehrig, et al., 2009) and eating concerns (Werrija, et al., 2009). Each individual was classified according to their gender (male / female), body weight (overweight / obese) and eating concerns (yes / no),

totalling five categories (It is noted that there are not eight categories in this trial because there were no males with eating concerns and all the overweight males received treatment in the same period thus the appropriate statistical measures were unable to be conducted on this group). Table 6.3 shows the characteristics for these categories.   These categories are henceforth collectively referred to as GWEC (Gender, Weight and Eating Concerns).

All analysis is carried out in the package E-views (Quantitative Micro Software) (Quantitative Micro Software, 2007).   The approach detailed in section 2.3 of Jones and Kenward was followed (Jones & Kenward, 1989). This approach consists of first performing a t test for the presence of a carry-over effect in those whose who received acupuncture in the first phase of the trial. ("Carry-over is the persistence (whether physically or in terms of effect) of a treatment applied in one period in a subsequent period of treatment" (Senn, 2002).)   The presence of carry-over is tested using a two sample t test for equality of means of $Y_1 + Y_0$ between those that received acupuncture first and second (See page 24 of Jones and Kenward (1989)). This approach caters for random effects.

If significant carry-over effects are found then following the approach of Jones and Kenward (page 28, 1989) the effect of the treatment is measured using a two sample t test on period 0 (both groups first phase only) results only.

This tests for equality of means of those who received acupuncture first and those who received sham first.

If no significant carry-over is found, then, another t test is performed for period effect ("Period effect is a where a *trend* affecting the experiment as a whole" (Senn, 2002)). The presence of a period effect is tested using a two sample t test for equality of means (crossover difference) of $Y_1 - Y_0$ for those that received acupuncture first and $Y_0 - Y_1$ for those that received acupuncture second (See page 27 of Jones and Kenward (1989)).

If significant period effects are found then following the approach of Jones and Kenward (page 25, 1989) the effect of the treatment is measured using a two sample t test for the equality of the two means: $Y_1 - Y_0$ for those that received acupuncture first and $Y_1 - Y_0$ for those that received acupuncture second.

If no significant period effect is found then following the approach of Senn (page 42, 2002) the effectiveness of the acupuncture can be measured using a paired t test. $\left(\begin{smallmatrix} Y_1 - Y_0 \\ Y_0 - Y_1 \end{smallmatrix} \right)$ where $Y_1 - Y_0$ is for acupuncture second and $Y_0 - Y_1$ for acupuncture first. This pools the groups together and a t test is

done for zero means. Figure 6.6 shows the pathway of analysis depending on the presence of significant carry-over and period effects.

Figure 6.6 Pathway of statistical analysis depending on the presence of carry-over effects and period effects.
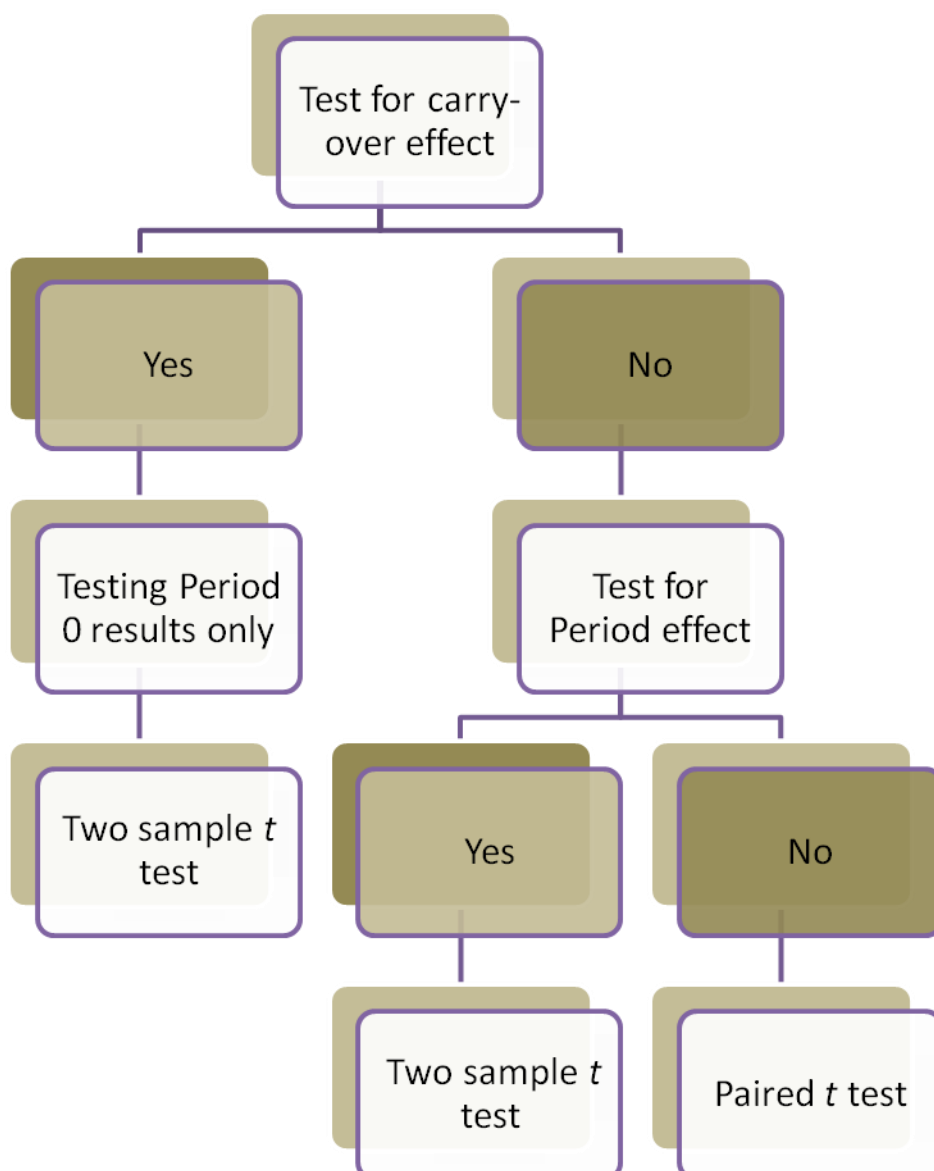
6.5   Results

Seven participants were found to have significant eating and weight concerns. One participant scored in the typical range for the EDRC; common in those with a clinical eating disorder (Garner, 2004), and was referred to a psychologist for treatment whilst continuing in the study.

Comparison of the groups that have eating concerns with those that do not

There were significant differences for all three EDRC measures, DT ($p<$ 0.001), B ($p=$ 0.02) and BD ($p<$ 0.001), between those with and without eating and weight concerns. Those with eating concerns were significantly more depressed ($p=$ 0.05) and more anxious, both state ($p = 0.03$) and trait ($p=$ 0.003), than those with no eating concerns.

Per-protocol Analysis

The analysis was carried out following the per-protocol analysis. Three participants failed to satisfy the inclusion criteria for the duration of the trial (one had a heart attack during the trial, one went on blood pressure medication and re-occurrence of a previously managed illness), all participants continued in the trial and treatments proceeded as per the protocols set out in the Methods section. These three individuals were included in the analysis. As shown in Figure 6.1, eleven participants did not receive the allocated treatment in the first

phase of the trial. These participants dropped out of the trial after receiving between none and nine acupuncture treatments (out of a prescribed twelve treatments). There were no measurements available for these eleven participants and therefore they could not be included in the analysis.

Analysis Results

There was evidence of significant carry-over and period effects in some of the outcome measures therefore all tests reported in this section are italicised to indicate which *t* test was used. † indicates a significant period effect thus a two sample *t* test on the period 0 results only, ǯ indicates a significant carry-over effect thus a two sample *t* test on both period results was used and ¥ indicates no significant carry-over or period effects thus a paired *t* test was used.

6.5.1 *Comparison of TCM Acupuncture and Sham - Primary Outcomes*

Table 6.3 shows the results of the of EDI-3 measures of weight and eating concerns (DT, B or BD) and the composite eating disorder risk composite score (EDRC). Significant differences were found for obese males with no eating concerns for both the Bulimia (B) measure ($p = 0.034$) and the Eating Disorder Risk composite score (EDRC) ($p = 0.04$). Significant differences were found for obese females with eating concerns for the Bulimia (B) measure ($p =$

0.005).   Both of these results found that acupuncture was significantly associated with increases in these scores.   Significant differences were also found for overweight females with eating concerns for both the Drive for Thinness (DT) measure ($p = 0.004$), the Bulimia (B) measure ($p = 0.011$) and thus the Eating Disorder Risk composite score (EDRC) which is a summed measure of *DT, B* and body dissatisfaction (BD) ($p = 0.0003$).

There were no significant differences for weight for any of the groups, indicating that in this instance TCM acupuncture and nutritional counselling was not significantly more effective than sham acupuncture and nutritional counselling for weight loss (Table 6.3).

Table 6.3. Average marginal effect of TCM acupuncture relative to sham acupuncture for weight and eating concerns (p value in brackets)

Measures	Male Obese No Eating Concerns		Female Overweight No Eating Concerns		Female Obese No Eating Concerns		Female Overweight Eating Concerns		Female Obese Eating Concerns	
EDI-3 EDRC scale										
Drive for Thinness	0.20	(0.95) ¥	-0.33	(0.87) ¥	-0.63	(0.79) ¥	-11.00	(0.004) ⅔*	7.50	(0.56) †
Bulimia	5.75	(0.03) †*	0.50	(0.65) ¥	3.00	(0.076) †	-5.50	(0.01) ⅔*	7.00	(0.005) †*
Body Dissatisfaction	-0.60	(0.88) ¥	-3.17	(0.24) ¥	-3.00	(0.88) ¥	-6.67	(0.22) ¥	9.50	(0.16) †
Eating Disorder Risk Composite	23.25	(0.04) †*	-3.58	(0.51) ¥	-1.13	(0.86) ¥	-35.75	(0.0003) ⅔*	17.5	(0.08) †
Weight Change										
Kgs	0.35	(0.64) ¥	-0.70	(0.56) ¥	-0.10	(0.91) ¥	-1.10	(0.36) ¥	0.65	(0.54) ¥
% weight Change	0.38	(0.65) ¥	-0.92	(0.50) ¥	-0.62	(0.38) ⅔	-1.41	(0.30) ¥	0.70	(0.55) ¥

* Significant at $p < 0.05$

† = period 0 results

⅔ = 2 sample results

¥ = paired t test results

6.5.2 Comparison of TCM Acupuncture and Sham -Secondary Measures

TCM acupuncture had a significant beneficial effect, relative to sham acupuncture, for overweight females with eating concerns on the following measures; SF36v2 Health Survey-Mental aspect (p = 0.0008), both STAI State (p = 0.004) and Trait Anxiety (p = 0.04) and the BDI-2 depression measure (p = 0.0001). There were no significant differences due to TCM acupuncture relative to sham acupuncture for any of the other GWEC categories (see Table 6.4).

6.5.3 Comparison of TCM Acupuncture and Sham – weight loss

All participants were grouped together to determine if acupuncture had a significance difference for weight loss. There were no significant differences for acupuncture relative to sham acupuncture for weight loss.

Table 6.4. Average marginal effect of TCM acupuncture relative to sham acupuncture for anxiety, depression and QoL (p value in brackets)

Measures	Male Obese No Eating Concerns		Female Overweight No Eating Concerns		Female Obese No Eating Concerns		Female Overweight Eating Concerns		Female Obese Eating Concerns	
SF-36v2 Health Survey										
Physical	4.20	(0.28) ¥	0.83	(0.74) ¥	2.00	(0.52) ¥	1.67	(0.74) ¥	-6.00	(0.17) ¥
Mental	0.40	(0.94) ¥	2.83	(0.42) ¥	-1.12	(0.79) ¥	26.3	(0.0006) ¥ *	7.75	(0.21) ¥
STAI										
State	-5.60	(0.36) ¥	-7.25	(0.07) ¥	1.00	(0.84) ¥	-24.67	(0.004) ¥ *	-15.50	(0.12) †
Trait	-1.60	(0.76) ¥	-3.67	(0.28) ¥	0.75	(0.86) ¥	-14.33	(0.04) ¥ *	1.00	(0.86) ¥
BDI-2										
BDI-2 Score	0.40	(0.91) ¥	-0.25	(0.91) ¥	-2.13	(0.47) ¥	-25.75	(0.0000) † *	-5.25	(0.15) †

* Significant at $p < 0.05$ † = period 0 results   ž = 2 sample results   ¥ = paired t test results

6.6   Discussion

The combination of elevated eating and weight concerns and dieting can have a serious risk to mental health and well being (Cooper & Fairburn, 1993; Cooper & Fairburn, 1987; Linde, et al., 2004; Vogeltanz-Holm, et al., 2000; Vollrath, et al., 1992).   The psychological health, specifically eating psychopathology, of those receiving TCM acupuncture while trying to lose weight has not been previously researched.   Therefore, it is unknown if people receiving TCM acupuncture for weight loss who have elevated weight concerns and problems with eating, respond in the same way as those with healthy eating behaviours and weight concerns.   TCM acupuncture, relative to sham acupuncture, was found to have significantly beneficial effects on the mental health (depression, anxiety, QoL) and eating psychopathology (drive for thinness, bulimia and the eating disorder risk composite) of overweight women with elevated eating and weight concerns.   For the measure Bulimia, TCM acupuncture, relative to sham acupuncture, was found to have significantly unfavourable effects on obese men without eating concerns and obese women with eating concerns.

Drive for thinness (preoccupation with dieting and weight, fear of weight gain) has been identified as a central feature associated with body dissatisfaction in those with and without diagnoised eating disorders (Sands,

2000).   The need to be thin can lead to psychological distress, distorted body image, excessive exercise, depression, self-starvation and or compulsive overeating and lowered self-esteem in the general population as well as those with elevated eating and weight concerns (Sands, 2000).   In addition to compulsive overeating, high *DT* scores are a predictor of bulimic symptoms ten years in the future as assessed by the Bulimia subscale (B) of the EDI (Joiner et al., 1997).   Elevated *B* scores indicate poor outcomes (Garner, 2004).   No prior TCM acupuncture research was found that specifically addressed eating concerns however both Mazzoni (1999) and Cabroglu (2007) both looked at psychological state and weight loss.   Given the poor possible mental health outcomes of having elevated *DT* and *B* scores for those with no clinically diagnosed eating disorder it is important that these attitudes and feelings can be altered and more importantly lowered to more 'healthy', less pathological levels. The significant beneficial effects of TCM acupuncture in lowering both *DT* and *B* in overweight women with eating concerns is promising.   The inclusion of addressing eating psychopathology (*DT* and *B*) in acupuncture weight loss programs, in particular for overweight women with elevated eating and weight concerns, is essential in decreasing the deleterious responses to the need to be thin.

Anxiety and depression are possible consequences of elevated eating and weight concerns (Sands, 2000) and a predictor of poorer weight loss (than

those without depression) (Linde, et al., 2004). Depression is also associated with decreased self-efficacy, eating more with depression shown to be associated with weight gain in dieters and greater likelihood of BED status (Linde, et al., 2004; Polivy & Herman, 1985). In addition those with weight concern have a greater risk of concurrent depression and the problems mentioned above (Vollrath, et al., 1992). Whilst TCM research has found an improvement in STAI-State anxiety (Chae, et al., 2008; Vickland, et al., 2009) and depression (Leo & Ligot Jr, 2007; Schnyer & Allen, 2001; Wang et al., 2008; Whiting et al., 2008) associated with acupuncture treatment, it has not specifically studied anxiety and depression in those with elevated eating and weight concerns. In this study, significant improvements in depression and anxiety were found for females who were overweight and had elevated eating and weight concerns. Given the detrimental consequences of depression and or anxiety, any treatment that can assist in reducing depression and anxiety is a valuable one.

QoL has been shown to be positively associated with changes in eating behaviour (de la Rie, et al., 2006). The results for enhancing QoL with TCM acupuncture in other populations have been mixed, varying from significant improvement (Maa, et al., 2003; Vas, et al., 2004) to little or no effect (Gosman-Hedström, et al., 1998; Stavem, et al., 2000). The enhancement of the mental

aspect of QoL gained by acupuncture may aid in positive changes related to eating behaviours and deserves further investigation.

The TCM acupuncture used in this study, relative to sham acupuncture, was found to have significantly unfavourable effects on obese men without eating concerns and obese women with eating concerns for the measure of Bulimia. Research suggests that dieting and binging co-occur, with dieting causing the binging (Polivy & Herman, 1985). In addition dieting increases the likelihood of subsequent binging particularly if the dieter feels they have violated their diet (e.g. they overeat or eat a 'bad' food) or that they are no longer capable of controlling their intake (Polivy & Herman, 1985). Therefore it is hypothesied that the increased Bulimia scores seen in obese men without eating concerns and obese women with eating concerns reflects an increase in the tendency towards episodes of binge eating reflecting the association of dieting on binging behaviours. Why acupuncture treatment is increasing this effect of dieting leading to binging is unknown. Given that it occurred in two of the three obese groups (not those who were obese with eating concerns) it may possibly be related to the psychopathology of dieting and obesity. As such maybe the points used in this study may not address the specific psychopathology of these obese individuals dieting. Further investigation to understand this unfavourable effect is needed especially as acupuncture is being more frequently used for weight loss (Cabroglu & Ergene, 2005, 2006,

2007; Cabroglu, et al., 2006; Hsu, et al., 2005a; Hsu, et al., 2005b; Lacey, et al., 2003). In addition, any future TCM weight loss studies should think seriously about monitoring EDI-3 Bulilmia in obese participants given these results.

The findings of this study replicate, in part, the results of a pilot study looking at the effect of acupuncture as an adjunct therapy in the treatment of those with Anorexia Nervosa (AN) or BN (Fogarty et al., 2010) (See Section 2). Whilst the two studies differ in the severity and aberrance of the eating dysfunction, both studies are investigating the role of TCM acupuncture in those with elevated eating and weight concerns. The pilot study showed that acupuncture, as an adjunct, had statistically significant beneficial effects on the mental aspect of Quality of Life and STAI-State anxiety and a weaker effect on STAI-Trait anxiety (Fogarty, et al., 2010) (See Section 2). The pilot study however found no significant effects for depression or drive for thinness or bulimia (Fogarty, et al., 2010) (See Section 2). The similarity of results from the pilot study and the current study shows potential for the use of acupuncture in treating the mental health of non-obese females with elevated eating and weight concerns. Given the gravity of elevated eating and weight concerns, the improvement in mental health is extremely valuable.

Because this is the first investigation of TCM weight loss acupuncture examining the specific eating psychopathology of elevated weight and body concerns in those who are overweight or obese, it is of interest to compare the results for overweight and obese females with eating concerns. As noted, the overweight group showed significant improvements in state and trait anxiety, depression, mental QoL, drive from thinness, bulimia and the EDRC, while the obese group did not. In addition to these seven significant measures, the point estimates for weight change showed a tendency for greater improvements for overweight females with eating concerns than their obese counterparts. It may be that the difference between the acupuncture effects for overweight and obese females with eating concerns may reflect a difference in psychopathology. Future research should investigate the validity of this hypothesis.

The findings of this study replicate the findings of Mazzoni et al's (1999) study of weight loss acupuncture. Both studies were similar in treatment length, type of control acupuncture (placebo acupuncture), life-style advice given in addition to the acupuncture and the outcome measures assessed. Both studies found similar results with no significant changes in body weight but significant benefit in decreasing depression (as measured by the BDI) and State anxiety (as measured by the STAI). The findings of this study also substantiate the findings of Cabroglu & Ergene (2007) that weight loss acupuncture is effective

in decreasing depression and STAI-Sate anxiety in those who are overweight. The improved psychological health of the participants in this study and both Mazzoni et al (1999) and Cabroglu et al's (2007) studies elucidates the effect of weight loss acupuncture on mental health of overweight individuals.

Despite prior research suggesting that acupuncture is effective in weight loss, this study found no significant differences for weight for any of the groups nor the group as a whole. There are a number of possible explanations for this finding. The majority of 'successful' acupuncture for weight loss studies had only obese female participants whereby this study had both males and females and obese and overweight participants. Both gender and body weight have been identified as important in affecting weight loss (Ramacciotti, et al., 2008; Roehrig, et al., 2009). Participants of different genders and different BMI's may respond differently to weight loss programs and thus the inclusion of both genders and those who were overweight and obese in the one study may have influenced the outcome of the treatments (Ramacciotti, et al., 2008; Roehrig, et al., 2009). In addition a large number of successful acupuncture weight loss studies were of a reasonably short duration (3-4 weeks) (Cabroglu & Ergene, 2005, 2006, 2007; Cabroglu, et al., 2006; Lacey, et al., 2003; Richards & Marley, 1998). Two stages in behavioural change that are pertinent to weight loss are i) commitment and motivation to change and ii) the initial behavioural change, therefore studies of a shorter duration may be reporting results of a

strong motivation to change and the initial behavioural change (Brownell &

Rodin, 1994; Kayman et al., 1990). The other pertinent behavioural change for

successful weight loss is maintenance of the change (Brownell & Rodin, 1994;

Kayman, et al., 1990). Longer studies may reflect the difficulties of maintaining

the change and those individuals who develop (or don't develop) effective

strategies for maintenance (Brownell & Rodin, 1994; Kayman, et al., 1990)

There are only a few successful studies with longer durations (8-12 weeks)

(Hsu, et al., 2005a; Hsu, et al., 2005b; Shafshak, 1995). In two of these longer

studies obesity management was forbidden and they were asked to keep their

former diet during the study period (Hsu, et al., 2005a; Hsu, et al., 2005b) thus

not reflecting much weight loss behavioural change other than the addition of

acupuncture. Shafshak (1995) had similar results with patients with

osteoarthritis who were unable to exercise. This suggests that acupuncture

over an 8-12 week time frame is effective in reducing weight without

behavioural change. This study did adapt behavioural changes along with the

acupuncture treatment and thus the results may reflect the variance of

maintaining the change and the effectiveness of strategies used by the

participants to retain the changes as well as any acupuncture effect.

Limitations and further research

This study found no significant effect of TCM acupuncture on weight loss. This study involved a mixed cohort including those who were obese, overweight and those with and without eating concerns. Table 6.3 indicates how these groups responded differently to TCM acupuncture compared to sham acupuncture. Future studies may investigate these different results of TCM acupuncture for the distinct groups used in this study.

It may be of interest to investigate the use of TCM acupuncture for weight loss and mental health benefits in participants, not only with elevated eating and weight concerns, but also those with formally diagnosed Eating Disorders (BED, EDNOS and BN in particular). Future studies could also assess the effect of decreasing depression and anxiety and increasing mental health on the severity of the participants' eating concerns.

6.7 Conclusion

Individuals undertaking a weight loss program (dieting), those who suffer from depression and or anxiety and those that have elevated eating and weight concerns are all at risk for possible poorer weight loss, decreased self-efficacy, eating more, greater likelihood of BED status, greater risk of concurrent

depression, psychological distress, distorted body image, excessive exercise, self-starvation and or compulsive overeating and lowered self-esteem (Linde, et al., 2004; Polivy & Herman, 1985; Sands, 2000; Vogeltanz-Holm, et al., 2000; Vollrath, et al., 1992) . This study has investigated the effect of TCM acupuncture on the mental and physical health of individuals undertaking a weight loss program, with particular reference to individuals who have elevated eating and weight concerns. TCM acupuncture was found to have beneficial effects on both eating disorder psychopathology (drive for thinness and bulimia) and the mental health (depression, anxiety, QoL) of overweight women with eating concerns. These findings have significance because this cohort is at greater risk of developing many of the above mentioned problems. Acupuncture was also found to have unfavourable effects on obese men without eating concerns and obese women with elevated eating concerns. This has relevance to caring for participants in future TCM studies involving obese individuals.

Chapter 7 Overview

7.1 Summary of the aims of the study

The overall aim of this thesis was to initiate the investigation and enquiry into better understanding eating disorders and elevated eating and weight concerns from a TCM perspective.

7.1.1 Aims of Section1

Was to identify and quantify the patterns of disharmony relevant to eating orders by systematically evaluating the signs and symptoms reported by respondents who self identified as having an eating disorder. A secondary aim was to identify whether there were any predictive indicators for determining whether an individual has no eating disorder, BED, EDNOS, BN or AN or no eating disorder from a Traditional Chinese Medicine (TCM) perspective.

7.1.2 Aims of section 2

Was to investigate the effect of acupuncture as an adjunct therapy in treating patients with an eating disorder.

7.1.3 Aims of section 3

Was to investigate the benefit of acupuncture in assisting weight loss and the role it may play in supporting the mental and physical health of those undergoing a weight loss program.

7.2 Summary of findings

7.2.1 Major Findings

Pre-meal anxiety has been shown to negatively correlate to energy intake for those with AN (Attia, 2010). Those with elevated eating and weight concerns, anxiety and depression have been shown to be at risk for decreased self-efficacy, eating more, greater likelihood of BED status, psychological distress, distorted body image, excessive exercise, self-starvation or compulsive overeating and lowered self-esteem. Increased quality of life in those with an eating disorder is associated with positive changes in eating behaviour and negatively with eating disorder severity. Despite individuals with an eating disorder seeking help from complementary and alternative therapies (CAM) (Brooke, 2008; Hay, et al., 2007; Mirasol, 2009; University of Maryland Medical Center, 2009) and there being much research investigating acupuncture and electo-acupuncture for weight loss there is no scientific

evidence investigating the role of acupuncture as a CAM treatment in eating disorders nor the role of weight loss acupuncture in mental health. In fact there is scant information about TCM, eating disorders and elevated eating and weight concerns.

Both cross-over studies, whilst differing in the severity and aberrance of the eating dysfunction, are investigating the role of TCM acupuncture in those with elevated eating and weight concerns. The results of these studies indicate that acupuncture, as an adjunct, had statistically significant beneficial psychological effects on those with elevated eating concerns and eating dysfunction. Both studies found beneficial effects on the mental aspect of Quality of Life and STAI-State anxiety and a weaker effect on STAI-Trait anxiety (Fogarty, et al., 2010).

The similarity of results from both studies show potential for the use of acupuncture in treating the mental health of overweight females with elevated eating and weight concerns and those with clinically diagnosed eating disorders.

The findings of a unfavourable effect of acupuncture on obese men with no eating concerns and obese women with elevated eating and weight

concerns indicates individuals at risk in future acupuncture for weight loss studies.

7.2.2 What does this mean for the diagnosis and clinical management of eating disorders and elevated eating and weight concerns?

The findings of section one needs more collaboration and further investigation before conclusive concordance about the patterns of disharmony (including the TCM core patterns/features) are defined. Thus the findings of this section can not yet be used to aid in diagnosis of an eating disorder. However it is hoped that this information may better inform TCM practitioners about eating disorders and elevated eating and weight concerns so they more readily recognize them in clinical practice.

A multidisciplinary approach is the most commonly prescribed form of treatment for those with an eating disorder (Andersen & Mehler, 1999; Anorexia Nervosa and Related Eating Disorders Inc, 2005b; Fairburn, et al., 2003; Treasure et al., 2005). This includes dieticians, psychologist and or psychiatrists, general practitioners and hospital resources such as inpatient stays and day programs. There is evidence for family-based therapy for adolescents presenting with AN, cognitive behavioural therapy for those with

BN and elevated eating and weight concerns (Andersen & Mehler, 1999; Anorexia Nervosa and Related Eating Disorders Inc, 2005b; Aronson, 1993; Ballas, 2006; Beumont et al., 2004; Blocher McCabe et al., 2004; Brownley, et al., 2007; Bulik, et al., 2007; de la Rie, et al., 2006; de Zwaan et al., 2004; Fairburn, et al., 2003; Tierney, 2005).

The results of these studies suggest that acupuncture has a role in the management of the mental health (depression, anxiety and quality of life) of those with eating disorders and elevated eating and weight concerns. For those with a clinical eating disorder it must be as an adjunct, for those with no clinical eating disorder and elevated eating and weight concerns it can be a primary treatment however the elevated eating and weight concerns need to be monitored carefully and referral to the appropriate practitioner if relevant. See Figure 7.1 for a theoretic diagram.

Figure 7.1 . Theoretic diagram of role of TCM in the management of eating disorders and elevated eating and weight concerns
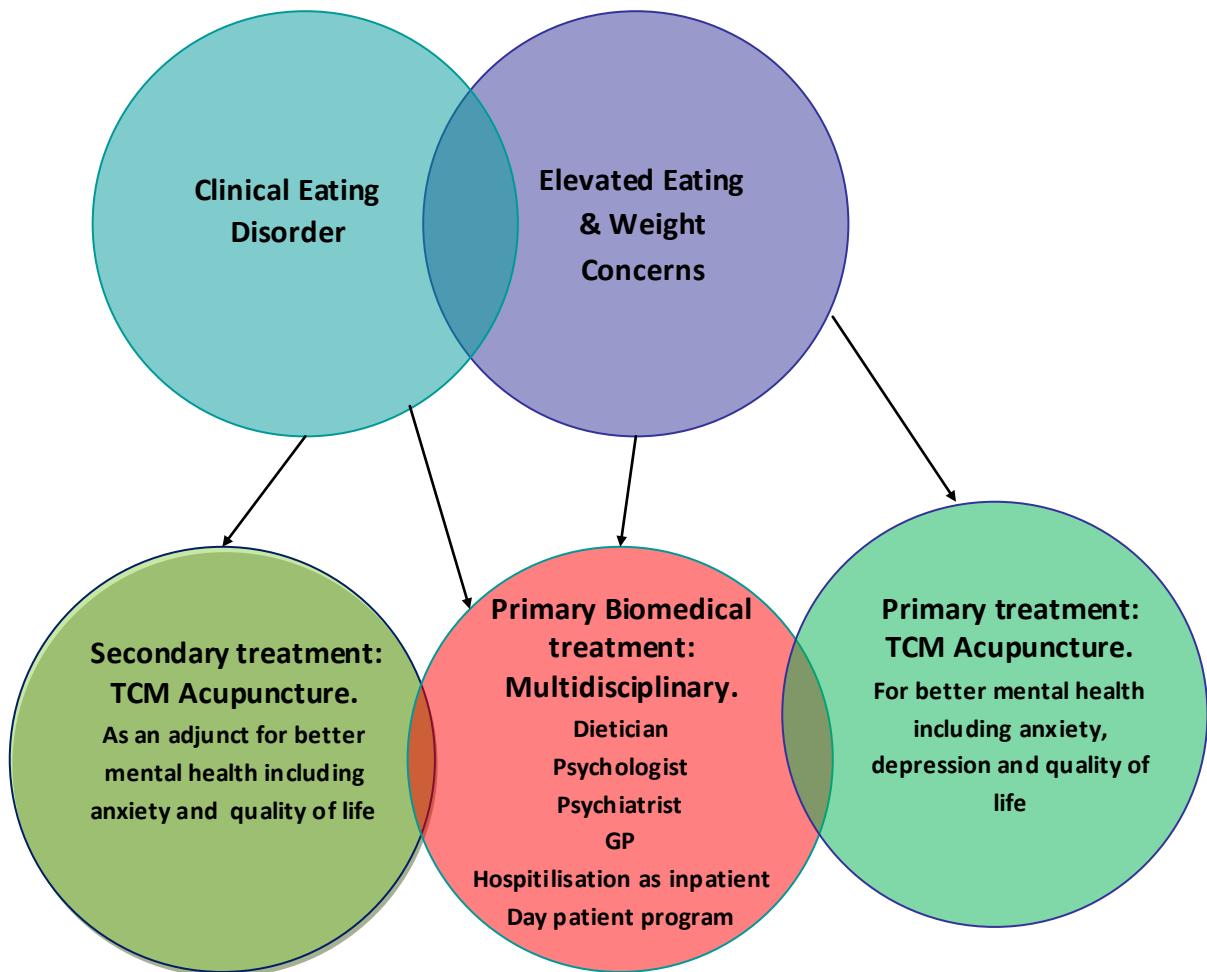
7.2.3 Summary of section1 findings

There is limited information about how TCM conceptualises and understands eating disorders. The findings from this study provide evidence of how eating disorders present according to the TCM paradigm.

Eating disorders generally present as *Yin* deficiency patterns it was found that eating disorders are more likely to present as *Yang* deficient patterns. Both *Liver Qi Depression* and *Spleen and Stomach Cold deficiency*

patterns were found to be strongly exhibited by sufferers of eating disorders of any type (the two most strongly expressed TCM patterns in all four of the eating disorders categories). Whilst *Liver Qi stagnation pattern* is intermittently mentioned as being involved in eating disorder presentation, *Spleen and Stomach Cold deficiency* pattern has not been identified as a primary pattern for eating disorders prior to this research.

The findings of this study provide some preliminary evidence that both *Spleen Qi deficiency* and *Heart Qi deficiency* are involved in individuals with AN and *Stomach Heat* and *Liver Qi Stagnation* in BN.

The ordered model with the grouping of [(NoED), (EDNOS) (BN or AN)] with BED dropped from the model was determined to predict with the best accuracy. This model correctly predicted No Eating Disorder (No ED) 100% of the time, EDNOS 11% of the time and BN or AN 87% of the time. Of note this model had the highest degree of in and out of sample predictive accuracy.

The model has potential use to help identify the core features of eating disorders.

7.2.4 Summary of section 2 findings

There is limited research on the use of acupuncture as an adjunct therapy in the treatment of eating disorders (Apostolos & Miltiades, 1996; Clarke, 2009; Hogberg, 1998; Wood, 2008). The results of this study indicate that participants with either AN or BN having acupuncture treatment, in addition to their Treatment As Usual (TAU), reported a significant improvement for quality of life (QoL) and a reduction in anxiety and the expression of perfectionism. To the best of our knowledge, this is the first study to investigate the effect of acupuncture as an adjunct for the treatment of eating disorders.

7.2.5 Summary of section 3 findings

While there is evidence that acupuncture can be beneficial as a weight loss therapy, there is no research on its affect on the eating psychopathology of weight loss participants. The results of this study demonstrate the effect of acupuncture on the mental health (eating disorder psychopathology and general psychopathology) of overweight or obese individuals.

TCM acupuncture, relative to sham acupuncture, was found to have significantly beneficial effects on the mental health (depression, anxiety, QoL) of overweight women with elevated eating and weight concerns. It was also found

to have significant beneficial effects in lowering drive for thinness (DT), Bulimia (B) and the overall eating disorder risk composite (EDRC) of overweight women with elevated eating and weight concerns. TCM acupuncture, relative to sham acupuncture, was found to have significantly increased Bulimia (B) scores in obese men with no eating concerns and obese women with eating concerns.

7.2.6 Thesis strengths

The strengths of this these include the novel nature of this work in investigating a previously under researched area. The integration of Biomedical and TCM viewpoints and synergistic treatment and the use of clinical samples.

7.2.7 Thesis weaknesses

Thesis weaknesses include the small sample sizes for both clinical studies. This in part was due to the difficult nature of recruiting eating disorder participants from the eating disorder clinic. They had initially promised more support and participants but a change of staff and attitude meant that this was not possible. Ensuring strong ties to the organizations and the organizations treatment philosophy is essential in any future research. The interventions in both clinical studies was relatively short and future studies could look at the feasibility of acupuncture treatment including the length of the intervention.

Confirmation of the self-reported eating disorder in the survey would be ideal but given the budget of this project confirmation was not possible.

7.2.8 Future Directions

The findings of this thesis are exciting and promising for the possible future role of TCM acupuncture in the treatment of eating disorders and eating disorder psychopathology.

A continuation of the research on the patterns of disharmony involved in eating disorders and mental health (particularly those that present strongly in those with an eating disorder such as *Yang Deficiency, Spleen and Stomach Deficiency cold and Liver Qi Stagnation*) has the potential to help provide a better understanding of the causes, pathogenesis and evolution of an eating disorder from a TCM perspective and in due course hopefully more effective treatments for those with eating disorders and disordered eating. While a longitudinal study would be optimal, there is a role for both case studies and case series.

Further research is needed to address the reliability and validity of the survey results and thus the predictive model used in this thesis. More testing on the predictive model is required before it can be used in a clinical setting but the initial results prove promising for future use in a clinical setting.

One of the most exciting findings of the study was the beneficial effects of TCM acupuncture (as an adjunct) for those suffering from an eating disorder. These findings raise important research questions involving the timing of treatment for those with pre-meal anxiety, the effect of improved quality of life on eating disorder severity and the effect of acupuncture on remission and treatment outcome. Specifically further research could investigate the role of TCM acupuncture to a sufferer's existing treatment to help reduce anxiety and thus increase energy intake particularly if the treatment was given prior to meal times. Also the role of TCM acupuncture and its effect on QoL and thus the improvement of eating disorder severity and positive changes in eating behaviours. This was a preliminary study and had a small sample size, but the significant findings suggest that replication of the study with a larger sample size would also be valuable.

The other exciting finding from this thesis was the beneficial effect of TCM acupuncture specifically on the mental health of overweight females involved in weight loss program. It may be of interest to investigate the use of TCM acupuncture for weight loss and mental health benefits in participants, not only with elevated eating and weight concerns, but also those with formally diagnosed Eating Disorders (BED, EDNOS and BN in particular). Future

studies could also assess the effect of decreasing depression and anxiety and increasing mental health on the severity of the participants' eating concerns.

Investigation into the possible mechanisms for the unfavourable effects of acupuncture for obese men and obese women with elevated eating and weight concerns is important.

While this thesis has added evidence to how eating disorders are understood from the TCM perspective, how acupuncture treatment effects those with elevated eating concerns and psychopathology, and how this new understanding may affect how eating disorders are treated and evaluated, further research is needed to replicate these findings and to determine the most synergistic role of acupuncture in the treatment of eating disorders and those with eating pathophysiology.

Appendix 1 The diagnostic criteria for eating disorders

The diagnostic criteria for Anorexia Nervosa

The DSM-IV (American Psychiatric Association, 2009) diagnostic criteria for AN consists of:

A. Refusal to maintain minimal healthy body weight.

B. Intense fear of gaining weight or becoming fat, even though underweight.

C. Disturbance in the way in which one's body weight or shape is experienced e.g. distorted body image and undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.

D. Where relevant, amenorrhea i.e. the absence of at least three consecutive menstrual cycles.

Low weight (or weight loss) is usually obtained by a reduction in food and or excluding perceived high calorie, junk, bad foods from the diet. Other methods of weight loss include purging (i.e. self induced vomiting or the misuse of laxatives or diuretics) and increased or excessive exercise.

The diagnostic criteria for Anorexia Nervosa continued

The two subtypes of AN are:

Restricting type: Weight loss is accomplished primarily through dieting, fasting, or excessive exercise. There is no regular engagement in binge eating or purging.

Binge-Eating/Purging Type: Regular engagement in binge eating or purging (or both).

The diagnostic criteria for Bulimia Nervosa

The DSM-IV (American Psychiatric Association, 2009) diagnostic criteria for BN consists of:

A. Recurrent episodes of binge eating. Binge eating is characterized by both of the following:

- eating, in a discrete period of time (e.g. within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.

- a sense of lack of control over eating during the binge episode (e.g. feeling that one cannot stop eating or control what or how much one is eating)

B. Recurrent inappropriate compensatory behaviours in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise.

C. The binge eating and inappropriate compensatory behaviours both occur, on average, at least twice a week for 3 months.

D. Self-evaluation is unduly influenced by body shape and weight.

E. The disturbance does not occur exclusively during an episode of AN.

The diagnostic criteria for Bulimia Nervosa continued

The two subtypes of BN are:

Purging Type: Regular engagement in self-induced vomiting or the misuse of laxatives, diuretics, or enemas.

Non-purging Type: The use of other inappropriate compensatory behaviours, such as fasting or excessive exercise, but not regularly engaging in self-induced vomiting or the misuse of laxatives, diuretics, or enemas.

The diagnostic criteria for EDNOS

EDNOS is a category for disorders of eating that do not meet the criteria for any specific eating disorder. The DSM-IV (American Psychiatric Association, 2009) diagnostic criteria for EDNOS consists of:

1. For females, all of the criteria for AN are met except that the individual has regular menses.

2. All of the criteria for AN are met except that, despite significant weight loss, the individual's current weight is in the normal range.

3. All of the criteria for BN are met except that the binge eating and inappropriate compensatory mechanisms occur at a frequency of less than twice a week or for a duration of less than 3 months.

4. The regular use of inappropriate compensatory behavior by an individual of normal body weight after eating small amounts of food (e.g. self-induced vomiting after the consumption of two cookies).

5. Repeatedly chewing and spitting out, but not swallowing, large amounts of food.

6. Binge eating disorder.

The diagnostic criteria for Binge Eating Disorder

The DSM-IV (American Psychiatric Association, 2009) diagnostic criteria for BED consists of recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviours characteristic of BN.

Appendix 2 The proposed DSM-5 diagnostic criteria for eating disorders

The proposed DSM-5 diagnostic criteria for Anorexia Nervosa

(American Psychiatric Association, 2010a)

A. Restriction of energy intake relative to requirements leading to a markedly low body weight. Markedly low is defined as a weight that is less than minimally normal, or, for children and adolescents, less that that min expected for age and height.

B. Intense fear of gaining weight or becoming fat or persistent behavior to avoid weight gain, even though at a markedly low weight.

C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight.

The proposed DSM-5 diagnostic criteria for Anorexia Nervosa
(American Psychiatric Association, 2010a) continued

The two subtypes of AN are:

Restricting type: During the last three months, the person has not engaged in recurrent episodes of binge eating or purging behavior (i.e. self-induced vomiting or the misuse of laxatives, diuretics, or enemas).

Binge-Eating/Purging Type: During the last three months, the person has engaged in recurrent episodes of binge eating or purging behavior (i.e. self-induced vomiting or the misuse of laxatives, diuretics, or enemas).

The proposed DSM-5 diagnostic criteria for Bulimia Nervosa

(American Psychiatric Association, 2010c)

A. Recurrent episodes of binge eating. Binge eating is characterized by both of the following:

(1) eating, in a discrete period of time (e.g. within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances).

(2) a sense of lack of control over eating during the episode (e.g. feeling that one cannot stop eating or control what or how much one is eating).

B. Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise.

C. The binge eating and inappropriate compensatory behaviours both occur, on average, at least once a week for 3 months.

D. Self-evaluation is unduly influenced by body shape and weight.

E. The disturbance does not occur exclusively during an episode of AN.

The proposed DSM-5 diagnostic criteria for EDNOS
(American Psychiatric Association, 2010d)

It is recommended that Binge Eating Disorder, described in this section of DSM-IV, be recognised as an independent disorder in DSM-5.

Recommended changes in the criteria for Anorexia Nervosa, Bulimia Nervosa and for eating and feeding disorders usually beginning in childhood should also reduce the need for Eating Disorders Not Otherwise Specified.

If these recommendations are accepted, the examples in Eating Disorders Not Otherwise Specified will be changed accordingly.

The work group is considering whether it may be useful and appropriate to describe other eating problems (such as purging disorder- recurrent purging in the absence of binge eating, and night eating syndrome) as conditions that might be the focus of clinical attention. Measures of severity would be required and might be listed in as Appendix of DSM-5.

The proposed DSM-V diagnostic criteria for Binge Eating Disorder
(American Psychiatric Association, 2010b)

A. Recurrent episodes of binge eating. An episode of binge eating is characterised by both of the following:

(1). Eating, in a discrete period of time (e.g. within any 2-hour period), an amount of food that is definitely larger than most people would eat in a similar period of time under similar circumstances.

(2). A sense of lack of control over eating during the episode (e.g. a feeling that one cannot stop eating or control what or how much one is eating).

B. The binge eating episodes are associated with three (or more) of the following:

(1). Eating more rapidly than normal

(2). Eating until feeling uncomfortably full

(3). Eating large amounts of food when not feeling physically hungry

(4). Eating alone because of being embarrassed by how much one is eating

(5). Feeling disgusted with oneself, depressed, or very guilty after overeating

The proposed DSM-V diagnostic criteria for Binge Eating Disorder

(American Psychiatric Association, 2010b) continued

C. Marked distress regarding the binge eating is present.

D. The binge eating occurs, on average, at least once a month for three months.

E. The binge eating is not associated with the recurrent use of inappropriate compensatory behaviours (i.e. purging) and does not occur exclusively during the course of bulimia nervosa or anorexia nervosa.

Appendix 3   General Health in Eating Disorders Questionnaire for those with a self-reported eating disorder.

Gender: Are you? ☐ Male ☐ Female

Age: Which age group do you belong to?

☐ 18-25 ☐ 26-33 ☐ 34-41 ☐ 42-49 ☐ 50-57 ☐ 58-63 ☐ 64-71 ☐ 71+

Have you had a formal diagnosis of an eating disorder made? ☐ Yes ☐ No

If yes please indicate which eating disorder.

☐ Anorexia (AN) ☐ Bulimia (BN) ☐ Binge Eating Disorder (BED)

☐ Eating Disorder not Otherwise Specified (EDNOS) ☐ Other: …………….………………

Who made the diagnosis?

☐ Medical Doctor ☐ Self ☐ Psychologist ☐ Psychiatrist ☐ Other: ……………...

How long has it been since your eating disorder was diagnosed?

☐ 0-1 yr ☐ 2-5 yrs ☐ 6-10 yrs ☐ 11-15 yrs ☐ more than 15 yrs

Are you receiving treatment for your eating disorder? ☐ Yes ☐ No

If yes, what treatment are you receiving?

☐ Nutritional Counselling   ☐ Treatment from a Psychologist

☐ Treatment from a counsellor   ☐ GP or Dr supervision

☐ Specialist Dr or GP   ☐ Specialist eating disorder facility clinic treatment

How long have you been receiving the above treatment?

☐ 0-3 mths ☐ 4-6 mths ☐ 7-9 mths ☐ 10-12 mths- ☐ more than 12mths

How do you feel about your treatment?

☐ I definitely want to get better   ☐ I mostly want to get better

☐ I partially want to get better   ☐ I'm not sure whether I want to get better

☐ I only want to get better occasionally   ☐ I don't want to get better

☐ I want to get better only to stop people bothering me (e.g. feeling forced to eat etc.)

☐ I fluctuate between some/all of the above thoughts

☐ I don't care whether I get better or not

Appendix 3   General Health in Eating Disorders Questionnaire for those with a self-reported eating disorder Continued.

☐   ☐

If you have Anorexia Nervosa do you?

☐ Binge & Purge   ☐ Restrict food intake   ☐ Both

If you have Bulimia Nervosa how do you compensate for your binging? (Please tick all that apply)

☐ Vomiting   ☐ Laxatives   ☐ Restricting   ☐ Exercise   ☐ Other ………………

Please tick whether you have any of the signs and symptoms below:

☐ Abdominal Pain	☐ Feelings of abdominal bloating	☐ Feels full easily
☐ Think about food regularly	☐ Lack of control of eating	☐ Digestive problems
☐ Swollen salivary glands	☐ Salivary glands increase in size	☐ Gums bleed easily
☐ Vomiting blood	☐ Callus on knuckles	☐ Sore throat
☐ Heartburn	☐ Frequent urination	☐ Night urination
☐ Constipation	☐ Hair loss from scalp	☐ Fine hair on body
☐ Dry skin	☐ Brittle nails	☐ Headaches
☐ Decreased bone density	☐ Muscle weakness & cramping	☐ Bone pain
☐ Fatigue	☐ Tiredness	☐ Lethargy
☐ Poor concentration	☐ Poor short-term memory	☐ Dizziness
☐ Dizziness on standing	☐ Low blood pressure	☐ Fluid retention
☐ Slow heart rate	☐ Irregular heart beat	☐ Palpitations
☐ Hyperactive	☐ Hypersensitivity to noise	☐ Feel cold frequently
☐ Sensitivity to cold & heat	☐ Extremities are constantly blue	☐ Can't stand the cold
☐ Irregular periods	☐ No periods	☐ Poor sleep
☐ Kidney infections	☐ Bleeding from your bottom	☐ Kidney stones
☐ Ankle swelling	☐ Marked variation in weight	☐ Mood swings
☐ Suicidal thoughts	☐ Ambivalence to treatment for your eating disorder	

Appendix 3.   General Health in Eating Disorders Questionnaire for those with a self-reported eating disorder Continued.

Please answer the following questions about your general health:

Temperature:

Do you prefer the:	☐ cold weather	☐ hot weather
Do you have an aversion to:	☐ the cold	☐ the heat
Do you alternative between being hot and cold?	☐ Yes	☐ No
Do you get hot (feverish) during the night?	☐ Yes	☐ No
Do you get cold hands and or feet?	☐ Yes	☐ No

Sweating:

Would you say you sweat a lot?   ☐ Yes   ☐ No

If yes where?

☐ Only on the head	☐ Only on the forehead	☐ Whole body
☐ Only on the arms and legs	☐ Only the palms, soles & chest	☐ Only on the hands

Do you sweat?

☐ During the day	☐ During the night	☐ Both day and night

Headaches:

Do you get headaches?   ☐ Yes   ☐ No

If yes where? (Tick all that apply to you)

☐ Forehead	☐ Back of the head/top of the neck	☐ Top of the head
☐ Temples or side of the head	☐ Whole head	☐ Inside the head
☐ Behind the eyes		

Are the headaches:

☐ Sharp	☐ Dull	☐ Fixed
☐ Made worse when tired	☐ Heavy feeling in the head	☐ Moves

Appendix 3   General Health in Eating Disorders Questionnaire for those with a self-reported eating disorder Continued.

Dizziness:

Do you suffer from dizziness? ☐ Yes   ☐ No

If yes is it:

☐ Severe (everything sways & I lose balance)

☐ Slight with feeling of heaviness in the head

☐ Slight only & worse when tired

☐ Slight and only happens when I stand

Appetite:

How do you feel after eating? ☐ Better   ☐ Worse

How is your appetite?

☐ No appetite   ☐ Appetite comes and goes   ☐ Always hungry

☐ Prefer hot food   ☐ Feel full & distended after eating ☐ Prefer cold food

If you binge, how often do you binge?

☐ Greater than 5 times per day   ☐ 3-4 times per day   ☐ 1-2 times per day

☐ 5-6 times per week   ☐ 3-4 times per week   ☐ 1-2 times per week

☐ 3 times per month   ☐ 1-2 times per month

Thirst:

Do you have: (Tick all that apply to you)

☐ Thirst with no desire to drink   ☐ Thirst with desire to drink a lot   ☐ No thirst

☐ Desire for cold liquids   ☐ Thirst with desire to sip liquids   ☐ Desire for hot liquids

Appendix 3   General Health in Eating Disorders Questionnaire for those with a self-reported eating disorder Continued.

Vomiting:

Do you vomit?   ☐ Yes   ☐ No

Is your vomiting forced (e.g. sticking fingers down your throat, willing yourself to vomit etc)?

☐ Yes   ☐ No

How often do you vomit?

☐ Greater than 5 times per day   ☐ 3-4 times per day   ☐ 1-2 times per day

☐ 5-6 times per week   ☐ 3-4 times per week   ☐ 1-2 times per week

☐ 3 times per month   ☐ 1-2 times per month

Bowels:

Do you use laxatives?   ☐ Yes   ☐ No

How often in a day would you empty your bowels? …………………………………

Do you get any of the following?

☐ Blood in your stools   ☐ Alternate between constipation & diarrhoea

☐ Diarrhoea   ☐ Constipation

Urination:

How often in a day would you go to the toilet in a day to urinate ? …………………………………

Do you get any of the following?

☐ Burning pain with urination   ☐ Get up during the night to urinate   ☐ Difficulty urinating

Sleep:

Do you have?

☐ Trouble getting to sleep   ☐ Wake a lot during the night   ☐ Trouble staying asleep

☐ Feel sleepy after you eat   ☐ Generally feel lethargic & tired   ☐ Tired despite sleep

☐ Waking up early in the morning & failing to fall asleep again   ☐ Always tired

Appendix 3   General Health in Eating Disorders Questionnaire for those with a self-reported eating disorder Continued.

Menstruation:

Do you get your period? ☐ Yes ☐ No

Does your period come? (Tick all that applies to you)

☐ The same time each cycle ☐ Sometimes early ☐ Sometimes late

☐ Irregular & Early ☐ Every three months or greater ☐ Irregular & Late

Do you have? (Tick all that applies)

☐ Heavy blood loss ☐ Minimal (not much) blood loss ☐ Clots

☐ Small stones like clots ☐ Medium clots (like raisins) ☐ Large clots > 5cents

Is the blood (on the first few days)? (Tick all that applies)

☐ Dark-red ☐ Bright-red ☐ Pale-red

☐ Purplish ☐ Brownish ☐ Blackish

Do you get? (tick all that applies)

☐ Sharp Pain with your period ☐ Pain before your period starts ☐ Pain at ovulation

☐ Dull Pain with your period ☐ Pain after your periods finished ☐ Breast tenderness

Emotions:

Below are a list of feelings and emotions, please indicate all the statements that best describe how you feel about yourself.

☐ I worry a lot ☐ I think too much ☐ I'm pre-occupied

☐ I'm driven ☐ I'm anxious ☐ I feel loved

☐ I feel needy ☐ I'm content ☐ I'm bitter

☐ I'm hostile ☐ I feel beautiful ☐ I'm irritable

☐ I obsessive about things ☐ I'm over-protective ☐ I'm introspective

☐ I'm forgiving of myself ☐ I brood over things ☐ I feel resentful

☐ I'm determined ☐ I lack concentration ☐ I'm at peace

☐ I blame myself ☐ I'm inflexible ☐ I feel depressed

☐ I persevere despite fear	☐ I'm a tranquil person	☐ I blame others
☐ I lack confidence	☐ I'm easily annoyed	☐ I'm patient
☐ I'm indecisive	☐ I'm a curious person	☐ I'm often bored
☐ I neglect myself	☐ I'm forgetful	☐ I feel insecure
☐ I'm compassionate	☐ I'm disorganised	☐ I feel guilty
☐ I want vengeance	☐ I'm fearless	☐ I'm innovative
☐ I am habit bound	☐ I like to be touched	☐ I'm fed up
☐ I feel alienated	☐ I'm Alert	☐ I'm frustrated
☐ I'm sensitive	☐ I'm very organised	☐ I'm very sensitive
☐ I'm unreasonable	☐ I'm scared to be close to people	☐ I'm carefree
☐ I'm irrational	☐ I feel free	☐ I am furious
☐ I'm antagonistic	☐ I'm impatient	☐ I am lucky
☐ I feel stuck	☐ I feel exacerbated	☐ I'm bubbly
☐ I'm spiteful	☐ I feel great	☐ I am rebellious
☐ I'm special	☐ I feel on edge	☐ I'm hesitant
☐ I'm disciplined	☐ I feel overwhelmed	☐ I feel grumpy
☐ I feel miserable	☐ I feel cheerful	☐ I feel hopeless
☐ I am rigid	☐ I feel lost	☐ I am fulfilled
☐ I feel resentful	☐ I am inspired	☐ I despair
☐ I'm happy	☐ I'm broken hearted	☐ I'm feeling blue
☐ I am hopeful	☐ I feel abandoned	☐ I'm distressed
☐ I set appropriate boundaries	☐ I'm hurting	☐ I am decisive
☐ I am withdrawn	☐ I am optimistic	☐ I am devastated
☐ I am lonely	☐ I have good self worth	☐ I am jealous
☐ I'm ambitious	☐ I'm defensive	☐ I pity myself
☐ I'm cynical	☐ I'm thoughtful	☐ I'm a perfectionist
☐ I'm self-assertive	☐ I'm critical of my-self	☐ I'm courageous
☐ I feel oppressed	☐ I'm generous	☐ I'm envious

- [ ] I'm grounded
- [ ] I am stoic
- [ ] I am sad
- [ ] I feel nourished
- [ ] I'm agitated
- [ ] I'm a nurturing person
- [ ] I'm easily discouraged
- [ ] I'm flexible
- [ ] I'm good at problem solving
- [ ] I feel inadequate
- [ ] I am timid
- [ ] I feel helpless
- [ ] I am haunted
- [ ] I am paranoid
- [ ] I am cautious
- [ ] I am powerless
- [ ] I am safe
- [ ] I lack motivation
- [ ] I feel understood
- [ ] Life has purpose
- [ ] I value myself
- [ ] I have trouble letting go
- [ ] I crave love
- [ ] I dislike to be touched
- [ ] I have mood swings
- [ ] I'm uncertain about the future
- [ ] I need reassurance
- [ ] I'm easily intimidated

- [ ] I am pessimistic
- [ ] I am hopeful about the future
- [ ] I am a reserved person
- [ ] I am controlling
- [ ] I am creative
- [ ] Things are hopeless
- [ ] I have a vision
- [ ] I'm unhappy
- [ ] I feel separate from others
- [ ] I feel inferior
- [ ] I am compassionate
- [ ] I don't trust others
- [ ] I am stable
- [ ] I'm apprehensive
- [ ] I am scared
- [ ] I am strong
- [ ] I'm secretive about my behaviour
- [ ] I'm hungry for attention
- [ ] I crave to be accepted
- [ ] Life has no direction
- [ ] I feel like I've being walked over
- [ ] I have poor self worth
- [ ] I have a poor memory
- [ ] I am proud of myself
- [ ] I have great will power
- [ ] I work till exhausted
- [ ] I crave to be understood
- [ ] I'm not connected to people

- [ ] I'm focussed
- [ ] I feel isolated
- [ ] I'm restless
- [ ] I'm easily offended
- [ ] I'm nervous
- [ ] I feel empty
- [ ] I'm confused
- [ ] I hate myself
- [ ] I'm intolerant
- [ ] I am afraid
- [ ] I'm easily startled
- [ ] I feel used
- [ ] I am fearful
- [ ] I like myself
- [ ] I am jumpy
- [ ] I am discouraged
- [ ] I'm guarded
- [ ] I'm hungry for love
- [ ] I'm angry
- [ ] Life feels futile
- [ ] I'm easy going
- [ ] I try to excel
- [ ] I crave warmth
- [ ] I crave compassion
- [ ] I quit when afraid
- [ ] I'm a hard worker
- [ ] I'm very loyal
- [ ] I crave fun

Appendix 3   General Health in Eating Disorders Questionnaire for those with a self-reported eating disorder Continued.

☐ I'm please with my achievements   ☐ I have an excessive need for acknowledgement

If you would like to be notified of the results of this questionnaire please leave your name and contact details:

Name: …………………………………….

Email/Home Address: …………………………………………………………………………………………

Thank you for your time. Wishing you all the best in health and happiness.

Appendix 4 General Health Questionnaire for those with no eating disorder.

Gender: Are you? ☐ Male ☐ Female

Age: Which age group do you belong to?

☐ 18-25 ☐ 26-33 ☐ 34-41 ☐ 42-49 ☐ 50-57 ☐ 58-63 ☐ 64-71 ☐ 71+

Do you currently have an eating disorder? Yes ☐ No ☐

Please tick whether you have any of the signs and symptoms below:

☐ Abdominal Pain ☐ Feelings of abdominal bloating ☐ Feels full easily

☐ Think about food regularly ☐ Lack of control of eating ☐ Digestive problems

☐ Swollen salivary glands ☐ Salivary glands increase in size ☐ Gums bleed easily

☐ Vomiting blood ☐ Callus on knuckles ☐ Sore throat

☐ Heartburn ☐ Frequent urination ☐ Night urination

☐ Constipation ☐ Hair loss from scalp ☐ Fine hair on body

☐ Dry skin ☐ Brittle nails ☐ Headaches

☐ Decreased bone density ☐ Muscle weakness & cramping ☐ Bone pain

☐ Fatigue ☐ Tiredness ☐ Lethargy

☐ Poor concentration ☐ Poor short-term memory ☐ Dizziness

☐ Dizziness on standing ☐ Low blood pressure ☐ Fluid retention

☐ Slow heart rate ☐ Irregular heart beat ☐ Palpitations

☐ Hyperactive ☐ Hypersensitivity to noise ☐ Feel cold frequently

☐ Sensitivity to cold & heat ☐ Extremities are constantly blue ☐ Can't stand the cold

☐ Irregular periods ☐ No periods ☐ Poor sleep

☐ Kidney infections ☐ Bleeding from your bottom ☐ Kidney stones

☐ Ankle swelling ☐ Marked variation in weight ☐ Mood swings

☐ Suicidal thoughts ☐ Ambivalence to treatment for your eating disorder

Appendix 4   General Health Questionnaire for those with no eating disorder continued.

Please answer the following questions about your general health:

Temperature:

Do you prefer the:	☐ cold weather	☐ hot weather
Do you have an aversion to:	☐ the cold	☐ the heat
Do you alternative between being hot and cold?	☐ Yes	☐ No
Do you get hot (feverish) during the night?	☐ Yes	☐ No
Do you get cold hands and or feet?	☐ Yes	☐ No

Sweating:

Would you say you sweat a lot?   ☐ Yes   ☐ No

If yes where?

☐ Only on the head   ☐ Only on the forehead   ☐ Whole body

☐ Only on the arms and legs ☐ Only the palms, soles & chest ☐ Only on the hands

Do you sweat?

☐ During the day ☐ During the night ☐ Both day and night

Headaches:

Do you get headaches?   ☐ Yes   ☐ No

If yes where? (Tick all that apply to you)

☐ Forehead   ☐ Back of the head/top of the neck   ☐ Top of the head

☐ Temples or side of the head ☐ Whole head   ☐ Inside the head

☐ Behind the eyes

Are the headaches:

☐ Sharp   ☐ Dull   ☐ Fixed

☐ Made worse when tired ☐ Heavy feeling in the head ☐ Moves

Appendix 4   General Health Questionnaire for those with no eating disorder continued.

Dizziness:

Do you suffer from dizziness?   ☐ Yes   ☐ No

If yes is it:

☐   Severe (everything sways & I lose balance)

☐   Slight with feeling of heaviness in the head

☐   Slight only & worse when tired

☐   Slight and only happens when I stand

Appetite:

How do you feel after eating?   ☐ Better   ☐ Worse

How is your appetite?

☐ No appetite   ☐ Appetite comes and goes   ☐ Always hungry

☐ Prefer hot food   ☐ Feel full & distended after eating   ☐ Prefer cold food

If you binge, how often do you binge?

☐ Greater than 5 times per day   ☐ 3-4 times per day   ☐ 1-2 times per day

☐ 5-6 times per week   ☐ 3-4 times per week   ☐ 1-2 times per week

☐ 3 times per month   ☐ 1-2 times per month

Thirst:

Do you have: (Tick all that apply to you)

☐ Thirst with no desire to drink   ☐ Thirst with desire to drink a lot   ☐ No thirst

☐ Desire for cold liquids   ☐ Thirst with desire to sip liquids   ☐ Desire for hot liquids

Appendix 4   General Health Questionnaire for those with no eating disorder continued.

Vomiting:

Do you vomit? ☐ Yes   ☐ No

Is your vomiting forced (e.g. sticking fingers down your throat, willing yourself to vomit etc)?

☐ Yes   ☐ No

How often do you vomit?

☐ Greater than 5 times per day   ☐ 3-4 times per day   ☐ 1-2 times per day

☐ 5-6 times per week   ☐ 3-4 times per week   ☐ 1-2 times per week

☐ 3 times per month   ☐ 1-2 times per month

Bowels:

Do you use laxatives? ☐ Yes   ☐ No

How often in a day would you empty your bowels? …………………………………

Do you get any of the following?

☐ Blood in your stools   ☐ Alternate between constipation & diarrhoea

☐ Diarrhoea   ☐ Constipation

Urination:

How often in a day would you go to the toilet in a day to urinate ? ………………………………

Do you get any of the following?

☐ Burning pain with urination   ☐ Get up during the night to urinate   ☐ Difficulty urinating

Sleep:

Do you have?

☐ Trouble getting to sleep   ☐ Wake a lot during the night   ☐ Trouble staying asleep

☐ Feel sleepy after you eat   ☐ Generally feel lethargic & tired   ☐ Tired despite sleep

☐ Waking up early in the morning & failing to fall asleep again   ☐ Always tired

Menstruation:

Do you get your period? ☐ Yes ☐ No

Does your period come? (Tick all that applies to you)

☐ The same time each cycle ☐ Sometimes early ☐ Sometimes late

☐ Irregular & Early ☐ Every three months or greater ☐ Irregular & Late

Do you have? (Tick all that applies)

☐ Heavy blood loss ☐ Minimal (not much) blood loss ☐ Clots

☐ Small stones like clots ☐ Medium clots (like raisins) ☐ Large clots > 5cents

Is the blood (on the first few days)? (Tick all that applies)

☐ Dark-red ☐ Bright-red ☐ Pale-red

☐ Purplish ☐ Brownish ☐ Blackish

Do you get? (tick all that applies)

☐ Sharp Pain with your period ☐ Pain before your period starts ☐ Pain at ovulation

☐ Dull Pain with your period ☐ Pain after your periods finished ☐ Breast tenderness

Emotions:

Below are a list of feelings and emotions, please indicate all the statements that best describe how you feel about yourself.

☐ I worry a lot ☐ I think too much ☐ I'm pre-occupied

☐ I'm driven ☐ I'm anxious ☐ I feel loved

☐ I feel needy ☐ I'm content ☐ I'm bitter

☐ I'm hostile ☐ I feel beautiful ☐ I'm irritable

☐ I obsessive about things ☐ I'm over-protective ☐ I'm introspective

☐ I'm forgiving of myself ☐ I brood over things ☐ I feel resentful

☐ I'm determined ☐ I lack concentration ☐ I'm at peace

☐ I blame myself ☐ I'm inflexible ☐ I feel depressed

☐ I persevere despite fear ☐ I'm a tranquil person ☐ I blame others

- [ ] I lack confidence
- [ ] I'm indecisive
- [ ] I neglect myself
- [ ] I'm compassionate
- [ ] I want vengeance
- [ ] I am habit bound
- [ ] I feel alienated
- [ ] I'm sensitive
- [ ] I'm unreasonable
- [ ] I'm irrational
- [ ] I'm antagonistic
- [ ] I feel stuck
- [ ] I'm spiteful
- [ ] I'm special
- [ ] I'm disciplined
- [ ] I feel miserable
- [ ] I am rigid
- [ ] I feel resentful
- [ ] I'm happy
- [ ] I am hopeful
- [ ] I set appropriate boundaries
- [ ] I am withdrawn
- [ ] I am lonely
- [ ] I'm ambitious
- [ ] I'm cynical
- [ ] I'm self-assertive
- [ ] I feel oppressed
- [ ] I'm grounded
- [ ] I am stoic

- [ ] I'm easily annoyed
- [ ] I'm a curious person
- [ ] I'm forgetful
- [ ] I'm disorganised
- [ ] I'm fearless
- [ ] I like to be touched
- [ ] I'm Alert
- [ ] I'm very organised
- [ ] I'm scared to be close to people
- [ ] I feel free
- [ ] I'm impatient
- [ ] I feel exacerbated
- [ ] I feel great
- [ ] I feel on edge
- [ ] I feel overwhelmed
- [ ] I feel cheerful
- [ ] I feel lost
- [ ] I am inspired
- [ ] I'm broken hearted
- [ ] I feel abandoned
- [ ] I'm hurting
- [ ] I am optimistic
- [ ] I have good self worth
- [ ] I'm defensive
- [ ] I'm thoughtful
- [ ] I'm critical of my-self
- [ ] I'm generous
- [ ] I am pessimistic
- [ ] I am hopeful about the future

- [ ] I'm patient
- [ ] I'm often bored
- [ ] I feel insecure
- [ ] I feel guilty
- [ ] I'm innovative
- [ ] I'm fed up
- [ ] I'm frustrated
- [ ] I'm very sensitive
- [ ] I'm carefree
- [ ] I am furious
- [ ] I am lucky
- [ ] I'm bubbly
- [ ] I am rebellious
- [ ] I'm hesitant
- [ ] I feel grumpy
- [ ] I feel hopeless
- [ ] I am fulfilled
- [ ] I despair
- [ ] I'm feeling blue
- [ ] I'm distressed
- [ ] I am decisive
- [ ] I am devastated
- [ ] I am jealous
- [ ] I pity myself
- [ ] I'm a perfectionist
- [ ] I'm courageous
- [ ] I'm envious
- [ ] I'm focussed
- [ ] I feel isolated

☐ I am sad

☐ I feel nourished

☐ I'm agitated

☐ I'm a nurturing person

☐ I'm easily discouraged

☐ I'm flexible

☐ I'm good at problem solving

☐ I feel inadequate

☐ I am timid

☐ I feel helpless

☐ I am haunted

☐ I am paranoid

☐ I am cautious

☐ I am powerless

☐ I am safe

☐ I lack motivation

☐ I feel understood

☐ Life has purpose

☐ I value myself

☐ I have trouble letting go

☐ I crave love

☐ I dislike to be touched

☐ I have mood swings

☐ I'm uncertain about the future

☐ I need reassurance

☐ I'm easily intimidated

☐ I'm please with my achievements

☐ I am a reserved person

☐ I am controlling

☐ I am creative

☐ Things are hopeless

☐ I have a vision

☐ I'm unhappy

☐ I feel separate from others

☐ I feel inferior

☐ I am compassionate

☐ I don't trust others

☐ I am stable

☐ I'm apprehensive

☐ I am scared

☐ I am strong

☐ I'm secretive about my behaviour

☐ I'm hungry for attention

☐ I crave to be accepted

☐ Life has no direction

☐ I feel like I've being walked over

☐ I have poor self worth

☐ I have a poor memory

☐ I am proud of myself

☐ I have great will power

☐ I work till exhausted

☐ I crave to be understood

☐ I'm not connected to people

☐ I have an excessive need for acknowledgement

☐ I'm restless

☐ I'm easily offended

☐ I'm nervous

☐ I feel empty

☐ I'm confused

☐ I hate myself

☐ I'm intolerant

☐ I am afraid

☐ I'm easily startled

☐ I feel used

☐ I am fearful

☐ I like myself

☐ I am jumpy

☐ I am discouraged

☐ I'm guarded

☐ I'm hungry for love

☐ I'm angry

☐ Life feels futile

☐ I'm easy going

☐ I try to excel

☐ I crave warmth

☐ I crave compassion

☐ I quit when afraid

☐ I'm a hard worker

☐ I'm very loyal

☐ I crave fun

Appendix 4   General Health Questionnaire for those with no eating disorder continued.

If you would like to be notified of the results of this questionnaire please leave your name and contact details:

Name: …………….……….……….…..

Email/Home Address: …………….……….……….……….……….……….……….……….………

Thank you for your time. Wishing you all the best in health and happiness.

Appendix 5 Pattern Checklist.

Stomach heat pattern:

Thirst	
Foul Breath	
Hyperorexia (over stimulation of the appetite)	
Oliguria with dark urine (diminished urine)	
Constipation	
Ulceration of the mouth or gingivitis	
Scorching pain of the stomach that refuses pressure	
Preference for clod fluids	
Acid up flow	
Rapid hungering	
Swelling and pain of the teeth	
Scorched lips	
	/12

Liver Qi depression pattern:

Depression	
Frequent sighing	
Hypochondriac or lower abdominal distension or moving pain	
Feeling of foreign body in the throat	
Distending pain of the breast	
Irregular menstruation/ Abdominal pain prior to menstruation/Premenstrual syndrome	
Agitation/irascibility	
Fatigue	
Reduced food intake	
Flatulence/bloating	
	/10

Heart yin deficiency pattern:

Mental irritability	
Palpations/Fearful Throbbing	
Insomnia	
Low fever	
Night sweating	
Warm palms and soles of feet	
Thirst	
Profuse dreaming	
Dry lips and throat	
Bitter taste in the mouth	
Constipation	
Yellow urine	
	/12

Stomach yin deficiency pattern:

Dry mouth	
Thirst	
Anorexia (lack of appetite)	
Constipation	
Retching	
No intake of food or swift digestion with increased appetite	
Scorching pains of the stomach duct	
Hic coughs	
No desire to eat even when hungry	
Possible wasting thirst	
Dysphagia (difficulty in swallowing)	
	/11

Heart yang deficiency pattern:

Palpitations	
Tendency to be easily frightened	
Dyspnea (laboured or difficult breathing)	
A feeling of pressure in the chest	
Difficulty falling asleep despite desire to sleep	
Forgetfulness	
Aversion to cold	
Spontaneous sweating	
Cold limbs	
Fatigued spirit	
Lack of strength	
Shortage of Qi	
Laziness in speaking	
Bright pale complexion	
	/14

Spleen Qi deficiency pattern:

Dizziness	
Reduced food intake	
Fatigue	
Fatigued limbs	
Sallow Face	
Indigestion	
Abdominal distension	
Lassitude	
Anorexia (decreased appetite)	
Loose bowels	
Shortage of Qi	
Laziness in speaking	
	/12

Stomach Qi deficiency pattern:

Dull epigastric pain relieved by pressure	
Anorexia	
Torpid intake	
Tastelessness of food	
Distension and fullness of the stomach	
Nausea	
Vomiting	
Belching	
Hiccough	
	/9

Heart harassing the heart spirit pattern:

Fever	
Thirst	
Vexation	
Insomnia	
Manic or delirious speech	
Flushed face	
Constipation	
Dark coloured urine	
	/8

Liver Qi stagnation and stomach heat pattern:

Vomiting sour fluid	
Torpid stagnant stomach intake	
Stomach duct pain	
Aversion to food	
Abdominal distension	
Diarrhoea	
Dizziness	
	/7

Phlegm clouding the heart spirit

Impairment of consciousness	
Psychotic depression or coma	
Phlegmatic sound in the throat	
	/3

Food damage:

Sour and rotten vomit	
Distension and fullness of the abdomen	
Rotten and malodorous belching	
Aversion of food	
Abdominal pain	
Intestinal rumbling	
Diarrhoea	
Diminishing of abdominal pain after discharge then return of pain	
Rotten and malodorous faecal matter	
	/9

Food Accumulation:

Glomus oppression in the chest and stomach duct or hardness with glomus lumps	
Acid regurgitation	
Abdominal pain that is worse with pressure	
Constipation	
Torpid intake	
Reduced appetite	
Rotten belching	
	/7

Liver Fire flaming Upwards pattern:

Distension, pain and burning sensation in hypochondriac region	
Irritability	
Hot red face	
Difficulty sleeping	
Red eyes	
Constipation	
Irascibility (easily angered)	
Bitterness and dryness in the mouth	
Headache	
Dark Urination	
	/10

Stomach-Spleen disharmony pattern:

Epigastric stuffiness and distension	
Anorexia	
Fatigue	
Sloppy Stool	
Abdominal distension after eating	
Lack of strength	
Belching	
Borborygmi	
Shortage of Qi	
Torpid intake (slow or sluggish)	
Laziness in speaking	
	/11

Heart Qi deficiency pattern:

Palpitations	
Easily frightened	
Shortness of breath	
Difficulty falling asleep	
Listlessness	
Forgetfulness	
Spontaneous sweating	
Pallor	
Lack of strength	
	/9

Kidney yin deficiency with fire effulgence pattern:

Tidal fever	
Tinnitus	
Night sweating	
Flushed checks	
Vexing heat in the chest, palms and soles	
Nocturnal emission	
Premature ejaculation	
Hypersexuality	
Lumbar pain	
	/9

Kidney yang deficiency pattern:

Aversion to cold	
Tinnitus	
Cold limb	
Dizziness	
Listlessness	
Lack of strength	
Weakness and soreness of the loins and knees	
Predilection (preference or bias) for sleep	
Premature ejaculation or impotence/frigidity/infertility	
Nocturia (excessive urination at night)	
	/10

Spleen and Kidney yang deficiency pattern:

Bright white facial colour	
Fifth watch diarrhoea/chronic diarrhoea	
Physical cold (aversion to cold)	
Swollen limbs	
Cold limbs	
Coldness and pain in the loins and lower abdomen	
Bland taste in the mouth	
Lack of thirst	
Torpid intake	
Diminished appetite	
Abdominal distension after eating	
Head dizziness	
Ringing in the ears	
Cold pain of the lumbus and knees	
Inhibited urination	
	/15

Heart blood deficiency pattern:

Palpitations	
Insomnia	
Dizziness	
Forgetfulness	
Pale nails	
Dream disturbed sleep	
Pale or sallow complexion	
Pale lips	
	/8

Spleen Yang deficiency pattern:

Cold limbs	
Emaciation	
Coldness and pain in the abdomen	
Oedema	
Anorexia	
Abdominal distension	
Abdominal fullness	
Aversion to cold	
Chronic diarrhoea	
No thirst	
Lassitude	
Torpid intake	
	/12

Spleen and Stomach deficiency cold pattern:

Colds and pains over the stomach	
Cold limbs	
Chronic diarrhoea	
Abdominal Fullness	
Belching	
Vomiting thin fluid	
Lassitude	
Anorexia (decreased appetite)	
	/8

Liver Qi invading the stomach:

Hypochondriac pain	
Irritability	
Epigastric distension	
Epigastric pain	
Anorexia	
Belching	
Nausea	
Vomiting	
Torbid intake	
Dizziness	
	/10

Yin deficiency pattern:

Dizziness	
Emaciation/thin body	
Tinnitus	
Dryness of the mouth and throat	
Constipation	
Dark coloured urine	
Afternoon Fever	
Malar flush	
Night sweats	
Wan and sallow facial complexion	
	/10

Yang deficiency pattern:

Intolerance of cold	
Cold extremities	
Spontaneous sweating	
Loose bowels	
Long voiding of clear urine	
Bright-white facial complexion	
Fatigue	
Lack of strength	
Shortage of Qi	
Laziness in speaking	
	/10

Qi deficiency pattern:

Shortness of breath	
Faint voice	
Fatigue/lassitude	
Spontaneous sweating	
Lack of strength	
Dizziness	
Laziness in speaking	
Torpid intake	
Listlessness	
	/8

Blood deficiency pattern:

Pale or sallow complexion	
Pale lips and nails	
Dizziness	
Dimmed vision	
Palpations	
Numbness of extremities	
Insomnia	
Abnormal menstrual periods (diminished or delayed)	
	/8

Qi and Blood Qi deficiency pattern:

Dizziness	
Listlessness	
Lack of strength	
Shortness of breath	
Pale or allow complexion	
Dimmed vision	
Pale lips and nails	
Palpitations	
Insomnia	
	/9

Appendix 6 Figures 3.2-3.23. Eating Disorder Pattern Severity Index Results -Specific Patterns

These figures show statistical significant difference between the eating disorders as according to the colours/patterns.   For example for stomach heat (see Figure 3.2 below), not having an eating disorder is significantly different from every other eating disorder, BED, EDNOS and AN are not significantly different from each other and BN is significantly different from having no eating disorder, BED, EDNOS and AN.

Fig 3.2   Stomach Heat
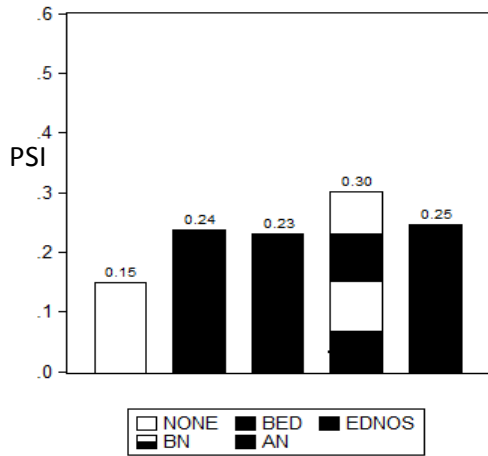
Fig 3.3   Liver Qi Depression
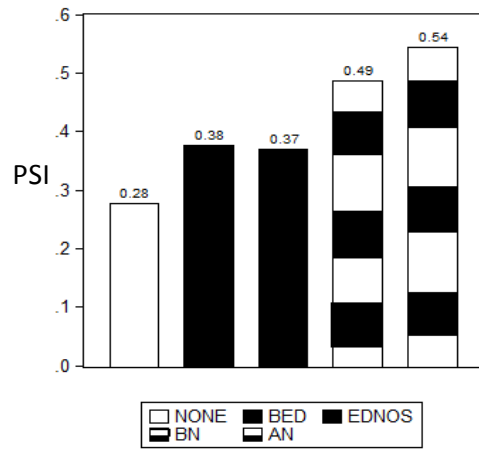
Fig 3.4   Heart Yin Deficiency
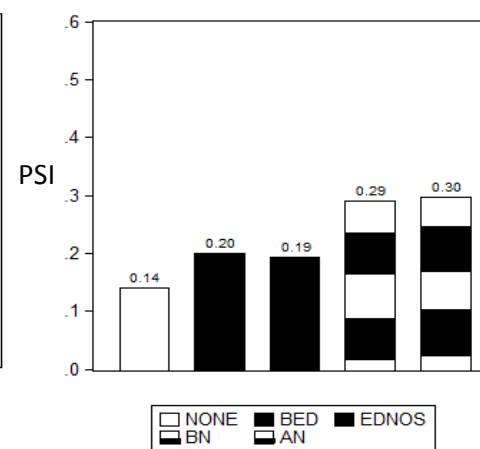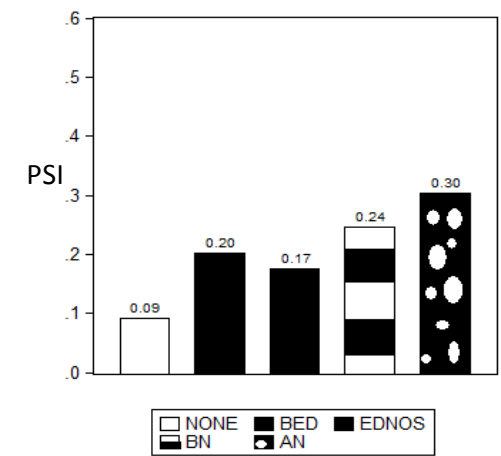
Fig 3.5 Stomach Yin Deficiency
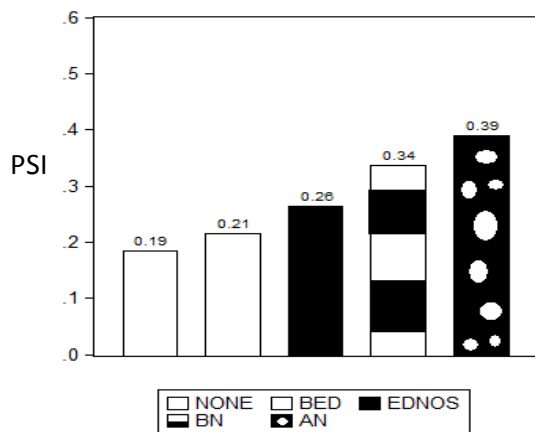
Fig 3.6   Heart Yang Deficiency

Fig 3.7   Spleen Qi Deficiency
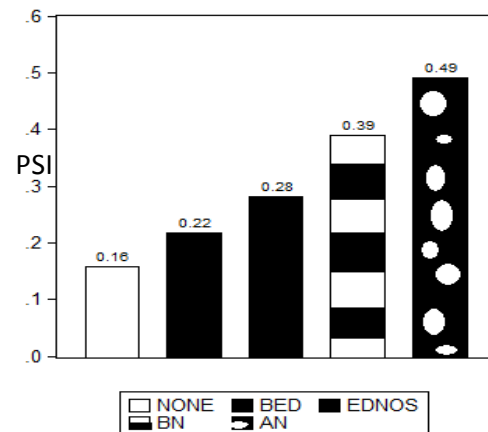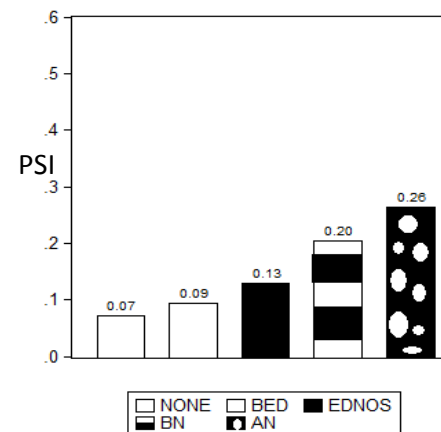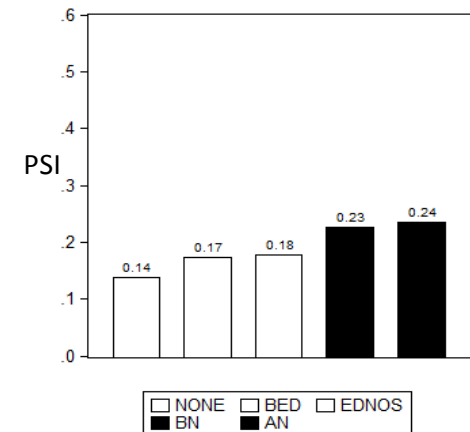
Fig 3.8   Stomach Qi Deficiency

Fig 3.9   Heat Harassing the Heart Spirit

Fig 3.10 Liver Qi stagnation & Stomach Heat

Fig 3.11   Food Damage

Fig 3.12   Food Accumulation

Fig 3.13 Liver Fire flaming upwards

Fig 3.14 Spleen/Stomach Disharmony

Fig 3.15   Heart Qi Deficiency

Fig 3.16 Kidney Yin Deficiency with fire effulgence

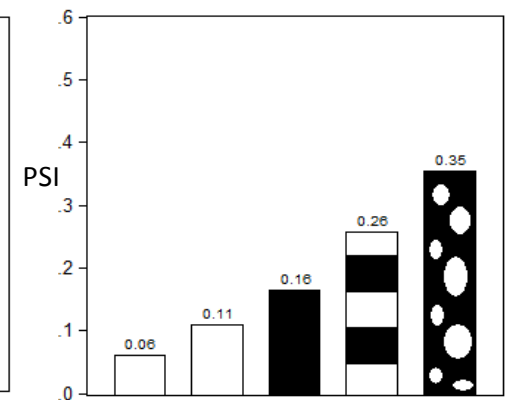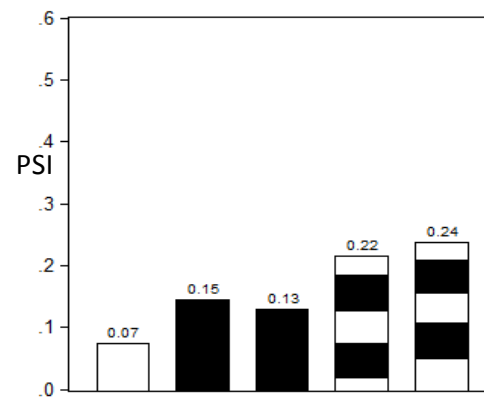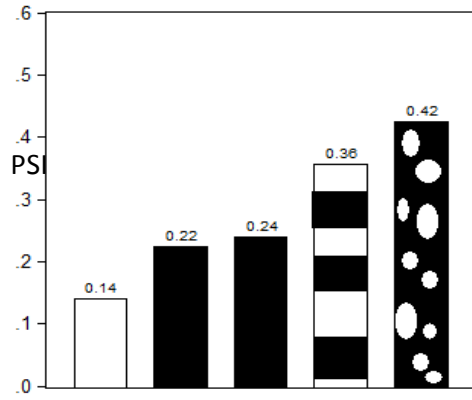
Fig 3.17 Kidney Yang Deficiency

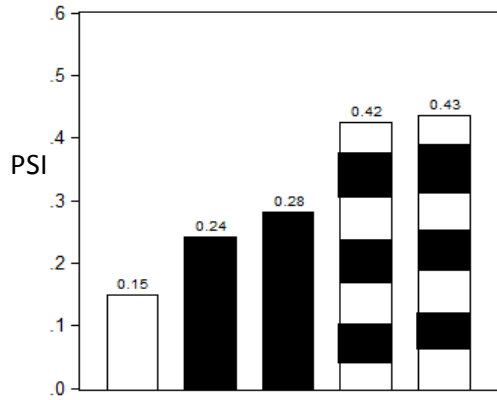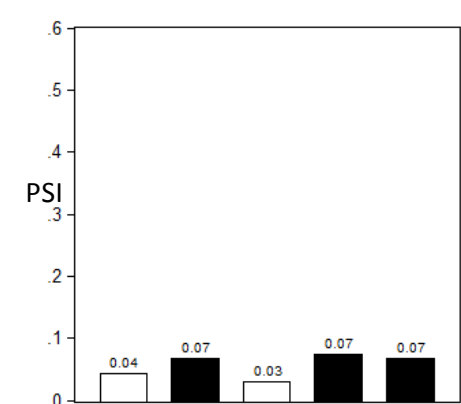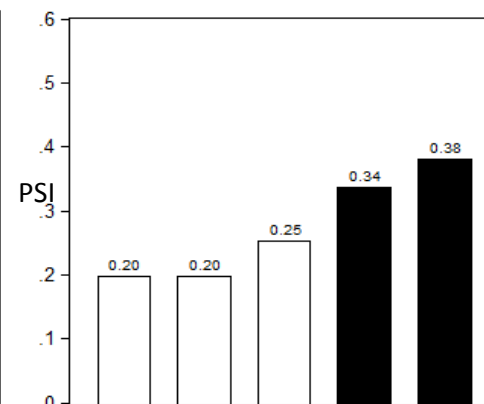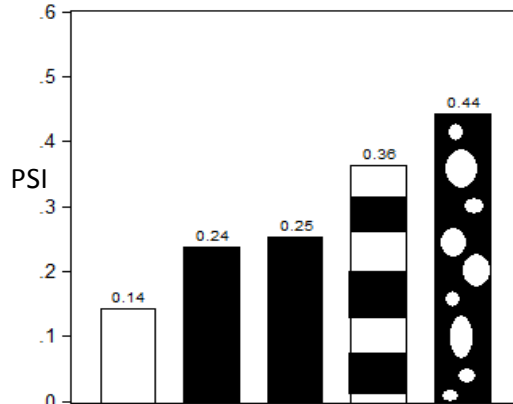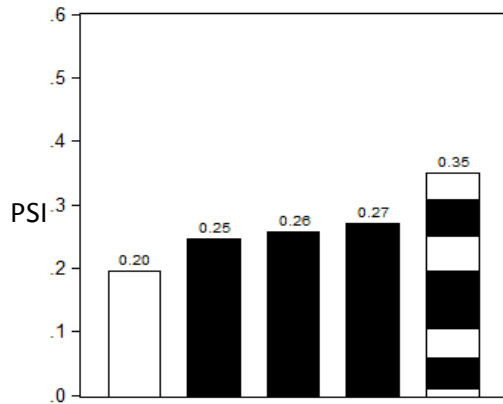*Appendix 6   Figures 3.2-3.22. Eating Disorder Pattern Severity Index Results -Specific Patterns Continued*

Fig 3.18 Spleen & Kidney Yang Deficiency   Fig 3.19   Heart Blood Deficiency   Fig 3.20   Spleen Yang Deficiency   Fig 3. 21 Spleen & Stomach Deficiency Cold
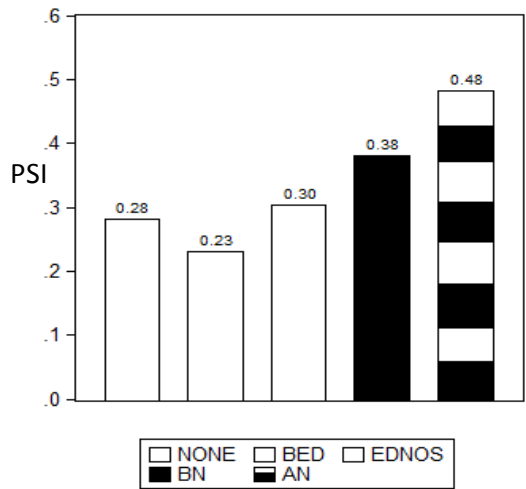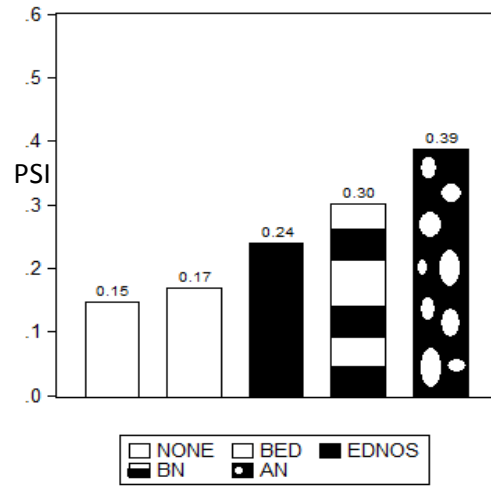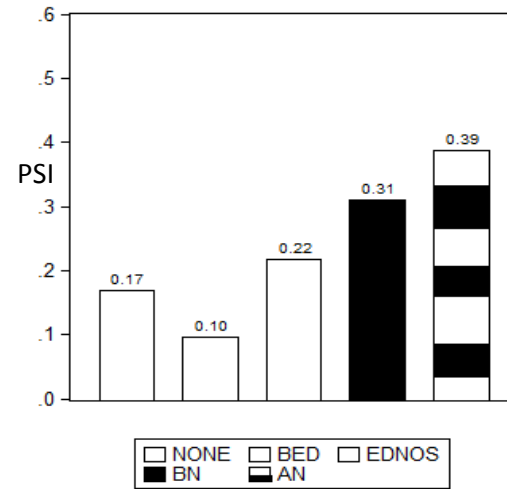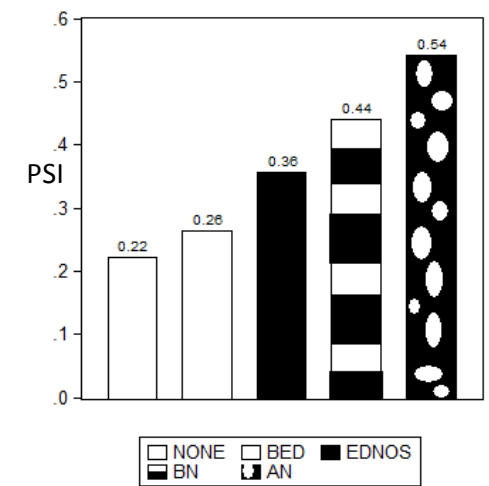
Fig 3.22   Liver Qi invading the Stomach
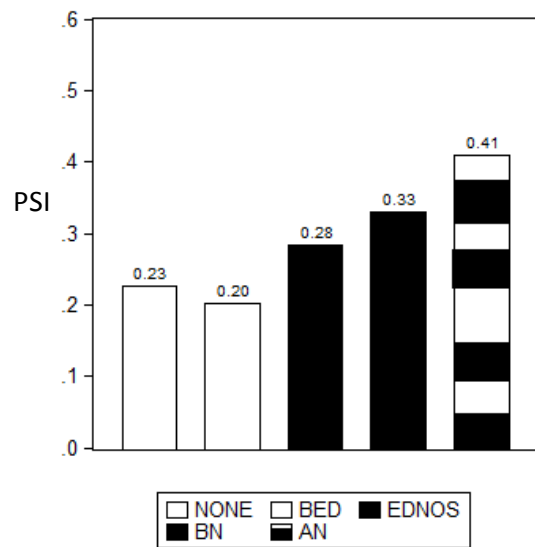
Appendix 7 Figures 3.23-3.29. Eating Disorder Pattern Severity Index Results –General Patterns

These figures show statistical significant difference between the eating disorders as according to the different colours/patterns.

Fig 3.23 Yin Deficiency
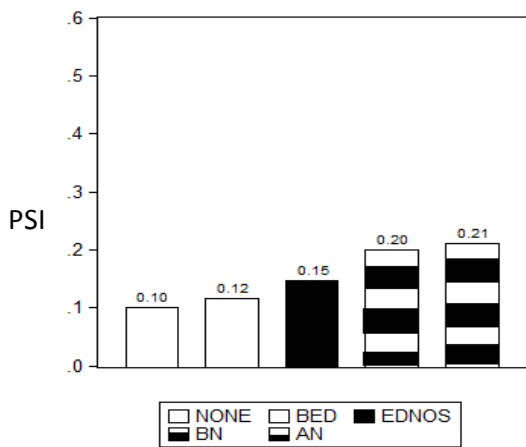
Fig 3.24 Yang Deficiency
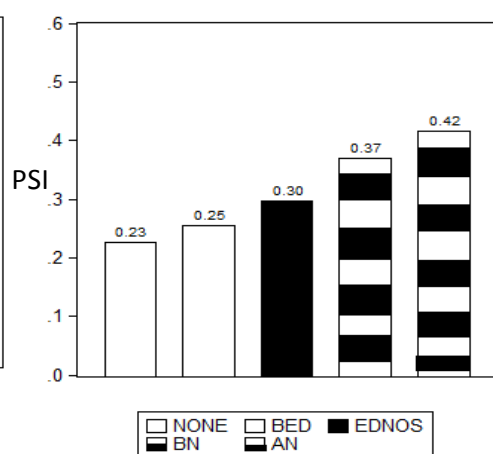
Fig 3.25 Qi Deficiency
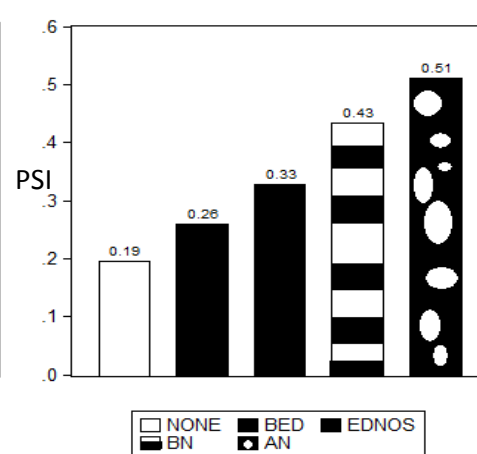
Fig 3.26 Blood Deficiency
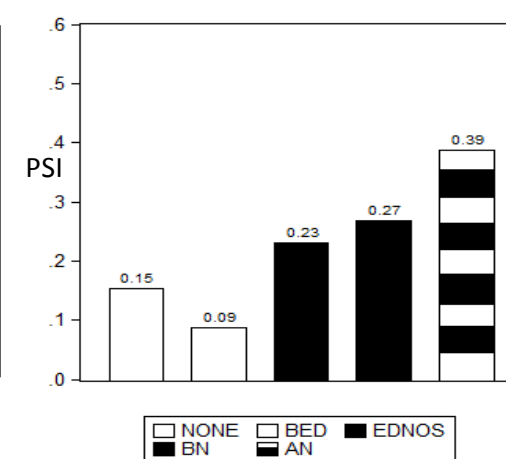
Fig 3.27 Qi and Blood Deficiency
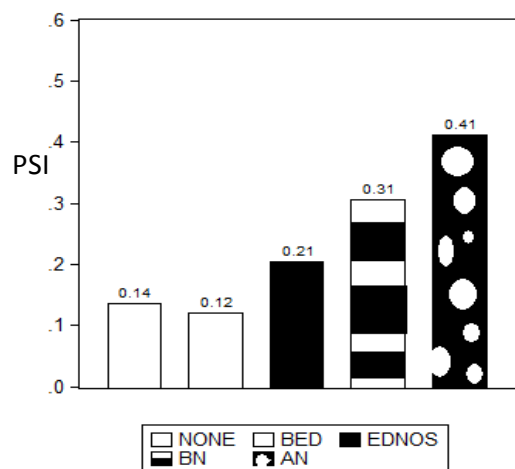
Appendix 8 The clinical application of the model in a 'real life' scenario*.

*Please note that this is a fictitious situation used only to demonstrate the use of the model in a clinical environment.

Jane Doe, aged 19, comes to see you for the first time for TCM acupuncture for help with her troubles sleeping and feeling a bit depressed. You assess her as you normally would according to the four methods of TCM diagnosis; looking, hearing (and smelling), asking and feeling (Maciocia, 1989). Jane is pale and thin (but not emaciated) but when questioned about her weight she stresses she eats a lot, has lots of energy to exercise and is just naturally thin. After collecting all the signs and symptoms from her you make a diagnosis of Liver Qi stagnation and Heart Blood deficiency. Jane is a first time user of acupuncture and is reluctant to undress too much so you chose points on her hands/arms/legs and feet. You continue to see Jane over the next four weeks and you start to find out more about Jane. You find out that Jane exercises more than twice a day and often for over an hour at a time. You also find out that she has a whole range of 'bad' foods that she doesn't eat. You have gained her confidence and she has allowed you to use acupuncture points on her back and while not 'starved' she is very thin. You start to suspect that maybe Jane has issues with eating and a possible eating disorder. You ascertain that she is not seeing any other practitioners, complementary or medical. You go home and do some eating disorder research and discover that eating disorder sufferers are reluctant to admit they have a problem. You

discover that TCM information on eating disorders is limited. You find a tool to help you with understanding and assessing your treatment (the survey). You download the model and decide to use it on Jane.

The first part is filling in the survey. The survey is seen in Appendix 3 (page 237). You have most of the information in Jane's file so you only need to ask her a couple of questions personally. Then, using the information from the survey you then transfer the signs and symptoms to the Pattern checklist seen in Appendix 5 (page254) to determine Jane's Pattern Severity Index. You do not need to determine the PSI's for all the patterns just for the following patterns: *Heart Yin Deficiency, Heart Yang deficiency, Heat Harassing Heart Spirit, Heart Qi deficiency, Stomach Yin deficiency, Spleen and Stomach deficiency cold* and *Spleen Qi deficiency*. Jane's PSI's for the aforementioned patterns are:

Heart Yin Deficiency	0.33
Heart Yang deficiency	0.57
Heat Harassing Heart Spirit	0.38
Heart Qi deficiency	0.67
Stomach Yin deficiency	0.27
Spleen and Stomach deficiency cold	0.38
Spleen Qi deficiency	

These PSI's are put in the model program and the following probabilities are computed:

No ED: 3.9%

EDNOS: 13.2%

BN/AN: 82.9%

Thus according to TCM principles, Jane is highly likely to have AN or BN. You decide to approach Jane with these results and suggest that she should be referred to an eating disorder specialist whilst continuing with your care. Ideally Jane would decide to take up the referral to an eating disorder specialist and continue to see you for treatment.   However, given eating disorder patients refusal to admit something is wrong, Jane may decide to refuse to seek medical care. Each practitioner will have to decide whether they believe it is ethical and safe to continue to treat her without medical support for her eating disorder. Whilst the survey is easy to administer, the decisions regarding treatment may be less so. If Jane continues to see you and seek medical help, you may wish to re-administer the survey as one measure of your treatment effect and hopefully her probability for having AN/BN has decreased.

Appendix 9   Translation of the Swedish article.

Original Text

Har el-akustimulering effekt på anorexi och bulimi?

Intervjuer med 26 flickor med anorexi- och bulimidiagnos, som behandlats med elektrisk stimulering av akupunkturpunkter (el-akustimulering) tyder på att man borde studera dess effekt i en rando
miserad och kontrollerad studie. Flickorna behandlades vid den alternativmedicinska Shantung-praktiken i Ängelholm. Av dessa 26 hade 21 tidigare behandling inom barnpsykiatri, somatisk vård eller vuxenpsykiatri utan att ha blivit symtomfria. Studien finansierades av PBU i Stockholms läns landsting.

Med hjälp av ett mätinstrument (Inlandsteknik, Arvidsjaur) noterades hudresistensen vid akupunkturpunkter. Lateral skillnad noterades. Behandling gavs sedan med samma instrument med transkutan stimulering av akupunkturpunkter enligt ett givet schema. Den påminner alltså om transkutan neurostimulering (TNS). En liknande behandlingsform är i Tyskland känd som EAV (Elektroakupunktur Dr Voll). Den syftar till att återställa den laterala obalansen i hudresistens vid akupunkturpunkterna.

Behandlingen varade 1–3 timmar och åtföljdes av aktivt lyssnande, ibland avreaktion av känslor och avslutades ofta med musik. Antalet behandlingar per patient var cirka sju, behandlingsintervallet varierade.

Resultat

21 flickor uppgav vid intervjuerna att de blivit fria från sin ätstörning och att de levde ett normalt socialt liv. Fem flickor upplevde ingen effekt av behandlingen. Ingen blev sämre. Den genomsnittliga uppföljningstiden var 3 1/2 år. Som bifynd noterades att en flicka med social ångest blev botad.

Patienterna positiva till behandlingen

Behandlingen beskrevs av alla på ett liknande sätt. Det första som noterades var en trötthetskänsla i kroppen. Tröttheten efterträddes av en glädjekänsla, och när kroppsupplevelsen förändrades fördes tankarna bort från malande tvångstankar kring mat och motion. Tankarna blev glädjefyllda, varierade och åldersadekvata.

Efter dessa angivna förändringar i stämningsläge och kognition återkom aptiten. atbeteendet och motionsbeteendet normaliserades successivt. Många flickor var positiva till den flex-

ibla behandlingstiden.

Resultatet kan tillskrivas placeboeffekten, en biologisk effekt av el-akustimulering eller en kombination av båda. En biologisk effekt av aku-stimuleringen kan kanske tänkas.

Hos den anorektiska patienten noteras en förhöjd halt av »corticotropin-releasing hormone» (CRH) i cerebrospinalvätskan som ett tecken på att hypotalamus aktiverar kroppens stressreaktion [1, 2]. CRH är även en av flera centralnervösa peptider med hämmande effekt på födointaget hos djur [3].

Det är känt att akupunktur stimulerar beta-endorfinproduktion [4]. Det rapporteras vidare att el-akustimulering ger ökad produktion av det av binjuren producerade dehydroepiandrosteron(DHEA) [5].

Kanske ger ökad halt av beta-endorfin och DHEA en ångestminskning som resulterar i en minskad halt av CRH. Kanske blir resultatet av de åstadkomna hormonella förändringarna ett tillstånd av välbefinnande istället för det tillstånd av rädsla och tvång som utmärker patienter med ätstörning.

Jag hoppas att detta meddelande kan föranleda klinisk forskning med randomiserade grupper, reproducerbar be handlingsteknik samt mätning av kliniska och hormonella parametrar.

Göran Högberg

överläkare, PBU Liljeholmen, Stockholm

(Translated by a friend of the author who wishes to remain anonymous)

Has electrical acustimulation an impact on anorexia and bulimia?

Interviews with 26 girls with anorexia and bulimia-diagnosis, treated with electrical stimulation of acupuncture points (electrical acu-stimulation) suggests that one should study its efficacy in a randomized and controlled study. The girls were treated at the alternative medical Shantung clinic in Ängelholm. Of these 26, 21 had previous treatment in child psychiatry, somatic or adult psychiatric care without being symptom free. The study was funded by the PBU in Stockholm City Council.

The skin resistance was noted at acupuncture points with the help of a measuring instrument (Inlandsteknik, Arvidsjaur). Lateral difference was noted. With the same instrument, treatment was then given with trans-cutaneous stimulation of acupuncture points according to a given schedule. So it's similar to transcutaneous neural stimulation (TNS). A similar form of treatment in Germany is known as EAV (Electro Acupuncture Dr. Voll). It aims to restore the lateral imbalance in skin resistance at acupuncture points.

The treatments lasted between 1-3 hours and were accompanied by active listening, sometimes abreact of emotions and were often ended with music. The number of treatments per patient was about seven, treatment interval varied.

Results

21 girls said in interviews stated that they've become free from their eating disorders and that they were living a normal social life. Five girls experienced no effect of the treatment. None became worse. The average follow-up period was 3 1/2 years. As an incidental finding it was noted that a girl with social anxiety was cured.

Patients positive about the treatment

The treatment was described by all in a similar way. The first thing that was noted was a feeling of tiredness in the body. The fatigue was succeeded by a sense of joy, and when the experience changed all thoughts regarding obsessions about food and exercise were removed. The thoughts became filled with joy, varied, and age-appropriate.

After these changes in mood and cognition the appetite returned. The eating behaviour and physical activity behaviour gradually returned to normal. Many girls were in favour of the flexible treatment.

The result can be attributed to a placebo effect, a biological effect of electrical acu-stimulation or a combination of both. A biological effect of acu-stimulation can possibly be imagined.

An increased level of "corticotropin-releasing hormone" (CRH) in cerebrospinal fluid was noted in the anorexic patient as a sign that the hypothalamus activates the body's stress response [1, 2]. CRH is also one of several central nervous peptides with inhibitory effect on food intake in animals [3].

It is known that acupuncture stimulates the beta-endorphin production [4]. It is reported that electrical acu-stimulation increases production of the adrenal gland produced dehydroepiandrosterone (DHEA) [5].

Perhaps the increased levels of beta-endorphin and DHEA gives an anxiety reduction, that results in a reduced concentration of CRH. Perhaps the result of the hormonal-made change brings a state of well-being instead of the state of fear and coercion that characterized patients with eating disorders.

I hope this message can lead to clinical research with randomized groups, reproducible document technologies, and measurement of clinical and hormonal parameters.

Göran Högberg

Physician, PBU Liljeholmen,Stockholm

Appendix 10 Letter to prospective participants at the Private Eating Disorder Facility in Melbourne

Dear Oak House Client,

My name is Sarah Fogarty. I am a PhD student at Victoria University studying the effects of acupuncture treatment in eating disorders. I would like to invite you to consider participating in my research project.

How the project works and what you have to do:

* You will receive 10 complementary sessions of acupuncture in conjunction with your current treatment at the Oak House.

* Answer some questionnaires regarding your health, well-being and your eating attitudes taking no more than 30 minutes to complete each time.

* Participate in a 30-minute interview discussing your experiences about your acupuncture treatment.

Confidentiality is assured at all stages of participation in this project with your details kept in a locked filing cabinet and your information encoded and de-identified.

We believe that acupuncture may benefit you by reducing stress, depression, anxiety, gynaecological complaints and digestive complaints.

The project is expected to run for 18 months so if you feel that now is not an appropriate time for you to participate please keep it in mind for a future date.

Please feel free to discuss any aspect of the project with Associate Professor Lily Stojanovska, your treating practitioner at the Oak House or myself, our contact details are below.

If you would like to participate in the project please contact me on 0405 078 914.

I look forward to hearing from you and wish you all the best in your recovery.

Take care,

Sarah

Sarah Fogarty	Dr Lily Stojanovska	The Oak House Team
PhD Student (Victoria University)	Principal Supervisor	Research Supporters
Ph: 0405 078 914	**Ph: 9919 2737**	**Ph: 9888 4737**
sarah.fogarty@research.vu.edu	**lily.stojanovska@vu.edu.au**	**info@theoakhouse.com.au**

Glossary of TCM terms

All TCM terms taken from (World Health Organsiation, 2007).

acupuncture 鍼;鍼法 the insertion of needles into humans or animals for

remedial purposes or its methods.

 electro-acupuncture 電鍼 electric stimulation of the needle following

insertion.

 sham acupuncture acupuncture in non acupuncture points.

bladder 膀胱;胞 one of the six bowels, which stores and discharges urine.

blood 血 the red fluid circulating through the blood vessels, and nourishing and

moistening the whole body.

corporeal soul (Po) 魄 the animating part of one's mind.

dietary irregularities 飲食不節　　　diet harmful to health, including ingestion of raw,

cold or contaminated food, voracious eating or excessive hunger, predilection for a

special food, alcohol addiction, etc.

deficiency and excess 虛實　　　one of the guiding principles for analysing the

condition of the body's resistance to pathogenic factors, in which deficiency refers to

deficiency of the healthy qi and excess refers to excessiveness of the pathogenic qi.

　　deficiency 虛 (1) deficiency of the healthy qi; (2) weak constitution; (3) weak

reaction against pathogens.

　　excess 實　　　(1) excessiveness of the pathogenic qi; (2) strong

constitution; (3) strong reaction against pathogens.

essence-spirit 精神　state of mind or mood, reflection of the strength of

essence, also called **spirit or mind**.

ethereal soul (Hun)魂　　　the moral and spiritual part of the human being.

gallbladder 膽　　　one of the six bowels, which, connecting with the liver, stores

and discharges bile.

gallbladder qi 膽氣　essential qi of the gallbladder, the physical substrata and dynamic force of the functional activities of the gallbladder.

heart 心　　the organ located in the thoracic cavity above the diaphragm, which controls blood circulation and mental activities.

heart qi 心氣　　essential qi of the heart, the physical substrata and dynamic force of the functional activities of the heart.

holism 整體觀念　one of the philosophical ideas regarding the human body as an organic whole, which is integrated with the external environment.

ideation (Yi) 意　act or power of thinking and forming ideas

kidney 腎　a pair of organs located in the lumbar region, which store vital essence, promote growth, development, reproduction, and urinary function, and also have a direct effect on the condition of the bone and marrow, activities of the brain, hearing and inspiratory function of the respiratory system.

kidney qi 腎氣 essential qi of the kidney, the physical substrata and dynamic force of the functional activities of the kidney.

large intestine 大腸 one of the six bowels, which receives waste passed down from the small intestine and then forms it into stool before discharging it from the body.

liver 肝 the organ located in the right hypochondrium below the diaphragm, which stores blood, facilitates the coursing of qi, and is closely related to the function of the sinews and eyes.

liver qi 肝氣 essential qi of the liver, the physical substrata and dynamic force of the functional activities of the liver.

lung 肺 a pair of organs located in the thoracic cavity above the diaphragm, which control respiration, dominate qi, govern diffusion and depurative downbearing, regulate the waterways, and are closely related to the function of the nose and skin surface.

lung qi 肺氣 essential qi of the lung, the physical substrata and dynamic force of the functional activities of the lung.

mechanism of disease 病機　　　the mechanism by which disease arises and develops, the same as **pathogenesis.**

mind (Shen)神　　　mental activities, referring to mentality, consciousness, thinking and feeling.

pattern/syndrome 證　　　(1) diagnostic conclusion of the pathological changes at a certain stage of a disease, including the location, cause, and nature of the disease as well as the trend of development; (2) conditions suggesting appropriate treatment; (3) condition specific to the individual

pattern identification/syndrome differentiation 辨證　　　the process of overall analysis of clinical data to determine the location, cause and nature of a

patient's disease and achieving a diagnosis of a pattern/syndrome, also called pattern differentiation.

pattern identification/syndrome differentiation and treatment辨證論治 diagnosis of the pattern/syndrome, through comprehensive analysis of symptoms and signs, which has implications for determining the cause, nature and location of the illness and the patient's physical condition, and their treatment.

pericardium 心包；心包絡 the outer covering of the heart, including the

pericardium collateral.

qi氣 the basic element that constitutes the cosmos and, through its movements,

changes and transformations, produces everything in the world, including the human

body and life activities. In the field of medicine, qi refers both to the refined nutritive

substance that flows within the human body as well as to its functional activities.

   innate qi先天之氣 the qi that exists from birth and is stored in the kidney,

also the same as **prenatal qi.**

   acquired qi 後天之氣 the qi that is acquired after birth and is formed

from the food in combination with the fresh air inhaled in the lung, also the same as

post-natal qi.

small intestine 小腸 one of the six bowels, whose main function is to receive food

content of the stomach, further digest it and absorb nutrients and water.

spleen脾 the organ located in the middle energizer below the diaphragm, whose

main function is to transport and transform food, upbear the clear substances, keep the

blood flowing within the vessels, and is closely related to the limbs and flesh.

spleen qi 脾氣   essential qi of the spleen, the physical substrata and dynamic

force of the functional activities of the spleen.

stomach 胃   one of the six bowels, who's main function is to receive and

initiate food digestion.

stomach qi 胃氣   essential qi of the stomach, the physical substrata and dynamic

force of the functional activities of the stomach. Also used to denote a state of basic

vitality detected by examination of the radial pulse.

theory of mechanism of disease 病機學說   the theory that deals with the

mechanism by which disease arises and develops.

transportation and transformation 運化   the function of the spleen by which the

essence is transformed from food and drink, absorbed, and

distributed to all parts of the body.

treat the root 治本; 本治法 treat the primary aspect of a disease

treat the tip 治標；標治法   treat the secondary aspect of a disease

triple energizers 三焦   a collective term for the three portions of the body cavity, through which the visceral qi is transformed, also widely known as **triple burners**.

yang 陽   In Chinese philosophy, the masculine, active and positive principle (characterized by light, warmth, dryness, activity, etc.) of the two opposing cosmic forces into which creative energy divides and whose fusion in physical matter brings the phenomenal world into being.

yang deficiency 陽虛   a pathological state characterized by deficiency of body's yang qi that leads to diminished functions, decreased metabolic activities, reduced body reactions as well as deficiency-cold manifestations; in Kampo medicine, "yang" and "excess" are independently understood.

yin 陰   In Chinese philosophy, the feminine, latent and passive principle (characterized by dark, cold, wetness, passivity, disintegration, etc.) of the two opposing cosmic forces into which creative energy divides and whose fusion in physical matter brings the phenomenal world into being.

yin deficiency 陰虛 a pathological change marked by deficiency of yin with diminished moistening, calming, downbearing and yang-inhibiting function, leading to relative hyperactivity of yang qi; in Kampo medicine, "yin" and "deficiency" are independently understood.

viscera and bowels 臟腑　　　a collective term for internal organs, also called zang-organs and fu-organs.

will (Zhi) 志　　　mental power by which a person can direct his thoughts and actions.

Zang Fu organs　　**(viscera and bowels)** a collective term for internal organs, also called zang-organs and fu-organs.

Glossary of Eating Disorder and Medical terms

All terms taken from Garner, 2004; American Psychiatric Association, 2009; Dorland's Medical Dictionary 1995.

Anorexia   Lack or loss of appetite for food.

Anorexia Nervosa   A disease whereby the sufferer refuses to maintain a minimal healthy body weight, has an intense fear of gaining weight and a distorted body image leading to emaciation.

Biomedicine   Clinical medicine based on the principles of the natural sciences (biology, biochemistry etc).

Binge Eating Disorder   A disease whereby the sufferer engages in recurrent episodes of binge eating which has a marked physical and psychological of their health and self-esteem.

Binging   Eating unusually large amounts of food (definitely larger than what most people would eat in the same context or under the same circumstances) in

a discrete period of time (i.e. a two-hour period). The binging must occur while experiencing a clear sense of lack of control (i.e. an inability to stop or control the eating).

Recurrent binging The binging occurs frequently i.e. twice weekly over an extended period of time i.e. three months. The frequency of binging is a criteria for BN and BED.

Body Dissatisfaction (BD) as part of the EDI-3 A scale that assesses discontentment with overall shape and with the size of those regions of the body of extraordinary concern to those with eating disorders (i.e. stomach, hips, thighs and buttocks).

Elevated scores for body dissatisfaction indicate extreme disparagement of body size or shape as well as extraordinary discontentment.

Bulimia Literal meaning is Ox hunger although in modern usage it generally refers to Bulimia Nervosa.

Bulimia (B) as part of the EDI-3   A scale that assesses the tendency to think about, and engage in, bouts of uncontrollable overeating (i.e. binge eating).

   Elevated scores for bulimia   indicate engaging very frequently in thoughts and behaviours consistent with binge eating.

Bulimia Nervosa   A mental disorder affecting predominately adolescents and young adults whereby the sufferer engages in recurrent episodes of binge eating followed by purging, either through fasting, excessive exercise, vomiting, laxatives or other purging methods but without the extreme weight loss of Anorexia Nervosa. The recurrent binge eating and purging has a marked physical and psychological on the sufferers health and self-esteem.

Drive for thinness (DT) as part of the EDI-3   A scale that assesses a preoccupation with restrictive dieting, concern about dieting and fears about weight gain.

   Elevated scores for drive for thinness   indicate terror about gaining weight, preoccupation with a desire to be thinner and spending inordinate amounts of time thinking about dieting.

Dyscontrol Inability to control one's behaviour

EDNOS A disease category for disorders of eating that does not meet the criteria for any specific eating disorder.

Purging/Inappropriate compensatory behaviours Compensatory methods used to prevent weight gain such as self-vomiting, excessive exercise, fasting or purgative medicines which induce bowel evacuations.

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