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# Internet-based cognitive behavioural treatment for the fear of vomiting

Mark Sykes

Faculty of Health

School of Applied Psychology

Griffith University – Gold Coast Campus

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Principal supervisor: Dr Mark Boschen

Principal supervisor: Associate Professor Elizabeth Conlon

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**Statement of Sources**

I hereby certify that this thesis is the result of my original research. All sources and references quoted have been acknowledged in the text. The material contained in this thesis has not been submitted, in whole or in part, for a degree at this or any other University.

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Mark Sykes

Griffith University

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**Abstract**

This research program (EmetStudy) extends emetophobia-related knowledge in seven key areas and achieves three milestones in the treatment of emetophobia. The first milestone is that it is the largest emetophobia treatment study conducted to date. There was a total of 107 participants completed treatment using an online cognitive behavioural therapy (CBT) program, administered by a single therapist over a 12 month period. Second, two new measures of emetophobia related symptoms were developed and validated using a large pool ($N$ = 459) of emetophobia treatment seekers. Finally, EmetStudy led to the publication of the first, and currently the only non-retrospective, structured clinical interviews ($N$ = 64) to ascertain emetophobia comorbidity rates, confirming that comorbidity rates may be lower than previously suggested.

Overall this thesis examined seven key research areas that included two treatment goals and five theory related goals, outlined below. The two treatment goals were: (1) to assess the effectiveness of an online cognitive-behavioural internet therapy developed specifically for the treatment of emetophobia and (2) understand the progress of participants during treatment by quantifying commencement, dropout and completion of treatment. The treatment program was conducted in two phases with a Pilot and Main Study.

**Treatment Design**

The Pilot treatment study ($N$ = 70) used a 2 × 2 mixed factorial design, with group (EmetStudy, control) as the between-subjects factor and time (pre, post-test) as the within-subjects variable. The Main Study ($N$ = 172) analysis was conducted as a series of ANOVAs. Four time periods were examined (baseline, pre-treatment, post-treatment and follow-up). Participants completed the Emetophobia Questionnaire (EmetQ: Boschen, Veale, Ellison, & Reddell, 2013) the Specific Phobia of Vomiting Inventory: (SPOVI; Veale, Ellison, et al., 2013), the Depression Anxiety and Stress Scale (DASS-21; Henry & Crawford, 2005), the

World Health Organization Quality of Life questionnaire (WHOQoL-BREF; Skevington, Lotfy, O'Connell, & WHOQOL Group, 2004)), and two new assessment measures. The first of these new measures assessed emetophobia-related cognitions (EmetCog) and the second measured emetophobia-related gastrointestinal sensitivity (GISQ).

**Two Treatment Related Goals**

In the Pilot Study 26 participants completed treatment. There was a significant interaction between treatment group and time for emetophobia severity, and simple effects analysis revealed no significant difference between the control and treatment groups at pre-treatment. The treatment group showed a significant decrease in emetophobia severity from pre-test to post-test on the EmetQ, $F(1,50) = 18.9$, $p < .001$, $\eta_p^2 = .43$). There was no significant change in reported symptoms of the control group from pre-test to post-test, $F(1,50)= 0.01$, $p < .001$. The treatment group showed an improvement in emetophobia symptom severity by 12.2 EmetQ points compared to the control after treatment, $t(1,50) = 4.3$, $p < .001$.

For the Main Study 172 participants completed the three month waitlist with no change in EmetQ or quality of life measures but reported small changes on the SPOVI, depression, anxiety and stress symptoms. After treatment 81 participants showed a reduction in all measures including symptoms of emetophobia, depression, anxiety, and stress, as well as all four quality of life dimensions (psychological, physical, social and environmental). After a three month follow-up from treatment ($N = 22$) improvement in emetophobia symptoms was maintained, with small increases in reports of depression and stress.

Depression, anxiety and stress measured by the DASS-21 was found to be moderately correlated with the two validated emetophobia measures and emetophobia symptom changes therefore need to be interpreted cautiously. The study demonstrated that an internet treatment for emetophobia can be as effective as face-to-face treatments. A relatively high attrition rate

was examined as the second treatment goal and the demographic and severity profiles of treatment applicants was explored to identify the factors that determine attributes of completers and treatment dropouts. Demographic attributes did not identify who would complete or drop out of treatment. The number of goals defined in the very early stages of treatment predicted retention. The gastro-intestinal sensitivity questionnaire (GISQ) baseline measure predicted treatment outcome.

**Five Theoretical Goals**

The relatively high rate of attrition for EmetStudy and other internet treatments led to the development of a model of attrition that integrated the Transtheoretical Model of Readiness to Change (TTM: Prochaska & DiClemente, 1994). This generic model of treatment attrition is most applicable to internet treatments where many of the barriers to registration can be low.

The second theoretical goal addressed was the development and validation of two new measures of emetophobia related assessment measures. These measures were developed to specifically address components of Boschen's (2007) cognitive behavioural model. A measure of emetophobia-related cognitive content (EmetCog) was developed from an initial pool of 31 questions, and was reduced to a 21-item scale, comprising 3 factors. The EmetCog was found to be a valid and reliable measure of emetophobia-related cognition. A new gastro-intestinal sensitivity questionnaire (GISQ) was developed from an initial pool of 12, and reduced to a single factor solution of 10 items. The GISQ was found to be a reliable and valid measure for the assessment of gastrointestinal sensitivity.

A third goal was to conduct a preliminary investigation in the social networks of individuals with emetophobia. The results tentatively indicate that people with emetophobia have family and friends who have relatively normal levels of symptoms of emetophobia, depression, anxiety, and stress. Emetophobia symptoms were not present in the family

members as would be expected if there was a genetic basis for emetophobia. The friends of the treatment participants and the entire social network were substantially better than treatment participants on the EmetQ, depression, anxiety and stress, except for perceptions regarding their quality of the environment, which was similar. This preliminary study did not confirm a genetic contribution of emetophobia symptoms but the biased recruitment of family and friends reduced the generalisability of these conclusions.

An investigation into the fourth theoretical goal of assessing the dominant conceptualisation of emetophobia (Boschen, 2007) drew upon the two new assessment measures (GISQ and EmetCog) and emetophobia severity measures to confirm the models expected treatment outcomes. The Boschen model predicted that the somatic vulnerability factor would be stable despite treatment changes and this was confirmed during treatment. Similarly, the model predicted that changes in emetophobia cognitions would be negatively correlated with changes in emetophobia symptoms and this was confirmed. Overall the Boschen model was supported as a model of emetophobia acquisition and recovery. It was hypothesised that biological damage to the gastrointestinal system may play a significant role in maintaining the stability of somatic vulnerability and may provide a future medical intervention target to facilitate recovery.

The final theoretical goal of EmetStudy was to quantify the comorbidity rates of people with emetophobia. Previous attempts have used practical but less reliable methods than the gold standard of a structured clinical interview. The publication of the summary of 64 structured clinical interviews established a clearer understanding of comorbidity rates that were found to be substantially lower than previously suggested.

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## Published Papers

Sykes, M., Boschen, M. J., & Conlon, E. G. (2015). Comorbidity in emetophobia (specific phobia of vomiting): Emetophobia comorbidity. *Clinical Psychology & Psychotherapy*, n/a. doi:10.1002/cpp.1964

## Conference Papers

Sykes, M, Boschen, M.J, Conlon, E.G. (2013). Finding of an online emetophobia treatment study. European Association for Behavioural and Cognitive Therapies (EABCT) Conference. Morocco.

Sykes, M, Boschen, M.J, Conlon, E.G. (2012). Seven lessons learned implementing an online CBT treatment. Stepping up Symposium. Melbourne.

Sykes, M, Boschen, M.J, Conlon, E.G. (2011) Preliminary results of an internet treatment for emetophobia. Australian Association for Cognitive and Behaviour Therapy Conference. Gold Coast.

Sykes, M, Boschen, M.J, Conlon, E.G. (2010) European Association for Behavioural and Cognitive Therapies (EABCT). Internet based treatments for emetophobia. Milan

## Online CBT Treatment for the Fear of Vomiting

Emetophobia is a preoccupation with the fear that oneself or others may vomit (Boschen, 2007). It is an anxiety disorder with an estimated lifetime prevalence of 0.2% in the general population (Becker et al., 2007; Lipsitz, Fyer, Paterniti, & Klein, 2001). Perhaps due to its low prevalence, research into the condition has been limited (Boschen, 2007). There have been less than a dozen published treatment studies that have described the treatment of a total of less than 50 individuals. Despite the substantial impacts on sufferers (Lipsitz et al., 2001; Veale & Lambrou, 2006), the formulation of detailed treatment strategies have been relatively recent (Boschen, 2007; Veale, 2009). This thesis broadens the currently available emetophobia-related knowledge in both treatment and theory. In all there are seven research goals. Two are focused on treatment delivery and participant attrition and five additional goals relate to the theoretical basis of emetophobia and treatment attrition.

### Two Treatment Goals

With the exception of one recent group treatment program (N = 23: Ahlen, Edberg, Di Schiena, & Bergström, 2015), most published treatments for emetophobia have involved single case or small-sample studies in a traditional face-to-face context. This thesis explores the efficacy of a cognitive behavioural therapy (CBT) internet treatment program for emetophobia (EmetStudy). There are several reasons why an internet approach is ideally suited to the treatment of emetophobia. First, there is a relatively low prevalence of the condition and this may lead to: (a) limited treatment expertise by health professionals, (b) inadequate use of appropriate and specialised clinical assessment tools, and (c) limited geographical access to specialists. Second, current evidence suggests that face-to-face CBT is an efficacious treatment for emetophobia (Veale, Ellison, et al., 2013) and that many CBT treatments have been successfully translated to an online environment (Calear, Christensen, Mackinnon, Griffiths, & O'Kearney, 2009; Reger & Gahm, 2009). The development and

evaluation of an online CBT emetophobia treatment is therefore the primary treatment-related goal of this research. The second goal is to identify the demographic and psychological characteristics of the people who apply to, commence, dropout, and fully complete the online emetophobia treatment program (EmetStudy). In addition to the two pre-planned treatment goals five other goals were established.

**Five Additional Theoretical Goals**

Five additional key research areas were explored to expand the current theoretical knowledge of emetophobia in order to:

3. Formulate a model of attrition that provides a theoretical basis for internet treatment attrition;
4. Evaluate the theoretical model of emetophobia proposed by Boschen (2007);
5. Identify the frequency of comorbidity with other psychological disorders in treatment applicants;
6. Explore the mental health characteristics of the family and friends (their social network) of individuals seeking treatment for emetophobia; and
7. Evaluate two new measures of emetophobia relating to cognitions (EmetCog) and gastro-intestinal sensitivity (GISQ).

**Summary of Thesis Chapters**

The first two chapters comprise the literature review of the thesis. **Chapter 1** introduces emetophobia, diagnostic issues and the reported experiences of sufferers. Due to the limited published research into the treatment of emetophobia, **Chapter 2** begins by exploring the broader area of computer based CBT anxiety treatments, narrowing to internet based anxiety CBT treatments, before exploring a broad spectrum of emetophobia specific treatments.

**Chapter 3** presents the first empirical study of the thesis and gathers epidemiological data from a set of 64 clinical interviews. It explores DSM-IV-TR comorbidities of treatment applicants. Emetophobia has at times been misdiagnosed or been hard to diagnose both because it presents with symptoms also seen in other disorders such as generalised anxiety disorder (GAD), panic disorder and obsessive compulsive disorder (OCD), and because individuals with emetophobia may also have these and other conditions in addition to emetophobia. Previous studies have suggested higher comorbidity rates among those with emetophobia than in the general population. The thesis makes a contribution to the field by conducting structured clinical interviews to assess comorbidities, while previous studies have used self-report measures. The results show lower comorbidity rates than previously reported which has important implications for the understanding and treatment of emetophobia.

Two new instruments were developed to assess theoretical constructs drawn from Boschen's (2007) model of emetophobia: a measure of gastro-intestinal sensitivity (GISQ) and a measure of emetophobia cognitions (EmetCog). These are discussed in **Chapter 4**. The thesis makes a second contribution to the field by assessing the validity and reliability of these two new tools.

**Chapters 5** to **9** focus on the primary goal of the current research by evaluating an online treatment of emetophobia (EmetStudy). The methodology used is described in **Chapter 5** and the treatment results in **Chapter 6. Chapter 7** examines demographic, severity, and participation measures that could predict treatment outcome. **Chapter 8** presents a new model of attrition for internet treatments based on the Transtheortical Model of Readiness to Change (TTM). **Chapter 9** widens the analysis of the treatment participants and encompasses their social network of family and friends.

**Chapter 10** evaluates Boschen's (2007) conceptualisation of emetophobia and concludes that the model may describe the acquisition of emetophobia but has limitations as a

recovery orientated model. Finally, **Chapter 11** summarises the key research questions outlined in **Chapter 1** and briefly evaluates the strengths and limitations of the EmetStudy research program.

## Introduction to Emetophobia

### Emetophobia Diagnosis

Previous research has reported that a non-clinical fear of vomiting exists in approximately 7% of women and 1.8 % of men (van Hout & Bouman, 2012). When a fear of vomiting causes the person marked distress and/or impairment, the clinical condition is referred to as emetophobia. An equally valid term for emetophobia, the 'specific phobia of vomiting' or SPOV, is derived from the DSM-IV-TR diagnostic classification (APA, 2000; DSM-IV-TR) and has been used by several authors (Höller, VanOverveld, Jutglar, & Trinka, 2013; Price, Veale, & Brewin, 2012; Veale, Ellison, et al., 2013). The historical term emetophobia is used in this document to refer to a clinical fear of vomiting.

Emetophobia is an anxiety disorder that has an estimated lifetime and 12 month prevalence of 0.2%, and a point prevalence of 0.1% in the population (Becker et al., 2007; 2001). It emerges predominantly between the ages of 13 and 18 years (van Hout & Bouman, 2012). Individuals with emetophobia can experience a number of debilitating symptoms including panic attacks, social avoidance, and obsessive cognitions (Boschen, 2007; Veale, 2009). These individuals report that the condition has a significant impact on their lives, with the majority reporting chronic difficulties which include avoiding work when a co-worker is sick, avoiding contact with sick children, and avoiding parties, public bars and public transport (Lipsitz et al., 2001).

Despite the clinical impact of the condition, research into emetophobia has been limited, and consequently the condition is poorly understood (Boschen, 2007). This chapter

reviews the research to date and explores the classification, aetiology, prevalence, impact and theoretical basis of emetophobia.

Individuals with emetophobia have a fear of vomiting themselves and/or vomiting of others, which causes them distress and significantly reduces their capacity to conduct a normal life (Boschen, 2007). The Diagnostic and Statistical Manual of Mental Disorders (APA, 2000; DSM-IV-TR) classifies the fear of vomiting within the anxiety disorder spectrum, grouping the condition together with a number of other specific phobias that include common phobias such as the fear of heights, blood and spiders (Coelho et al., 2010). Key features of the diagnostic classification are that adults with emetophobia have a fear of vomiting that is marked, persistent, excessive or irrational, and that creates immediate anxiety on exposure to vomit-related stimuli. The DSM-IV-TR was superseded by the DSM-5 in May 2013 (American Psychiatric Association, 2013). The new diagnostic criteria replaced a requirement that the individual perceive that the condition is excessive or irrational (Dziegielewski, 2013). The research presented here commenced when the DSM-IV-TR was still current and references to diagnostic criteria refer specifically to the DSM-IV-TR unless otherwise specified.

One of the diagnostic problems in correctly identifying emetophobia is that the phobia is loosely defined within the *DSM* system. Emetophobia is grouped within the broad class of 'phobia other' and requires no additional attributes to distinguish it from other phobias such as the fear of choking (phagophobia). The broad, heterogeneous quality of the 'phobia other' classification results in an inconsistency in classifying individuals with emetophobia (Veale, 2009). The specific phobia definition currently incorporates the fear of vomiting by others, self, or both. Veale (2009) has argued that individuals who are exclusively or predominantly fearful of others vomiting should not be classified as having emetophobia. Boschen (2007) does not exclude these individuals from the diagnosis. Veale's definition is more precisely

aligned to the fear of vomiting, but individuals who identify as having emetophobia may associate it simply with the fear of vomit. In the absence of any clear, widely accepted clinical definition, the use of the term emetophobia will be employed in this document to refer to the condition of individuals who have any fear of vomiting (others, self or both) that causes clinical levels of distress that meets the DSM-IV-TR classification of 'specific phobia other'.

To complicate diagnosis, emetophobia is a condition that frequently presents with a mixture of symptoms which are more often associated with other anxiety related disorders including social phobia, panic disorder, eating disorders and obsessive compulsive disorder (OCD) (Boschen, 2007; Höller, VanOverveld, Jutglar, & Trinka, 2013). Compounding the problem, emetophobia is frequently comorbid with social phobia, panic disorder, agoraphobia and OCD (Lipsitz et al., 2001; Sykes, Boschen, & Conlon, 2015; Veale, Hennig, & Gledhill, 2015).

**Emetophobia Symptoms**

The fear of vomiting is the central defining feature of emetophobia but the broader range of symptoms can be divided into three clusters: Somatic-related symptoms; non-somatic-related symptoms; and maintenance behaviours.

***Somatic symptoms and cognitions.*** Somatic symptoms for people with emetophobia include nausea and gastro-intestinal discomfort (Höller et al., 2013). People with emetophobia use these symptoms as danger signals in the same way that a canary has been used to detect a gas build-up in a coal mine. A reoccurring and disabling pre-emptive fear develops as both symptom frequency and the overestimated significance of these symptoms are combined. With the former, individuals with emetophobia frequently experience somatic symptoms such as nausea and gastro-intestinal discomfort (Boschen, 2007). Gastro-intestinal

sensations are used by individuals with emetophobia as a warning of illness or imminent vomiting.

***Hypervigilance***. Boschen (2007) proposed that a central feature of emetophobia is a heightened vigilance to gastrointestinal sensations. It was suggested that somatic hypervigilance is a key element in maintaining the fear of vomiting. Hypervigilance involves the monitoring of internal and external events (Rollman, 2009). Behavioural examples that affect the body may include holding one's breath or placing a hand over one's mouth to avoid inhaling disease or 'airborne' vomit, covering the nose, eyes or ears to reduce vomit related sensory inputs, touching lymph nodes on the neck to assess illness severity and placing a hand on the heart to monitor heart rate. Cognitions associated with hypervigilance may include counting heartbeats (Pollock, Carter, Amir, & Marks, 2006) or scanning the body (Crombez, Van Damme, & Eccleston, 2005).

Hypervigilance to gastrointestinal symptoms is not unique to emetophobia. It has been identified in people who have reported a broad range of conditions that frequently includes an anxiety component such as panic disorder (Roth) and, to a lesser extent, depression (Haug, Mykletun, & Dahl, 2002). Anxious people in general have been found to have a higher prevalence of gastrointestinal concerns including irritable bowel syndrome (IBS: Blanchard, Scharff, Schwarz, Suls, & Barlow, 1990). The role of the biological systems such as the hypothalamic, pituitary, adrenal (HPA) axis have been identified as causing physical damage to the gastro-intestinal system (Fukudo, Kanazawa, Tanaka, & Drossman, 2011).

The cause of the gastrointestinal hypervigilance has not been clearly established for individuals with emetophobia. IBS has similarities to the hypervigilance seen in individuals with emetophobia that include a history of anxiety with gastrointestinal hypervigilance and sensitivity. For IBS, the physical damage to the gastrointestinal tract is initiated by the HPA

axis. This damage may increase gastrointestinal sensitivity (Fukudo et al., 2011). Gastrointestinal complaints were found to be present ten years before the onset of irritable bowel syndrome (IBS) and Jansen (2010) concluded that individuals with an eating disorder were also likely to have exacerbated the gastrointestinal problem (Janssen, 2010). Gastrointestinal sensitivity may have a biological basis that, if developed early, may exacerbate future conditions such as IBS, eating disorders and possibly emetophobia.

In previous literature, gastrointestinal hypersensitivity overlaps with the term body vigilance (Rosa Esteve & Camacho, 2008). The fear of anxiety related body sensations serves to increase the individual's vigilance and indirectly promotes escape and avoidance behaviours. The debate around hypervigilance in people with emetophobia is paralleled very closely by a similar debate in the more common IBS. For both patients with IBS and people with emetophobia, the origin of the sensitivity to gastro-intestinal sensations can be either psychological or physical. The physical causes might be induced by anxiety or be the result of a genetic sensitivity. Regardless of the cause, patients with IBS have been shown to have a physical basis for their sensitivity and are able to detect balloon distention of the colon better than non-IBS patients (Azpiroz et al., 2007). This effect has been identified in children (Waters, Schilpzand, Bell, Walker, & Baber, 2013) and in adults (Blanchard et al., 1990; Gros, Antony, McCabe, & Swinson, 2009; Haug et al., 2002). Waters et al. (2013) found in a sample of 105 children ($N$ = 51 anxious children, 54 non-anxious controls) that 40.7% of anxious children had symptoms of a gastrointestinal disorder compared to 5.9% of non-anxious control children. Haug et al. (2002) tested 60,998 Norwegian adults using the Hospital Anxiety and Depression Scale (HADS) and a gastrointestinal survey. Almost half of the respondents (48%) reported some gastrointestinal- related issue. Gastrointestinal symptoms such as nausea, heartburn, diarrhoea and constipation were found to be strongest in respondents with anxiety. Depression was also found to be related to an increased reporting

of gastrointestinal symptoms. The causal pathway for hypervigilance for people with emetophobia has not been investigated, but may follow a similar physical and psychological basis as has been proposed for IBS.

***Nausea.*** Although nausea is included in general gastrointestinal surveys, Haug et al. (2002), Veale and Lambrou (2006) and more recently Höller et al. (2013) have emphasised its special role in emetophobia, since survey respondents reported that nausea was the primary reason they consulted with a medical practitioner for emetophobia-related concerns. Frequent nausea was reported by 80.9% of people in a sample of 131 people with emetophobia. Nausea was reported as a permanent state by 23.3% and 73.6% reported that nausea occurred at least once a week. Nausea was a strong sensation in 45% of participants who reported that it nearly initiated vomiting. The survey reported that nausea preceded the fear of vomiting by an average of 2.7 years (*SD* = 1.32), commencing on average at 9.5 years of age (Höller et al., 2013). The survey did not explore if other symptoms of anxiety were present at this age.

**Non-somatic related symptoms and cognitions**. The non-somatic related symptoms and cognitions of emetophobia tend to overlap in appearance with related anxiety disorders such as OCD, social anxiety disorder and panic disorder (Veale, 2009). For people with emetophobia, non-somatic cognitions may include fears concerning dying, losing control, long vomiting durations, the judgement of others, and an over-inflated belief in one's ability to control the vomit reflex. In practice, somatic and non-somatic symptoms and cognitions can be present during an acute event since somatic issues may be the trigger for non-somatic issues, as in the case of panic attacks. Veale and Lambrou (2006) compared healthy controls with people with emetophobia and found that people with emetophobia are overly concerned with cognitions associated with shame such as "others will find me repulsive" and "others will not want to know me".

Similar to a number of related disorders such as OCD, GAD, health anxiety and social anxiety disorder, people with emetophobia have been reported to have intrusive threat-related imagery (K. Price, Veale, & Brewin, 2012). Price et al. reported that in a sample of 36 participants with emetophobia, 80.6% had intrusive vomit-related imagery and of these 51.7% of the imagery was in the context of being an adult, 31.0% were in a childhood context and 17.2% were 'flashforward' future imaginings (Holmes, Crane, Fennell, & Williams, 2007). Like other anxiety disorders (Ehlers & Steil, 1995; Hirsch & Holmes, 2007), Price et al. suggest that intrusive imagery may play a significant role in maintaining the fear of vomiting. Addressing intrusive imagery in therapy is a current area of innovation and has been approached using virtual exposure (Foa, Steketee, Turner, & Fischer, 1980), imagery rescripting (Wild, Hackmann, & Clark, 2008) and more controversially, eye movement desensitization and reprocessing (EMDR; de Jongh & Broeke, 2009; Shapiro, 2001) (de Jongh & Broeke, 2009; Shapiro, 2001).

***Maintenance behaviours.*** Central to cognitive behavioural models of psychopathology is the idea that dysfunctional behaviour is maintained in part due to maintenance behaviours (Seaman et al., 2009). Maintenance behaviour prevents the sufferer from correcting distorted cognitions about feared situations and provides short-term relief from anxiety. As a consequence, faulty cognitions remain unchanged and the maintenance behaviours are negatively reinforced (Antony, Coons, McCabe, Ashbaugh, & Swinson, 2006). Typical avoidance behaviours for people with emetophobia include avoiding the use of psychoactive substances, avoiding intoxicated or sick people, fairground rides, boats, foreign holidays, travel by boats, plane or public transport, alcohol and crowded places, hospitals, public toilets and food outlets (Lipsitz et al., 2001).

**Eating behaviours.** Disordered eating and food-related rituals are a common feature of emetophobia (Lipsitz et al., 2001; Veale, Costa, Murphy, & Ellison, 2012). Lipsitz

reported that approximately three quarters of a sample of 53 people with emetophobia had eating rituals or significantly restricted the amount and range of foods they ate. Veale et al. reported that approximately 80% of a sample of 86 restricted their food intake, including seafood and meat. Veale identified three dysfunctional eating patterns in the study: (a) quantity restriction, (b) context restrictions (where, when and how) and (c) type restrictions (what). Weight loss may not be the goal of the eating behaviour but it can be at least a side effect of the behaviour. Of a sample of 94 participants, 8.5% were found to be underweight with a BMI of less than 18.5, which was five times less than the expected population rate (Veale et al., 2012).

For a person with emetophobia, the primary goal of modifying eating behaviour is to minimise the risk of vomiting. Implicit is the need to avoid food contamination and nausea. Weight loss becomes a by-product. This behaviour can be misdiagnosed as an eating disorder like anorexia (Veale, 2009). Context restrictions include food preparation locations (dirty/clean), food preparers (dirty/clean), time of day (high traffic with low risk and low traffic times with higher contamination risk).

**Diagnostic recognition by professionals**. A major revision of the DSM-IV-TR has revised the diagnostic category of a specific fear of vomiting in the DSM-5. Despite emetophobia being included as a valid diagnosis, it still remains poorly accepted. Vandereycken (2011) interviewed 111 Dutch speaking professionals (psychologists, psychiatrists, GPs and nurses) who specialised in eating disorders. He used a set of questions about a number of psychological disorders related to eating disorders and conditions including night eating syndrome, orthorexia (dysfunctional healthy eating obsession) and muscle dysmorphia. The survey found that 4.5% of Dutch speaking eating disorder professionals believed that emetophobia was a creation of the popular media and the internet. Almost a third (29.7%) reported that they were unaware of the condition and approximately a

third (31.5%) stated that emetophobia was a variant of another disorder. Based on this data, almost two thirds (65.7%) of Dutch speaking eating specialist professionals would be unlikely to provide a diagnosis of emetophobia. Achieving a clinical diagnosis of a specific fear of vomiting would therefore appear to be difficult to attain due to the overlapping symptoms from conditions such as eating disorders, OCD, social phobia, hypochondria and the general resistance from some professionals to assign the diagnosis.

**Impact of Emetophobia**

Emetophobia can significantly affect the quality of life of sufferers. Lipsitz et al. (2001) asked 56 people with emetophobia to rate the impact of their symptoms on a scale from 0 (not at all) to 10 (very severe). On average, participants rated the impact on their social life at 6.7, work at 5.4, intimate relationships at 4.9 and domestic life at 4.8. Examples of these impacts included avoiding work when a co-worker was sick, avoiding contact with their sick children, and avoiding parties and public bars.

Individuals with emetophobia may also avoid pregnancy due to the fear of morning sickness or observing a child vomiting. In a sample of 94 individuals with emetophobia, half avoided or delayed having children. From this sample it was reported that 5.3% of women terminated a pregnancy due to the fear of vomiting (Veale & Lambrou, 2006). Veale (2009) considers the impacts on sufferers of emetophobia as more significant than the impacts on those suffering from other specific phobias, as it frequently results in delay or avoidance of pregnancy and health risks from restriction of food. Veale's concerns make intuitive sense but comparative studies of the impacts of emetophobia and the relative impacts of other phobias have not yet been made. Research by Lipsitz et al. (2001) and Veale (2009) has identified that emetophobia does have a significant impact on the sufferer's satisfaction and quality of life. By measuring life impacts using a standardised quality of life measure, the self-perception of these impacts can be compared between people with a range of phobias.

Instruments that have good reliability and widespread use that would permit a better relative comparison include the Satisfaction with Life Scale (Griffin, Larsen, Emmons, & Diener, 1985), the Quality of Life Inventory (Frisch et al., 2005) and the internationally tested World Health Organisation Brief Quality of Life Scale (WHOQoL BREF; Skevington, Lotfy, O'Connell, & WHOQoL Group, 2004).

### Aetiology

Emetophobia predominately emerges in an identifiable form between the pre-teens (Becker et al., 2007; Lipsitz et al., 2001) and the teenage years (van Overveld, de Jong, Peters, van Hout, & Bouman, 2008). The exact aetiology of emetophobia is unclear but the currently available evidence does not negate that it may have the same theoretical foundations as other phobias. Recent studies indicate that phobias are caused by a combination of learning and hereditary factors (Kendler, Karkowski, & Prescott, 1999; Kendler, Myers, Prescott, & Neale, 2001; Lichtenstein & Annas, 2000). Boschen (2007) and Maack et al. (2013) outlined a model which described the factors that initiate and maintain emetophobia. These are discussed in detail in a later section of this chapter.

**Learning.** The landmark ‘little Albert’ experiment (Watson & Rayner, 1920) demonstrated that classical conditioning can lead to the development of fear responses in humans. Vomiting is a common but generally infrequent event that is widely regarded as disgusting (Chapman & Anderson, 2012). A person who experiences vomiting may perceive it as a traumatic event (de Jongh, 2012). It becomes the fearful response to be avoided in a classical conditioning framework. Bandura (1978) showed that people can also learn by observation, and it is possible that the fear of vomiting can be learned by observing unpleasant outcomes that other people experience (Veale, Murphy, Ellison, Kanakam, & Costa, 2013). Rachman (1978, 1991) proposed that humans also have the sophisticated capacity to develop fear simply by interpreting information that is supplied to them through

verbal transmission. Scenarios for individuals with emetophobia that would be aligned to Rachman's verbal transmission hypothesis includes parents informing children that vomiting was dirty or bad, or being told that you can choke and die from your own vomit.

The available evidence suggests that learning can play a role in the development of emetophobia. Lipsitz (2001) conducted a survey in which one third of 56 self-assessed people with emetophobia attributed the onset of their condition to a severely traumatic personal or vicarious vomiting experience (Lipsitz et al., 2001). Veale et al. (2013) found further support for a learning basis with vicarious learning playing major role. To evaluate the role of autobiographical memories in the initiation and maintenance of emetophobia Veale et al. (1994) interviewed 94 people with emetophobia and 90 sex and age-matched controls. Veale's original hypothesis was that the origins of emetophobia were the result of associative learning. It was hypothesised that people who developed emetophobia appeared to have an increased awareness of other people's vomiting experiences. This may distort the real risk of vomiting and consolidate the learned fear. The vicarious acquisition of the fear is then maintained by the ongoing hypervigilance to vomit-related cues and experiences, as proposed by Boschen (2007).

**Genetic basis of emetophobia.** Seligman (1971) proposed that humans are predisposed ("prepared") to fear certain objects and situations because such fear bestows an evolutionary advantage. Ohman and Mineka (2001) noted that contemporary objects that cause injury and death such as motorcycles and weapons invoke less fear than wild animals and heights. The results imply that historic nature-based phobias may be more readily learned than fears for other dangerous objects without a long history. Specific adaptive fears could be a genetic adaptation for survival and dysfunctional phobias might be viewed as a less functional variability of the species, in the same way that IQ is similarly variable within a species. If emetophobia is an evolutionary fear, it would have to serve an advantageous

reproductive function for genes within the species. Veale et al. (2013) argued that emetophobia appears to be counterproductive from an evolutionary perspective as the retention of vomit fails to expel toxins which are harmful. There are two counter-arguments to Veale's hypothesis. First, people ($N$ = 28) with emetophobia still vomit at a similar frequency to individuals with only panic disorder (Veale & Lambrou, 2006). Second, fear of vomit and vomiting may serve a functionally indirect role in survival. In contemporary society, individuals with emetophobia avoid untrusted food outlets and hospitals. It is possible that in Neolithic times the equivalent would include the avoidance of sickness and foul smelling food and water. The latter's avoidance is protective for an adult and for the mother and an unborn child during pregnancy. Allowing that emetophobia might serve such a protective role, if specific fears serve a species' evolutionary survival, then the evolutionary argument needs to demonstrate a genetic basis for phobias that enables a vulnerability to them to be inherited.

In a comprehensive attempt to assess the contribution of genetic, shared environmental, and non-shared environmental factors in phobias, Lichtenstein and Annas (2000) assessed 1,106 Swedish twins. Analysis of monozygotic and dizygotic twins led these researchers to conclude that all three factors played a role in the presence of fears and phobias. Due to the low prevalence rates of phobias, the data was aggregated and so it was unclear if the narrowness of one specific phobia is genetically different from another, and thus directly transferable. A similar study employing 854 twin pairs concluded that anxiety disorders that are frequently comorbid (specific phobia, social anxiety disorder, separation anxiety and social phobia) could be predominantly attributed to a shared familial environment (Eley, Rijsdijk, Perrin, O'Connor, & Bolton, 2008). In a twin study of 2163 females with phobias, Kendler et al. (1992) estimated that heritability ranged from 30% to 40%. In the specific case of emetophobia, inheritability could encompass a range of possibilities

including gastrointestinal sensitivity, anxious disposition and even a specific vulnerability to vomit related fear.

The closest attempt to assess the role of genetics in emetophobia was conducted by Lipsitz et al. (2001). In a sample of 54 individuals with emetophobia, 57% had a first degree relative with a psychiatric disorder, predominantly anxiety or depression. Of these, 7% had a first degree relative with emetophobia which is substantially higher than would be expected from the general population, and is consistent with findings that anxiety disorders may have a genetic component (Marks, 1986; Merikangas, Dierker, & Szatmari, 1998; Torgersen, 1985). It is difficult to accurately interpret Lipsitz's findings as no attempt was made to subtract the effect of the learning environment; however, the data is consistent with the possibility that emetophobia may incorporate an inherited vulnerability.

**Cognitive Behavioural Frameworks**

Two models of emetophobia have been proposed (Boschen, 2007; Maack et al., 2013). Both are grounded in existing CBT anxiety frameworks (Barlow, 1988; Clark, 1986; Ehlers, 1991; Ehlers & Breuer, 1992; Rapee & Heimberg, 1997). Extending the basic CBT model, Boschen (2007) incorporated features such as interoceptive hypersensitivity into an emetophobia-specific CBT framework. Boschen's model, shown in Figure 1.1, is conceptualised in three phases: predisposing, acute and maintenance phases. Maack et al.'s model (Figure 1.2) restricts itself to the acute and maintenance phases described in Boschen's model. Maack et al.'s model has a simplified linear path with two feedback loops but incorporates no additional aetiological pathways beyond the existing Boschen model. As it is a subset of Boschen's model, only the earlier model developed by Boschen will be described.

Boschen's model has four key components: The initiating trigger, predisposing factors, an acute phase and a maintenance phase. The model proposes two key predisposing factors that include an underlying anxiety or neuroticism and a tendency to somatise anxiety.

The individual has an increased receptivity to vomit-related issues and a triggering event may activate a heightened response. The triggering event is interpreted using interoceptive sensations and anxious cognitions. This may result in an increase in anxiety and a feedback loop may be generated between gastrointestinal awareness and the body's normal chemical response to fear. In the acute phase, the feedback loop will eventually peak and then return to normal, but the person's response to the acute phase results in cognitions and behaviours that are designed to prevent a re-occurrence. Worry about a re-occurrence creates an attention bias to interoceptive cues and avoidance behaviour that distorts the perceived risk. Worry avoidance maintains the condition in the absence of triggers, but leads to an increased sensitivity to triggers. This results in a feedback loop between the acute and maintenance phases.

When broken down into its key parts, Boschen's model identifies seven components of emetophobia. Somatic-related components include (a) a tendency to somatise anxiety symptoms into gastrointestinal distress, (b) misinterpretation of gastrointestinal discomfort as an impending vomiting event and (c) hypervigilance of gastrointestinal cues. Non-somatic components include (a) an inherited general anxiety vulnerability, (b) dysfunctional beliefs and cognitions regarding vomiting and (c) failure to challenge dysfunctional beliefs and cognitions. The behavioural component includes nausea avoidance behaviour and the failure to challenge dysfunctional beliefs and cognitions.

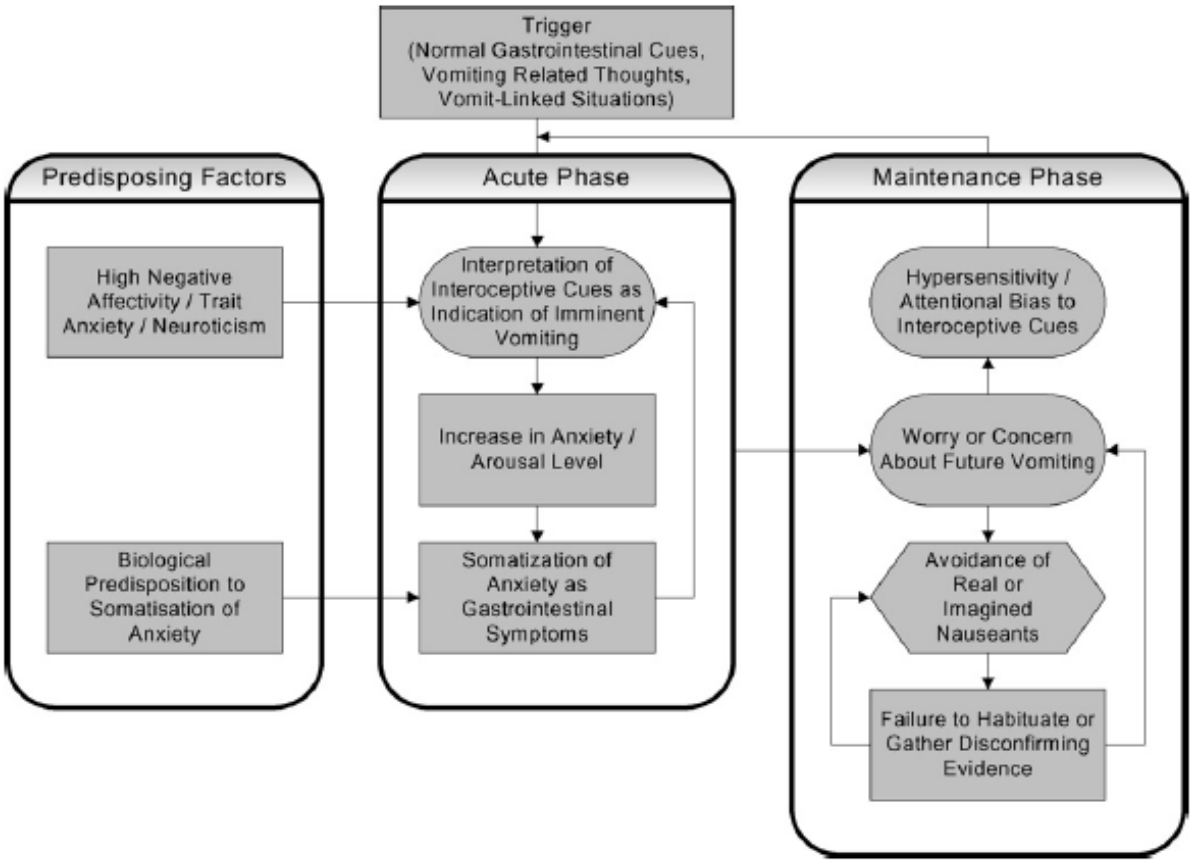


*Figure 1.1* Boschen (2007, p.413) conceptual model of emetophobia

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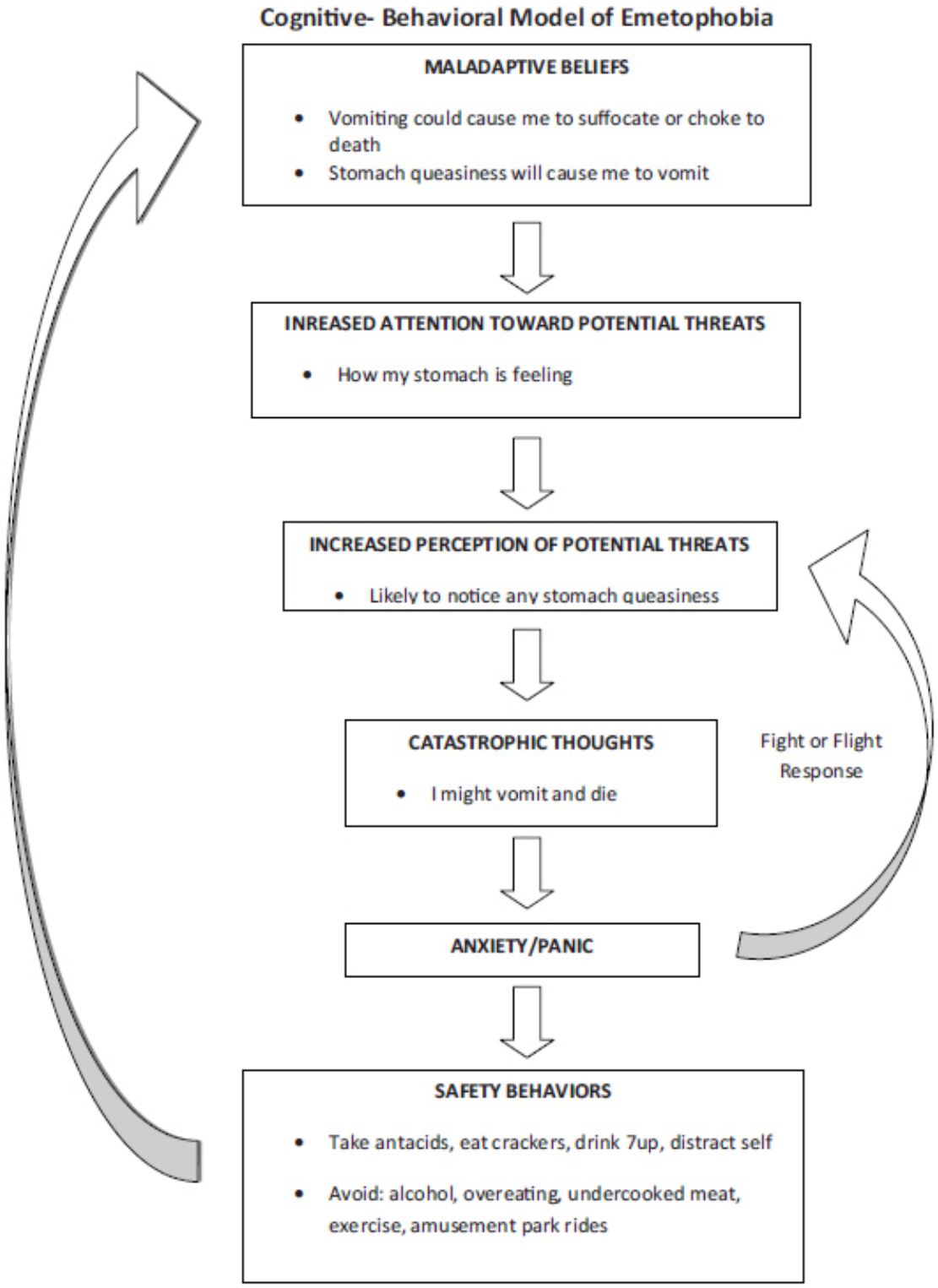


*Figure 1.2* Maack et al. (2013; p530) Cognitive Behavioural Model of Emetophobia

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Based on this conceptualisation of emetophobia, Boschen (2007) developed a theoretical CBT treatment strategy that is designed to specifically target features of emetophobia using four techniques. These techniques are arousal management, cognitive restructuring, distraction / attention training, and exposure therapy (Table 1.1).

Table 1.1

*Treatment Techniques Based on Boschen's (2007) Model of Emetophobia*

| Technique | Description |
|---|---|
| Arousal management | Reduces general anxiety vulnerability and somatisation vulnerability. |
| Cognitive restructuring | Reduces catastrophic misappraisal and cognitions and beliefs about the unacceptability of vomit attributions. |
| Distraction and attention training | Reduces hypervigilance. |
| Exposure control | Reduces nausea avoidance and provides disconfirming evidence for dysfunctional cognitions. |

One possible critique of this treatment approach is that it assumes that each technique is restricted to resolving a very limited domain. For phobias, exposure therapy can be very effective in multiple domains. Tryon (2005) argued that this is because cognitive restructuring occurs automatically as participants learn from the exposure process. Thus one technique can be effective in multiple domains.

Distraction training has gradually fallen out of favour as a CBT technique and has been shown not to provide key treatment benefits (Jakes, Hallam, Rachman, & Hinchcliffe, 1986). Distraction training may restrict emotional processing of the feared stimulus (Grayson, Foa, & Steketee, 1982). Attention training has been shown to be effective in social phobia (Heeren, Reese, McNally, & Philippot, 2012) and specific phobias (Waters et al., 2014). Achieving positive treatment outcomes using arousal management strategies such as biofeedback, meditation and motivation is complex (Cuthbert, 1981). The effectiveness of

arousal management strategies has been shown to occur if the arousal is for a positive emotion (sexual) but ineffective for negative disgust stimuli that include vomit (van Overveld & Borg, 2014).

***Assessing Boschen's model.*** Boschen (2007) described a cognitive-behavioural formulation for emetophobia. Boschen's model can be evaluated experimentally to assess its validity. The verification points include: (1) confirming the role of emetophobia cognitions as central to maintaining symptoms and (2) confirming the role of gastrointestinal sensitivity in recurrence of symptoms. The model is assessed in Chapter 10.

**Learned Experiences**. Veale et al. (2013) reported that on average, learning experiences did not significantly differ in frequency between people with emetophobia and controls, prior to the onset of emetophobia. However, a difference was found after the fear of vomiting was identified as problematic. Veale et al. proposed that multiple learning pathways were likely to be involved. Some individuals may have acquired the phobia from a personally experienced vomiting event (classical conditioning). Vicarious learning may have occurred through multiple pathways. First, the phobia may be learned through the observation of other people's social rejection and disgust when other people vomit. This is consistent with the theme of intense shame associated with vomiting as expressed by individuals with emetophobia (Veale & Lambrou, 2006). Second, although it is difficult to uncouple innate disgust and socially learned disgust (Navarrete & Fessler, 2006), observational learning may occur in response to a personal disgust response rather than observing social rejection. An area for further investigation in the area of autobiographical memories would be to assess the relative importance of social rejection and personal disgust for the affected and control groups within the memories. In relation to Boschen's model, Veale et al. (2013) suggested that observations of others vomiting and a reported heightened

gastrointestinal sensitivity (Veale, 2009) may be learned outcomes of the condition rather than the initiating agents.

**Prevalence**

The fear of vomiting appears to be exaggerated in the public domain of the internet. There are over 1,090[1] web pages citing the phrase that "emetophobia is the fifth most common phobia". If cited, a common source for this information is the internet forum emetophobia.org. The statistic has also been reproduced in the San Francisco Examiner ("Baylist 97 Most common phobias WHO WE ARE," 1997) and published in the ebook 'Living with Emetophobia: Coping with Extreme Fear of Vomiting' (Heaton-Harris, 2007). Yet this statistic has very little to substantiate it. There is currently no evidence that the fear of vomiting is a major concern worldwide. All published cases to date are centred in the Western world with the exception of one Indian girl (Faye, Gawande, Tadke, Kirpekar, & Bhave, 2013).

The Fear Survey Schedule-III (Wolpe & Lang, 1964) has a standardised list of fears. The published results of three sets of survey data indicate that for an undergraduate sample the fear of being nauseous or vomiting ranks considerably lower than fifth. In an English undergraduate University sample of 547 participants (F = 302, M = 201, U = 44) the fear of being nauseous was ranked 16$^{th}$ (Kartsounis, Mervyn-Smith, & Pickersgill, 1983). A revised version of the Fear Survey Schedule included vomiting as a fear, and provides a less ambiguous measure. Abdel-Khalek (1994) surveyed 520 Egyptian undergraduate students and reported that the fear of vomiting was the 50$^{th}$ ranked fear for Egyptian females (N = 238,

[1] Dated 30-10-2014

*M* = 2.35, SD = 1.33) and ranked 31st for males (*N* = 282, M = 2.07, *SD* = 1.33). Klieger (1992) sampled 860 college students (F = 508, M = 352) and found vomiting was ranked the 35th fear for females and 39th for males.

The uncertainty regarding the prevalence and spread of the fear, highlights how poorly understood emetophobia is, with very little research conducted into its assessment, conceptualisation, or treatment (Boschen, 2007). There have been only three peer-reviewed publications on the prevalence of emetophobia. A Dutch study by van Hout and Bouman (2012) stated that the prevalence for the (non-clinical) fear of vomiting for women and men was 7% and 1.8% respectively. An earlier study conducted by Philip (1985) derived a similar result for women (7%) but reported 3.1% for men, almost double the rate reported by van Hout and Bouman (2006, cited in van Overveld et al., 2008). Veale (2009) regards these data as a measure of the rate of the non-clinical fear of vomiting. Using a world population estimate of 6,794,059,411 individuals (U.S. Census Bureau, 2010) and using a conservative clinical point prevalence estimated by Becker (2007; .01% for females, zero for males), it indicates that 340 thousand people suffer from some degree of emetophobia. If limited to the western world the projection conservatively shrinks to approximately fifty thousand individuals.

**Common and differentiating features.** Anxiety disorders have a number of common features including physical arousal, avoidance and safety behaviours, concentration problems, muscle tension, and dysfunctional cognitions (American Psychiatric Association, 2000; Boschen, 2007). What differentiates each disorder are the specific stimuli, cognitions, interoceptive cues, and situations (Andrews et al., 2003; Boschen & Oei, 2008) that trigger the anxiety. Veale (2009) separates a number of common differential diagnoses to emetophobia. These are summarised in Table 1.2.

Table 1.2

*Emetophobia Diagnostic Differentiation*

| Alternative diagnosis | Similarity | Emetophobia differentiation |
|---|---|---|
| Hypochondriasis | Concerned with being ill and food contamination.<br>Attribute anxiety related symptoms to a physical problem | Emetophobia is primarily focused on avoidance of vomiting and vomit related stimuli. |
| Obsessive compulsive disorder (OCD) | Rituals and superstitious behaviour | Restricted to vomit related issues without a grossly exaggerated sense of the control rituals have over themselves or others |
| Panic disorder | Unexpected panic attacks with anticipatory anxiety about further attacks.<br>May have nausea and vomit related concerns. | Restricted to vomit related stimuli |
| Social phobia | There may be fears about vomiting in public. | Does not include people who can vomit in private without distress. |
| Anorexia nervosa | Disordered eating and possible weight loss | The disordered eating is not for the purpose of weight management but to eliminate the risk of vomiting |

With a combination of poorly defined boundaries and potentially misleading comorbid symptoms, emetophobia can be difficult to diagnose in clinical practice (Boschen, 2007). Veale (2009) raised doubt as to the accuracy of the emetophobia diagnosis of participants in a number of emetophobia case studies (Lesage & Lamontagne, 1985; McFadyen & Wyness, 1983; McKenzie, 1994) highlighting the indistinct boundaries of the condition. Similarly, the overlapping features of emetophobia with other conditions makes identifying comorbidity with other conditions difficult.

**Comorbidity**

Comorbidity refers to the co-occurrence of different disorders in the same individual (Kessler, 2001). It is important to identify the presence of other disorders as it is central to

both classification and treatment (Brown & Barlow, 1992). Therapeutically, comorbidity has been reported to predict increased treatment costs (Goldsmith, 1999; Souêtre et al., 1994), result in a more chronic course (Schoevers, Deeg, van Tilburg, & Beekman, 2005) and increase suicide rates (Johnson, Weissman, & Klerman, 1990).

A relatively high comorbidity rate with other anxiety disorders would provide tentative support for Boschen's (2007) hypothesis for an underlying genetic anxiety pre-disposition. This support is cautionary as a relatively high comorbidity may also be an indicator of a learning environment that facilitates the development of a number of disorders that are recognised in the DSM-IV-TR (Eley et al., 2008). There is also the possibility that individuals with emetophobia develop additional anxiety disorders over the course of their condition due to the direct and indirect effects of the condition.

Two previous studies have attempted to quantify the level of comorbidity in emetophobia (Lipsitz et al., 2001; van Hout & Bouman, 2012). In both cases the researchers targeted people who self-identified as having emetophobia via a specialist emetophobia internet forum group. van Hout and Bouman also included a randomised community sample group gathered via mail out to randomly generated addresses.

The rates of comorbid diagnoses in these two previous studies are shown in Table 1.3. These findings indicate that as the severity of vomiting fear increases, the rate of comorbidity also increases. Participants who self-identified as having a fear of vomiting had higher comorbidity rates for all measured conditions compared to a non-vomit fearful community sample (van Hout & Bouman, 2011). Individuals recruited from an internet emetophobia forum reported higher comorbidity rates than a community sample that identified the same vomiting fear. With the exception of depression, the comorbidity rates reported by van Hout and Bouman are higher than the results of Lipsitz et al. The difference in comorbidity rates may be due to the different assessment methods used in the two studies.

When compared with larger-scale epidemiological research, Table 1.3 shows that the prevalence of comorbid conditions in emetophobia was higher than that observed in the general population (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). The comorbid conditions of social anxiety disorder and depression are approximately twice as common in vomit fearful groups than in the general population. In the clinical population the estimates rise to almost an eightfold increase for social anxiety disorder and a doubling for depression.

Three limitations of the previous comorbidity research are the validity of the assessment tools used, sample size, and participant bias. van Hout and Bouman's comorbidity rates were based on an unpublished Dutch translation of the Psychiatric Diagnostic Screening Questionnaire (Arrindell, 2004). This is a self-report questionnaire used to assess for the presence of common DSM-IV Axis I disorders. The assessment tool validity of van Hout and Bouman can be cross checked by comparing their control community incidence with Kessler et al.'s (2012) epidemiological sample of 5223 individuals as the results of the two should be similar. The comparison shown in Table 1.3 indicates that, with the exception of depression, the comorbidity rates reported by van Hout and Bouman are substantially higher than would be expected, indicating either that the Dutch version of the PDSQ may overestimate comorbidity, or that the American and Dutch anxiety and depression rates are dissimilar. The assessment tool used by Lipsitz et al. was based on an unpublished 29 item self-reported questionnaire that has an unknown diagnostic validity. In both studies the validity of the comorbidity rates are uncertain.

Table 1.3

*Axis-1 disorders in the community and vomit fearful populations*

| | Lipsitz et al. (2001) | van Hout & Bouman (2012) | | | Kessler et al. (2012) |
|---|---|---|---|---|---|
| Sample Source | Internet Emetophobic | Community Controls | Community Vomit-Fearful | Internet Vomit-Fearful | Community Epidemiological |
| Sample Size | *N* = 56 | *N* = 156 | *N* = 15 | *N* = 19 | *N* = 5223 |
| Diagnostic Method | Self-Reported Diagnosis | Psychiatric Diagnostic Screening Questionnaire | | | NCS-R interview |
| Prevalence | Lifetime prevalence | Point-Prevalence | | | 12 Month |
| Diagnosis | | | | | |
| Specific Phobia | 30% | - | - | - | 10.1% |
| Panic Disorder | 40%[a] | 7.1% | 20.0% | 52.6% | 3.1% [a] |
| Agoraphobia | | 5.8% | 20.0% | 84.2% | 1.7% [b] |
| SocAD | 21% | 12.2% | 19.5% | 63.2% | 8.0% |
| OCD | 18% | 2.6% | 26.7% | 31.6% | 1.3% |
| GAD | - | - | - | - | 2.9% |
| PTSD | - | - | - | - | 4.4% |
| AD-NOS | - | - | - | - | - |
| Hypochondriasis | - | 5.8% | 7.9% | 26.3% | - |
| Dysthymia | - | - | - | - | - |
| Depression | 46% | 2.6% | 13.3% | 21.1% | 9.3% |
| Bipolar | - | - | - | - | 1.7% |
| BDD | - | - | - | - | - |
| SomatDis | - | - | - | - | - |

OCD = Obsessive-Compulsive Disorder; GAD = Generalised Anxiety Disorder; PTSD = Post Traumatic Stress Disorder; AD-NOS = Anxiety Disorder, Not Otherwise Specified; BDD = Body Dysmorphic Disorder; SomatDis = Somatisation Disorder

[a] Includes individuals with Panic Disorder and/or Agoraphobia.

[b] Includes individuals with or without a history of panic disorder.

Both emetophobia studies had relatively small sample sizes (*N*s = 19 and 56) and therefore small variations in the sample could disproportionally influence comorbidity rates. In addition, the selection of participants from a specialist internet support group may attract individuals whose condition is more severe than those individuals with a vomit phobia who have not sought external support. The current study will attempt to quantify the point

prevalence Axis I comorbidity rates for individuals with emetophobia in order to clarify this current state of uncertainty.

**Demographic treatment outcome predictors.** One of the aims of this research is to gain a greater understanding of the demographic factors that will assist in predicting internet-based treatment outcomes. Based on previous research a number of demographic variables are expected to influence treatment outcomes. These include social support (relationship status), employment, age, motivation and comorbidity. Improved outcomes can be found with increased social support associated with a relationship (Broadhead et al., 1983) and high functioning as indicated by working or volunteering (Ross & Mirowsky, 1995). Age is expected to be negatively correlated with the acceptability of the internet (Kanai et al., 2004) and perhaps persistence with the online treatment (Batterham, Neil, Bennett, Griffiths, & Christensen, 2008). Participants who persist with an online treatment have been shown to achieve more positive treatment outcomes than those who terminate therapy early (Batterham et al., 2008).

Despite meeting inclusion criteria, some participants who have previously engaged in CBT therapy may be excluded from CBT treatment research on the basis of their previous treatment (Klinger et al., 2005; Liossi, White, Franck, & Hatira, 2007; Neovius, Johansson, Rossner, & Neovius, 2008). The reasons are not explicitly stated but it is assumed that prior experience with CBT treatment is expected to be positively correlated with poorer treatment outcomes. Similarly, participant exclusions relating to comorbidity with other mental illnesses may result in poorer treatment outcomes for some conditions (Hirschfeld, 2001). This study will not exclude applicants with a CBT treatment history or comorbid conditions.

Due to the low participant numbers in emetophobia treatment research, no reliable data has been reported for the influence of demographic variables in treatment outcomes. This study captures a number of demographic variables which have been classified into three

groups (functioning, general and severity). The data obtained during the registration and treatment program will aim to provide a fuller picture of who applies for treatment and what factors influence treatment outcomes.

The treatment program is called EmetStudy and is an internet-delivered adaptation of conventional cognitive behavioural treatment programs that incorporates features of many previously published and successful CBT treatments. The treatment approaches are discussed in Chapter 2.

## Review of Emetophobia Treatments

### Emetophobia and Related Treatments

There are very few published treatment studies for emetophobia. As such the following review of emetophobia treatments will be approached very broadly, starting with transdiagnostic treatment approaches and progressing through to anxiety based internet treatments, general internet phobia treatments, and finally to specific emetophobia treatments that include face-to-face and internet approaches. Such a broad review will assist in identifying strengths and weaknesses of other internet-based and anxiety-focused treatments. These lessons can then be applied to the internet treatment of emetophobia.

### Transdiagnostic CBT Treatment approaches

Unified or transdiagnostic CBT approaches to the treatment of anxiety disorders are designed to treat the common features of more than one disorder such as anxiety and depression in a single treatment package (Craske, 2012; Craske et al., 2009; Norton, 2012; Norton & Philipp, 2008). Anxiety and depression lend themselves to a transdiagnostic approach as they share similar symptoms, negative affectivity and an underlying amygdala hyperactivity (Craske, 2012; Titov et al., 2011). The shared cognitive and behavioural processes can be a target for treatment across the range of diagnostic classifications (Mansell, Harvey, Watkins, & Shafran, 2009).

For the treatment of emetophobia, a transdiagnostic approach holds promise as emetophobia has a number of overlapping symptoms from other diagnostic categories, a relatively high comorbidity with other anxiety and depression related disorders (Norton & Philipp, 2008), and an underlying vulnerability factor of elevated general anxiety (Boschen, 2007). The advantage of a transdiagnostic approach is that many of these related issues may be addressed in a single treatment package (Norton & Philipp, 2008). High levels of

comorbidity with other anxiety and mood disorders (Sykes et al., 2015) also means that transdiagnostic approaches may also yield benefits for other comorbid conditions.

Transdiagnostic approaches have received limited evaluation to date compared to traditional CBT treatments. Transdiagnostic treatments have been found to improve anxiety and depression along with other comorbid conditions (Dear et al., 2011; Erickson, Janeck, & Tallman, 2009; Newby, Mewton, Williams, & Andrews, 2014; Norton et al., 2013).

The transdiagnostic approach is relatively new. Published transdiagnostic treatments that include participants with diagnosed specific phobias (Erickson et al., 2009) have not reported a reduction of the specific phobia. Two limitations of the Erikson et al. (2009) study were that the documented transdiagnostic protocol appeared to have a strong generic cognitive focus but less emphasis on behavioural exposure, and that only the Beck Anxiety Inventory was used to determine treatment success. There were no specific phobia symptom measures limiting the interpretability of the results.

A transdiagnostic approach has potential benefits for emetophobia treatment strategies as people with emetophobia often have other comorbid conditions (van Hout & Bouman, 2012). There has been one recent case study using a transdiagnostic treatment approach for emetophobia (Paulus & Norton, 2015) which is reviewed in further detail on page 73.

## Online Anxiety CBT Treatment Overview

**Computer based CBT programs as a model for Internet CBT (iCBT).** Due to significant advancements in new computer hardware, software platforms, internet speed, and global penetration (Chinn & Fairlie, 2010; Rice & Katz, 2003) many of the capabilities and features of stand-alone computerised CBT systems (CCBT: Computerised cognitive behavioural therapy) can be found in contemporary internet delivered CBT (iCBT: Internet cognitive behavioural therapy) programs. The modern distinctions between computer based CBT (CCBT) and internet based CBT (iCBT) are small, the key differences being internet

connectivity and a more constrained user interface for iCBT. For some authors, the historical distinction becomes irrelevant and CCBT can refer to most forms of computer assisted therapy (Vares, 2007). Historically, stand-alone CCBT treatments emerged first and therefore comparisons to contemporary iCBT systems is confounded by the limitations of technology. Despite this, desktop based CCBT design and effectiveness serves as a close analogue to iCBT programs.

***Similarities.*** As a treatment approach, the shared features of CCBT and iCBT include self-guided study, variable therapist contact, flexible engagement, geographical access and financial cost structures.

*Structured self-guided study***.** In face-to-face therapy the therapist is often seen, in part, as a teacher (Hollon, 2003) or as an equal coach (Podell et al., 2013; Waller, 2009) who adapts to the learning needs of the client. Bibliotherapy (Gregory, Canning, Lee, & Wise, 2004) and computerised forms of therapy have a stronger focus on the patient actively engaging in an independent and structured manner (Usher, 2013). In practice, the application of self-guided study within software systems tends to adopt a small book paradigm where the study is mostly restricted to pre-prepared content, frequently in a sequentially presented order. The online depression software MoodGYM (version 2; "MoodGYM Training Program," 2015), for example, permits non-sequential learning between a limited set of modules, with each module retaining a fixed structure (Australian National University, 2009; Christensen, Griffiths, Groves, & Korten, 2006).

*Variable therapist contact.* A CCBT program may integrate external support or be designed to be essentially standalone. CCBT support options have included integrated face-to-face contact, telephone or email/chat support (Vares, 2007). Despite the high degree of automation, participants can report feelings normally associated with therapist contact such as a perception of trust (Pak, Fink, Price, Bass, & Sturre, 2012). When combined with even a

minimal level of therapist contact, a sense of therapeutic alliance can still be achieved (Gerhard Andersson et al., 2012).

*Flexible engagement.* Except where access to a computerised system is time-restricted, a general principle of CCBT is that it removes the time and geographical restrictions associated with accessing face-to-face support (Griffiths, Lindenmeyer, Powell, Lowe, & Thorogood, 2006; Mewton, Wong, & Andrews, 2012). Like a book, patients could also re-engage with previously learned content and at a pace that suits the learner. This flexibility of engagement may also provide a sense of privacy (Gavin Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010; Ferriter, Kaltenthaler, Parry, & Beverley, 2008).

*Geographical access.* The resources allocated to mental health services in low and middle-income countries are both scarce and unequally distributed (Saxena, Thornicroft, Knapp, & Whiteford, 2007). Wealthier countries like Australia also have reduced access to traditional mental health services in rural and remote areas (Jorm, 2012; Morley et al., 2007). Kohn et al. (2004) argue that globally even common anxiety conditions are under-treated. They reported that worldwide over half of the people that need to be treated for anxiety-related conditions were not treated. To estimate the estimate of the proportion of untreated individuals with emetophobia the proportions would be at least the same as the commonly treated comorbidities found with emetophobia such as panic disorder, generalised anxiety disorder (GAD) and obsessive compulsive disorder (OCD). This suggests that approximately 55% of individuals with emetophobia are not receiving treatment. The frequently proposed solution to address the lack of suitable treatment due to geographical inequality is to deliver treatments via the internet as it is both technically feasible and in demand (Handley et al., 2014).

The use of internet treatments may address some of the accessibility issues, but many of those who lack access to affordable mental health services will also have a greater risk of

constituting part of the ‘digital divide’ (Mehra, Merkel, & Bishop, 2004). For example indigenous populations in remote and rural Australia have poor mental health access and also limited internet access. With the global adoption of mobile phone technology, the term digital divide has evolved into a ‘digital inequality’. Digital inequality occurs when some individuals experience a limited access to the full range of internet accessibility. Poorer nations and rural Australia currently have limited access to fast broadband but improving access to internet through mobile telephony (e.g. 3G/4G/LTE networks). The inequality extends to reduced technology platforms with the current mobile phone platform as the primary internet device rather than a computer (James, 2014). An internet-based solution helps to democratise mental health access for the urban affluent but its reach is restricted in more remote and poorer regions. In Australia, restricted internet infrastructure overlaps with the reduced delivery of mental health infrastructure. For this reason some of the theoretical advantages of internet delivery have practical constraints. A meta-analysis of the geographical advantages of internet based treatment delivery concludes that studies have not clearly demonstrated that this theoretical advantage has yet occurred (Musiat & Tarrier, 2014). The commonly proposed geographical benefits of internet delivery appear sensible but are moderated by the realities of current internet infrastructure delivery. The use of broadband into rural areas and mobile broadband such as 4G and the proposed 5G networks may provide adequate access to internet therapy. Most importantly, internet expansion is likely to be achieved at a much faster rate than expansion of the public mental healthcare sector which is attempting to constrain rising health care costs in Australia (Australian Bureau of Statistics, 2010). In summary, the immediate geographical benefits of internet treatments are frequently exaggerated but maybe met in the near future as technology infrastructure matures.

*Financial Costs.* The costing models for all software-based systems are essentially similar due to the nature of software development, with the development of software requiring substantial resources, and subsequent maintenance requiring considerably less expense. CCBT and iCBT both have initially high development costs but relatively low variable costs that include maintenance, distribution and support. Hourly labour costs can be high when specialist professionals assist treatment participants and lower when volunteers (Cavanagh, Seccombe, Lidbetter, & Bunnell, 2011; Vares, 2007) or generalist professionals (O'Brien & Arthur, 2007; Stuhlmiller & Tolchard, 2009) are used.

Where the average cost of treating a patient remains relatively fixed for face-to-face treatment, software-based treatments generally have low variable costs and the total cost of treatment delivery becomes more cost effective for each patient as demand increases, and initial development costs are distributed among greater numbers of individuals (Musiat & Tarrier, 2014). When economic costs are defined more broadly to encompass societal costs, the benefits are not clear-cut, with traditional methods gaining ground because of their greater clinical effectiveness (Gerhards et al., 2010). Musiat and Tarrier (2014) have noted in their meta-analysis that computer based treatments rarely report the full lifecycle costs (development and maintenance) and so the overall costs may be under-reported.

***Differences.*** The fundamental difference between CCBT and iCBT is connectivity. CCBT in its pure form is self-contained with all the therapeutic guidance “hard-coded” or fixed at the time of software installation. Pure CCBT can be combined with supplemental technologies like short message service SMS (Aguilera & Muñoz, 2011), email (Martin et al., 2011; Vincent, Walsh, & Lewycky, 2010) and telephone (Titov, 2009) which blurs the technological and connectivity boundaries. iCBT has a ‘live’ dimensionality and can offer the possibility of connecting with shared data using cloud storage, connection to other clients and connection to therapists. Historically CCBT had the advantage of providing the capacity

for rich multimedia content but faster internet and mobile telephone data speeds have moderated this advantage especially in economically disadvantaged locations (Ono & Zavodny, 2007). Real-time interactivity is a core advantage of iCBT due to the high speed and bidirectional nature of the connection. Although not extinct, stand-alone CCBT has been an evolutionary stepping stone into the modern highly connected iCBT systems.

**CCBT applications.** Anxiety-related computer-based systems have attempted to address a range of disorders from phobias, generalised anxiety, stress, and social anxiety (Gerhard Andersson et al., 2012). A computerised system may achieve similar outcomes to face-to-face therapies but this may not be through the same therapeutic pathways. For example, a computerised spider phobia exposure system (Gilroy, Kirkby, Daniels, Menzies, & Montgomery, 2000) used simple black and white cartoon-like images of spiders and a stick figure to represent the participant. The study had 45 subjects of which 15 were allocated to the computer treatment group. The computerised exposure was found to be as effective as in-vivo exposure. Compared to the visual realism available currently, the simple stimuli were surprisingly effective. This indicates that there is an additional factor in the process of the computerised exposure treatment that is critical. In fact it may have been the simplicity of the stimulus that required the participant to mentally enrich the poor visual image. This cognitive engagement may have a similar mechanism to an imaginal exposure technique where the participant places themselves in a mental representation of the physically avoided situation (Kazdin, 1979). Both require strong cognitive engagement. Not all software designs may activate high cognitive level enrichment. A spider exposure system that required a user to assist an animated figure to overcome a spider phobia in a single session of up to three hours was found superior to wait-list, but not to in-vivo treatment ($N$ = 40 with $N$ = 13 in CCBT treatment) (Heading et al., 2001). The authors identified that the in-vivo

experience was rated with higher credibility than the alternative black and white picture stimulus.

Pre-cursors to the first Apple iPhone were palmtop computers which had small LCD screens, a keyboard, and were portable. Palmtops were essentially advanced programmable calculators. The screen had a simple user interface and has been used to treat panic disorder incorporating graded interoceptive exposure (Kenardy et al., 2003). The application reminded the participant to complete treatment tasks five times per day for 12 weeks. A total of 163 participants were allocated to the 5 treatment conditions. Of these, 41 were randomly selected for the palmtop treatment condition. The palmtop treatment was found to be effective and two other therapist-led treatment approaches yielded similar results after a six month follow-up. The advantage of the palmtop system over a desktop system is its accessibility and portability. Treatment outcomes were still achieved with older technology that was restricted to a 16 line × 40 character display. The simplicity of the technology may have required a higher level of creative participant engagement than with more passive but visually engaging technology. The nature of the technology may therefore shape the therapeutic experience. These studies are representative of the transitional therapy delivery that worked with the severe limitations of the available technology but incorporated key principles of face-to-face therapy. CCBT has been applied to a range of anxiety and depressive disorders such as phobias (Coldwell et al., 1998; Heading et al., 2001; Smith, Kirkby, Montgomery, & Daniels, 1997), social anxiety disorder (Przeworski, Amy, & Michelle, 2004), generalised anxiety disorder (Newman, 1999), panic disorder (Kenardy et al., 2003) and depression (Whitfield, Hinshelwood, Pashely, Campsie, & Williams, 2006).

**iCBT applications.** Existing CBT delivery paradigms and the restrictions imposed by a browser interface tends to produce iCBT treatments that have a number of common features. Meta analyses for the treatment of anxiety related conditions and depression have

found that iCBT is effective (Gavin. Andrews & Williams, 2014; Arnberg, Linton, Hultcrantz, Heintz, & Jonsson, 2014; Spek et al., 2007). Typical of major iCBT applications that have treated high numbers of participants are Fearfighter, CRUfADClinic and MoodGYM. Fearfighter was one of the earlier iCBT applications based in the UK, CRUfADClinic is an Australian application developed with the collaboration of the University of NSW and St Vincent's Hospital and MoodGYM is a highly funded Australian Government initiative that has been revised several times and is still active.

Fearfighter (Marks, Kenwright, McDonough, Whittaker, & Mataix-Cols, 2004) is a treatment for panic and phobias developed in the UK and was recommended by the National Institute for Health and Clinical Excellence (MacGregor, Hayward, Peck, & Wilkes, 2009). Several studies have found Fearfigher to be effective (Kenwright, Marks, Gega, & Mataix-Cols, 2004; MacGregor et al., 2009; A. J. Schneider, Mataix-Cols, Marks, & Bachofen, 2005). The program is composed of nine modules. In module one, participants orientate to the application, and complete questionnaires. Module two is a psycho-educational module that explains self-exposure therapy. Module three explains how to engage with the allocated therapist. Module four focuses on trigger recognition and personalised problem statements. In module five participants identify exposure tasks for each trigger. Module six provides advice on coping strategies. In module seven, participants are provided with coping exercises to practice during exposure. In module eight the exposure homework is reviewed, feedback is given and new goals may be set. The final module troubleshoots participant problems. Total therapist contact time in a study of 37 Fearfighter participants was an average of 76 minutes (*SD* = 43 minutes) (Marks et al., 2004).

The Fearfighter program is sequential and although it teaches participants to construct their own homework, the therapist time indicates a moderate reliance on a therapist to individualise homework feedback. The program was not designed to be self-contained but as

an extension of the clinician's care. This study did not employ open internet recruitment and sourced participants from mental healthcare professionals. Despite recruitment from highly trusted locations (GPs and self-help groups), a 25 minute therapist-led screening process and high therapist contact time, 16 of the 37 (43%) participants dropped out of the treatment. The authors noted that the dropouts mostly left after the psychoeducational component and before they actively engaged in exposure therapy.

A large Australian online anxiety treatment program CRUfADClinic.org (renamed to thiswayup.org.au) conducted an assessment of 588 participants who suffered from GAD (Mewton et al., 2012). The treatment protocol is divided into six online modules that do not require therapist assistance. Each module has a classic CBT structure and encompasses psycho-education, behavioural activation, cognitive restructuring, problem solving, graded exposure, relapse prevention, and assertiveness skills. Each module is constructed within an illustrated story framework with two characters, a patient and a clinician. On completion of a module, a homework task is downloaded to consolidate the participant's learning. All six modules were completed by 55.1% of the participants with 60% of participants with moderate to severe GAD-7 (Spitzer, Kroenke, Williams, & Lowe, 2006) scores at commencement estimated to be in the non-clinical range at completion. The non-completers were found to be younger and from an Australian rural district (Mewton et al., 2012). The participant sample was relatively mature ($M$ = 39.5, $SD$ = 13.5) and there was a noticeable six year age difference between completers 42.2 years ($SD$ = 13.4) and non-completers 36.2 years ($SD$ = 13.0). Initial GAD severity did not influence treatment dropout. The participant recruitment was made via GP referrals and GPs were instructed that participants with suicidal thoughts, drug or alcohol dependence, schizophrenia, bipolar disorder, or who were prescribed antipsychotics or benzodiazepines would not benefit from the program. The GP referral process both filtered 'unsuitable patients' and may have contributed to a low dropout

rate as the participants were actively seeking professional medical assistance and therefore may be expected to have an increased level of change readiness and willingness to pursue treatment (Westra & Dozois, 2006; Zwar, Richmond, & Harris, 2008).

MoodGYM is an online CBT treatment developed in Australia at the Australian National University (ANU). It is primarily focused on the treatment of depression but has also been shown to reduce anxiety (Christensen, Griffiths, Korten, Brittliffe, & Groves, 2004). The MoodGYM program consists of five modules that each take approximately 45-60 minutes to complete. The first three modules address cognitive psycho-education, teach participants to identify and restructure dysfunctional thinking, and include strategies to increase positive behavioural activities. Module four introduces relaxation techniques and stress reduction strategies. Module five is an educational module that teaches problem solving techniques and assists in developing healthy responses to relationship breakup. In general the modules include psycho-education, animated explanations, quizzes, and homework tasks. The responses to the quizzes are stored and the user is able to access them. Although the user may remain anonymous, a valid email address must be used (Høifødt et al., 2013; Neil, Batterham, Christensen, Bennett, & Griffiths, 2009). As with most software, the MoodGYM application has been revised and was upgraded to version 2 in September 2003 (Christensen, Griffiths, Groves, et al., 2006).

MoodGYM reports that it has achieved 800,000 registrations from 222 countries (Australian Broadcasting Commission, 2014) since its first inception and has been evaluated in a variety of contexts. It has been used to treat depression and anxiety in adults and adolescents (Donker et al., 2013; O'Kearney, Kang, Christensen, & Griffiths, 2009; Sethi, 2013). A number of studies with larger sample sizes indicate that MoodGYM is an effective treatment for depression and anxiety (Christensen, Griffiths, & Korten, 2002; Griffiths & Christensen, 2007). MoodGYM has been tested internationally and has been converted into

six languages (Calear et al., 2009; Schneider, Sarrami Foroushani, Grime, & Thornicroft, 2014; Wilhelmsen et al., 2014).

A key issue with MoodGYM compared to face-to-face therapies is a high participant dropout rate. The dropout rate will vary depending on how participants are enrolled into the treatment. When anonymous non-referred participants access the program, the dropout rate is approximately 75%: (Donker et al., 2013). The rates are lower when the system is based on GP referrals and co-assisted with a therapist; 40%: (Lillevoll et al., 2013) and 67%: (Hickie et al., 2010). Due to the high dropout rates Twomey et al. (2014) concluded that self-help programs including MoodGYM should not be used as the first treatment strategy even in a stepped-care model. Twomey's conclusion may be flawed as it assumes that the readiness for change in the participants is the same for MoodGYM registrants as for face-to-face referrals and that the outcomes should therefore be comparable. This issue is explored in greater detail in Chapter 8. In summary, high dropout rates can be a major issue in internet treatment such as MoodGYM where registrations are open and participants can have a high degree of anonymity.

Meta-analysis concludes that iCBT is effective for anxiety and depression but these three examples of iCBT treatments have identified that they are very different. Fearfighter has a traditional dependence on clinican support, CRUfADClinic.org is self-guided and structured while MoodGYM has a relatively high level of treatment flexibility.

***Paradigm shift.*** Compared to abstract forms of psychotherapy, traditional face-to-face CBT and bibliotherapy treatments lend themselves to software conversion as they tend to be highly structured and sequential. CBT sessions can be structured into units of work and within each unit there can be clear outputs such as setting goals, learning content or documenting an event. Embedded in this framework is the paradigm of the units of work delivered face-to-face or involving bibliotherapy (e.g. self-help manuals). Software-based

treatment approaches are currently transitioning from adaptations of existing paradigms to packages that make specific use of the unique, innovative qualities of internet/computer delivery. Innovative treatment techniques for phobias using virtual reality are still anchored in a proven ERP paradigm (Dunsmoor, Ahs, Zielinski, & LaBar, 2014; Kniffin et al., 2014). Rather than a paradigm shift in the treatment approach, the innovation boundary focuses on how the exposure is experienced.

In the same way that therapist skill is a variable factor in treatment outcome (Anderson, Ogles, Patterson, Lambert, & Vermeersch, 2009; Podell et al., 2013), so the software package delivering the treatment may also be an important variable. The impact of iCBT differences software content, engagement, interactivity and ease of use has been inadequately compared (Griffiths & Christensen, 2007).

***User experience.*** The sequential weekly lesson paradigm found in face-to-face CBT treatments is converted relatively easily to a distinct programming module format of iCBT. The content may be styled in the same way as face-to-face treatments with a similar number of sessions, content and hourly duration. The Center for Clinical Interventions "Shy no longer" social anxiety treatment package is an example of a relatively direct translation. A more tailored approach is the MoodGYM application where the content is reworked into a storyboard format and is interactive and can be explored in a non-sequential order (Christensen, Griffiths, & Korten, 2002). In both treatments homework tasks are incorporated. The content for MoodGYM has been optimised for the browser experience and each page is optimised for short attention spans, required in a web environment (Stuart & Rutherford, 1978). The web page format follows published web design guidelines to achieve a simple and predictable interface (Hou, 2012; Palmer, 2002). MoodGYM uses a multimedia approach and multimedia learning that does not induce cognitive overload can be more effective than single sensory learning (Shams & Seitz, 2008).

Treatments that use a mobile user interface (McCarthy, 2014; Repetto et al., 2013) demand a more rigorous interface design approach. The smaller screen requires clear navigation, concise content, and shorter download speeds (Charland & Leroux, 2011; Holzinger & Errath, 2007; L. Kim & Albers, 2002). The restrictions of the mobile phone data entry and screen size is a limitation that is offset by the mobility of the device. A mobile device can be used to capture and store data as an activating event or in-vivo exposure is happening. The live recording of data is less prone to memory inaccuracies which may occur if the event is recalled several hours later.

***Participant dropout.*** Dropout is a term most commonly used to describe participants failing to complete a full therapy program (Melville, Casey, & Kavanagh, 2010). Price et al. (2012) divide the term dropout into two types. The first type is described as non-use attrition, and is also referred to as pre-treatment dropout (Melville et al., 2010). That is, the participant initially commits to the therapy by engaging in the registration process or completion of the initial assessment, but fails to engage in therapy. The second type is dropout attrition and also referred to as treatment dropout, where participants commence active therapy but discontinue before the program is completed. Melville et al. describes a third form of dropout as follow-up dropout where participants fail to complete an end stage assessment. Participants effectively drop out of the planned assessment schedule rather than the therapy.

Dropout has been identified as a significant issue for face-to-face therapy (Baekeland & Lundwall, 1975) and online therapy (Christensen, Reynolds, & Griffiths, 2011). Dropout rates for face-to-face therapy range from 30% to 60% (Thormählen, Weinryb, Norén, Vinnars, & Bågedahl-Strindlund, 2003). In many cases the data for this range is based on hospital based samples with a broad diagnostic spectrum. A meta-analysis of 125 psychotherapy studies with a broader range of therapy settings including university, public and private clinics showed an average dropout of 47% (Wierzbicki & Pekarik, 1993).

Wierzbicki and Pekarik noted that they included studies with inconsistent definitions of the term dropout, and the mean number of sessions attended was relatively high at 48. Comparisons of these studies with a traditional 12 week online CBT program are difficult to assess for although they may have higher frequency of attendance, the participants may be subject to different pressures as they maybe residential, medicated by the therapist and subject to structured therapeutic activities. Christensen et al. (2011) further argue that the nature of the intake with such open access systems is significantly different from many face-to-face treatments where enrolment may occur after passing through the commitment barriers of a GP referral.

Dropout rates for online CBT has been identified as a significant problem (Christensen et al., 2011). Christensen et al. cite the example of Farvolden et al. (2005) who reported that out of 1,161 registered users only 12 (1.03%) completed the 12-week program. In another relatively large study of 2,794 participants 79.6% did not complete the treatment program (Christensen, Griffiths, Mackinnon, & Britliffe, 2006). When participants do not complete all online treatment modules or exit the program prematurely, the self-reported reasons for discontinuation included time constraints, a lack of motivation, technical or computer-access problems, illness, a lack of face-to-face contact, preference for taking medication, perceived lack of treatment effectiveness, improvement in condition and the burden of the program (Christensen, Griffiths, & Farrer, 2009). Melville et al. (2010) reviewed 19 studies published between 1990 and April 2009 and found that internet-based treatments that had minimal therapist contact reported a dropout rate ranging from 2% to 83% with a weighted average of 31%.

A number of face-to-face and internet treatment studies have tried to identify the causes of the dropout rates. The conflicting results tend to indicate that the participant, the therapy and the therapeutic context play a complex role. Examples of some of the findings

have included a face-to-face eating disorder program of 65 participants where no significant indicators from race, age, years of education and household income were found (Stein, Wing, Lewis, & Raghunathan, 2011). In a review of 13 studies that reported on the variables associated with dropout from internet treatment programs, Melville et al. (2010) concluded that the evidence was generally inconclusive. Socio-demographic variables such as age, sex, SES, education level, and relationship status showed a lack of consistency across studies but a severity of the target psychological problem is high then it tended to predict an increase in dropout. Melville et al. hypothesised that a lack of motivation and the commitment cost of doing the program may outweigh the reduced symptoms. Participants that have comorbidities also have inconclusive outcomes. Davis, Barlow and Smith (2010) found that in a naturalistic sample of 150 people presenting to an anxiety clinic for an average of 14 sessions, comorbidity did not predict dropout. Issakidis and Andrews (2004) found that in a larger sample of 659 participants comorbid depression was associated with higher probability of both pre-treatment dropout and treatment dropout.

In summary, dropout is higher for internet treatment than face-to-face treatments. The reasons for the higher rates have not been established but symptom severity had a more consistent predictive role than comorbidity.

**Content Analysis of Internet-Delivered CBT for Depression and Anxiety**

It has been established that iCBT treatments are effective treatments for anxiety and depression. To replicate similar results for an Internet treatment for emetophobia it is important to explore the detail of how these treatments are constructed and what is common to these systems. This perspective focuses on the building blocks of the design and construction of the program. Five themes were identified and these include: (1) communication medium and applications, (2) treatment targets, (4) CBT treatment structure, (4) degree of therapist assistance, and (5) diagnostic entry and exclusion.

**Communication medium and applications.** The delivery of software-based internet CBT therapy is linked to technology. The primary mechanism is via an internet browser but alternatives can include mobile phone-based applications. Internet browsers provide a somewhat consistent platform that is relatively independent of hardware and operating systems, permitting wide accessibility. Examples of internet browser based applications in the anxiety and depression treatment areas include applications previously discussed; MoodGYM (https://moodgym.anu.edu.au/welcome), The Brave Program (http://brave.psy.uq.edu.au/index_brave.html#), Virtual Clinic (https://www.virtualclinic.org.au/), FearFighter (http://www.fearfighter.com), and e-Couch (https://ecouch.anu.edu.au/welcome). From a treatment perspective, internet and computer based delivery have blurred boundaries as they share the common attributes of being software-based, interactive and technology dependent. Internet and computer related technology that has been used in treatments includes handheld palmtops (Newman, 1999), email and phone (Christensen et al., 2009; Jamison & Scogin, 1995), DVD and CD-ROMs (Cunningham et al., 2009; Schofield et al., 2008), SMS (Carlbring, Ekselius, & Andersson, 2003; Huang et al., 2006) and videoconferencing (Ruskin et al., 2004).

***Treatment targets.*** The first software-based "treatment" was an application developed in the mid-1960s named Eliza (O'Dell & Dickson, 1984). It was based on the principle of reproducing a natural language parsing technique that gave the appearance of a Rogerian reflective counselling experience. Such techniques were very general and did not specifically address any specific disorder. The recent trend has been a move towards targeted treatments. These include spider phobia (G. Andersson et al., 2009), acrophobia (Coelho, Waters, Hine, & Wallis, 2009; Rothbaum et al., 2006), PTSD (Litz, Engel, Bryant, & Papa, 2007), and social phobia (Titov, 2009). These applications may also be further modified to target particular sub-groups within a diagnostic category such as children with

anxiety (Spence et al., 2008). A highly specific and tailored internet CBT approach yields a significantly better treatment outcome than broad based internet CBT approaches (Titov, Andrews, Johnston, Robinson, & Spence, 2010).

***CBT treatment structure.*** CBT can be a manualised therapy that is reproducible and lends itself to programmatic design (Proudfoot, 2004). Published online protocols appear to follow general CBT principles but differ in structure and content.

Table 2.1 shows four examples of anxiety related CBT protocols delivered via the internet. Titov et al.(2010) used six modules, Ruwaard et al.(2009) used eight modules and Bergsrom (2010) and Klien et al.(2010) both used ten modules. The common elements included psycho-education, cognitive restructuring and exposure. Bergstrom (2010) used interoceptive exposure which will also be a feature of the proposed emetophobia treatment. None of the published protocols quantify the effectiveness of the separate modules either from a content learning perspective or each individual module's impact on treatment outcome. The inconsistency of computer based frameworks and individual computer module design would make a meta-analysis difficult.

Table 2.1

*CBT Internet Application Examples*

| # | Titov et al.(2010) Social phobia | Ruwaard et al.(2009) Depression | Bergstrom (2010) Panic disorder | Klien et al.(2010) PTSD |
|---|---|---|---|---|
| 1 | Education about the symptoms and treatment of anxiety | Inducing awareness – writing | Psychoeducation | Psycho-educational |
| 2 | Education on how to control physical symptoms and the importance of lifestyle factors | Inducing awareness monitoring (diary) | Cognitive restructuring 1 | Anxiety management and relaxation training 1 |
| 3 | Describes the basic principles of cognitive therapy | Structured pleasant activities and relaxation training | Cognitive restructuring 2 | Anxiety management and relaxation training 2 |
| 4 | Education on graded exposure | Cognitive restructuring | Interoceptive exposure 1 | Cognitive restructuring 1 |
| 5 | Education and guidelines on communication and assertiveness | Cognitive restructuring – Behavioural experimentation | Interoceptive exposure 2 | Cognitive restructuring 2 |
| 6 | Relapse prevention | Positive self-verbalisation | Exposure in-vivo | Cognitive restructuring 3 |
| 7 | | Social skills training | Exposure in-vivo | Graduated exposure instructions (writing and in-vivo) 1 |
| 8 | | Relapse prevention | Exposure in-vivo | Graduated exposure instructions (writing and in-vivo) 2 |
| 9 | | | Exposure in-vivo | Graduated exposure instructions (writing and in-vivo) 3 |
| 10 | | | Relapse prevention | Relapse prevention |

# Module number

**Degree of therapist assistance.** Computer assisted automation can imply a reduction in the time spent by the therapist conducting therapy. Internet delivered treatments such as videoconferencing or voice over internet protocol (VOIP) do not, by definition, imply a

reduction of therapist time, only the location of the two parties. Internet browser based treatments may contain varying degrees of therapist time, as the participant can engage with static content (video and text) as well as programmable and interactive elements. Browser-based treatments may extend from no interactivity to full interactivity. These include, with a generally increasing order of engagement (a) bibliotherapy (ebooks, guided self-help) (Chung & Kwon, 2008; de Graaf, Huibers, Riper, Gerhards, & Arntz, 2009), (b) interaction with an administrator or psychologist who reminds participants of upcoming tasks either by email or phone (Christensen et al., 2009; Jamison & Scogin, 1995), (c) interaction with a therapist who provides active therapy via email, chat or phone (G. Andersson et al., 2005) and (d) internet and the analogous ISDN based videoconferencing with a therapist (Przeworski, 2006). Research indicates that therapist or administrator contact significantly influences participant retention (overall increase) but plays a minor role in outcomes for those who complete treatment (Christensen et al., 2009; Tate, Jackvony, & Wing, 2003).

**Diagnostic entry and exclusion.** Entry into online CBT research applications tends to have the same restrictions as found in non-online applications. Admission may involve an over-the-phone assessment, face-to-face assessment, online assessment (Andersson et al., 2005) or a combination of these (Andersson et al., 2009; Klein et al., 2010; Richards, Klein, & Austin, 2006). Therapist assessments (phone or face-to-face) may have one advantage over fixed online questionnaire assessments in that they may support a longer assessment duration and be able to interactively assess open-ended questions. However, Chang and Krosnick (2010) demonstrated that online tests may have higher concurrent validity and less social desirability response bias compared to telephone interviews. In summary, whichever mechanism is used for assessment, it will have some inherent bias.

A number of studies have excluded potential participants when an intake diagnostic assessment identified a person who presents with a high score on one or more conditions.

Typical exclusions include drug dependence, engagement in other active treatments, or a comorbid diagnosis such as schizophrenia or bipolar disorder (Andersson et al., 2005; Klein et al., 2010; Titov et al., 2010). If the potential participant presents with a life-threatening condition, such as severe depression, they may be excluded on ethical grounds (Andersson et al., 2005). The number of participants who self-identify as in need of an internet based treatment but are excluded can be significant. Klein et al.(2010), for example, excluded 112 of 134 applicants for an online PTSD treatment. Such exclusionary criteria raise concerns over the generalisability of the outcomes to 'real world' clinical situations (Braslow et al., 2005). This has led to an increase in calls for effectiveness rather than just efficacy studies (Borkovec & Castonguay, 1998). The current study is 'open', with minimal exclusion criteria in an effort to reflect treatment effectiveness.

**Summary.** Overall six themes were identified for the construction of a system that incorporates new and old features of existing systems. The communication medium needs to maximise current interactive technology, integration of a powerful secure database 'in the cloud' and touch friendly interface to maximise useability and interactivity. Second, the use of specific examples and language that target people with emetophobia will help to make the treatment relevant to this group. The protocol and structure varies considerably for CBT systems, but a modular weekly approach is relatively common. Therapist assistance is beneficial but resource intensive. This development of the online treatment will have a limited capacity to assist participants, so much of the design will need to focus on making each module easy to understand and be subdivided into simple achievable set of tasks. Finally it is known that many participants will likely to have a comorbid diagnosis and that the system needs to identify these issues early and monitor the impact of comorbidity on attrition and treatment outcome.

## A Review of Emetophobia-Specific Treatments

Having reviewed internet and computer based treatments of other anxiety disorders, the following section will examine emetophobia specific treatments delivered by CBT and a range of alternative treatments. Published case studies of emetophobia treatment have included CBT, imaginal coping, systemic behaviour therapy, transdiagnostic, psychodynamic therapy, hypnotherapy, psychotropic medication, and various combinations of these approaches including group CBT (Ahlen et al., 2015; Klonoff, Knell, & Janata, 1984; Lipsitz et al., 2001; Manassis & Kalman, 1990; McKenzie, 1994; Moran & O'Brien, 2005; O'Connor, 1983; Paulus & Norton, 2015; Ritow, 1979; Wijesinghe, 1974). Hunter and Anthony (2009) argued that the key element in all successful treatments was the application of some form of exposure therapy. Similarly Veale (2009) concludes that in-vivo exposure is the most likely effective treatment component for emetophobia, based on evidence from a meta-analysis of other specific phobia treatments (Wolitzky-Taylor, Horowitz, Powers, & Telch, 2008). For the treatment of phobias, in vivo exposure may be used alone or incorporated into a broader CBT treatment program. The additive benefits of cognitive restructuring for phobias have been debated in the literature, with some studies finding added benefit (Scholing & Emmelkamp, 1993; van Oppen et al., 1995) and some finding no additional therapeutic effect, even over an extended 12 month period (Salaberria & Echeburua, 1998). Given the paucity of research supporting alternative approaches, the review of previous treatment research here will be restricted to CBT with the assumption that the exposure therapy component is likely to be the key ingredient.

**Emetophobia Adult Face-to-Face Case Studies**. Most emetophobia studies to date have been case studies of face-to-face CBT with adults (Faye et al., 2013; Herman, Rozensky, & Mineka, 1993; Hunter & Antony, 2009; Maack et al., 2013; McFadyen & Wyness, 1983; McKenzie, 1994; Paulus & Norton, 2015; Veale, Ellison, et al., 2013). There

is one group CBT study (Ahlen et al., 2015). Three case studies have focused on children: Whitton et al. (2006) treated an 8 year old girl with generalized anxiety disorder who also had a fear of vomiting; Faye et al. (2013) treated a girl in India with a combination of anxiolytic drugs and graded exposure therapy; and Graziano et al. (2010) treated an 11 year old boy with medication and 22 CBT sessions. In total, there have been less than a dozen published studies of face-to-face CBT treatments for emetophobia (Ahlen et al., 2015; Faye et al., 2013; Graziano et al., 2010; Hunter & Antony, 2009; Lesage & Lamontagne, 1985; McFadyen & Wyness, 1983; Philips, 1985; Wijesinghe, 1974). This research is summarised below with a brief outline of each study followed by a research synopsis.

***Adult case study outlines presented chronologically.*** Seven case studies are presented in chronological order and these are summarised in Tables 2.2 and 2.3. A trend towards improving the assessment strategies using improved tests and clearer treatment protocols was developed over time.

Wijesinghe (1974) conducted imaginal exposure on a 24 year old woman with an 11 year history of vomit phobia. Imaginal flooding exposure was conducted over three sessions. The first two sessions used traditional methods and the third session was conducted with the participant under hypnosis. Her case description appears to conform closely to a diagnosis of emetophobia although a formal assessment was not described. The author reports that in the first two sessions the participant avoided the imaginal task while the last session was effective. Wijesinghe reports that the participant had no phobic signs one year later. This is the only peer-reviewed published treatment incorporating hypnosis for emetophobia. In this early treatment the exposure approach (flooding) is very intensive and in the remaining case studies the exposure transitions to a much gentler graduated exposure hierarchy.

McFadyen and Wyness (1983) treated a woman in her late twenties who had been primarily concerned about other people vomiting since her early teens. Treatment used an

exposure hierarchy that included vomiting sounds, behavioural re-enactment of vomiting, and exposure to fake vomit. The client reported significant improvement after five exposure sessions. Eighteen months later, the researchers reported that the client had been symptom free for a year. A weakness of the study is that symptoms were not formally assessed. In this case study the treatment protocol used an exposure component that is used in the full CBT protocols and was also adopted by modern protocols as found in Ahlen et al. (2015).

Philips (1985) treated 7 participants using 8 to 13 weekly exposure sessions combined with a relaxation treatment. In the study the criteria for an emetophobia diagnosis was based on a history of anxiety regarding vomiting in others or oneself. Pre- and post- assessment were conducted using a behavioural approach test (approaching simulated vomit), a behavioural test (video), the Fear Survey Schedule (Wolpe & Lang, 1964)[2], Fear of Negative Evaluation Scale (Watson & Friend, 1969), and the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The exposure hierarchy was simpler than that used by McFadyen and Wyness (1983). They developed seven video recordings that varied the two aspects of the video stimuli; the sex of the person vomiting and the audio volume. Four of the seven participants responded in eight sessions; the remainder required thirteen sessions. All participants reported significant reductions of fear, which approached zero using a behavioural approach test. There was a reduction in all categories of the fear survey schedule and a reduction of the BDI from an average of 10.9 to 4.4. The participants were not

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[2] The original references to the Fear Survey Schedule, Fear of Negative Evaluation Scale, and the Beck Depression Inventory were missing in the published article and have been substituted with the most likely versions.

followed up after treatment. This multiple case study represented a substantially improved method for how emetophobia was assessed but it is evident that the lack of a specific psychometrically validated tool such as the Emetophobia Questionnaire (EmetQ; Boschen et al., 2013) and Specific Phobia of Vomiting Inventory: (SPOVI; Veale, Ellison, et al., 2013) limited the precision of the diagnostic assessment.

Two participants treated by Lesage and Lamontagne (1985) are frequently included in the emetophobia literature but the case studies lack a proper DSM diagnosis and the exposure treatment employed was used to address nausea rather than the fear of vomiting. In one of the case studies the participant induces his own vomiting to rid himself of the feelings of nausea which conflicts with a fear of vomiting diagnosis. This case study highlights the diagnostic difficulty of assessing emetophobia.

A case study of a 40 year old female by Hunter and Anthony (2009) is the first published case study using a CBT protocol that includes cognitive and exposure based techniques in an adult. This protocol closely resembles the current CBT treatment protocol. The participant was assessed using a structured clinical interview DSM-IV SCID (First, Spitzer, Gibbon, & Williams, 1996 ) and assessed using Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995), the Illness Intrusiveness Ratings Scale (Devins et al., 1993), and the Anxiety Sensitivity Index (Reiss, Peterson, Gursky, & McNally, 1986). The participant's CBT formulation followed Boschen's (2007) model and included exposure received over nine weekly sessions. At the end of the treatment, the participant no longer met the criteria for a diagnosis of specific phobia. The Hunter and Anthony (2009) study marks the transition into a modern full CBT treatment protocol. This protocol is based on the Boschen model (2007) which is underpinned by a proven CBT framework (Beck, 2011).

Maack et al. (2013), treated a 28 year old woman who was motivated to seek treatment as a key step towards becoming pregnant. The woman stated that she had the

condition since a traumatic episode at approximately 11 years of age. Baseline measures indicated that she had anxiety and the Obsessive Compulsive Inventory (revised) OCI-R (Foa et al., 2002) total score of 10 which is below the a score of 42 which indicates that the participant is in the normal range. The Mini International Neuropsychiatric Interview- 5th edition (M.I.N.I.-5; Sheehan et al. 1998) phobia module was used to confirm a diagnosis of emetophobia. The severity of the emetophobia was measured using an aversive anxiety measurement - the Anxiety Sensitivity Index (ASI-3; Taylor, Zvolensky, Cox, & Deacon, 2007). The treatment was graduated exposure therapy over five sessions with medication. It is unclear if the therapist sessions included any restructuring of cognitive beliefs in response to the exposure exercises. A follow-up measurement after three years indicated that the participant achieved a reduction in anxiety and OCD symptoms. The authors concluded that the participant no longer had emetophobia and propose an alternative cognitive behavioural model of emetophobia to the previous Boschen model. Like the Hunter and Anthony (2009) report, this case study uses a modern treatment protocol but lacks specific emetophobia assessment.

Veale, Ellison, et al. (2013) treated eight participants using CBT. The treatment was assessed using the Specific Phobia of Vomiting Inventory (SPOVI: Veale, Ellison, et al., 2013) and the participants mean score reduced from 37.4 at pre-treatment (*SD* = 14.1) to a post treatment score at 14.4 (*SD* = 12.5). The Patient Health Questionnaire depression module (PHQ-9; Kroenke, Spitzer, & Williams, 2001) and generalised anxiety disorder assessment (GAD-7; Spitzer et al., 2006) scores also decreased. The detailed protocol was not specified but would be likely to follow the protocol specified by Veale (2009) and is aligned to the EmetStudy protocol. This study combines effective assessment and modern treatment protocols.

Paulus and Norton (2015) treated a single female aged 23 using a transdiagnostic approach. The transdiagnostic five sessions that were detailed appeared to follow in principle a protocol close to the EmetStudy protocol. The use of worry scripts is analogous to imaginal exposure used in EmetStudy (Chapter 5) and the transdiagnostic emetophobia exposure stimuli used vomit specific YouTube.com clips whereas Ahlens et al. and EmetStudy each have used much more indirect stimuli such as incorporating public transport and food eating tasks. The participant achieved a SPOVI score (Veale, Ellison, et al., 2013) reduction from 42 to 12 points and this indicates an improvement into the normal range. The participant could not be followed up after the fifth session of treatment. The Anxiety Disorder Diagnostic Questionnaire–Weekly Version ADDQ-W (ADDQ-W: Smith, Paulus, & Norton) score decreased from 35 to 13 indicating a reduction of anxiety symptoms. The SDS was reported to be reduced.

**Adult Group Study.** Recently a group treatment for emetophobia was developed in Sweden (Ahlen et al., 2015). The program treated 23 adult patients in an adult anxiety clinic using a detailed ten session CBT program that followed guidelines from (Boschen, 2007) and Veale (2009). The program was assessed using a Swedish version of the Emetophobia Questionnaire (EmetQ13: Boschen et al., 2013). This study extends the Veale, Ellison, et al. (2013) into a group CBT format with effective results. In addition the program used a three month waitlist period and enabled a more sophisticated analysis of the treatment effects. The reported treatment EmetQ scores on a 0-4 scale in the four treatment periods (baseline, start, finish and follow- up) were T1: ($M$ = 33.3, SD = 8.9), T2: ($M$ = 34.6, $SD$ = 7.3), T3: $M$ = 27.4, $SD$ = 9.7), T4: ($M$ = 23.9, $SD$ = 10.8). A significant improvement in symptoms was found at post-test and three month follow-up for the EmetQ.

Overall the adult case studies presented show a diversity of treatment strategies and use of highly variable assessment tools. The focus of the adult treatment was orientated to

graduated exposure therapy. The role of direct therapist led cognitive restructuring was not always clear and was not always directly assessed. From 1974 to 2013 the diagnostic instruments to measure emetophobia have developed substantially and have culminated in the clinically validated SPOVI (Veale, Ellison, et al., 2013) and EmetQ (Boschen et al., 2013) tools. The assessments of comorbidities have been incorporated in the assessments but remain diverse and this restricts treatment comparisons. The EmetStudy program, Ahlen et al. (2015), and Veale, Ellison, et al. (2013) now essentially follow a recognisable CBT framework, assessed using specific standardised tools and underpinned by a cognitive behavioural framework.

***Child case studies.*** The two child case studies appear to differ in strategy compared to the adult studies. Both child studies use medication to support the treatment and use graduated exposure as the CBT approach. The Graziano, Callueng and Geffken (2010) protocol adopted the Boschen (2007) conceptualisation and therefore is aligned to the Veale (2009) CBT approach. In both these studies, the separate contribution of CBT treatment effects and medication effects were not established.

Graziano, Callueng and Geffken (2010) reported the successful treatment of an 11 year old male using medication and CBT conducted over a 22 week period. The boy was assessed using a number of anxiety measures: The Anxiety Disorders Interview Schedule: Child and Parent Versions (ADIS; Silverman & Albano, 2004) the Behavior Assessment System for Children–Second Edition (BASC-2; Reynolds & Kamphaus, 2004); and an unpublished Emetophobia Questionnaire (EQ; Bouman & van Hout, unpublished, cited in van Overveld et al., 2008). The authors reported adopting the Boschen (2007) conceptualisation of emetophobia and structured their treatment by adapting *The Coping Cat* program (Kendall, 1990). The five key treatment elements of the therapy were (1) recognizing anxious feelings/body sensations related to anxiety, (2) identifying unhelpful

thoughts in anxious situations, (3) changing internal self-talk, (4) doing exposures, and (5) between session homework and self-assessment. The child's parents were incorporated into the treatment with a focus on reducing their accommodating behaviours, which were likely to support their son's maintenance behaviours. The boy showed a reduction in Emetophobia Questionnaire scores from 187 to 129, a reduction in anti-depressant medication from 75mg to 0mg of sertraline and an emetophobia free diagnosis at post-treatment. The treatment effects were maintained in a six-month follow-up. Features of this case study compared to previous case studies were the adherence to case conceptualisation, parental involvement and an extended 22 session, six-month treatment period.

Until 2013 all peer reviewed emetophobia studies have been conducted in Western countries. Faye et al. (2013) reported the successful treatment of an eight year old girl in India. The child initially presented with a clinical case of emetophobia and the authors identified a recent and specific triggering event related to vomiting. The treatment consisted of a combination of medication and graded exposure therapy. The child was prescribed clobazam 5 mg and fluoxetine 10 mg. The child's parents had reported a reduction in anxiety and that the child was perceived as feeling somewhat comfortable after a week of medication. The child was given graded exposure therapy that included writing the word vomitus/vomiting, simulated vomiting by her parents, school attendance and graduated levels of exposure to children at play. More intense activities including smelling the toilet and spinning around were added as progress was made. The authors report that the child improved, but the nature of the improvements were not clearly defined. The study details a traditionally effective approach to the treatment for emetophobia, but some of the treatment outcomes are hard to assess due to the lack of documented symptom changes or emetophobia specific assessments. The lack of separation between the effects of medication and the effects of the exposure therapy makes it difficult to confirm that the exposure therapy was

effective above and beyond the effectiveness of the medication. The one week allocated to assessing the contribution of the medication seems inadequate. Follow-up outcomes were not reported and the effectiveness of the exposure treatment was not assessed after removal of the medication.

In summary, the two case studies with children confirm that emetophobia can be treated at an early age. Unlike the adult case studies, the two child case studies have used medication to support treatment but the contribution of the medication has not been evaluated. None of the current emetophobia symptom severity tools (SPOVI and EmetQ) have been evaluated for children and this may be a limitation in the assessment of treatment effectiveness for children.

***Eye movement Desensitisation and Reprocessing.*** Eye Movement Desensitization and Reprocessing (EMDR) has previously been a controversial approach but has now gained wider acceptance especially in the treatment of PTSD (de Jongh, Ten Broeke, & Renssen; Spector & Read, 1999). De Jong (2012) reported successfully treating a woman with emetophobia using EMDR. The participant was assessed using the DSM-IV-TR diagnostic interview, Mini International Neuropsychiatric Interview 5.0 (D. Sheehan et al., 1998) and was found to have emetophobia and no other comorbidity. The severity of the symptoms was determined using the Dutch Symptom Checklist-90-Revised version (SCL-90-R) (Arrindell & Ettema, 1986). The SCL-90-R identified high scores on the subscales of anxiety, agoraphobia and interpersonal sensitivity. In the absence of a clinical diagnosis of anxiety and agoraphobia, the Dutch SCL-90-R symptom profile for anxiety and agoraphobia may have overlapped with the symptom profile for emetophobia indicating that the SCL-90-R may have poor discrimination between the three conditions of emetophobia, anxiety and agoraphobia. De Jong applied an eight step EMDR protocol. Unlike graduated exposure therapy, this protocol initially focused on the most distressing imagery. De Jong used two

measures to track the strength of imagery; subjective units of distress (1-10) and a validity of cognitions scale (1-10). The operational goal of EMDR is to reduce the vividness and emotional value of the imagery (Lee, 2008). Similarly to CBT approaches, the protocol identified negative self-beliefs, emotions and body sensations. The most controversial element of the EMDR process is the eye movements, while the patient is recollecting feared memories. EMDR is a controversial protocol (Sikes & Sikes, 2003) that has achieved formal recognition as an evidence based treatment (Lee & Cuijpers, 2013). In a recent meta-analysis, Lee and Cuijpers concluded that eye movements in EMDR appear to serve an additional therapeutic function beyond the traditional therapeutic equivalents of exposure, personal mastery, mindfulness and cognitive restructuring that were identified within EMDR protocols. In the fourth treatment session de Jong led the participant through what traditional CBT might refer to as imagery rescripting (Holmes, Arntz, & Smucker, 2007), referred to as 'future template installation' within the framework of EMDR. After the fourth session symptom severity as measured by the SCL-90-R was reduced from a total score of 275 to 121. The final score was within the average range, and did not include high scores in any of the subscales. In an email follow-up three years later the participant reported an absence of violent panic reactions and the ability to participate in work that had a relatively high disgust factor. The clear weakness of the study was the use of an indirect assessment tool (SCL-90-R) to assess emetophobia symptoms. As the author identified, the use of general measures of anxiety and psychopathology as indicators of emetophobia recovery is a weakness of the study. The strength of the study is its indication that the EMDR protocol could be effective for emetophobia with a short treatment duration. De Jong's study highlights that targeting autobiographical memories and imagery rescripting could prove to be a useful target for a non-EMDR intervention.

**Emetophobia treatment study summary.** In summary, the published studies reported indicate that emetophobia is still an under-researched condition. The relatively small number of participants that have been recruited into these studies are likely the result of five factors including: (a) difficulty with clear emetophobia diagnosis, (b) incorrect diagnosis of frequently common comorbid conditions, (c) participant reluctance to seek treatment, (d) relatively low prevalence, and (e) frequent comorbidity of social phobia reducing the likelihood of face-to-face participation. The published case studies provide preliminary support for CBT as an effective therapy for emetophobia. It has been proposed that the supportive CBT data may be a result of a publication bias (Rosenthal, 1979; Veale, 2009). Veale (2009) supports the proposition that some form of exposure therapy, with or without cognitive restructuring, might provide both short- and long-term relief from the severe symptoms of emetophobia. Veale has proposed that in-vivo exposure, exposure in imagination and imagery re-scripting (Holmes, Arntz, et al., 2007) could be effective for people with emetophobia.

The effectiveness of non-exposure techniques proposed by Boschen (2007) such as cognitive restructuring, arousal management, distraction and attention training are less clear. The sample sizes are too small and previous research designs do not lend themselves to identifying the 'active ingredients' in the therapy. The use of a dismantling design that separates the treatment components could assist in identifying which techniques should be included, and in which order (Borkovec & Castonguay, 1998).

Despite initial indications that exposure therapy is efficacious, Lipsitz et al. (2001) reported that in a sample of chronic sufferers of emetophobia, just over half stated they would not be willing to try exposure therapy. To help manage the anxiety associated with exposure therapy, CBT frequently incorporates arousal management and educational sessions, outlining the benefits and addressing the barriers to exposure therapy use. The proposed

CBT emetophobia treatment will include all of these techniques and engage the participant in building a personalised exposure hierarchy.

A comparative review of the participant attributes of the available studies incorporating some form of exposure is shown below in Table 2.2, Table 2.3 and Table 2.4.

Table 2.2

*Study Comparison of Treatment Participant Characteristics Part A*

| | McFadyen (1983) | Philips (1985) | Hunter (2009) | Lesage (1985) | Wijesinghe (1974) |
|---|---|---|---|---|---|
| Sample size | 1 | 7 Split into two groups | 1 | 2 | 1 |
| Avg age | "Late 20's" | 29.9 | Early 40's | 29F, 26M | 24 |
| Female % | 100% | 71% | 100% | 50% | 100% |
| Self reported duration of condition in years | "Since teens" | Unspecified | 30 yrs | Not specified | |
| Average age of onset | | 8.5 years | 7 | NA | |
| Exclusion criteria | Nil | Unspecified | Unspecified | None | |
| Depression | Nil | Average BDI score 10.9 | DASS | Beck depression inventory (1961) | |
| Anxiety | Nil | | Anxiety sensitivity index (ASI; Reiss, Peterson, Gursky, & McNally, 1986). | Institute of personality (Cattell and Scheier 1958, Cattell 1965) and ability anxiety test. | |
| Personality disorder | Nil | | Nil | Nil | |
| Emetophobia classification procedure | No specified | Initial assessment with the Fear Survey Schedule and behavioural approach test | DSM-IV SCID | Not specified. Classification issues with male identified by authors Veale (2009) identifies them as likely to be social phobic | |
| Additional tests | | | Illness Intrusiveness Ratings Scale (IIRS; Devins et al., 1983) | | |

Table 2.3

*Study Comparison of Treatment Participant Characteristics Part B*

| | de Jongh (2012) | Graziano et al. (2010) | Faye (2013) |
|---|---|---|---|
| **Sample size** | **1** | **1** | **1** |
| Avg age | 46 | 11 | 8 |
| Female % | 100 | 0 | 100 |
| Self-reported duration of condition in years | "As long as she could remember" | 7 | .05 |
| Average age of onset | NA | 4 | 8 |
| Exclusion criteria | NA | Nil | Nil |
| Depression | Not recorded | Measured using the Child Depression Inventory (CDI; Kovacs, 1992). Baseline = 43, EOT = 39, F/UP = 42. | NA |
| Anxiety | High | Measured using Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978) Baseline = 58, EOT = 51, F/Up = 55. | Mental state exam self-reported anxious with appropriate affect |
| Personality disorder | NA | NA | NA |
| Emetophobia classification procedure | DSM-IV-TR | Emetophobia Questionnaire (EQ; Bouman & van Hout, in preparation) modified to suit a child. | NA |
| Additional tests | Mini International Neuropsychiatric interview<br>Dutch version of the Symptom Check List SCL-90-R | Behaviour Assessment System for Children–Second Edition (BASC-2; Reynolds & Kamphaus, 2004) | |

Table 2.4

*Study Comparison of Treatment Participant Characteristics Part C*

| | Maack et al. (2013) | Veale et al.(2013) | Ahlen et al. (2015) |
|---|---|---|---|
| Sample size | 1 | 8 | 23 |
| Avg age | 28 | NA | 32.3 (8.1) |
| Female % | 100 | NA | 96 |
| Self-reported duration of condition in years | 17 | NA | 15 (10.6) |
| Average age of onset | 11 | NA | 16<br>(8.4) |
| Exclusion criteria | Nil | NA | Nil |
| Depression | | The Patient Health Questionnaire depression module (PHQ-9; Kroenke et al., 2001) | Montgomery-Asberg Depression RatingScale-self assessment (MADRS-S)<br>14.2 (6.6) 11.5 (7.7) 11.6 (8.1) 9.0 (8.6) |
| Anxiety | Anxiety sensitivity index: ASI-3 (Taylor et al., 2007)<br>Baseline = 34<br>F/Up = 2 | Generalised anxiety disorder assessment (GAD-7; Spitzer et al., 2006) | Beck Anxiety Inventory (BAI)<br>Baseline: 19.2 (11.3)<br>Pre-treatment: 17.0 (9.6)<br>Post-treatment: 13.5 (7.9)<br>F/Up: 10.3 (9.1) |
| Personality disorder | | | NA |
| Emetophobia classification procedure | | SPOVI from 37.4 (SD = 14.1) to post treatment score at 14.4 (SD = 12.5). | Mini-international neuropsychiatric interview (MINI) |
| Additional tests | Mini International Neuropsychiatric interview (D. V. Sheehan et al., 1997)<br>Obsessive Compulsive Inventory – Revised (Foa et al., 2002)<br>Baseline = 12, F/Up = 4<br>Body Vigilance Scale (Schmidt, Lerew, & Trakowski, 1997) | | Client satisfaction questionnaire (CSQ–8) |

**Internet-Delivered Emetophobia Therapies**

The internet is a growing medium for individuals seeking information and treatment for a range of mental health issues. There are currently several specific emetophobia support groups represented online. Some of these provide information (Table 2.5), mailing lists, and forums (Table 2.6) for members to discuss their problems with similarly affected individuals. Limitations of support groups are that they are predominantly coordinated by individuals with a mental illness rather than by trained mental health professionals (Oravec, 2001). There is a risk that improperly administered support groups may assist suffers to consolidate concerns rather than effectively challenge them (Whitlock, Eckenrode, & Powers, 2006). Emetophobia, perhaps due to its relatively small affected population and low public profile, currently has a limited internet presence compared to other mental health concerns, such as anxiety and depression. Current commercial online treatments that offer emetophobia specific treatments appear to be based on approaches that have a poor evidence base, including neuro-linguistic programming (NLP) and hypnosis (Table 2.5). They include the unspecified 'Emetophobia eraser technique' (http://www.emetophobiaeraser.com) which was supported by a companion book based on unscientific ideas such as the "law of attraction" and an audio to facilitate relaxation. The law of attraction is the belief that "like attracts like" which states that positive or negative cognitions and wishes can directly produce positive or negative events (Atkinson, 1997). In a CBT framework this thinking process is termed 'magical thinking' and is a dysfunctional, unscientific thinking style.

The emetophobia treatments listed in Table 2.7 are not interactive and the internet simply provided an alternative delivery mechanism for traditional written, audio CD and DVD material. None of these websites offering internet delivered treatment, identified scientifically substantiated evidence of efficacy for the treatment of emetophobia.

Table 2.5

*Information Websites for Emetophobia*

| Resource | Web Address (URL) | 2013/2015 |
|---|---|---|
| Information | http://www.patient.co.uk/showdoc/276/ | Deleted |
| Information | http://www.gut-reaction.freeserve.co.uk/index.htm | Deleted |
| Information | http://fearofvomiting.co.uk/ | Valid |
| Information | http://psychology.iop.kcl.ac.uk/cadat/patients/vomit-phobia.aspx | Redirected to home university site |
| Information | http://www.phobics-awareness.org/emetophobia.htm | Deleted |
| Information | www.emetophobia.org | Valid |
| Information (Dutch) | http://www.stichtingemetofobie.nl/ | Valid |
| Information | http://www.anxietycoach.com/emetophobia.html | Valid |
| Information | http://www.anxietyuk.org.uk/about-anxiety/anxiety-disorders/emetophobia/ | Updated to https://www.anxietyuk.org.uk/page/emetophobia-vomit-phobia |
| Information | http://www.emetophobiaresource.org/ | Valid |

Originally sourced: 11/10/2013 and updated 19/3/2015

Table 2.6

*Forums, Blogs and Mailing Lists for Emetophobia*

| Resource | Web address (URL) | 2013/15 |
|---|---|---|
| Forum | http://www.emetophobia.org/ | Current |
| Forum | http://emetophobics.proboards.com/index.cgi? and http://emetophobics.proboards83.com/index.cgi | Redirected to http://emetophobics.proboards.com/ |
| Mailing list | http://www.lsoft.com/scripts/wl.exe?sl2=16946&r=769&n=emetophobia@listserv.icors.org | Deleted |
| Forum | http://health.groups.yahoo.com/group/fov/ | Deleted/closed |
| Blog | http://livingwithemetophobia.blogspot.com.au/ | Valid but not updated since April 2013 |
| Blog | http://emetophobiadeconstructed.blogspot.com.au/ | Current |
| Blog | http://emetophobia-struggler.blogspot.com.au/ | Valid but not updated since 2012 |
| Blog | http://www.experienceproject.com/groups/Have-Emetophobia/97800 | Current |
| Blog | http://www.time-to-change.org.uk/blog/living-with-emetophobia | Current |

Originally sourced: 11/10/2013 and updated 19/3/2015

Table 2.7

*Emetophobia Treatment Websites*

| Resource | Web address (URL) | 2013/15 |
|---|---|---|
| Treatment (hypnosis) | http://www.hypnosisdownloads.com/downloads/phobias_fears/emetophobia.html | Current |
| Treatment (NLP) | http://www.phobia-fear-release.com/vomiting-phobia.html | Current |
| Treatment (unspecified) | The emetophobia eraser product at http://fearofvomiting.com | Current |
| | http://www.youtube.com/watch?v=2rbe2yntrcq | Invalid |
| | http://www.emetophobiaeraser.com | Invalid |
| Treatment (hypnosis) | http://www.changingstates.co.uk/hypnotherapy_cd_audio_and_downloads.html | Current |
| Treatment (hypnosis) | http://www.emetophobia.com/ | Current |
| Treatment (Brightlife method) | http://www.fearintopower.com/cured/emetophobia.html | Current |
| Hypnosis | http://www.jamesfroggatt.co.uk/overcoming_phobias/emetophobia_treatment.shtml | Current |
| (NLP?) | http://www.changethatsrightnow.com/emetophobia/ | Current |
| EMDR and exposure kit | http://www.neuroinnovations.com/emetophobia_desensitisation.html | Current |
| Hypnosis | http://www.baysidepsychotherapy.com.au/hypnosis-download/overcome-emetophobia-mp3-recording | Current |

Originally sourced: 11/10/2013 and updated 19/3/2015

At the time of writing there were no scientifically supported internet-based treatments for emetophobia. There were three credible information resources from accredited professionals that included a UK site (http://www.veale.co.uk/resources-support/public-information/vomit-phobia/), a Dutch website (http://www.stichtingemetofobie.nl) and a Canadian website (http://www.emetophobiaresource.org/). These websites provided some emetophobia-specific exposure stimulus material that appears to be a resource for exposure therapy.

In summary, what does exist on the internet to support individuals with emetophobia can be divided into three groups. First, there are a number of support groups, emetophobia specific forums and interactive blogs that enable people with this uncommon condition to recognise shared symptoms in others, and attempt to seek some help. Second, there are information websites with resources available for people with emetophobia. Third, there are a range of therapies that deliver non-interactive content via the internet. There is currently not an internet treatment for emetophobia and the presence of forums, books, ebooks and CD ROMS indicate that there is a desire to address the symptoms of emetophobia. Overall there appears to be a significant demand for an effective online emetophobia treatment program.

## Assessing Comorbidity through Structured Clinical Interviews

The majority of this chapter has been published in Clinical Psychology & Psychotherapy (Sykes, Boschen, et al., 2015). This chapter has been updated with recently published data from Veale et al. (2015).

Emetophobia has been reported to be sometimes difficult to diagnose as the condition presents with features and symptoms that are also seen in obsessive compulsive disorder (OCD), panic disorder (PD), panic disorder with agoraphobia (PDA) and generalised anxiety disorder (GAD; Boschen, 2007; Veale, 2009). To complicate matters further, individuals with emetophobia may also meet full diagnostic criteria for comorbid conditions such as OCD, PD, PDA, GAD and other conditions (van Hout & Bouman, 2012) . In addition to conditions that have a similar appearance to emetophobia, individuals with anxiety disorders also show elevated rates of comorbidity with mood, substance, and personality disorders (Brown & Barlow, 1992).

Comorbidity refers to the co-occurrence of different disorders in the same individual (Kessler, 2001). It is important to identify the presence of other disorders as it is central to both classification and treatment (Brown & Barlow, 1992). Therapeutically, comorbidity has been reported to predict increased treatment costs (Goldsmith, 1999; Souêtre et al., 1994), more chronic course (Schoevers et al., 2005) and increased suicide rates (Johnson et al., 1990). With approximately half of the population in primary care meeting diagnostic criteria for one or more psychiatric disorder (Roca et al., 2009) and approximately 6% in the general population (Kessler, Berglund, Demler, Jin, & Walters, 2005), the problem is a significant issue.

### Previous Research

Two previous studies have attempted to quantify the level of comorbidity in emetophobia using surveys (Lipsitz et al., 2001; van Hout & Bouman, 2001). Recently two

studies have explored comorbidities using treatment samples. The surveys will be addressed first as they have the largest samples.

**Online Surveys.** In both surveys the researchers targeted people who self-identified as having emetophobia via a specialist emetophobia internet forum group. van Hout and Bouman also included a randomised community sample group gathered via mailout to randomly generated addresses.

The rates of comorbid diagnoses in these two previous studies are shown in Table 3.1. These indicate that as the severity of the vomiting fear increases the rate of comorbidity increases. Participants who self-identified as having a fear of vomiting had higher comorbidity rates for all measured conditions compared to a non-vomit fearful community sample (van Hout & Bouman, 2011). Individuals recruited from an internet emetophobia forum reported higher comorbidity rates than a community sample that identified the same vomiting fear. With the exception of depression, the comorbidity rates reported by van Hout and Bouman are higher than the results of Lipsitz et al. The difference in comorbidity rates may be due to the different assessment methods.

Table 3.1

*Axis-1 disorders in the community and vomit fearful populations*

| | Lipsitz et al. (2001) | van Hout & Bouman (2012) | | | Kessler et al. (2012) | (Veale et al., 2015) |
|---|---|---|---|---|---|---|
| Sample Source | Internet Emetophobic | Community Controls | Community Vomit-Fearful | Internet Vomit-Fearful | Community Epidemiological | Clinic Emetophobic |
| Sample Size | *N* = 56 | *N* = 156 | *N* = 15 | *N* = 19 | *N* = 5,223 | *N* = 85 |
| Diagnostic Method | Self-Reported Diagnosis | Psychiatric Diagnostic Screening Questionnaire | | | NCS-R interview | SCID |
| Prevalence | Lifetime prevalence | Point-Prevalence | | | 12 Month | Point prevalence |
| Diagnosis | | | | | | |
| Specific Phobia | 30% | - | - | - | 10.1% | |
| Panic Disorder | 40%* | 7.1% | 20.0% | 52.6% | 3.1%* | 1.2% |
| Agoraphobia | | 5.8% | 20.0% | 84.2% | 1.7%** | 1.2% |
| SocAD | 21% | 12.2% | 19.5% | 63.2% | 8.0% | 4.8% (includes anxiety) |
| OCD | 18% | 2.6% | 26.7% | 31.6% | 1.3% | 12% |
| GAD | - | - | - | - | 2.9% | |
| PTSD | - | - | - | - | 4.4% | 1.2 |
| AD-NOS | - | - | - | - | - | |
| Hypochondriasis | - | 5.8% | 7.9% | 26.3% | - | |
| Dysthymia | - | - | - | - | - | |
| Depression | 46% | 2.6% | 13.3% | 21.1% | 9.3% | 7.2% |
| Bipolar | - | - | - | - | 1.7% | |
| BDD | - | - | - | - | - | |
| SomatDis | - | - | - | - | - | |
| Eating disorder | | | | | | 2.4% |

* Includes individuals with Panic Disorder and/or Agoraphobia.
** Includes individuals with or without a history of panic disorder.
*Note.* AD-NOS = Anxiety Disorder Not Otherwise Specified, BDD = Body Dysmorphic Disorder, Bipolar = Bipolar Mood Disorder, Dysthymia = Dysthymic Disorder, OCD = Obsessive-Compulsive Disorder, PTSD = Post-Traumatic Stress Disorder, SCID = Structured Clinical Interview for DSM-IV, SocAD = Social Anxiety Disorder, SomatDis = Somatoform Disorder

When compared with larger scale epidemiological research, Table 3.1 shows that the prevalence of comorbid conditions in emetophobia was higher than that observed in the general population (Kessler et al., 2012). The comorbid conditions of social anxiety disorder and depression are approximately twice as common in vomit fearful groups, compared to the general population. In the clinical population the estimates rise to almost an eightfold increase for social anxiety disorder and a doubling for depression.

Three limitations of the previous research were assessment tool validity, sample size and participant bias. van Hout and Bouman's (2012) comorbidity rates were based on an unpublished Dutch translation of the Psychiatric Diagnostic Screening Questionnaire (Arrindell, 2004). This is a self-report questionnaire used to assess for the presence of common DSM-IV Axis I disorders. The van Hout and Bouman assessment tool validity can be cross checked by comparing their control community incidence with the Kessler et al. (2012) epidemiological sample of 5,223 individuals as the two should be similar. With the exception of depression the comorbidity rates reported by van Hout and Bouman are substantially higher than would be expected, indicating either that the Dutch version of the PDSQ has different psychometric qualities or that the American and Dutch anxiety and depression prevalence rates are dissimilar. The assessment tool used by Lipsitz et al. (2001) was based on an unpublished 29 item self-reported questionnaire that has an unknown diagnostic validity. In both studies the validity of the comorbidity rates are uncertain.

Both emetophobia studies had relatively small sample sizes ($N$ = 19 - 56) and therefore small variations in the sample could disproportionally influence comorbidity rates. In addition the selection of the participants from a specialist internet support group may attract individuals whose condition is more severe than those individuals with a vomit phobia that have not sought external support. The current study will attempt to quantify the point prevalence Axis I comorbidity rates for individuals with emetophobia.

**Non-internet Samples.** Comorbidity data based on a clinical sample of 83 has been recently published (Veale et al., 2015). The source for the study was based on a review of case notes from structured clinical interviews. Veale et al. (2015) reported that hypochondriasis and GAD were probably under-represented. The primary author is also a specialist in eating disorders and identified only two individuals (2.4%) with this condition. In addition 2.4% were found to have a personality disorder which was not measured for this Axis-1 inventory. One of the key advantages of the Veale et al. study was the use of a non-internet sourced clinical sample which provided an opportunity to compare the two sample groups.

## Method

### Participants

A total of 64 adults (55 females, 9 males), aged 19–63 years ($M$ = 32.2, $SD$ = 8.1) participated. There were 40 (63%) living in North America, 7 (11%) in Australia, 10 (16%) in the United Kingdom, 4 (6%) in Canada, with the remaining 3 (5%) in Ireland, Romania and New Zealand. The participants identified as 42 (56.6%) employed, 10 (15.6%) homemakers, 9 (14.1%) students, 2 (3.1%) on sick-leave and 1 (1.6%) unemployed.

### Measures

***Structured Clinical Interview for DSM-IV Axis I Disorders*** (SCID-I; First, Spitzer, Gibbon, & Williams, 1997). The SCID-I is a structured clinical interview that is used to assess the DSM-IV-TR Axis I diagnosis at a particular point in time. DSM-IV-TR Axis I disorders include all psychological diagnostic categories except personality disorder and mental retardation. The SCID-I has been found to have moderate to excellent inter-rater agreement of Axis I disorders (Lobbestael, Leurgans, & Arntz, 2011). The SCID-I, which was administered via Skype, took approximately 90 – 120 minutes to administer.

***NetSCID.***NetSCID is an online electronic scoring application for the SCID-I (First, et al., 1997) developed by TeleSage (2011) in collaboration with First. It has not been separately

evaluated for reliability. For each Axis I disorder the interviewer posed set of questions that were prompted by NetSCID and after responses from the participant the interviewer used clinical judgement to rate a 3-point scale (absent, subthreshold or threshold). The ratings determined a decision tree interview path and on conclusion of the interview NetSCID summarised the clinical diagnosis.

### Procedure

Participants were recruited from members of an international emetophobia forum community and from the wider public using paid web based advertising in exchange for a free online emetophobia treatment program. The participants self-identified as having a fear of vomiting and at the commencement of treatment participants were asked to complete an optional telephone/videoconference structured clinical assessment as part of the induction phase. Sixty-four participants agreed to a structured clinical interview. There were no stated inclusion or exclusion criteria for the treatment except a minimum age of 18 years. The interview was conducted by a registered psychologist and was guided and coded using the online NetSCID application.

The study was approved by Griffith University's Human Research Ethics Committee (PSY/14/11/HREC) and conforms to the provisions of the Declaration of Helsinki (as revised in Edinburgh 2000). Subjects gave informed consent.

## Results

Point prevalence rates for Axis I disorders based on structured clinical interviews are shown in Table 3.2.

Table 3.2

*Axis-1 disorders in the community and vomit fearful populations including the current study*

| | Lipsitz et al. (2001) | van Hout & Bouman (2012) | | | Kessler et al. (2012) | (Veale et al., 2015) | Current Study |
|---|---|---|---|---|---|---|---|
| Sample Source | Internet Emetophobic | Community Controls | Community Vomit-Fearful | Internet Vomit-Fearful | Community Epidemiological | | Internet SPOV |
| Sample Size | *N* = 56 | *N* = 156 | *N* = 15 | *N* = 19 | *N* = 5,223 | *N* = 85 | *N* = 64 |
| Diagnostic Method | Self-Reported Diagnosis | Psychiatric Diagnostic Screening Questionnaire | | | NCS-R interview | SCID | |
| Prevalence | Lifetime | Point prevalence | | | 12 Month | Point prevalence | Point |
| Diagnosis | | | | | | | |
| Specific Phobia | 30% | - | - | - | 10.1% | | - |
| Panic Disorder | 40% [a] | 7.1% | 20.0% | 52.6% | 3.1% [a] | 1.2% | 12.5% [a] |
| Agoraphobia | | 5.8% | 20.0% | 84.2% | 1.7% [b] | 1.2% | |
| SocAD | 21% | 12.2% | 19.5% | 63.2% | 8.0% | 4.8% (includes anxiety) | 7.8% |
| OCD | 18% | 2.6% | 26.7% | 31.6% | 1.3% | 12% | 12.5% |
| GAD | - | - | - | - | 2.9% | | 28.1% |
| PTSD | - | - | - | - | 4.4% | 1.2 | 1.6% |
| AD-NOS | - | - | - | - | - | | 9.4% |
| Hypochondriasis | - | 5.8% | 7.9% | 26.3% | - | | 12.5% |
| Dysthymia | - | - | - | - | - | | 3.1% |
| Depression | 46% | 2.6% | 13.3% | 21.1% | 9.3% | 7.2% | 7.8% |
| Bipolar | - | - | - | - | 1.7% | | 0.0% |
| BDD | - | - | - | - | - | | 1.6% |
| SomatDis | - | - | - | - | - | | 7.8% |
| Eating disorder | | | | | | 2.4% | |

[a] Includes individuals with Panic Disorder and/or Agoraphobia.
[b] Includes individuals with or without a history of panic disorder.

Comorbidity rates for panic disorder, OCD and GAD were higher than the 12 month prevalence rates found in the Kessler et al. (2012) epidemiological study. PTSD, major depressive disorder and bipolar rates were lower than the epidemiological sample. Panic disorder, social anxiety disorder, OCD and depression (in total) were all lower in the Kessler et al. epidemiological study when compared to the studies of both Lipsitz (2001) and van Hout and Bouman (2012). The level of hypochondria in the current study was about half of that reported by van Hout and Bouman.

**Discussion**

The results in general support the hypothesis that individuals with emetophobia have higher DSM-IV-TR Axis I comorbidity rates than would be expected in the general population. The odds-ratio shown in Table 3.2 highlights that PTSD and bipolar disorder are lower than would be expected compared to the Kessler et al., (2012) epidemiological sample. This could reflect self-selection for a treatment program, random variation due to the small SCID sample size ($N = 64$) and small under-reporting of the point prevalence measure compared to the 12-month prevalence sample measure.

The results show that previous self-reported rates are substantially higher than the clinician assessed rates. The reasons for the lower comorbidity rates may include, first, relatively high levels of hypochondriasis that may inflate self-reported measures compared to an independent SCID assessment. Second, some of the emetophobia symptoms closely overlap between DSM-IV-TR Axis I conditions. The previous online studies' self-assessment measures appear to be more additive than discriminatory compared to a structured clinical interview. The face-to-face assessments by Veale et al. (2015) were completed by skilled professionals rather than as a battery of questionnaires and are likely to show greater clinical discrimination. Like the EmetStudy results Veale's comorbidity rates are much lower than the online self-assessment measures. The prevalence for common comorbidities such as

depression and OCD were replicated in the Veale et al. study, supporting the argument that the internet estimations were high. Anxiety related conditions are higher in the EmetStudy sample compared to the Veale et al. sample especially in the comorbid diagnosis of GAD. Further research is needed to replicate the relatively high prevalence of GAD.

The core limitations in this study were similar to previous studies with a limited sample size and non-randomised sample. In particular the recruitment of subjects predominately from an internet forum group can introduce systematic bias into the sample. The relative rarity of the condition makes it difficult to access a broad cross-section of affected individuals. Future research should significantly increase sample size and seek a representative sample by drawing participants from a wider clinical sample than the internet. Future emetophobia treatment studies may investigate the impact comorbidity has on initial severity, quality of life and treatment outcome. The community sample recruitment methodology used by van Hout and Bouman has likelihood of bias and a mail out of 4,700 letters would be required for a comparative vomit fearful group.

The results carry several important implications for the understanding of emetophobia. First, 41% (26) of participants in the current study and 71% (59) for Veale et al. (2015) study showed no other comorbidity and this indicates that the diagnosis of emetophobia is more than a set of overlapping symptoms but a distinct condition in its own right. Second, the results indicate that people with emetophobia have high levels of comorbid conditions such as panic disorder, social anxiety disorder, OCD, depression and hypochondriasis. Finally, individuals with emetophobia might be significantly more likely to experience other DSM-IV Axis-I disorders than people in the general population. These results suggest that clinicians should routinely investigate the presence of additional comorbid disorders when a diagnosis of emetophobia is present. The long term outcomes for individuals with emetophobia comorbid conditions have not been reported but the early identification of individuals with a complex

presentation may help prioritise treatment plans (Boschen and Oei, 2008) and assist in reducing the likely risks of increased treatment costs and chronicity. The structured clinical interviews discussed in this chapter indicate that individuals with emetophobia have comorbidity rates for axis-1 disorders that are higher than the general population but lower than previously reported. The next chapter explores two new instruments developed to assess aspects of emetophobia: a measure of gastro-intestinal sensitivity (GISQ) and a measure of emetophobia cognitions (EmetCog), to evaluate whether these are reliable tools for the assessment of emetophobia.

## Psychometric validation of the GISQ and EmetCog

Currently there are two psychometrically validated emetophobia assessment tools available. These are the Emetophobia Questionnaire (EmetQ: Boschen et al., 2013) and the Specific Phobia of Vomiting Inventory (SPOVI: Veale, Ellison, et al., 2013). Each has acceptable reliability and validity in the assessment of emetophobia (Boschen et al., 2013; Veale, Ellison, et al., 2013). Two new measures; the Gastrointestinal Sensitivity Questionnaire (GISQ) and the Emetophobia Cognitions (EmetCog) scales were developed to assess specific aspects of the fear of vomiting that were not addressed by either the SPOVI or the EmetQ.

The EmetCog was constructed to specifically evaluate only the cognitive component of emetophobia and the GISQ was constructed to assess gastro-intestinal sensitivity in individuals with emetophobia. These measures were also used to assess the Boschen (2007) model of emetophobia (Chapter 10). The Boschen model highlights the role of cognitions in maintaining emetophobia symptoms and the EmetCog was targeted to assess this dimension. The Boschen model emphasises the strong role that gastrointestinal sensitivity plays in the maintenance of emetophobia and a decrease in gastrointestinal sensitivity was expected after treatment. This chapter described the development of these measures and explores their validity and reliability.

## Method

### Participants

Two groups of participants took part in the evaluation of the GISQ and the EmetCog; treatment registrants and a control group of university students. The recruitment of participants who were seeking treatment for emetophobia was common to the main treatment program and is described in detail in Chapter 5. Briefly, the initial treatment sample consisted of 498 participants ($N$ = 428 waitlist, 70 Pilot) ($F$ = 453, $M$ = 45) who successfully completed the primary test measure (EmetQ) in a group of 6 assessments. Not all of these participants

completed an EmetCog (N = 386, 77.5%) and a GISQ (N = 384, 77.1%). The control group consisted of 119 undergraduate psychology students (F = 93, M = 26) from Griffith University who were recruited for the assessment of the GISQ and the EmetCog. Students volunteered to complete a set of six questionnaires for course credit. The mean age of the student group was 23.8 years (*SD* = 9.0 years). The students were directed to a similar website as treatment participants and completed all assessments using the same user interface.

Incomplete assessments resulted in the GISQ being completed by 343 treatment participants (F = 316, M = 27). The mean age of the GISQ treatment sub-sample was 28.9 years (*SD* = 8.3 years). Students completed 112 GISQ assessments (F = 87, M = 25). The mean age of the students for the EmetCog sample was 18.3 years (*SD* = 6.4).

Incomplete assessments resulted in the EmetCog being completed by 288 treatment participants (F = 262, M = 26). The mean age of the EmetCog treatment sub-sample was 28.5 years (*SD* = 7.9 years). Students completed 74 EmetCog assessments (F = 57, M = 17). The mean age of the students for the EmetCog sample was 23.9 years (*SD* = 9.1).

The treatment and the control group used in the study differed in their employment status. There were 92.1% (261) of treatment registrants identified as employed compared to 8.0% of students. The control and treatment groups differed in employment ratios, $\chi^2(4, N = 362) = 61.2$, $p < .001$ .

There were 74% of the participants in the treatment group were in a relationship and of these 45.8% (*N* = 132) were married or cohabiting. In the student group who were younger, 45% were in a relationship, with 18.9% (*N* = 14) married or cohabiting. The difference was significant, $\chi^2(2, N = 362) = 17.8$, $p < .001$.

The educational level of the treatment and control group was unexpected with the treatment group being better educated than the younger university undergraduates (controls). The treatment and control groups both had a high level of education but the older treatment

group had completed more years of education than the control group, $\chi^2(2, N = 355) = 40, p < .001$. The treatment group reported an advanced level of education in 59.6% ($N = 170$) of cases, compared to 20.0% ($N = 14$) of the control group.

**Materials**

The materials can be divided into two main types: Emetophobia specific assessment tools and non-emetophobia questionnaires. The validated emetophobia assessment tools included the EmetQ (Boschen et. al, 2013) and the SPOVI (Veale et al., 2013). Emetophobia tools under development included the GISQ and the EmetCog. The non-emetophobia questionnaires included the DASS-21 (Henry & Crawford, 2005), the Subjective Units of Distress Scale (SUDS;Wolpe, 1969, 1990), WHOQoL (Murphy, Herrman, Hawthorne, Pinzone, & Evert, 2000) and the Structured Clinical Interview for DSM-IV Axis I Disorders, (SCID-I; Spitzer, Williams, Gibbon, & First, 1992).

**Established Emetophobia Specific Questionnaires (EmetQ).**The EmetQ (Boschen et al., 2013) is a self-report emetophobia questionnaire with 13 questions. The response scale uses a five-point Likert-type scale, extending from 1 (“Strongly Disagree) to 5 (“Strongly Agree”). The questions can be grouped into three factors; the avoidance of travel and places, the avoidance of exposure to vomit stimuli, and the avoidance of others who may vomit. Examples questions are shown in Table 4.1.

Table 4.1

*EmetQ: Three Factor Examples*

| Factor | Example |
|---|---|
| 1 | I avoid air travel because I may become nauseous/vomit |
| 2 | If I see vomit, I may be sick myself |
| 3 | I avoid adults who may be likely to vomit |

The EmetQ was based on the EmetQ-21 which was developed by Boschen and Riddell (2005). The validity of the EmetQ was based on a sample of 95 individuals with emetophobia. The total scale score has good internal consistency (Cronbach's α= .82) and the test-retest reliability of the total scale was .76 over three month period. The test-retest reliability of the three subscales was .79, .76 and .63 over the same period. Boschen and colleagues (2013) concluded that the EmetQ showed concurrent validity with the SPOVI, the disgust scale (DS-R) (Olatunji et al., 2007) and the Health Anxiety Inventory (Salkovskis, Rimes, Warwick & Clark, 2002). Tests of convergence identified that when all three factors were combined the greatest correlation of the EmetQ was with the Work and Social Adjustment Scale (WSAS) (WSAS: Mundt, Marks, Shear, & Greist, 2002) ($r$ = .50) and the weakest correlation was with disgust sensitivity (Olatunji et al., 2007) ($r$ = .33).

***The Specific Fear of Vomiting Inventory*** (SPOVI; Veale et al., 2012) is an emetophobia self-report questionnaire based on a 15 question unpublished vomit phobia questionnaire. The original 15 item questionnaire was based on cognitions and behaviours based on interviews from previously reported studies including Veale and Lambrou (2006) and K. Price et al. (2012). The SPOVI has 14 brief questions employing a five-point Likert-type scale ranging from 0 (not at all) to 4 (all the time). Two factors were identified, with the first factor representing avoidance behaviour and the second representing threat monitoring and control of symptoms (see Table 4.2). The scale is generally used as a single unidimensional measure. The Cronbach's α was reported as .91 ($N$ = 95) for a clinical sample and .81 for a community sample ($N$ = 90).

Table 4.2

*SPOVI: Two Factor Examples*

| Factor | Example |
|---|---|
| 1 | I have been avoiding adults or children because of my fear of vomiting |
| 2 | I have been feeling nauseous |

Tests of convergence identified that both SPOVI factors showed a strong correlation with health anxiety (HAI: Salkovskis, Rimes, Warwick, & Clark, 2002) (Factor 1: $r$ = .76, Factor 2: $r$ = .76) and were least correlated with disgust sensitivity (Olatunji et al., 2007) (Factor 1: $r$ = .35, Factor 2: $r$ = .34). The WSAS correlated in a similar range to the EmetQ (Factor 1: $r$ = .51, Factor 2: $r$ = .44). In studies using the SPOVI a total scores which combines both factors has been reported (Veale et al., 2012).

***SPOVI and EmetQ comparison.*** The SPOVI and the EmetQ both assess the severity of emetophobia symptoms. There are some similarities between the two scales. The two factors of the SPOVI are 'avoidance behaviour's and 'threat monitoring and control of symptoms'. In contrast the three factors in the EmetQ each assess a different aspect of avoidance (travel/places, vomit and avoidance of others). A close inspection of the items in factor 2 of the SPOVI 'threat monitoring' shows that all the items are vomit related and are therefore conceptually close to factor 2 of the EmetQ 'vomit avoidance'. Both the SPOVI and the EmetQ have an avoidance factor (travel\places\general) and a vomit specific avoidance factor. This indicates that the two assessment tools have slightly different factor structures but are measuring similar symptoms. The correlation between the SPOVI and the EmetQ has not been reported but as they address similar concerns are likely to be moderately correlated with each other.

**Non-Emetophobia Questionnaires.**

***Depression Anxiety and Stress Scale*** (DASS-21; Henry & Crawford, 2005). The DASS-21 is a 21-item self-report questionnaire designed to measure depression, anxiety and stress. In completing an item, the subject assesses the presence of a symptom within the last week and scores the item from 0 (did not apply to me over the last week) to 3 (applied to me very much or most of the time over the last week). In a sample of 1,794 student participants, the authors concluded that the DASS-21 subscales can be validly used to measure depression, anxiety, and stress (Henry & Crawford, 2005). Internal consistency, Cronbach alpha for the depression scale is .88 (95% CI = .87-.89) the anxiety scale .82 (95% CI = .80-.83) and .90 (95% CI = .89-.9I) for the stress scale (Henry & Crawford). The Cronbach alpha for the total scale was .93 (95% CI = .93-.94). Norton (2007) reported that the DASS has good reliability for American, Hispanic, British and Australian adults. Oei et al. (2013) and Wood et al. (2010) conclude that the DASS-21 is "psychometrically sound, with good reliability and validity" (Wood et al., 2010, p1019).

The DASS-21 scale has been challenged primarily for the validity of its three factor structure. Henry and Crawford (2005) found evidence for a general dimension of psychological distress which the dimensions of depression, anxiety, and stress all share. The evidence for the factor structure is mixed with Osman et al. (2012) in two studies that totalled 1297 non-clinical participants argued for the rejection of the three factor model and proposed that the evidence generally supported a single factor model. Willemsen, Markey, Declercq, and Vanheule (2011) confirmed the three factor model in a sample of 677 non-clinical adolescents. In the current study, depression, anxiety and stress will be treated separately.

***Subjective Units of Distress Scale*** (SUDS; Wolpe, 1969, 1990) (Wolpe, 1969, 1990) assesses an individual's subjective perception of relative distress. The scale typically starts at 0 and has a maximum value of 10 or 100. In the current study, SUDS scores ranged from 0 (no

distress) to 10 (maximum level of distress). Participants rated their SUDS both before and after the exposure to vomit fear related stimuli on a sliding scale graphically represented on a phone or a computer screen. Kaplan et al. (1995) has argued that high correlations of the SUDS scale with the State form of the State Trait Anxiety Inventory are evidence of the scale's concurrent validity. Kim et al. (2008) replicated and extended Kaplan's finding in a treatment group ($N$ = 61) finding that the SUDS scale was associated with a participant's current level of depression and anxiety as measured by the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and State Anxiety Inventory (SAI) (Spielberger, Gorsuch, & Lushene, 1970).

***World Health Organization Quality of Life Questionnaire*** *(WHOQoL-BREF).* The WHOQoL-BREF (Skevington et al., 2004) is a 26-item scale, based on the larger 100-item WHOQoL-100 (Power, Bullinger, & Harper, 1999). Both are designed as quality of life self-assessment measures intended to be culturally sensitive and comparable across cultures (Murphy et al., 2000; O'Carroll, Smith, Couston, Cossar, & Hayes, 2000). The Australian version of the WHOQoL-BREF contains 26 items and the questions are scored into four domains: physical health, psychological health, social relationships and environmental health (Murphy et al., 2000). A large study of 11,830 participants in 23 countries concluded that the WHOQoL-BREF has good to excellent psychometric properties of reliability and validity (Skevington et al., 2004). The four dimensions are highly correlated with each other and this has been interpreted as reflecting a single quality of life dimension (Wang, Yao, Tsai, Wang, & Hsieh, 2006). The internal consistency measured by Cronbach's α was reported as acceptable for three of the four dimensions (physical = .82, psychological = .81, and environment = .80). Social relationships were found to show marginal internal consistency with α = .68 (Skevington et al., 2004).

The WHOQoL-BREF scores were scaled to the WHOQoL-100 based on the formula from the user manual and interpretation guide (Murphy et al., 2000). Using this method the raw WHOQoL-BREF scores were translated into relative percentile rankings on each of the four domains.

Two new measures – the EmetCog and GISQ – were developed. The pool of questions for the EmetCog and the GISQ were generated on the cognitive behavioural model of emetophobia (Boschen, 2007) and additional material based on therapist experience with emetophobia patients. An initial pool of 31 questions was generated for the EmetCog and 12 questions for the GISQ. Both questions used a Likert-type scale from 1 to 5 (Strongly disagree, disagree, unsure, agree and strongly agree) in the same manner as the EmetQ.

### Procedure

Treatment participants registered with EmetStudy after agreeing to the terms and conditions. Users were then sent an email to complete the initial assessment set of six tests that included the four emetophobia scales, the DASS-21 and the WHOQoL. Treatment seeking participants registered using the domain emetstudy.org and Students who acted as controls registered using a subdomain survey.emetstudy.org. Each assessment took approximately 90 – 120 minutes to administer. Student participants were asked to complete the same standard set of EmetStudy assessments in the same order as Main Study treatment participants. The student participants used the same user interface to complete all assessments in the one session.

## Results

### EmetCog

**Factor Analysis and Data Cleaning.** A total of 428 participants had completed a valid EmetCog test, a valid EmetQ assessment and had attempted treatment. The factor analysis was conducted using the 428 treatment participants. All statistical analyses were conducted using SPSS 22.0. Initial inspection of the distributions of items and the correlations between them

revealed three items with negligible correlations with all other items on the scale. These items ("If I were to vomit while alone, that would be terrible", "If I were to vomit in public, that would be terrible" and "If I were to vomit in public, I would rather die") were excluded from further analysis, leaving a total of 28 items.

Table 4.3

*Original EmetCog Questionnaire*

| Item | Statement | *M* | *SD* |
|---|---|---|---|
| (1) | If I were to vomit while alone, that would be terrible. | 3.64 | 1.47 |
| (2) | If I were to vomit in public, that would be terrible. | 4.78 | 0.62 |
| (3) | If I were to vomit in public, I would rather die. | 3.35 | 1.50 |
| (4) | If I see or smell vomit, I will get nauseous or vomit. | 3.70 | 1.20 |
| (5) | If I get anxious or worried, I will get nauseous or vomit. | 3.30 | 1.36 |
| (6) | If I get a headache or pain, I will get nauseous or vomit. | 2.58 | 1.26 |
| (7) | If I eat food close to the used-by date, I will get nauseous or vomit. | 3.03 | 1.37 |
| (8) | If I eat leftovers, I will get nauseous or vomit. | 2.61 | 1.38 |
| (9) | If I eat certain foods, I will get nauseous or vomit. | 3.26 | 1.38 |
| (10) | If I drink alcohol, I will get nauseous or vomit. | 3.24 | 1.40 |
| (11) | I think I get nauseous or vomit more than the average person. | 3.25 | 1.57 |
| (12) | If I worry, I will get nauseous or vomit. | 3.14 | 1.44 |
| (13) | It is best to avoid places like bars/pubs where there are people who may vomit. | 3.35 | 1.38 |
| (14) | It is best to avoid places like hospitals where there are people who may vomit. | 3.95 | 1.25 |
| (15) | It is best to avoid places like hospitals where I may catch germs. | 3.83 | 1.33 |
| (16) | It is best to avoid places like hospitals where I may catch an illness that will make me vomit. | 3.97 | 1.33 |
| (17) | It is best to avoid some forms of transport (e.g., air travel, sea travel) because I may vomit. | 3.61 | 1.38 |
| (18) | It is important to monitor myself for any feelings of nausea. | 3.97 | 1.19 |
| (19) | It is important to avoid vomiting at all costs. | 4.63 | 0.85 |
| (20) | It is important to keep myself and my environment clean to avoid nausea or vomiting. | 4.02 | 1.24 |
| (21) | It is best to avoid certain foods to reduce risk of feeling nausea or vomiting. | 3.92 | 1.32 |
| (22) | It is best to avoid crowded places where I may catch germs. | 3.30 | 1.38 |
| (23) | It is best to avoid crowded places where there are people who may vomit. | 3.70 | 1.37 |
| (24) | It is dangerous to vomit. | 2.91 | 1.52 |
| (25) | If I vomited, this would indicate a serious medical problem. | 2.17 | 1.26 |
| (26) | If I vomited, this would mean that I am likely to be sick for a while. | 3.43 | 1.37 |
| (27) | If I vomited, I could choke or be unable to breathe. | 2.65 | 1.45 |
| (28) | If I vomited, I may vomit for a long time. | 3.78 | 1.32 |
| (29) | I worry about nausea or vomiting. | 4.80 | 0.61 |
| (30) | I cannot control my worry about nausea and vomiting. | 4.55 | 0.80 |
| (31) | I am constantly on guard for things that may make me nauseous or vomit. | 4.42 | 1.05 |

**EmetCog exploratory factor analysis.** The aim of the analysis was to extract the factors that define the cognitive components of emetophobia. The expectation was that the analysis would yield a three factor solution similar to the EmetQ, or a two factor solution of the SPOVI. This expectation was based on the idea cognitions of emetophobia may have specific relationships with clusters of emetophobia symptoms.

The criteria for item exclusion during factor analysis were consistent with those used by previous authors (including Boschen et al., 2013) in the development of the EmetQ-13, including factor loadings on a single factor of .4 or above, an item communality of greater than .3, with no item loading at more than .4 on more than one factor, or showing complex loadings across factors. Initially a three-factor solution was produced using Principal Components Analysis (PCA) with a Varimax rotation using a fixed number of factors. Following this solution four items were excluded (see Table 4.4). In the second iteration, one further item was excluded because of generally but similar loading across all three factors. In the third iteration a further two items were excluded, because of low communalities and low item loading. In the final solution, there were 21 items satisfying the criteria for inclusion.

Table 4.4

*EmetCog Factor Reduction*

| Iteration | Items | Items eliminated |
|---|---|---|
| 1 | 28 | I cannot control my worry about nausea and vomiting (Q30) [a] |
| | | It is important to monitor myself for any feelings of nausea (Q18) [b] |
| | | It is best to avoid certain foods to reduce risk of feeling nausea or vomiting (Q21) [b] |
| | | It is important to keep myself and my environment clean to avoid nausea or vomiting (Q20) [b] |
| 2 | 24 | I am constantly on guard for things that may make me nauseous or vomit (Q31) [c] |
| 3 | 23 | It is important to avoid vomiting at all costs (Q19) [a] |
| | | I worry about nausea or vomiting (Q29). [a, d] |
| 4 | 21 | |

[a] Communality < .30
[b] Item had high factor loadings on multiple factors.
[c] Poorly discriminating has similar loadings across all factors.
[d] no loading greater than .4 in rotated matrix

In the final solution, the Kaiser Meyer Olkin measure of sampling adequacy, 0.86, with all items also achieving sampling adequacy between 0.78 and 0.95 demonstrating good sampling adequacy for factor analytic procedures (Tabachnik & Fidell, 2013). Overall 54.3% of the variance was accounted for by the solution. In the Varimax rotation, Factor 1 (causal worry) had 10 items describing beliefs about the causes of vomiting and accounted for 20.8% of the variance. Factor 2 (places and people) consisted of 6 items describing beliefs about places where people are likely to vomit or pass on germs associated with vomiting. Factor 2 accounted for 19.4% of the variance. Factor 3 (consequences of vomiting) consisted of 5 items assessing beliefs about the perceived consequences of vomiting and accounted for 14.1% of the variance. Table 4.5 shows the factor loadings for the items in the final solution. The three factor solution appeared to have consistency across the items in each factor and was consistent with the three factor solution from the EmetQ.

***Internal consistency.*** The Cronbach's α of the 10 items of Factor 1 was .87, Factor 2, .87 and Factor 3, .79. Cronbach's α for the overall scale was.89 ($N$ = 428).

Table 4.5

*EmetCog Factor Loadings*

| Item | Factor 1 | Factor 2 | Factor 3 | Comm. |
|---|---|---|---|---|
| If I get anxious or worried, I will get nauseous or vomit | .80 | .02 | .15 | .66 |
| If I worry, I will get nauseous or vomit. | .78 | -.03 | .17 | .64 |
| I think I get nauseous or vomit more than the average person. | .74 | -.07 | .08 | .56 |
| If I get a headache or pain, I will get nauseous or vomit | .68 | .13 | .13 | .50 |
| If I eat certain foods, I will get nauseous or vomit | .64 | .27 | .23 | .54 |
| If I eat leftovers, I will get nauseous or vomit. | .56 | .30 | .23 | .46 |
| If I eat food close to the used-by date, I will get nauseous or vomit | .55 | .30 | .27 | .46 |
| If I drink alcohol, I will get nauseous or vomit | .55 | .33 | .19 | .45 |
| If I see or smell vomit, I will get nauseous or vomit | .53 | .14 | -.06 | .31 |
| It is best to avoid some forms of transport (e.g., air travel, sea travel) because I may vomit. | .47 | .36 | .09 | .36 |
| It is best to avoid places like hospitals where there are people who may vomit. | .06 | .81 | -.02 | .66 |
| It is best to avoid places like hospitals where I may catch germs | .13 | .81 | .12 | .68 |
| It is best to avoid places like hospitals where I may catch an illness that will make me vomit | .19 | .78 | .20 | .69 |
| It is best to avoid crowded places where there are people who may vomit | .06 | .74 | .06 | .56 |
| It is best to avoid crowded places where I may catch germs. | .19 | .72 | .23 | .61 |
| It is best to avoid places like bars/pubs where there are people who may vomit | .14 | .64 | .03 | .43 |
| If I vomited, this would indicate a serious medical problem. | .19 | .11 | .75 | .61 |
| It is dangerous to vomit. | .09 | .12 | .74 | .57 |
| If I vomited, I could choke or be unable to breathe | .04 | -.11 | .72 | .54 |
| If I vomited, I may vomit for a long time. | .25 | .19 | .68 | .57 |
| If I vomited, this would mean that I am likely to be sick for a while | .21 | .26 | .67 | .55 |
| Variance accounted for | 20.8% | 19.4% | 14.1% | |
| Internal consistency (α) | .87 | .87 | .79 | |
| Mean | 31.75 | 22.10 | 14.93 | |
| SD | 9.23 | 6.24 | 5.10 | |
| Overall scale = .89 | *M* = 68.69, *SD* = 16.23 | | | |

Comm. is the proportion of the variance accounted for in each item.

Table 4.5 shows the subscales and a total score on the emetophobia scale were produced, summing the relevant items for each subscale. Mean sub-scale scores are shown for each factor. The correlations between these subscales are shown in Table 4.6 using data from participants at the start of the main treatment study. Each of the three EmetCog factor intercorrelations were all moderately positive. Table 4.7 shows a strong positive correlation with the EmetQ and the SPOVI. There are moderate positive correlations with mood and negative correlations with WHOQoL measures with the exception of social health that was a low negative correlation. Table 4.8 indicates that the other measures of severity and mood are moderately correlated with each other.

Table 4.6

*EmetCog Factor Intercorrelations*

| | Factor 2 (Places and people) | Factor 3 (Consequences) |
|---|---|---|
| Factor 1 (Causal worry) | .42*** | .44*** |
| Factor 2 (Places and people) | | .32*** |

***. $p < .001$

Table 4.7

*EmetCog Correlations between EmetCog Total, Subfactors and Assessment Tools*

| | EmetCog Total | EmetCog Factor 1 | EmetCog Factor 2 | EmetCog Factor 3 |
|---|---|---|---|---|
| EmetQ | .71*** | .63*** | .54*** | .33*** |
| SPOVI | .71*** | .63*** | .53*** | .34*** |
| Depression | .47*** | .48*** | .22** | .28** |
| Anxiety | .52**** | .55*** | .15 | .38*** |
| Stress | .47*** | .53*** | .17* | .25** |
| Physical health | -.52*** | -.53*** | -.28** | -.26** |
| Psychological health | -.45*** | -.43*** | -.24** | -.26** |
| Social health | -.17* | -.15 | -.14 | -.08 |
| Environmental health | -.40*** | -.34*** | -.28** | -.27** |
| GISQ | .36*** | .43*** | .08 | .21* |

***. $p < .001$, ** $p < .01$, *.$p < .05$

Table 4.8

*Correlations between measures (baseline – Pilot and Main Study combined)*

| | GISQ | EmetQ | SPOVI | Depression | Anxiety | Stress |
|---|---|---|---|---|---|---|
| GISQ | | | | | | |
| EmetQ | .37** | | | | | |
| SPOVI | .38** | .58** | | | | |
| Depression | .32** | .45** | .44** | | | |
| Anxiety | .41** | .47** | .61** | .61** | | |
| Stress | .40** | .44** | .49** | .74** | .74** | |
| EmetCog | .38** | .69** | .73** | .47** | .50** | .48** |

**. $p < .01$, N ranges from 132 to 187. These values change because of missing data.

**Concurrent Validity.** The EmetCog is an attempt to measure the cognitive component of emetophobia. If valid it would be expected to be correlated with the other measures of emetophobia symptom severity such as the EmetQ and the SPOVI. It should also be positively associated with the measure of gastro-intestinal sensitivity (GISQ). It would be expected to be less strongly correlated with other constructs such as depression, anxiety, stress and quality of life. Table 4.8 shows the Pearson correlations between the first assessments of the EmetCog correlated with the initial waitlist scores for EmetQ, SPOVI, and the DASS-21 (depression, anxiety and stress), WHOQoL (health, psychological, social and environmental) and the GISQ. As expected, There are strong positive correlations with the two emetophobia severity measures (EmetQ and SPOVI). This suggests that all three assessment measures may share underlying attributes. The SPOVI and the EmetQ are strongly correlated with each other (Table 4.10) indicating considerable common variance between the EmetCog, EmetQ and SPOVI.

There were moderate correlations between the EmetCog and all three mood measures, which is consistent with both the mood correlations with the EmetQ and SPOVI (Table 4.8). The moderate mood correlations for all three emetophobia measures may appropriately reflect the chronic severity of the problem with increased severity leading to poorer mood outcomes. Alternatively it may indicate that all three measures are measuring both mood and emetophobia severity which may indicate that changes in mood might influence scores on the measures of emetophobia.

The correlations between the emetophobia measures including the EmetCog and WHOQoL measures were low to moderate for physical, psychological and environmental health and low for social health. These results indicate that the severity of chronic emetophobia tends to impact highest when the severity is high. The impacts on social health (e.g. relationships) were relatively low compared to the other quality of life measures

indicating people with emetophobia can engage in relationships that can accommodate the stressful effects of emetophobia.

The results generally support EmetCog as a valid and discriminate measure of belief in emetophobia-related cognitions. There is a strong positive correlation with the SPOVI and EmetQ indicating that the EmetCog might be measuring similar underlying factors. The cognitive component of the EmetCog is assumed based on the framing of the questions. The results do indicate that all three emetophobia measures assess similar emetophobia attributes and are all likely to be sensitive to changes in depression, anxiety and stress.

**Treatment Effect Validity.** A further validity check would be that the EmetCog score would be sensitive to change occurring during successful treatment. Of the 28 people who completed the EmetCog at the start and end of treatment only one individual met the criteria for reliable clinical change and so the repeated measures mean values were calculated on just the treatment completers. The EmetCog pre- treatment ($M$ = 69.7, $SD$ = 16) and post-treatment scores ($M$ = 52.4, $SD$ = 18.8) consisted of a small sample of 27 participants. The difference of 17.3 points was significant $F(1,26) = 49.7$, $p < .001$.

It was expected that relatively healthy control subjects would score much lower than treatment participants on emetophobia measures. The EmetCog pre- treatment scores of Pilot and Main Study participants (N = 210, $M$ = 90.0, $SD$ = 15.8) was substantially higher than the student controls (N = 101, $M$ = 41.4, $SD$ = 14.2). The difference of 17.3 points was significant $F(1,26) = 49.7$, $p < .001$. The control group scored 48.6 EmetCog points below the treatment start scores of the treatment group. This shows that the EmetCog has a clear separation from a clinical group who are seeking treatment compared to people who are unaffected by emetophobia.

## GISQ

**GISQ Exploratory Factor Analysis.** The aim of the analysis was to identify a scale that would assess the severity of emetophobia related gastrointestinal sensitivity. Exploratory factor analysis determined if like the SPOVI, EMETQ, and EmetCog there were separate subscales that can be identified in the GISQ.

Initial evaluation of the distributions and correlations among the 12 items, revealed two items with distributions that were very different to other items on the scale. These items, “When I am anxious or worried, I 'dry retch'” and “When I am anxious or worried, I vomit” had 80% and 93% of the sample responding that they strongly disagreed. In addition, these items were correlated positively with each other ($r = .48$) but not with any other item the scale. On this basis they were excluded from further analysis.

Table 4.9

*Initial GISQ Questionnaire*

| Item | Statement | *M* | *SD* |
|---|---|---|---|
| 1 | When I am anxious or worried, I get 'butterflies' in the stomach. | 4.23 | 0.87 |
| 2 | When I am anxious or worried, I feel nauseous. | 3.82 | 1.16 |
| 3 | When I am anxious or worried, my stomach rumbles. | 3.40 | 1.30 |
| 4 | When I am anxious or worried, I need to use the bathroom to pass a bowel movement. | 3.52 | 1.33 |
| 5 | When I am anxious or worried, I burp or belch more often. | 2.73 | 1.44 |
| 6 | When I am anxious or worried, I experience increased flatulence. | 2.97 | 1.35 |
| 7 | When I am anxious or worried, I experience indigestion. | 3.36 | 1.34 |
| 8 | When I am anxious or worried, I 'dry retch'. | 1.71 | 1.11 |
| 9 | When I am anxious or worried, I vomit. | 1.30 | 0.72 |
| 10 | When I am anxious or worried, I can feel my digestion changing. | 3.53 | 1.34 |
| 11 | When I am anxious or worried, I lose my appetite. | 3.94 | 1.23 |
| 12 | When I am anxious or worried, I experience diarrhoea | 3.14 | 1.40 |

Items were scaled from 1 to 5 (1: Strongly disagree, 2: Disagree, 3: Unsure, 4: Agree and 5: Strongly agree).

The same iteration process used for the EmetCog was employed with this scale. The initial solution with 10 items produced two factors that accounted for 54.7% of the variance. Factor 1 accounted for 42.8% of the variance with Factor 2, accounting for 11.7% of the variance. Two items with complex factor loadings, “When I am anxious or worried, I experience diarrhoea” and “When I am anxious or worried, I lose my appetite”, were excluded. In the second iteration a single factor solution was produced accounting for 48.1% of the variance. This indicated the presence of a unidimensional solution. The final solution included all items to be interpreted as a unidimensional construct. For this solution, Bartlett’s test was significant (approx. $\chi^2 = 906.7$, $df = 28$, $p < .001$), indicating that the intercorrelation between

different items was adequate, while Kaiser's Measure of Sampling Adequacy was .87 demonstrating good sampling adequacy for factor analytic procedures (Tabachnik & Fidell, 2013). The sampling adequacy for each item was also inspected using the anti-image correlation matrix, with each variable falling between average (.82, Item 4) and extremely good (.92, Item 3).

The internal consistency of the total scale was .83 (for the 8 items) and the Spearman-Brown Split-Half reliability coefficient was .82.

**Concurrent Validity.** The GISQ measures the tendency to somatise anxiety as gsastro-intestinal symptoms and distress. According to the cognitive-behavioural model of emetophobia (Boschen, 2007), this tendency should be correlated with the severity of emetophobia symptoms. If the GISQ is a valid assessment of this somatisation vulnerability, it would be expected to have moderate to high correlations with measures of emetophobia severity such as the EmetQ and the SPOVI. The GISQ would be expected to be less strongly correlated with depression and quality of life. Table 4.10 shows the Pearson correlations between the first assessments of the GISQ correlated with the initial waitlist scores for EmetQ, SPOVI, and the DASS-21 (depression, anxiety and stress) and WHOQoL (health, psychological, social and environmental). There are low to moderate positive correlations with the two emetophobia severity measures (EmetQ and SPOVI) and there are low to moderate positive correlations with all three mood measures. WHOQoL measures (Table 4.11) was low for physical health but for none of the other measures.

In summary, the results indicate partial support for the GISQ as a valid and discriminate measure of the somatic sensitivity associated with emetophobia. There are two possible explanations. First, the GISQ might be measuring gastro-intestinal sensitivity that is less dependent on emetophobia symptoms than the model suggests. Anxiety, depression and stress clearly play a role, but it is not clear if it is the cause of the gastrointestinal distress or the

consequence. The low to moderate correlations suggest that gastrointestinal changes may occur over a longer time-period that changes to emetophobia symptoms. Second, if the effects of the emetophobia symptoms on gastrointestinal sensitivity are immediate then the GISQ is not measuring gastrointestinal sensitivity as intended.

Table 4.10

*GISQ Correlations between GISQ, DASS-21, SPOVI, EmetQ and EmetCog*

| | GISQ | EmetQ | SPOVI | Depression | Anxiety | Stress |
|---|---|---|---|---|---|---|
| GISQ | | | | | | |
| EmetQ | .37** | | | | | |
| SPOVI | .38** | .58** | | | | |
| Depression | .32** | .45** | .44** | | | |
| Anxiety | .41** | .47** | .61** | .61** | | |
| Stress | .40** | .44** | .49** | .74** | .74** | |
| EmetCog | .38** | .69** | .73** | .47** | .50** | .48** |

**. $p < .01$, $N$ ranges from 142 to 172

Table 4.11

*GISQ Correlations between GISQ, and WHOQoL-BREF dimensions*

| | GISQ |
|---|---|
| Physical health | -.25* |
| Psychological health | -.10 |
| Social health | -.05 |
| Environmental health | -.11 |

***. $p < .001$, ** p < .01, *.$p < .05$
N = 141

**Concurrent Validity.** If the changes in emetophobia severity were associated had an immediate effect on GISQ sensitivity then a further validity check would be that the GISQ

score would be sensitive to change occurring during successful treatment. A repeated measures ANOVA, which compared pre-treatment (N = 24, *M* = 27.8; *SD* = 7.0) and post-treatment (*M* = 25.6; *SD* = 7.9), showed a significant reduction on the GSIQ, $F(1, 23) = 5.1$, $p = .03$ $\eta p^2 = .18$. The small change (2.2 GISQ points) indicates that the GISQ has some relationship to severity changes but that vulnerability to somatisation of gastrointestinal symptoms may persist even after successful treatment.

It would be expected that relatively healthy control subjects would score much lower than treatment participants. The student control group (N = 112, *M* = 18.3; *SD* = 6.4) scored 7.6 GISQ points below, $F(1,189) = 65.6$, $p < .00$, the treatment start scores of the treatment group (N = 79, *M* = 25.9; *SD* = 6.4).

These two results lend partial support to the GISQ as a measure of gastrointestinal sensitivity that has relevance to people with emetophobia. The GISQ is lower in control subjects and is reduced after emetophobia symptoms decreases with treatment.

**Discussion of GISQ and EmetCog**

The two new measures of emetophobia-related constructs (GISQ and EmetCog) are reliable measures of emetophobia cognitions and gastrointestinal sensitivity. The strong positive correlations with the EmetQ and the SPOVI suggests that the EmetCog may have much in common with these two measures and there is a risk that that it may not be measuring factors substantially different than these two established measures. The GISQ has an adequate relationship to emetophobia severity but is sufficiently distinct to be an additional assessment tool for measuring gastro-intestinal sensitivity. The strengths and weaknesses of each of these new measures, and how these tools might increase knowledge about emetophobia will be discussed.

**GISQ**

As a measure of the somatic symptoms that might be associated with emetophobia, the GISQ demonstrated high reliability. Similar weak linear associations were found between the measures of emetophobia severity (SPOVI and EmetQ), mood (depression, anxiety and stress) and the GISQ. Together these findings indicate the reports of gastro-intestinal sensitivities may partially reflect an individual's general level of mood. The low to moderate correlations found between mood and the GISQ are consistent with existing gastro-intestinal assessment measures (Haug et al., 2002; Olatunji, Deacon, Abramowitz, & Tolin, 2006; Waters et al., 2013). Higher scores on the GISQ were also associated with poorer physical health, but not psychological, social or environmental health quality of life measures. These results indicate that gastro-intestinal sensitivity express themselves in a restricted way, and that gastro-intestinal sensitivities have very little perceived impact on the wider aspects of the individual's life.

The small improvement in GISQ scores after emetophobia treatment indicates that the GISQ may reflect an enduring stable sensitivity to gastrointestinal symptoms, which may not change as readily as emetophobia symptoms. Physical changes to the gastro-intestinal system (Barreau, Ferrier, Fioramonti, & Bueno, 2004; Chang et al., 2009) may affect sensitivity over an extended period. The significant difference found on GISQ scores between the group with emetophobia and the control group, suggests that the GISQ is measuring an important component of emetophobia-related gastrointestinal sensitivity that are not directly assessed with the standard emetophobia severity measures. When participants present after a chronic course of emetophobia the causality of the gastro-intestinal sensitivity would be hard to establish.

Overall the GISQ seems to be responsive to emetophobia severity and this suggests that it measures a useful dimension of the symptoms that are not comprehensively measured with the EmetCog and the SPOVI.

**EmetCog**

The EmetCog also proved to be reliable, and broadly met the validity criteria. The strong positive correlation found between the EmetCog, the EmetQ and the SPOVI indicate that this cognitive measure assesses cognitions related to emetophobia severity. Although moderate associations were found between the EmetCog and the measures of mood (depression, anxiety, stress), these associations were lower than those found with the EmetQ and SPOVI. Unlike the GISQ, higher scores on the EmetCog were associated with better physical, psychological and environmental health indicating that the EmetCog may relate to the broader aspects of health and wellbeing. Overall the EmetCog appears to be a reliable and valid measure of emetophobia severity. It is a measure that responded strongly to the effects of treatment and scores on this measure were substantially lower in an unaffected control sample.

Overall the GISQ and the EmetCog have been shown to be credible assessment tools. The GISQ brings a new element to assessing emetophobia-related issues. The gastro-intestinal sensitivity of emetophobia has previously been poorly assessed and so the GISQ offers an assessment path that may help uncover the significance of the role of gastrointestinal sensitivity with emetophobia. The EmetCog's focus on cognitions rather than symptoms offers a new approach to explore changes during treatment.

## EmetStudy Method

The EmetStudy was conducted in two phases. The first phase was a Pilot Study used to assess the design and functionality of a new software program that would be used to deliver a twelve-week online CBT program for emetophobia. The Pilot sample included early treatment applicants and a matched control group. Changes were made to the software and administrative processes based on direct and indirect feedback from the participants in the Pilot Study. In the second phase, a second group of participants were required to wait 90-days from registration so that this period of non-treatment could be compared with a gains or losses identified in the 90-day treatment period.

Two additional non-treatment groups were recruited. The first was a control group without emetophobia, and the second, a group friends and family of individuals with emetophobia, who had enrolled in the study. The data from the family and friends group is intended to provide an insight into the social environment that the affected person is exposed to. Data from a control group of undergraduate students was captured to provide a baseline of a relatively unaffected population. The attributes of the individuals with emetophobia and the control groups and the methodology of the Pilot and treatment studies are reported in the current Chapter.

## Method

### Participants

**Recruitment.** ***Treatment seeking.*** All treatment seeking participants were recruited using a dedicated website; www.emetstudy.org. Potential participants with symptoms of emetophobia were directed to the website in four ways: (1) indirectly through registration with internet search engines such as Google and Yahoo; (2) paid web advertising through Google; (3) from a specialist international internet forum (emetophobia.org); and (4) from the Australian referral web domain. Recruitment commenced from 11 February 2011 and ended

on 28 February 2012. Between 11 February 2011 and 8 September 2011, participants were offered the treatment with an optional immediate start (Pilot group). Participants recruited after 8 September 2011 were only eligible for the main treatment program.

There were 774 people who made an initial application to participate. Of these 242 failed to complete the initial assessment, so were excluded. Of the remaining 542 participants, 73 (F = 65, M = 8) volunteered to participate in the Pilot program. Three of these participants were excluded because in the initial assessment they failed to complete the EmetQ. Each of the participants in the Pilot Study was matched on sex, age and emetophobia severity (EmetQ score) with a participant from the waitlist (*n* =26). These details are shown in the CONSORT diagram (Figure 5.1).

The remaining 428 (F = 391, M = 37) participants who completed an initial valid EmetQ were allocated to the main treatment program. Of these 172 started the treatment program, with 81 classified as program completers.

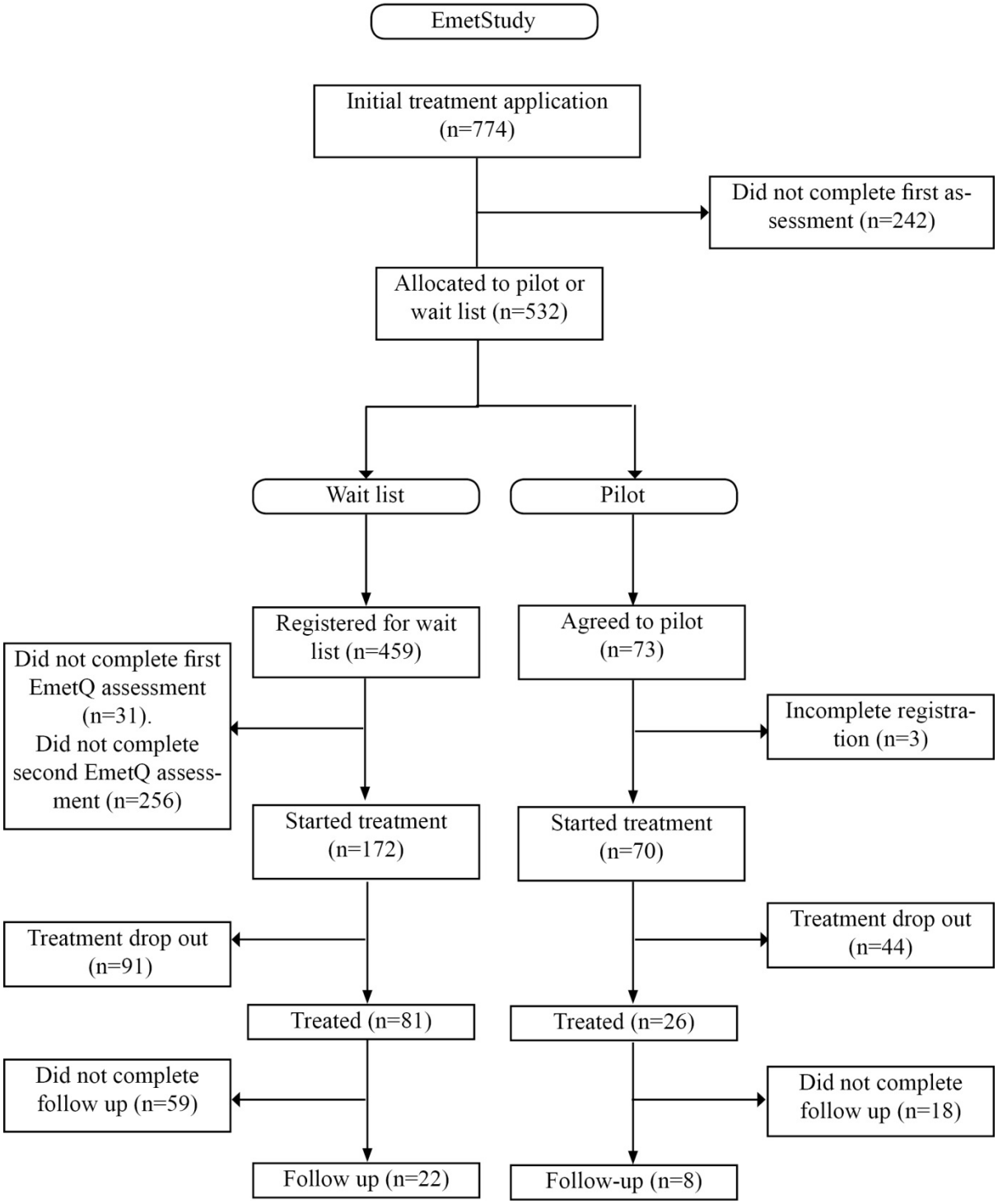


*Figure 5.1* CONSORT Diagram showing the treatment allocation process for the Pilot and Main treatment studies. **Comparison Groups: *Family and friends.*** The family and friends of participants were recruited by an email invitation from the participant. A total of 88 participants responded but four of the family and friends did not specify the relationship to the affected individual and were excluded, leaving a total of 84 (F = 55, M = 29). The family and

friend group consisted of 46 friends (F = 28, M = 18), 33 close relatives (F = 22, M =11) and 5 distant relatives (F = 5, M = 0).

***Control group.*** The control group consisted of 119 undergraduate psychology students (F = 93, M = 26) recruited for course credit. This group of healthy participants was invited to complete the assessment tools used in this study for research purposes, to provide a comparison measure for the new tools developed and validated in the study (EmetCog and GISQ, discussed in chapter 4) and to provide a measure of participants' environments.

**Demographic Characteristics.** ***Overall sample.*** Australians were overrepresented in the Pilot group compared to the main treatment group. The over- representation resulted from the early local promotion of the treatment, use of a secondary Australian domain (emetstudy.com.au), the use of an Australian contact address and Australian university contact information that may have directed local Google searches by Australian participants to an Australian domain. Demand from the USA and the UK was also strong. The high US participation rate is likely to have been the result of multiple factors that include recruitment through an emetophobia forum which had a USA domain (.com); the domain for the primary study website (EmetStudy.org) being based in the USA; Google's USA-biased search algorithm; the English language used in the emetophobia forum website which limits non-English speakers; and the high cost of healthcare in the US. The relatively high UK participation rate might reflect the specialised emetophobia forum's demographics and the limited emetophobia expertise in the UK National Healthcare System (NHS). Strong Canadian participation was likely due to the emetophobia forum demographics. A broader range of nationalities participated in the main treatment program than the Pilot Study. In addition to these countries participants in the main treatment study included individuals from Bulgaria, Greece, Ireland, Luxembourg, the Netherlands, Norway and South Africa (Table 5.1).

## Pilot study

**Pilot study demographics.** The nationalities of individuals who participated in the Pilot Study were predominantly from four countries. The matched controls came from a wider geographical region and are reported in Table 5.1. Demographic data for all participants was obtained at the time of initial registration as a single online questionnaire.

Table 5.1

*Pilot and Matched Control Nationality of Participant*

| | Treatment | | | Matched controls | | |
|---|---|---|---|---|---|---|
| Country | Female | Male | Total | Female | Male | Total |
| Australia | 13 | 2 | 15 | 3 | 1 | 4 |
| Canada | 9 | 0 | 9 | 8 | 1 | 9 |
| United Kingdom | 13 | 0 | 13 | 14 | 0 | 14 |
| United States | 29 | 6 | 35 | 33 | 5 | 38 |
| Other | 1 | 0 | 1 | 7 | 1 | 8 |
| Total | 65 | 8 | 73 | 65 | 8 | 73 |

Both the treatment and the matched control group used in the Pilot Study had relatively low levels of unemployment, indicating high functioning. The matched control and treatment groups did not differ in employment status, $\chi^2(4, N = 135) = 1.93$, $p = .75$. There were about 70% of participants in a relationship, with no significant differences found between groups, $\chi^2(2, N = 135) = 1.48$, $p = .48$. The groups were highly educated, with 39.7% holding a bachelor's degree or higher (Treatment: 38.8%, matched control 40.3%). Data on 25 (17.1%) participants in the treatment group was missing, however a chi-squared test found no statistically significant group differences in education level, $\chi^2(2, N = 121) = .79$, $p = .48$.

Table 5.2 shows participant age and fear related profiles obtained from the registration questionnaire for the groups used in the Pilot Study. With the exception of the control group

reporting not vomiting for a significantly longer period than the treatment group, there were no significant differences in age or fear profile of the groups.

Table 5.2

*Pilot: Treatment and Matched Control Age and Fear Profiles*

| | Treatment | | Matched controls | | Comparison |
|---|---|---|---|---|---|
| | M | SD | M | SD | T-test p |
| Age | 30.7 | 7.6 | 29.2 | 7.4 | .22 |
| Time spent worrying per day (minutes) | 314.3 | 381.4 | 331.7 | 361.2 | .57 |
| Years since last vomited | 6.5 | 7.1 | 8.6 | 8.1 | .05 |
| Age when fear of vomiting became a problem (years) | 13.4 | 9.8 | 15.1 | 8.3 | .28 |
| Age when aware of fear (years) | 9.3 | 7.6 | 10.2 | 6.2 | .21 |
| Days fearful in a year | 22.6 | 75.6 | 8.7 | 42.7 | .20 |

The DSM-IV-TR does not specify a fear type to achieve a diagnosis of a specific phobia (American Psychiatric Association, 2000). The fear types reported by the Pilot treatment and control groups are described in Table 5.3. Individuals reporting a fear solely of others vomiting represented only a small percentage: 3-4% in the overall Pilot sample (treatment and matched control). There were no significant differences between the treatment and matched control group, $\chi^2(5, N = 135) = 7.73$, $p = .20$ for the fear categories.

Table 5.3

*Pilot: Fear Type*

| | Treatment | | Matched Control | |
|---|---|---|---|---|
| | Freq | % | Freq | % |
| Unspecified | 11 | 15.1 | 2 | 2.7 |
| I fear equally myself and others vomiting | 23 | 31.5 | 35 | 47.9 |

| | | | | |
|---|---|---|---|---|
| I only fear myself vomiting (not others) | 8 | 11 | 6 | 8.2 |
| My main fear is of myself vomiting but I have some fear of others vomiting | 23 | 31.5 | 17 | 23.3 |
| I only fear others vomiting (not myself) | 3 | 4.1 | 2 | 2.7 |
| My main fear is of others vomiting but I have some fear of myself vomiting | 5 | 6.8 | 11 | 15.1 |

Of the 70 individuals who began immediate treatment, 44 did not continue the treatment program beyond the assigned cut-off period of 21 days after registration (63% non-completers). There were 26 who completed at least up to week 3 of the program. These individuals were classified as treatment completers. The third week of the program (21 days) was selected as a completion cut-off point as little of the treatment program had started and the high initial dropout would not represent individuals who were treated using CBT.

**Main Study**

**Participant Characteristics for the Main Study.** The demographics of the main treatment group are presented and analysed with regard to the demographic attributes of those who completed treatment ('treatment completers', TC) and those who started treatment but did not complete it ('treatment attempters', TA).

***Main Study demographics.*** Upon enrolment, to act as their own controls, there was a 90-day waitlist applied (which corresponded to the length of the following treatment program). Eligible participants were those who completed the initial assessment and follow-up control assessment 90-days later. Of the 459 eligible participants, there were 31 (7%) who failed to complete the EmetQ at initial assessment, so were excluded. There were 256 (55.7%) who initially enrolled who failed to complete the second assessment and for analysis purposes they were treated as treatment non-starters (NS). There were 172 (37.3%) participants (F = 158, M = 14) who completed the second assessment so were eligible to enter the main treatment program. This group were referred to as treatment attempters (TA). A comparison of the non-

starters and the treatment attempters was undertaken to identify if there were any differences between the two groups.

The last observation carried forward (LOCF) is a conservative method of managing missing data that has a number of limitations (Gadbury, Coffey, & Allison, 2003). This is especially evident in internet treatment studies where high dropout rates are common (Donker et al., 2013; Marks et al., 2004). A variant of the LOCF method was employed in an attempt to provide meaningful interpretation of the data. Due to the large initial dropout rates and the relatively delayed implementation of core CBT treatment the LOCF 21 days after the second assessment was used. This approach attempts to best represent those who commenced at a minimal degree of the CBT treatment. Of the 172 treatment attempters, 91participants did not continue after 21 days of the CBT treatment program and were referred to as treatment dropouts (TD). The 81 people who were active in treatment after at least 21 days from the second assessment were classified as treatment completers (TC).

The nationality profile of individuals who applied for the program is divided into treatment attempters (TA) and non-starters (NS) and is shown in Table 5.4. Like the Pilot, the main treatment study was strongly represented by the US, UK, Canada and Australia. The treatment attempters (TA) and the non-starters (NS) did not differ significantly in the overall nationality profile, $\chi^2(4, N = 412) = 5.7, p = .23$.

Table 5.4

*Main Treatment Nationality Profile for Non-Starters and Treatment Attempters*

| | Non-starters (NS) | Treatment attempters (TA) | Total |
|---|---|---|---|
| USA | 129 | 91 | 220 |
| UK | 53 | 31 | 84 |
| Canada | 20 | 21 | 41 |
| Australia | 23 | 16 | 39 |
| Other[1] | 31 | 13 | 44 |
| Total | 256 | 172 | 428 |

[1] Countries included Argentina, Austria, Bangladesh, Belgium, Brazil, Brunei Darussalam, Bulgaria, Finland, France, Greece, Hungary, Ireland, Italy, Luxemburg, Mexico, Netherlands, New Zealand, Norway, Romania, Singapore, Slovakia, South Africa, Spain, Sweden and Switzerland.

Compared with treatment attempters, Table 5.5 shows that the non-starters had a higher proportion of students than any other employment group status, $\chi^2(4, N = 411) = 16.6$, $p < .01$.

Table 5.5

*Main: Employment Status Non-starters V Treatment Attempter*

| | Student | Employed | Homemaker | Unemployed | Sick-leave | Total |
|---|---|---|---|---|---|---|
| Non-starter | 76 | 130 | 14 | 12 | 6 | 238 |
| Treated attempter | 28 | 113 | 21 | 7 | 4 | 173 |
| Total | 104 | 243 | 35 | 19 | 10 | 411 |

Demographic variables that had no relationship to attempting treatment were relationship status, $\chi^2(2, N = 411) = 3.4$, $p = .18$ (Table 5.6), and gender, $\chi^2(1, N = 412) = .29$, $p = .59$ (Table 5.7).

Table 5.6

*Main: Relationship Status; Non-starter versus Treatment Attempter*

| | Married / co-habiting | In a relationship but not co-habiting | Single | Total |
|---|---|---|---|---|
| Non-starter | 110 | 41 | 87 | 238 |
| Treated attempt | 94 | 30 | 49 | 173 |
| Total | 204 | 71 | 136 | 411 |

Table 5.7

*Main: Gender; Non-starter versus Treatment Attempter*

| | Female | Male | Total |
|---|---|---|---|
| Non-starter | 216 | 23 | 239 |
| Treated attempt | 159 | 14 | 173 |
| Total | 375 | 37 | 412 |

The non-starters were significantly younger than the treatment starters. Non-starters were 2.2 years younger on average than the treatment attempters, $t(426) = 2.8$, $p < .001$. A chi-squared test indicated that being 26 years and over was significantly associated with attempting treatment, $\chi^2(1, N = 426) = 9.4$, $p < .01$.

Table 5.8 shows the age and fear related profiles of treatment attempters and non-starters. No significant differences were found between groups found on fear type, $\chi^2(5, N = 411) = .41$, $p = .99$ (Table 5.9).

Table 5.8

*Main Study: Age and Fear Profile for Non-starters and Treatment Attempters*

| | NS *N*=256 | | TA *N*=172 | | Comparison |
|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | T-test |
| Age | 28.1 | 8.2 | 30.3 | 7.5 | $t(426) = 2.8$, $p < .001$ |
| Time spent worrying minutes per day | 332.8 | 396.3 | 276.9 | 326.0 | $t(426) = 1.5$ , $p = .13$ |
| Years since last vomited | 6.8 | 7.5 | 8.4 | 8.3 | $t(426) = .97$ , $p = .33$ |
| Age when fear of vomiting became a problem | 15.2 | 6.7 | 15.6 | 8.5 | $t(426) = .49$, $p = .63$ |
| Age when aware of fear | 10.6 | 5.5 | 10.8 | 7.1 | $t(426) = .43$, $p = .67$ |
| Days fearful in a year | 10.5 | 42.0 | 9.4 | 41.1 | $t(426) = .25$, $p = .81$ |

NS = non-starter
TA = treatment attempter

Table 5.9

*Main Study: Fear Type; Non-starter versus Treatment Attempter*

| | I fear equally myself and others vomiting | I only fear myself vomiting (not others) | Main fear is myself vomiting but some fear of others vomiting | I only fear others vomiting (not myself) | Main fear is others vomiting but some fear of myself vomiting | Total |
|---|---|---|---|---|---|---|
| Non-starter | 112 | 19 | 90 | 10 | 25 | 256 |
| Treated attempt | 79 | 11 | 62 | 6 | 17 | 175 |
| Total | 191 | 30 | 152 | 16 | 42 | 431 |

**Materials/Apparatus**

***Measures***. Measures used in the Main Study were also used in the Pilot Study and these included emetophobia specific assessment tools and non-emetophobia questionnaires. The validated emetophobia assessment tools included the EmetQ (Boschen et al., 2013) and the

SPOVI (Veale et al., 2013). Emetophobia tools developed for the current study included the GISQ and the EmetCog. The non-emetophobia questionnaires included the Depression, Anxiety and stress Scale DASS-21 (Henry & Crawford, 2005), World health Organisation Quality of Life (WHOQOL: Murphy et al., 2000) and The Structured Clinical Interview for DSM-IV Axis I Disorders; SCID-I (Spitzer et al., 1992). These were described in detail in Chapter 4.

***Software Tools.*** The EmetStudy software application was developed using open source client and server-side programming languages. Client software resides on the desktop or mobile phone and server side resides in the cloud. PHP is a recursive acronym for "PHP: Hypertext Preprocessor" and is open source software used to manage database access and security. PHP only exists on the server and is not copied to the computer or smartphone. The client side programming languages included hypertext mark-up language (HTML), JavaScript and the JavaScript library JQuery. The JQuery mobile framework was used to accommodate mobile phones and multiple desktop browsers.

The webserver and MySQL database was commercially hosted by Dreamhost.com. Data security support was delivered using a number of tools including Dreamhost hosting security, the use of 256 bit encrypted user passwords, PHP programming techniques and through the use of a security filter called an htaccess file.

## Procedures

**Design and Analyses.** The data was collected in two phases; the Pilot and the Main Study. Each is presented separately.

**Pilot Study.** For the Pilot Study, a 2 × 2 mixed factorial design was used. Group (treatment, control) was the between-subjects factor and time (pre, post-test) was the within-subjects factor. The null hypothesis rejection level for all analyses was set at $p = .05$. The Pilot Study did not include a three month waitlist period that was used in design of the Main Study.

**Main Study.** The EmetStudy treatment program was a 12 week CBT program drawing on the basic CBT principles (Clark, 2004; Clark & Beck, 2010; Leahy, 2004), and the treatment model proposed by Boschen (2007). The protocol was identical for the Pilot and the Main Study. The protocol is summarised in Table 5.10.

Table 5.10

*Treatment Week Summary*

| Week | Treatment focus |
|---|---|
| Orientation | Administrative tasks: change password, update time-zone, book a SCID interview, complete baseline assessment. |
| 1 | Goal setting. |
| 2 | Psychoeducation: Principles of CBT anxiety theory and emetophobia symptoms. |
| 3 | Cognitive restructuring - Padesky & Mooney's 'hot-cross bun model' |
| 4 | Document personal cognitions and associate or link these cognitions to an activating event |
| 5 | Document behaviours |
| 6 | Principles of exposure therapy and build a hierarchy |
| 7 | Experiments |
| 8 | Classifying previously documented dysfunctional beliefs |
| 9 | Imaginal exposure and invitation for participants to write and email stories |
| 10 | Repetition of CBT tasks – Participants choice |
| 11 | Repetition of CBT tasks – cognitive restructuring |
| 12 | Repetition of CBT tasks – Participants choice |

The content was drawn from a broad base of general anxiety related treatments. Generic anxiety focused psycho-educational material was substantially modified to include emetophobia specific symptoms, where appropriate. Treatment methods used conventional CBT techniques used for anxiety disorders, but the treatment content was framed in the context of emetophobia, so it was relevant to the participant. The use of imaginal exposure in week 9 draws on a tested CBT approach but has previously not been documented in the use of emetophobia treatment.

The content was sequentially released on a weekly basis and all previous content remained accessible. At the start of each week a summary page was presented outlining the

tasks for that week. Participants were requested to complete tasks for that week in a sequential order, starting from the top of the web page and working downwards. The tasks were separated so the participant could repeat any particular task as required. This was essential for repetitive actions such as adding an activating event or completing assessments. The comprehension level of the content was targeted at an 18-25 year age group who may also have English as a second language.

Before treatment commenced an orientation week (week 0) was included to enable participants to complete administrative and assessment tasks. These tasks included changing their password, updating their time-zone, booking a SCID interview via Skype and completing the baseline assessment shown in Table 5.11. The orientation week contained no CBT treatment.

Week one of treatment focused on goal setting. The participant was provided with instructional material to define SMART (specific, measurable, achievable, realistic and time based) goals. Participants were asked to define three goals, preferably one short, one medium and one long term goal. In week one the participants were also asked to repeat a core set of assessments (EmetQ, SPOVI and DASS-21).

Week two of treatment introduced the principles of CBT anxiety theory that included somatic reactions (edu002.pdf on DVD appendix) and how the body reacts to fear, part1 (edu011.pdf, see DVD appendix) and part 2 (edu012.pdf, see DVD appendix). Video training in diaphragmatic breathing was demonstrated using an embedded public domain YouTube video (Richardson, 2008). An upper body applied relaxation MP3 audio file was developed based on progressive relaxation outlined by Öst (1987) and the wording used in a publically available audio file developed by Monash University (Monash University, 2012). The 128kbs high quality audio lasted 12:07 minutes and was re-recorded using a female voice. It could be downloaded and replayed by the participant as often as required (see DVD appendix).

Week three of the treatment introduced further concepts of CBT (edu014.pdf, see DVD appendix). Content for this week introduced Padesky and Mooney's 'hot-cross bun model" (1990) showing the interaction between behaviour, thoughts, emotions and physical sensations. Data on the participants' behaviour, thoughts, emotions and sensations was collected using this model and formed the basis for feeding back results to the participant over subsequent weeks of the program. The data capture was progressive: new elements were added each week as the 'hot-cross bun model" was explained progressively in week's four to seven. Participants were requested to report several activating events each day in their diary, and to record associated behaviours, thoughts, emotions and sensations. The diary was electronic, enabling participants to report data using a computer or mobile phone. To assist participants to use the web form or mobile phone to report events, an instructional video was developed to explain the process. In this way the EmetStudy treatment program enabled participants to observe and understand the interrelationship of their behaviours, cognitions, emotions and sensations, and to link these to specific activating events.

A second relaxation MP3 audio file was presented in week three which described lower body progressive muscle relaxation. The audio lasted 4:55 minutes using the researchers (male) voice and was available for download.

Week four of the treatment focused on understanding the role of cognitions in maintaining emetophobia. An introduction to cognitions was presented (edu016.pdf, see DVD appendix) and a list of common emetophobia beliefs was shown. This list was generated from a database. Additional beliefs anonymously added to the database by other participants were also shown in the list if the original owner of the belief had identified that they wished to make it public. These beliefs did not contain identifying information and were reviewed by the researcher prior to publication. This feature of the design of this study was implemented to assist participants in recognising cognitions linked specifically to emetophobia, rather than

normalising such cognitions as thoughts every person might share, or as unique to them. From week four onwards participants could document personal cognitions and associate or link these cognitions to an activating event.

Week five of the treatment focused on behaviour and its role in Padesky and Mooney's (1990) hot cross bun model. All of the data related to feelings, behaviours and cognitions were now associated with the one activating event. Participants could view the activating event with the associated feelings, beliefs and behaviours displayed within the Padesky and Mooney model so that they could observe the patterns and interrelationships.

Week six was the commencement of exposure therapy. The participant was informed about the principles of exposure therapy (edu017.php, see DVD appendix) and how to build an exposure hierarchy using emetophobia specific examples (edu024.pdf, see DVD appendix). Participants were reminded that they could engage with the therapist to discuss issues with building a hierarchy and were encouraged to make an appointment time if they needed to do so.

Week seven introduced the principles of behaviour experiments (edu019.pdf, see DVD appendix), how to conduct behaviour experiments (edu020.pdf, see DVD appendix) and documented some sample behaviour experiments to assist participants to design their own.

Week eight guided the participant though classifying dysfunctional beliefs that they had documented from week four onwards.

Week nine introduced imaginal exposure and invited participants to write and email stories. Some participants recorded these stories in their own voice and agreed to make them available to other participants. The stories were reviewed for suitability and privacy related issues before they were released. Other participants permitted the therapist to audio record their submitted stories and make these available for participant use. A total of 20 imaginal exposure stories were available for download.

Week ten focused on the consolidation of a number of CBT techniques that were presented in previous weeks. Participants were encouraged to reflect on areas that they had avoided in the treatment program to that point, and to revisit those tasks. Graphs and assessments permitted participants to monitor progress.

Week eleven revisited the Padesky and Mooney model (for the primary content see edu022.pdf, see DVD appendix). Participants were requested to follow-up on goals that they had set and to rate the level of goal completion from (a) unknown outcome, (b) completed within time, (c) completed late, (d) almost completed and (e) not completed. Finally participants were asked to re-rate the significance of the issue surrounding the goal.

Week twelve was the last week of treatment and participants were asked once again to finalise goals and to complete the final assessment review. Participants could review their progress in a summary scorecard. The summary presented the test data and graphed the results based on a number of progress markers. Although participants were encouraged to book a Skype appointment to discuss their treatment progress and future strategies only one person made contact.

Three months after completion of treatment, participants were invited to complete a full set of follow-up assessments to determine short-term treatment outcomes.

**Design and Statistical Analysis.** The Pilot analysis was a 2 (time) by group (treatment and control) mixed factorial ANOVA. Simple effects analyses were conducted on the significant interaction expected between the treatment and control groups at post-test. The results are presented and discussed in chapter six. Chapter seven, eight and nine explore detailed aspects of the analysis that includes prediction of treatment outcome, predicting attrition and the social context.

Table 5.11

*Assessment Set Schedule (Pilot and Main Study)*

| Week | EmetQ | SPOVI | DASS-21 | WHOQoL | GISQ | EmetCog |
|---|---|---|---|---|---|---|
| Orientation | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1 | ✓ | ✓ | ✓ | | | |
| 2 | ✓ | ✓ | ✓ | | | |
| 3 | ✓ | ✓ | ✓ | | | |
| 4 | ✓ | ✓ | ✓ | | | |
| 5 | ✓ | ✓ | ✓ | | | |
| 6 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 7 | ✓ | ✓ | ✓ | | | |
| 8 | ✓ | ✓ | ✓ | | | |
| 9 | ✓ | ✓ | ✓ | | | |
| 10 | ✓ | ✓ | ✓ | | | |
| 11 | ✓ | ✓ | ✓ | | | |
| 12 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

If the treatment participants completed an assessment more than once the first valid assessment for the week was used. The treatment period was measured from orientation week up to week 12 of treatment. Pilot and main-study participants who did not complete an EmetQ on or before day 21 of the treatment schedule for at least the third week of treatment (Table 5.11) were not classified as part of the treatment group. Participants could still log in without completing a questionnaire but if no further EmetQ assessments were completed, then the week of the last EmetQ treatment was defined as the last treatment week. At the end of the 12 week treatment period no further clinical contact was made with participants. Ninety days later some of the participants received a reminder to complete the second series of questionnaires.

**Procedure Main Study.** The Main Study followed the same protocol as the Pilot Study with three exceptions. First, all waitlist participants waited 90-days before commencing treatment. Second, participants had access to a pre-existing pool of emetophobia specific behaviours and cognitions that were generated primarily by the Pilot group. The Main Study group were also able to increase the pool of cognitions and behaviours during the course of the treatment. Third, the Main Study group had a pre-existing pool of audio stories generated during the Pilot phase which were available during week 9 of the treatment. The pool of stories also increased during the course of the Main Study from contributions from participants and the therapist.

**Main Study Design and Statistical Analysis.** The Main Study analysis was conducted as a series of ANOVAs. Four time periods were examined (baseline, pre-treatment, post-treatment and follow-up. The type of participant (non-starter, treatment attempter and completer) was compared where relevant for the Pilot and Main Study. Simple effects analyses were used to further evaluate the significant interactions found.

**Summary.** Overall the treatment program was conducted in two phases. A small Pilot and a larger Main Study. The treatment remained relatively unchanged between the two groups but technical issues were addressed. The treatment protocol followed core CBT practices for the treatment of anxiety disorders and addressed recommendations for the treatment of emetophobia by Veale (2009) and Boschen (2007). The results of the treatment program are discussed in the next chapter (Chapter 6).

# EmetStudy Results

The previous chapter outlined the treatment and assessment methods used in the Pilot Study and Main Study. The current chapter presents the results of both the Pilot and Main Study. The results of the Pilot Study are presented first, followed by the main treatment study. For each study, the evaluation of the characteristics of individuals who began treatment is contrasted with those who dropped out of the program, or who failed to start the intervention program. For the Pilot Study, the efficacy of the program is compared to matched waitlist controls, and for the main treatment study symptom changes are evaluated against the same participant's reported symptoms during the waitlist phase of the study.

## Pilot Study Results

### Pilot and Control Attrition Rate

In the untreated waitlist control group 26 of 73 (35.6%) participants were retained at the end of the 12 week treatment program. These individuals responded to the second EmetQ assessment. In the Pilot treatment group 26 of 70 (37.1%) completed an EmetQ after 21 days from the commencement of the treatment program, so were labelled treatment completers (n = 8). On average, Pilot participants who completed treatment had completed 9.4 weeks of treatment (*SD* = 2.9 weeks). There were 44 participants who had dropped out of treatment and these are classified as treatment dropouts. Figure 6.1 shows the attrition rate for the treatment program based on last login and the last assessment (EmetQ).

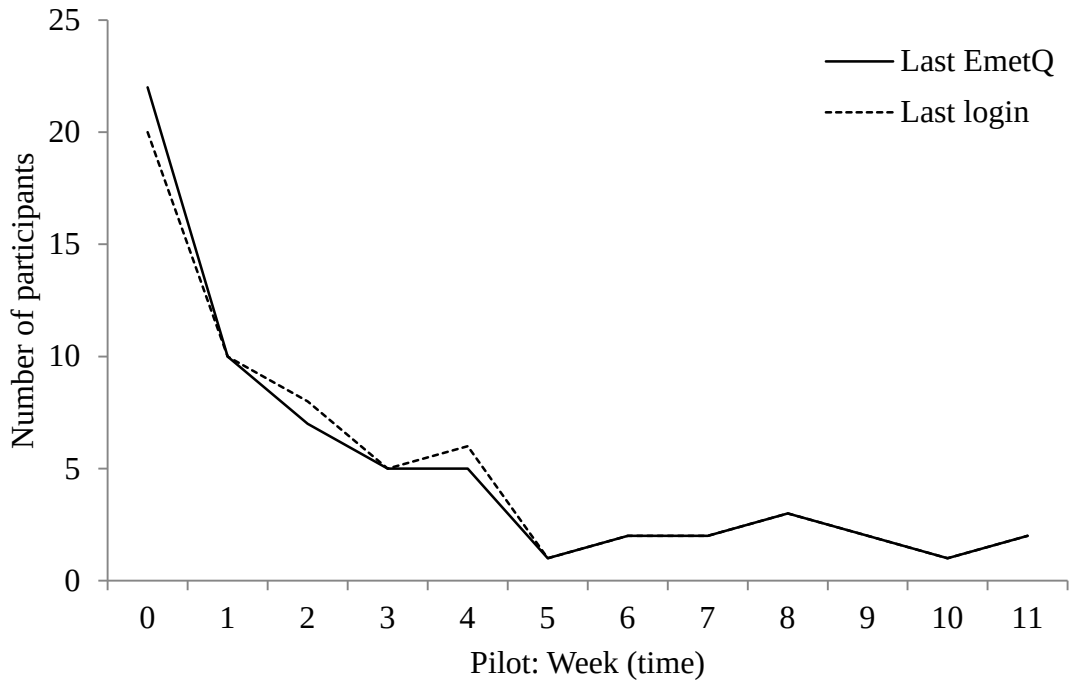


*Figure 6.1* Treatment group attrition rate based on last EmetQ monitored weekly for the Pilot Study. The last EmetQ completed was considered the point of drop-out.

**Demographic and Fear Profile Differences Between Treatment Completers and Non-Completers.**

The initial analysis investigated differences between treatment completers and treatment non-completers. Independent sample *t*-tests were conducted on the continuous demographic variables including participant age, fear days per year, fear times per day, years since last vomited, initial age of problem, age aware of problem and the number of sick days per week. No significant differences were found between the groups on any of these variables (see Table 6.1).

Table 6.1

*Profile of completers (n = 26) and treatment non-completer (n = 44) in the Pilot study*

| Demographic Variables | | *M* | *SD* | *p* |
|---|---|---|---|---|
| Age of participant | Non-completer | 30.7 | 7.3 | .88 |
| | Completer | 30.6 | 8.1 | |
| Fear days per year | Non-completer | 26.8 | 87.4 | .12 |
| | Completer | 13.9 | 48.4 | |
| Fear time per day (mins) | Non-completer | 263.6 | 367.0 | .61 |
| | Completer | 359.6 | 406.1 | |
| Years since last vomited (years) | Non-completer | 4.9 | 6.3 | .13 |
| | Completer | 7.3 | 7.5 | |
| Age problem (years) | Non-completer | 13.7 | 10.7 | .13 |
| | Completer | 13.1 | 8.5 | |
| Age aware (years) | Non-completer | 8.8 | 8.7 | .14 |
| | Completer | 9.1 | 5.8 | |
| Number of days sick per week | Non-completer | 3.0 | 2.6 | .42 |
| | Completer | 2.5 | 2.3 | |
| Initial Emetophobia severity (EmetQ) | Non-completer | 48.4 | 7.9 | .18 |
| | Completer | 46.0 | 9.5 | |

Chi-squared tests conducted on the categorical demographic variables of gender, $\chi^2(1, N = 70) = 0.0$, $p > .05$, emetophobia fear type, $\chi^2(4, N = 59) = 0.33$, $p > .05$, and employment status, $\chi^2(4, N = 59) = 0.17$, $p > .05$, did not show any significant differences between treatment completers and non-completers. The education level for most participants was high with only 2 of 49 (4%) participants who specified an education level indicating lower than year 12 education. In addition, 59% held a bachelor's degree or higher and this was proportionally the same for completers and non-completers, $\chi^2(1, N = 49) = 0.70$, $p > .05$.

The differences in goal setting (performed in week 1) between treatment completers and non-completers is shown in Table 6.2. A large proportion (59%) of non-completers did not set goals compared to 3.8% of completers. The use of goal setting as a predictor of treatment completion is explored using a larger sample size from the Main Study later in this chapter.

Table 6.2

*Goals Set: Pilot Treatment Completers and Non-completers*

| Number of goals set | Treatment non-completer | Treatment completer |
|---|---|---|
| 0 | 26 | 1 |
| 1 | 7 | 3 |
| 2 | 5 | 4 |
| 3 | 2 | 10 |
| 4 | 2 | 5 |
| 5 | 1 | 1 |
| 6 | 1 | 2 |
| Total | 44 | 26 |

**Effectiveness of the Pilot Program**

Symptoms of emetophobia for the 26 Pilot participants who completed the treatment were compared to the waitlist control group ($n$ = 26). A two-way mixed factorial ANOVA was conducted that examined the effect of treatment (EmetStudy, control) and time (pre, post) on the primary emetophobia severity measure (EmetQ). Effect sizes are reported using partial eta squared ($\eta_p^2$). This is a variance accounted for effect size which determines the proportion of the variance in the dependent variable accounted for by the independent variable or variables used. According to Cohen (1988), a small effect size corresponds to 0.01 (1%), a medium effect size, 0.06 (6%) and a large effect size 0.14 (14%). For the main treatment effects of the

intervention study, Cohen's *d* is also reported. This is a standardised effect size measure, presented in standard deviation units. A small effect size corresponds to a distance between the means presented of 0.2 standard deviations, a medium effect size corresponds to 0.5 standard deviations and a large effect size 0.8 standard deviations or greater (Cohen, 1988).

There was a statistically significant interaction found between group and time for emetophobia severity, $F(1,50) = 14.5$, $p < .001$, $\eta_p^2 = .23$ (see Figure 6.2). Simple effects analysis revealed no significant difference between the groups at pre-test. The treatment group showed a significant decrease in emetophobia severity from pre-test to post-test on the EmetQ, $F(1,50) = 18.9$, $p < .001$, $\eta_p^2 = .43$). There was no significant change in reported symptoms of the control group from pre-test to post-test, $F(1,50)= 0.01$, $p < .001$. At post-treatment there was a significant difference in the EmetQ scores for the Pilot treatment group ($M = 36.5$, $SD =11.5$) and the control ($M = 48.7$, $SD = 8.6$) conditions; $t(1,50)=4.3$, $p < 0.001$.

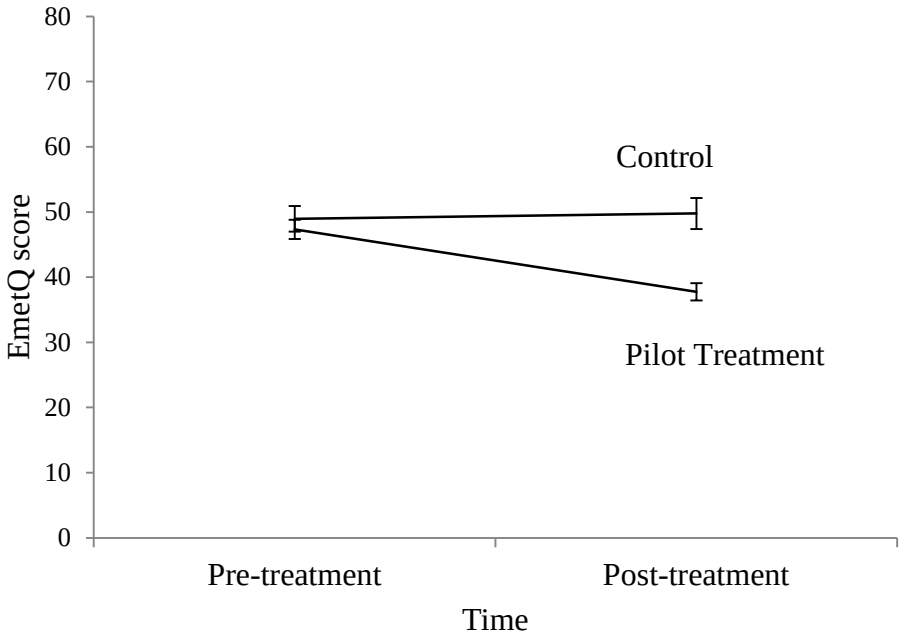


*Figure 6.2* EmetQ: The influence of the treatment program for the intervention and control groups in the Pilot Study. Treatment group ($n$ = 26) and controls ($n$ = 26). Error bars are one standard error of the Mean.

There was a large effect found for the treatment effect found for the treatment group pre-treatment and post-treatment (Cohen's $d$ = 1.23).

**Secondary Measure of Emetophobia (SPOVI).** A two-way mixed factorial ANOVA was conducted that examined the effect of treatment (EmetStudy, control) and time (pre, post) on the secondary emetophobia severity measure (SPOVI). There was a statistically significant interaction between the effects of treatment and time for emetophobia severity, $F(1,50) = 14.8$, $p < .001$ ,$\eta_p^2 = .23$ (see Figure 6.3). At pre-test there were no significant differences on SPOVI scores for the treatment and control groups. Simple effects analysis revealed that the treatment group showed a significant decrease in emetophobia severity from pre to post-test, $F(1,50) = 32.5$, $p < .001$, $\eta_p^2 = .40$, with no significant change found for the control group, $F(1,50) = 0.14$, $p = .72$, $\eta_p^2 < .01$. At post-treatment there was a significant difference in the SPOVI scores for the Pilot treatment group ($M$ = 22.2, $SD$ =15.1) and the control ($M$ = 35.2, $SD$ = 11.8) conditions; $t(1,50)=3.5$, $p$ = 0.001.

The SPOVI pre-test to post-test Cohen d for the treatment group was 1.23 and the control group was 0.10. The treatment group showed a large effect size as Cohen's d was >.80.

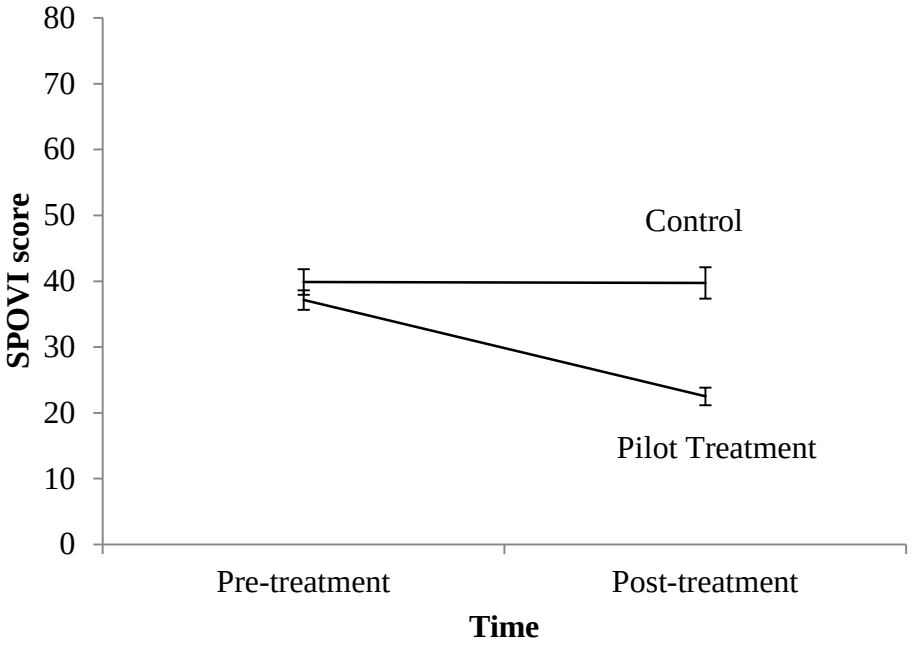


*Figure 6.3.* SPOVI Pilot treatment group compared to matched control.Error bars are one standard error of the Mean

## Pilot Discussion

Overall, the results of the Pilot Study indicate that for individuals who completed at least three weeks of treatment, the online therapy was effective in reducing the symptoms of emetophobia based on EmetQ and SPOVI assessments. The attrition rate was high, which is consistent with online treatments for anxiety and depression (Christensen et al., 2011; Farvolden et al., 2005; Twomey et al., 2014). Efficacy and attrition issues will be discussed only briefly as both of these issues are discussed in detail in relation to the Main Study.

### Efficacy of the Pilot EmetStudy Internet-Based CBT Program for Emetophobia

The 12-week EmetStudy Pilot program was effective in reducing the symptoms of emetophobia, when compared to a waitlist control group. The reduction of EmetQ severity after 12 weeks of treatment (pre-test mean was 46.0) to a mean of 36.5 (9.5 point decrease) was comparable with the reduction in symptoms found in a face-to-face 12 week treatment

delivered by a specialist psychiatrist and clinical psychologist (Boschen et al., 2013). In that study, the treated clinical group had an average EmetQ score of 52.0 at pre-test, which was reduced by 8.7 points at post-test. These results indicate that the internet format for program delivery was successful in reducing the symptoms of emetophobia and broadly comparable in its efficacy to a tailored face-to-face emetophobia treatment.

**Pilot Attrition**

Attrition rates in the Pilot Study were high, as had been expected based on previous research on internet therapies (Farvolden et al., 2005). However, the timing of the attrition was informative. The highest level of attrition for participants in the Pilot program occurred between orientation week and week 4, with the highest rate found in the orientation week. Orientation week was a relatively intensive administrative and assessment module that included a direct request for a phone/skype based interview and these combined tasks may have may have deterred some participants from continuing. These tasks were key research elements of the study and could not be modified.

The attrition continued in weeks 1 and 2 and although the assessment and administrative load was greatly reduced, these weeks involved goal setting and basic psycho-educational content. Marks et al. (2004) also found high attrition (43%) in this early stage. The goal setting task in week 1 set an expectation concerning an active response from the participant during the treatment program, and a reduced engagement was a feature of treatment participants who did not complete the intervention program. Participants who completed the goal setting task clearly demonstrated an active commitment to the program, with those failing to set goals participating in a passive manner only. There was continued attrition, although smaller, until week 4 when the core of the CBT treatment began, after which time participants appeared to have made a commitment to the CBT treatment. From this point on the attrition rate was fairly stable. Overall, the data suggests that the Pilot attrition occurred primarily in

the first 4 weeks and it was not in response to CBT task complexity or fear related stimuli such as exposure, which were introduced in later weeks of the intervention. The slight increase in drop-out rated from weeks 8 to 11 suggests that maintaining a sense of challenge and achievement for committed participants could be a key element in non-face-to-face internet treatment systems.

**Changes Implemented to the Treatment Program Prior to the Main Study**

**Treatment Change Summary.** The Pilot program enabled some changes to be made to the treatment program before the larger group commenced. There were six types of additional functionality to the main treatment program that were not available in the Pilot program. The six types are detailed below and in summary they included (1) increased emetophobia specific resources, (2) graphing of EmetQ, SPOVI and DASS-21 scores, (3) family and friends module (see Chapter 9), (4) activity tracking module (see Chapter 8), (5) enforcing strict sequential access to treatment modules based on weekly time schedule, and (6) miscellaneous security features. In addition to these six key functional improvements, there were a number of software problems that were also identified. Some faults were related to the user interface, functionality and data capture. The user interface was modified slightly in the final version to increase comprehension, but from a treatment perspective, these changes were mostly of a technical nature.

**Treatment Changes in Detail.** As the Pilot participants completed the behavioural and cognitive components of the therapy, the emetophobia specific behaviours and cognitions were stored in a database. These Pilot participants' contributions were reviewed and used as a resource for participants in the Main Study. The behaviours and cognitions gathered from Pilot participants were very specific to emetophobia and provided the participants in the Main Study with a relevant list of suggestions to assist them in identifying their own triggering stimuli, including behaviours and thoughts. These lists of emetophobia specific actions and thoughts

were presented to the Main Study group to assist in simplifying a relatively challenging CBT task. In a similar vein, a large pool of emetophobia specific audio-imaginal exposures were recorded and made available to the main treatment group for the imaginal exposure module in week 9. This larger pool of emetophobia specific audio visual resources enabled the participants to select a story that best matched their own fears.

The second improvement was a graphing module that permitted participants to see a simple line graph of their emetophobia severity ratings and DASS-21 scores. The intended aim was to provide visual feedback on their progress to achieve better treatment outcomes. Patient progress feedback has been shown to improve treatment outcomes (Hawkins, Eric, Michael, Dave, & Kärstin, 2004). In addition, the visual feedback was intended to provide some motivation to continue to complete the extensive research assessment battery. In the Pilot Study, participants would complete the assessment battery but did not get immediate feedback on progress.

A third improvement was a family and friends module that was developed for the Main Study that captured data from the participant's social environment (reported in Chapter 9).

A fourth improvement was an activity tracking module that captured some of the participant engagement with the system. Examples includes recording login dates and times taken to complete assessments. The data was used to predict treatment outcomes (reported in Chapter 7)

The remaining areas for improvement enhanced the security of the program by implementing a range of technical solutions that included advanced data encryption and software protection. Administrative changes were made during the Pilot treatment after it was identified that a participant circumvented the program's treatment schedule but did not engage with any of the activities. Programming barriers were implemented to prevent this behaviour for the remaining participants.

## Main Study Results

Participants in the Main Study completed a 90-day waitlist period during which time no treatment was given. This period served as a comparison for the following 90-day treatment period. There were 256 participants (59.8%) who completed the initial assessments but failed to complete the assessments again after the expiry of the 90-day waitlist period and so were ineligible to commence treatment. This group are described as non-starters (NS). The group of 172 who did start treatment are referred to as treatment attempters (TA).

### Main Study Attrition

The Main Study experienced high levels of dropout. Overall only 81 of the 459 people that registered for the program completed the treatment. From a total of 428 participants that registered correctly for the treatment program 256 individuals did not successfully complete an EmetQ three months later to commence treatment. This was a 59.8% pre-treatment dropout rate. An overview of the treatment attrition is shown in Figure 6.4 and the detail of the weekly loss is shown in Figure 6.5. A full review of Main Study attrition is explored in Chapter 8.

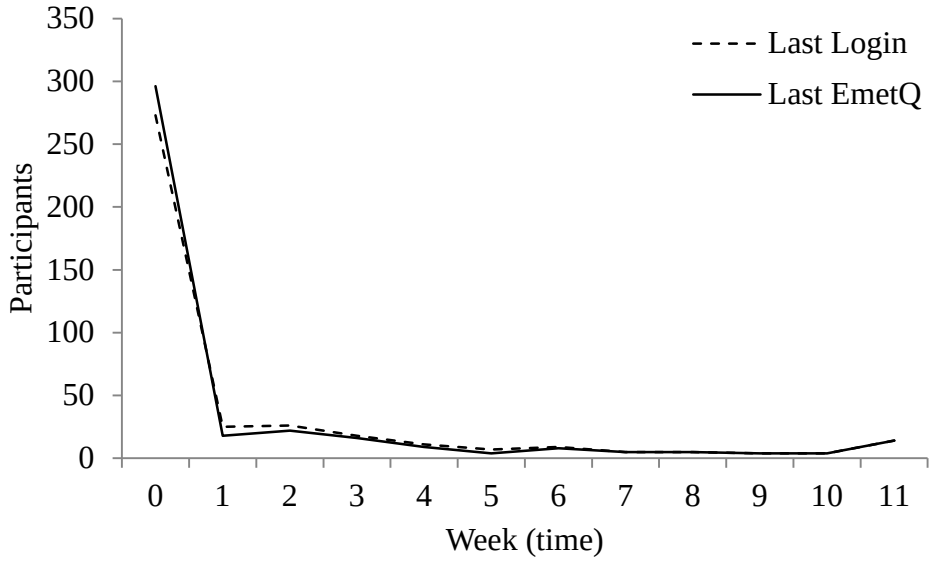


*Figure 6.4.* Treatment Group Attrition Rate Commencing from Orientation Week

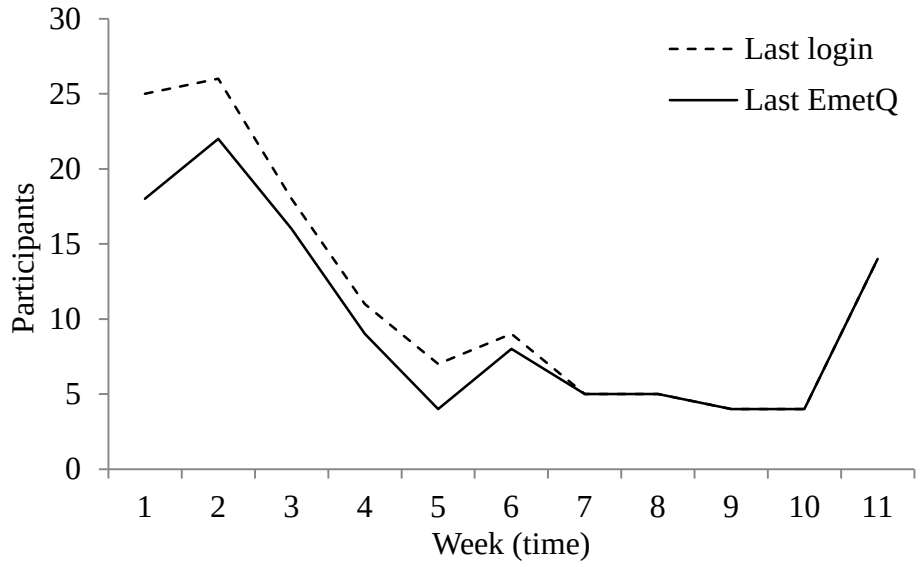


*Figure 6.5.* Treatment Group Attrition Rate Commencing from Week 1 (detail)

**Non-Starters and Treatment Attempters.** There were no significant differences between non-starters and treatment attempters on the EmetQ, SPOVI, the three DASS-21 dimensions (depression, anxiety and stress), the four WHOQoL dimensions (physical, psychological, social and environmental), and the somatic (GISQ) and cognitive (EmetCog) measures of emetophobia, measured at participant registration (baseline). These results are shown in Table 6.3.

Table 6.3

*Main Study: Baseline Test Scores for Non-Starters (NS) and Treatment Attempters (TA)*

| Measure | N | M | SD | Df | F | p |
|---|---|---|---|---|---|---|
| EmetQ13 | | | | | | |
| Treatment attempted | 172 | 46.7 | 8.7 | 1, 428 | 0.30 | .58 |
| Non-starter | 256 | 46.2 | 9.5 | | | |
| SPOVI | | | | | | |
| Treatment attempted | 172 | 34.6 | 11.7 | 1, 428 | 0.10 | .74 |
| Non-starter | 256 | 35.0 | 12.4 | | | |
| DASS-21 depression | | | | | | |
| Treatment attempted | 170 | 17.3 | 11.0 | 1, 387 | 0.10 | .81 |
| Non-starter | 219 | 17.0 | 11.3 | | | |
| DASS-21 anxiety | | | | | | |
| Treatment attempted | 170 | 19.1 | 11.2 | 1, 387 | 1.60 | .20 |
| Non-starter | 219 | 20.5 | 10.9 | | | |
| DASS-21 stress | | | | | | |
| Treatment attempted | 170 | 23.5 | 10.4 | 1, 387 | 0.03 | .86 |
| Non-starter | 219 | 23.3 | 9.9 | | | |
| WHOQoL physical health | | | | | | |
| Treatment attempted | 171 | 25.5 | 5.3 | 1, 419 | 0.60 | .43 |
| Non-starter | 250 | 25.1 | 5.4 | | | |
| WHOQoL psychological health | | | | | | |
| Treatment attempted | 171 | 18.1 | 4.3 | 1, 419 | 0.50 | .50 |
| Non-starter | 250 | 18.4 | 4.6 | | | |
| WHOQoL social relationships | | | | | | |
| Treatment attempted | 171 | 9.6 | 2.7 | 1, 419 | 0.30 | .59 |
| Non-starter | 250 | 9.8 | 2.9 | | | |
| WHOQoL environmental health | | | | | | |
| Treatment attempted | 171 | 29.2 | 5.2 | 1, 419 | 0.40 | .51 |
| Non-starter | 250 | 28.9 | 5.1 | | | |
| Emetcog | | | | | | |
| Treatment attempted† | 146 | 85.5 | 16.3 | 1, 384 | 0.60 | .42 |
| Non-starter | 238 | 84.0 | 19.1 | | | |
| GISQ | | | | | | |
| Treatment attempted† | 142 | 27.4 | 6.6 | 1, 343 | 0.20 | .66 |
| Non-starter | 201 | 27.7 | 7.3 | | | |

† Lower compliance for EmetCog and GISQ assessment because the repetitions assessment schedule was lower and they were presented last.

**Pre-Treatment Predictors of Attrition.** Binary logistic regression was conducted with completion status at the dependent variable and the number of goals as the independent variable. These results are shown in Table 6.4. The results showed that the number of goals

set predicts 79.1% of the completion measure, $\chi^2(1, N = 172) = 80.5$, $p < .001$. Nagelkerke $R^2 = .50$. The more goals set by the participant the less likely the individual was to dropout.

Table 6.4

*Predicting attrition: Number of Goals Set*

| Independent variable | B | SE | Wald | p | Odds ratio |
|---|---|---|---|---|---|
| Number of goals set | -1.11 | .18 | 40.2 | < .001 | .33 |

**Main Study 90-day Baseline Results**

The 90-day waitlist period served as a control for the Main Study. During this no-treatment period, the scores on all assessments were expected to remain stable (see Table 6.5). Scores on the EmetQ and the WHOQoL dimension of (physical health, social relationship, psychological health and environment) remained stable during the 90-day waitlist period. The SPOVI, DASS-21 (depression, anxiety and stress), EmetCog and the GISQ showed significant symptom changes during the waitlist period. Unlike the other measures the GISQ symptoms worsened rather than got better. However, on all measures of emetophobia and mood (depression, anxiety and stress), participants continued to be in the clinical range of difficulties.

Table 6.5

*Assessment Measures: Main Study Baseline to Pre-test Period Results*

| Measure | N | M | SD | Df | F | p | ηp2 |
|---|---|---|---|---|---|---|---|
| EmetQ13 | | | | | | | |
| Baseline | 172 | 46.7 | 8.7 | 1,171 | <.01 | .98 | .00 |
| Pre-test | 172 | 46.7 | 9.6 | | | | |
| SPOVI | | | | | | | |
| Baseline | 172 | 34.8 | 11.5 | 1,171 | 29.10 | <.001** | .15 |
| Pre-test | 172 | 31.4 | 12.6 | | | | |
| DASS-21 depression | | | | | | | |
| Baseline | 163 | 17.4 | 11.1 | 1,162 | 12.60 | <.001** | .07 |
| Pre-test | 163 | 15.0 | 10.7 | | | | |
| DASS-21 anxiety | | | | | | | |
| Baseline | 163 | 19.2 | 11.0 | 1,162 | 20.10 | <.001** | .11 |
| Pre-test | 163 | 16.0 | 11.0 | | | | |
| DASS-21 stress | | | | | | | |
| Baseline | 163 | 23.6 | 10.3 | 1,162 | 8.90 | <.01* | .05 |
| Pre-test | 163 | 21.7 | 10.8 | | | | |
| WHOQoL Physical health | | | | | | | |
| Baseline | 168 | 25.3 | 5.2 | 1,168 | 0.18 | .67 | <.01 |
| Pre-test | 168 | 25.2 | 5.2 | | | | |
| WHOQoL Psychological health | | | | | | | |
| Baseline | 168 | 17.9 | 4.4 | 1,168 | 3.00 | .09 | .01 |
| Pre-test | 168 | 18.3 | 4.4 | | | | |
| WHOQoL Social relationships | | | | | | | |
| Baseline | 168 | 9.6 | 2.6 | 1,167 | 0.53 | .47 | <.01 |
| Pre-test | 168 | 9.5 | 2.8 | | | | |
| WHOQoL Environment | | | | | | | |
| Baseline | 168 | 29.9 | 5.2 | 1,168 | 0.02 | .88 | <.01 |
| Pre-test | 168 | 29.0 | 5.1 | | | | |
| EmetCog † | | | | | | | |
| Baseline | 122 | 86.8 | 15.3 | 1,121 | 5.60 | .02* | .04 |
| Pre-test | 122 | 84.6 | 16.3 | | | | |
| GISQ † | | | | | | | |
| Baseline | 112 | 26.8 | 7.0 | 1,111 | 7.60 | <.01* | .06 |
| Pre-test | 112 | 28.2 | 7.1 | | | | |

† Lower compliance for EmetCog and GISQ assessment because the repetitions assessment schedule was lower and they were ordered last.

Table 6.6

*Correlations with EmetQ, SPOVI and Mood for Treatment Attempters at Baseline (N=161)*

| | | SPOVI | Depression | Anxiety | Stress |
|---|---|---|---|---|---|
| EmetQ | *r* | .58** | .44** | .46** | .43** |
| | *p* | > .001 | > .001 | > .001 | > .001 |
| SPOVI | *r* | | .42** | .60** | .48** |
| | *p* | | > .001 | > .001 | > .001 |

**Main Study Treatment Results**

**Weeks in Treatment.** The number of weeks the participant was in treatment, defined by last login week, was significantly correlated with the change in EmetQ and SPOVI scores during the treatment period. The change in EmetQ during the treatment period was weakly correlated with treatment duration, ($r$ = .36, $p$ <.001) but the change in SPOVI during the treatment period was not ($r$ = .18, $p$ = .08). Mood was not significantly correlated with number of weeks of treatment (depression; $r$ = .08, p = .40. anxiety; $r$ = .09, $p$ = .40, stress; $r$ = .09, $p$ = .40.). The change in EmetQ during the treatment period was not significantly correlated with mood changes, but the higher scores on the SPOVI were significantly associated with higher depression; $r$ = .29, $p$ < .01, anxiety; $r$ = .35,$p$ <.001, and stress $r$ = .26, $p$ <.01.

The change scores in the four WHOQoL dimensions (physical, psychological, social and environmental factors) were not significantly correlated with treatment duration (physical; $r$ = -.22, $p$ = .14, psychological; $r$ = -.27, $p$ = .07, social; $r$ = -.17, $p$ = .25, and environmental; $r$ = -.19, $p$ = .21). Lower scores on the EmetQ and the SPOVI were correlated with improvements in physical health; EmetQ; $r$ = -.32, $p$ = .03, SPOVI; $r$ = -.29, $p$ = .05 and with psychological health; EmetQ; $r$ = -.37, $p$ = .01, SPOVI; $r$ = -.34, $p$ = .02. The two other WHOQoL dimension change scores of social relationships and environment were not

significantly correlated with symptom severity (EmetQ and SPOVI) or mood (depression, anxiety or stress).

**Treatment Non-Completers.** Of the 172 participants who started treatment, 52.9% (*n* = 91) dropped out of treatment (TD) before completing an EmetQ on or after day 21 of the program. Table 6.7 shows the age and fear related profiles of treatment completers (TC) and treatment dropouts (TD). The dropouts were 2.3 years younger than the treatment completers. Although a simple measure of age was not significant, a Chi squared test found that participants aged under 21 years were more likely to drop out of the treatment, than individuals over 21 years of age, $\chi^2(1, N = 172) = 5.7$, $p = .02$. Other factors, including worry time; the years since the participant last vomited; the age when the fear of vomiting became a problem; the age of awareness of the fear; and the number of days fearful in a year, were not significantly different between the two groups.

Table 6.7

*Age and Fear Profile*

| | TD *n* = 91 | | TC *n* =81 | | Comparison |
|---|---|---|---|---|---|
| | M | SD | M | SD | F-test |
| Age | 31.5 | 7.3 | 29.2 | 8.5 | $F$ (1,170) = 3.60, $p$ = .06 |
| Time spent worrying minutes per day | 313.2 | 347.1 | 244.6 | 304.2 | $F$ (1,170) = 0.80, $p$ = .36 |
| Years since last vomited | 8.5 | 8.8 | 6.6 | 8.0 | $F$ (1,170) = 2.10, $p$ = .15 |
| Age when fear of vomiting became a problem (years) | 16.4 | 8.7 | 14.8 | 8.1 | $F$ (1,170) = 1.50, $p$ = .22 |
| Age when aware of fear (years) | 11.0 | 6.9 | 10.7 | 7.3 | $F$ (1,170) = 0.05, $p$ = .82 |
| Days fearful in a year | 12.5 | 57.0 | 6.7 | 17.8 | $F$ (1,170) = 0.84, $p$ = .36 |

Table 6.8

*Goals Set: Treatment Completers and Treatment Dropouts*

| Goals | Treatment completer | Treatment dropout | Total |
|---|---|---|---|
| 0 | 7 | 71 | 78 |
| 1 | 19 | 10 | 29 |
| 2 | 14 | 3 | 17 |
| 3 | 17 | 5 | 22 |
| 4 | 10 | 1 | 11 |
| 5 | 3 | 0 | 3 |
| 6 | 6 | 1 | 7 |
| 7 | 1 | 0 | 1 |
| 9 | 1 | 0 | 1 |
| 10 | 2 | 0 | 2 |
| 24 | 1 | 0 | 1 |
| Total | 81 | 91 | 172 |

Table 6.8 shows the number of goals set for treatment completers and treatment dropouts. A chi-squared test reported that the number of goals set for completers were significantly higher than those set by treatment dropouts, $\chi^2(10, N = 172) = 87.6$, $p < .001$, a finding consistent with the results of the Pilot Study.

Table 6.9

*Main Study Test Scores for Treatment Dropouts and Treatment Completers*

| Measure | *N* | *M* | *SD* | *df* | *F* | *p* |
|---|---|---|---|---|---|---|
| EmetQ | | | | | | |
| Completer (TC) | 81 | 46.5 | 8.5 | 1,170 | 0.03 | .87 |
| Dropout (TD) | 91 | 46.8 | 9.0 | | | |
| SPOVI | | | | | | |
| Completer (TC) | 81 | 34.2 | 11.6 | 1,170 | 0.20 | .66 |
| Dropout (TD) | 91 | 35.0 | 11.8 | | | |
| DASS-21 depression | | | | | | |
| Completer (TC) | 80 | 17.0 | 11.5 | 1,168 | 0.10 | .75 |
| Dropout (TD) | 90 | 17.6 | 10.6 | | | |
| DASS-21 anxiety | | | | | | |
| Completer (TC) | 80 | 18.9 | 11.0 | 1,168 | 0.04 | .85 |
| Dropout (TD) | 90 | 19.2 | 11.4 | | | |
| DASS-21 stress | | | | | | |
| Completer (TC) | 80 | 22.6 | 10.0 | 1,168 | 1.10 | .30 |
| Dropout (TD) | 90 | 24.2 | 10.7 | | | |
| WHOQoL physical health | | | | | | |
| Completer (TC) | 80 | 25.2 | 5.4 | 1,169 | 0.40 | .54 |
| Dropout (TD) | 91 | 25.7 | 5.1 | | | |
| WHOQoL psychological health | | | | | | |
| Completer (TC) | 80 | 18.1 | 4.6 | 1,169 | 0.01 | .99 |
| Dropout (TD) | 91 | 18.1 | 4.1 | | | |
| WHOQoL social relationships | | | | | | |
| Completer (TC) | 80 | 9.7 | 2.7 | 1,169 | 0.04 | .85 |
| Dropout (TD) | 91 | 9.6 | 2.6 | | | |
| WHOQoL environmental | | | | | | |
| Completer (TC) | 80 | 29.2 | 5.8 | 1,169 | 0.02 | .88 |
| Dropout (TD) | 91 | 29.3 | 4.8 | | | |
| Emetcog | | | | | | |
| Completer (TC) | 78 | 86.1 | 16.7 | 1,144 | 0.30 | .65 |
| Dropout (TD) | 68 | 84.9 | 15.9 | | | |
| GISQ | | | | | | |
| Completer (TC) | 68 | 26.4 | 5.6 | 1,140 | 7.60 | .01* |
| Dropout (TD) | 74 | 29.2 | 6.0 | | | |

**Main Study Intent-to-Treat.** Intent-to-treat analysis was conducted using treatment completers. For participants who failed to complete the EmetQ in Week 12, the last valid EmetQ completed at or after week 3 was used. Some participants who completed the EmetQ assessments failed to complete all of the secondary measures. The missing assessment on these secondary measures for treatment completers was allowed to remain missing from the analysis.

***Primary outcome measure***. One-way ANOVA was used to compare treatment outcome from baseline to pre-test, and from pre-test to post-test. There was no significant change in scores on the EmetQ from baseline to pre-test, but there was a significant decrease in reported symptoms from pre-test to post-test, $F(1, 80) = 86.5$, $p < .001$, $\eta_p^2 = .52$ (see Table 6.10).

Table 6.10

*Main Study: Primary Emetophobia Severity Measure (EmetQ): Main Treatment Pre-test and Post-test Results*

| EmetQ ($n$ = 81) | *N* | *M* | *SD* | *df* | *F* | *p* | $\eta_p^2$ |
|---|---|---|---|---|---|---|---|
| Baseline | 81 | 46.5 | 8.5 | 1,80 | 0.06 | .80 | .005 |
| Pre-test | 81 | 46.4 | 9.5 | | | | |
| Cohen's $d$ = 0.01 | | | | | | | |
| Pre-test | 81 | 46.4 | 9.5 | 1,80 | 86.50 | <.001 | .52 |
| Post-test | 81 | 36.7 | 11.8 | | | | |
| Cohen's $d$ = 0.90 | | | | | | | |

***Clinical Significant Improvement and Reliable Change for the EmetQ.*** Jacobson and Truax (1991) described quantitative measures to assess whether the change in individual scores from pre- to post-intervention were clinically significant (Clinically Significant Change) and reliable (Reliable Change Index). To determine if clinically significant change had occurred

due to treatment, they stated “The level of functioning subsequent to therapy should fall within the range of the functional or normal population, where range is deemed as within two standard deviations of the mean of that population” (Jacobson & Truax, 1991, p13). In the current study, clinically significant change was determined using the probabilistic technique recommended by Jacobson and Truax (1991). Using this technique a score on the EmetQ is determined using data from the functionally normal and clinical populations. The cut-off point is represented as a weighted mid-point between means of functional and clinical populations. If the post-test score falls below this cut-off score, the individual is considered to be more likely to be a member of the functionally normal population from the clinically impaired population. The data used to calculate the cut-off for clinically significant change was the baseline data from the whole clinical sample obtained at baseline and from the functionally normal student population used. The control mean was 28.3 (*SD* = 8), the clinical mean at pre-treatment was 46.4 (*SD* = 9.5) and the clinical mean at post was 36.7 (*SD* = 11.8).

This quantity is obtained using the following formula:

$$\frac{[(SD_{clin} \times M_{non\text{-}clin}) + (SD_{non\text{-}clin} \times M_{clin})]}{(SD_{clin} + SD_{non\text{-}clin})}$$

The Reliable Change Index (RCI) is a standardized measure of effect which measures ‘real’ or reliable change. It is based on change that occurs among the sample from pre- to post-treatment. A change score is reliable if the magnitude of change for an individual is two standard error of measurement smaller than the pre-test score, when the measurement error of the test used (EmetQ), random error or chance is taken into account. When using the RCI a reliable change can occur, regardless of whether or not the individual becomes a part of a functionally normal population following treatment (Jacobson & Truax, 1991).

Calculation of the reliable change index was based on the large samples used in the current study. Boschen et al. (2013) reported the EmetQ reliability as .85. The standard error of difference based on the baseline standard deviation was 4.77. The amount of change

required for statistically meaningful change to occur at the 0.05 level of statistical significance was 14.55 EmetQ points.

The estimated point at which individuals are deemed to have a clinical level of emetophobia is 37.1 EmetQ points. In the main treatment sample 15 (18.5%) participants did not meet this technical criteria of clinical difficulties with emetophobia at the start of treatment. At the end of treatment 37 (45.7%) did not meet the clinically significant change score and 44 (54.3%) met or exceeded the clinical cut-off. Overall 29 (35.8%) participants presented with clinical levels of emetophobia at the start of treatment but did not have a clinical level of emetophobia after treatment.

The reliable change index determines whether a statistically meaningful change has occurred in a treatment sample but this does not determine whether the change is clinically significant. Clinical significance (CS) is typically calculated based on a conservative two standard deviations from the post-test mean but the use of one standard deviation may also be a practical method where clear separation of the clinical and normally functioning populations are difficult (Wise, 2004). Using the primary severity measure (EmetQ) there were 35 participants (43.2%) whose RCI scores showed at least a two standard deviation improvement. There were 45 participants (55.6%) who showed no evidence of reliable change (see Table 6.11). One participant experienced a clinical decrease (1.2%). When using the less conservative one standard deviation from the post-test mean to show evidence of some change, there were 57 participants (70.4%) who improved and no meaningful change was experienced by 20 (24.7%) participants. Four participants (4.9%) experienced a clinical increase in scores on the EmetQ.

Table 6.11

*EmetQ RCI and cut-off score table*

| Category | Frequency 2*SD* | Percentage 2*SD* | Frequency 1*SD* | Percentage 1*SD* |
|---|---|---|---|---|
| Recovered (passed CS and RCI) | 28 | 34.6% | 36 | 44.4% |
| Improved (passed RCI but not CS) | 0 | 0% | 0 | 0% |
| Unchanged (passed neither criterion) | 45 | 55.5% | 20 | 24.7% |
| Deteriorated (worsened on RCI) | 1 | 1.2% | 4 | 4.9% |
| False positive (passed CS but not RCI) | 16 | 19.7% | 7 | 8.6% |

**Main Study: Secondary Outcome Measures.** A significant reduction in emetophobia symptoms defined by the SPOVI scores were reported from baseline to pre-test. However, following treatment, there was a further significant reduction in symptom reports (see Table 6.12).

Table 6.12

*Main Study Secondary Outcomes Scores*

| Assessment | N | M | SD | df | F | p | $\eta_p^2$ |
|---|---|---|---|---|---|---|---|
| SPOVI (n = 78) | | | | | | | |
| Baseline | 80 | 35.5 | 11.2 | 1,79 | 27.40 | <.001 | .26 |
| Pre-test | 80 | 29.4 | 12.4 | | | | |
| Pre-test | 78 | 29.7 | 12.5 | 1,77 | 74.00 | <.001 | .49 |
| Post-test | 78 | 17.6 | 13.0 | | | | |
| DASS-21 depression | | | | | | | |
| Baseline | 80 | 17.0 | 11.5 | 1,79 | 12.50 | .001 | .14 |
| Start | 80 | 13.7 | 10.1 | | | | |
| Start | 71 | 14.3 | 10.2 | 1,70 | 18.10 | <.001 | .21 |
| Finish treatment | 71 | 9.6 | 9.1 | | | | |
| DASS-21 anxiety | | | | | | | |
| Baseline | 80 | 18.9 | 11.0 | 1,79 | 17.00 | <.001 | .18 |
| Start | 80 | 14.4 | 10.3 | | | | |
| Start | 71 | 14.7 | 10.4 | 1,70 | 12.10 | .001 | .15 |
| Finish treatment | 71 | 10.8 | 9.9 | | | | |
| DASS-21 stress | | | | | | | |
| Baseline | 80 | 22.6 | 10.0 | 1,79 | 5.60 | .02 | .07 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Start | 80 | 20.4 | 10.7 | | | | |
| Start | 71 | 21.1 | 10.7 | 1,70 | 30.10 | <.001 | .30 |
| Finish treatment | 71 | 14.2 | 10.4 | | | | |
| WHOQoL Physical health | | | | | | | |
| Baseline | 76 | 25.1 | 5.3 | 1,75 | 0.03 | .85 | 0 |
| Start | 76 | 25.1 | 5.4 | | | | |
| Start | 41 | 25.4 | 5.1 | 1,40 | 28.40 | <.001 | .42 |
| Finish treatment | 41 | 27.2 | 4.4 | | | | |
| WHOQoL Psychological health | | | | | | | |
| Baseline | 76 | 17.9 | 4.5 | 1,75 | 3.60 | .06 | .05 |
| Start | 76 | 18.4 | 4.5 | | | | |
| Start | 41 | 18.5 | 4.3 | 1,40 | 17.40 | <.001 | .30 |
| Finish treatment | 41 | 20.1 | 3.7 | | | | |
| WHOQoL Social relationships | | | | | | | |
| Baseline | 76 | 9.6 | 2.7 | 1,75 | 0.17 | .68 | <.01 |
| Start | 76 | 9.6 | 2.7 | | | | |
| Start | 41 | 9.9 | 2.5 | 1,40 | 6.80 | .01 | .15 |
| Finish treatment | 41 | 10.5 | 2.4 | | | | |
| WHOQoL Environment | | | | | | | |
| Baseline | 76 | 29.0 | 5.8 | 1,75 | 0.80 | .38 | .01 |
| Start | 76 | 29.3 | 5.5 | | | | |
| Start | 41 | 29.8 | 5.3 | 1,40 | 19.80 | <.001 | .33 |
| Finish treatment | 41 | 31.8 | 4.7 | | | | |
| EmetCog [a] | | | | | | | |
| Baseline | 68 | 71.2 | 14.7 | 1,67 | 1.80 | .19 | .03 |
| Start | 68 | 69.7 | 15.0 | | | | |
| Start | 27 | 69.7 | 16.0 | 1,26 | 49.70 | <.001 | .66 |
| Finish treatment | 27 | 52.4 | 16.8 | | | | |
| GISQ [a] | | | | | | | |
| Baseline | 59 | 25.6 | 6.7 | 1,58 | 7.90 | < .01 | .12 |
| Start | 59 | 27.8 | 6.9 | | | | |
| Start | 24 | 27.8 | 7.0 | 1,23 | 5.10 | .03 | .18 |
| Finish treatment | 24 | 25.6 | 7.9 | | | | |

[a] Lower compliance for EmetCog and GISQ assessment because the repetitions assessment schedule was lower and were ordered last.

**SPOVI Reliable Change Index.** Veale, Ellison, et al. (2013) reported the SPOVI test-retest reliability (.85). EmetStudy data (Table 6.13) reports the standard error of difference based on pre-test and post-test standard deviations was 6.30 SPOVI points. The amount of change required for statistical meaningful change to occur at the 0.05 level of statistical significance was 12.35 SPOVI points. The clinically significant change score was 14.37.

The reliable change index was calculated using two and one standard deviations as the classification criteria on the sample of 78 treatment completers. Two standard deviations identified 23 participants who improved (28.4%) and no change was experienced by 58 (71.6%) (Table 6.13). Two participants (2.5%) experienced a clinical worsening of symptoms. The less conservative one standard deviation used to show some evidence of improvement, found that 32 participants improved (39.5%), 49 (60.5%) participants did not show evidence of reliable change and three (3.7%) participants scores on the SPOVI increased.

Table 6.13

*SPOVI RCI and Clinically Significant Change score Table*

| Category | Frequency 2SD | Percentage 2SD | Frequency 1SD | Percentage 1SD |
|---|---|---|---|---|
| Recovered (passed CS and RCI) | 23 | 28.4% | 32 | 39.5% |
| Improved (passed RCI but not CS) | 13 | 16.0% | 23 | 28.4% |
| Unchanged (passed neither criterion) | 58 | 71.6% | 49 | 60.5% |
| Deteriorated (worsened on RCI) | 2 | 2.5% | 3 | 3.7% |
| False positive (passed CS but not RCI) | 18 | 22.2% | 9 | 11.1% |

Based on the clinically significant change score, all participants were classified into the clinical population with regard to severity of emetophobia at the start of treatment. Eleven participants met the SPOVI cutoff that had not met the EmetQ cutoff and ten others had made the EmetQ cutoff but not the SPOVI cutoff. A total of 67 (82.7%) met the clinical cut-off at the start of treatment. At the finish of treatment 40 (49.4%) did not meet the clinical cut-off and 41 (50.6%) met or exceeded the clinical cut-off. Overall 29 (35.8%) participants met or exceeded the clinical cut-off at the start of treatment and fell below the clinical cut-off at the end of treatment.

**WHOQoL Outcomes.** Scores on all WHOQoL dimensions (physical health, psychological health, social relationship and environment) had significantly improved from the beginning to the end of the intervention program (see Table 6.11). The new measures of emetophobia severity (EmetCog and GISQ) both showed improvements at the end of treatment. Despite the small sample sizes, both the EmetCog and the GISQ showed significant decreases in symptoms from the pre-test to post-test.

Table 6.14

*Correlations between Symptom Severity and Mood*

| | *N* | ΔDepression | | ΔAnxiety | | ΔStress | |
|---|---|---|---|---|---|---|---|
| | | *r* | *p* | *r* | *p* | *r* | *p* |
| ΔEmetQ | 80 | .17 | .14 | .12 | .27 | .05 | .64 |
| ΔSPOVI | 74 | .32** | < .01 | .34** | < .01 | .27 | .02 |
| ΔWHOQoL physical | 40 | -.28 | .08 | -.37* | .02 | -.10 | .53 |
| ΔWHOQoL psychological | 40 | -.30 | .06 | -.21 | .18 | -.03 | .84 |
| ΔWHOQoL social | 40 | .03 | .87 | -.01 | .93 | .14 | .39 |
| ΔWHOQoL environmental | 40 | .07 | .65 | -.09 | .60 | .15 | .36 |

Note: Δ refers to the difference in scores from the start of treatment and the finish of treatment.

Table 6.14 shows the correlation in the change in scores between the pre-test and post-test scores for emetophobia symptom severity and mood. The EmetQ changes were uncorrelated with changes in mood. The SPOVI scores had a weak positive correlation with changes in depression and anxiety scores, so therefore as emetophobia severity decreased so did depression score. Greater change in the SPOVI scores were associated with greater change in reports of depression and anxiety indicating a reduction in scores is associated with a corresponding reduction in depression and anxiety. Changes in WHOQoL physical dimension were correlated with the changes in anxiety during the treatment, indicating that a decrease in anxiety is associated with an increase in the perception of physical health.

**Follow-Up.** Three months after the completion of treatment participants were asked to complete a follow-up assessment. Although attempts were made to contact all treatment completers, a technical issue restricted contact with the participants and it is unclear if the low numbers were due to contact failures or participants being unwilling to complete a follow-up assessment. A total of 22 particpants attempted the assessments and 17 participants sucessfuly completed the entire set of assessments. There was no significant change in EmetQ, SPOVI, anxiety and WHOQoL dimensions between post-test and the 90-day follow-up. There was a significant increase in depression and stress scores from post-test to follow-up.

Table 6.15

*Main Study Follow-up Results*

| Measure | *N* | *M* | *SD* | *Df* | *F* | *p* | $\eta_p^2$ |
|---|---|---|---|---|---|---|---|
| EmetQ | | | | | | | |
| Post-test | 22 | 30.3 | 10.3 | 1,21 | 2.40 | .14 | .10 |
| 3 month follow-up | 22 | 32.6 | 10.6 | | | | |
| SPOVI | | | | | | | |
| Post-test | 20 | 8.0 | 4.0 | 1,19 | 1.90 | .18 | .09 |
| 3 month follow-up | 20 | 10.3 | 9.0 | | | | |
| DASS-21 depression | | | | | | | |
| Post-test | 18 | 4.3 | 4.5 | 1,17 | 5.30 | .04* | .24 |
| 3 month follow-up | 18 | 6.3 | 5.4 | | | | |
| DASS-21 anxiety | | | | | | | |
| Post-test | 18 | 6.0 | 5.9 | 1,17 | 1.50 | .24 | .08 |
| 3 month follow-up | 18 | 7.7 | 6.9 | | | | |
| DASS-21 stress | | | | | | | |
| Post-test | 18 | 8.4 | 6.3 | 1,17 | 6.90 | .02* | .29 |
| 3 month follow-up | 18 | 11.3 | 6.4 | | | | |
| WHOQoL Physical health | | | | | | | |
| Post-test | 17 | 29.9 | 3.5 | 1,16 | 0.02 | .90 | <.01 |
| 3 month follow-up | 17 | 29.8 | 3.6 | | | | |
| WHOQoL Psychological health | | | | | | | |
| Post-test | 17 | 22.0 | 3.7 | 1,16 | 0.06 | .82 | <.01 |
| 3 month follow-up | 17 | 22.1 | 4.2 | | | | |
| WHOQoL Social relationships | | | | | | | |
| Post-test | 17 | 11.2 | 2.7 | 1,16 | 0.46 | .51 | .03 |
| 3 month follow-up | 17 | 10.9 | 2.7 | | | | |
| WHOQoL Environment | | | | | | | |
| Post-test | 17 | 33.2 | 4.9 | 1,16 | 1.30 | .27 | .08 |
| 3 month follow-up | 17 | 32.6 | 4.9 | | | | |

## Main Study Discussion

### Attrition

The Pilot and Main Study showed successful treatment outcomes consistent with outcomes found in face-to-face treatment programs. Attrition was a significant feature of the EmetStudy treatment both for the Pilot and the Main Study. The theoretical basis of attrition is further expanded in Chapter 8. The treatment outcome evaluation is explored immediately after attrition has been addressed.

**Rates of Attrition.** In the EmetStudy, the attrition rate after registration was 59.8%. This rate is much higher than face-to-face attrition rates but within expectation for self-guided therapy (D. Richards & Richardson, 2012). If the attrition rate for the Main Study excludes the waitlist period and is calculated from the start of therapy the rate falls to 47.1%.

**Predicting Post-Treatment Attrition.** The number of goals specified at the early stage of treatment was a predictor of post-treatment attrition. This finding was consistent in the Pilot and Main Study treatment studies. Goal setting is an active cognitive process that requires assessing the current situation and imagining changes to the future and then committing to a future direction. Failure to complete this task adequately may indicate that the individual in not in an active stage of the Transtheortical Model of Readiness to Change (TTM: Prochaska & DiClemente, 1994). DiClemente has suggested[3] that participants who fail to set goals could receive additional brief guidance regarding change readiness. This could be via a therapist or an additional web page and may assist some individuals to return or move back to

[3] Personal communication with Elizabeth Conlon and Carlo DiClemente regarding EmetStudy on 1/10/2015

the active phase. A second approach is to adapt a tool such as questionnaires developed for change readiness for problem drinkers (Miller & Tonigan) and use it as a screening tool for identifying individuals more likely to complete an internet intervention for emetophobia. This explanation is further discussed in Chapter 8.

**Treatment Discussion**

The main treatment study examined the progress of 459 participants through the treatment program. Individuals who did not complete treatment were compared with treatment completers. The effectiveness of the treatment was assessed by comparing the changes in symptom severity between the 90-days of treatment with 90-days of non-treatment. To evaluate if treatment improvements or losses were sustained the final treatment scores were compared with follow-up assessment scores.

**Efficacy of the EmetStudy Internet-Based CBT program for Emetophobia**

The main treatment study indicated that the 12 week EmetStudy treatment program reduced the symptoms of emetophobia severity during treatment and this was sustained for a further three months. These results are consistent with the Pilot Study. In the Pilot Study symptom severity decreased by 9.5 EmetQ points and by 9.7 points in the Main Study. These results indicate that the efficacy of the internet program is similar to that found in a traditional 12 week face-to-face emetophobia treatment program conducted by a psychiatrist and clinical psychologists which showed symptom reduction on the EmetQ of 8.7 points (Boschen et al., 2013). In a recently published group emetophobia therapy study, 23 patients showed a significant decrease in EmetQ scores from 47.6 to 40.4 (adjusted to a 1-5 scale), a decrease of 7.2 points.

**Outcomes from the Treatment.** Participants in the Main Study who completed the treatment showed significant improvements in all four measures of emetophobia symptom severity (EmetQ, SPOVI), emetophobia-related cognitions and gastro-intestinal sensitivity

(EmetCog and GISQ). The set of four emetophobia measures indicate a consistent improvement across a broad spectrum of emetophobia symptoms and theoretically related constructs. Although the statistical difference between the pre-test and post-test means indicates that the treatment improved using the participant's symptoms on average to show change oversimplifies the diversity of the treatment outcomes in individual participants. To objectively assess these gains measures of reliable and clinically significant change were used to clarify the clinical value of the outcome scores for individual participants in the treatment program. Using the standard criterion of clinically significant and statistically reliable change one third (34.6%) of participants had recovered at post-test. A further 8.6% showed some evidence of improvement on the RCI. There were 24.7% of participants who remained unchanged following the treatment program. There was one participant who showed evidence of deterioration. Considering the participant's chronic history with emetophobia of 16.4 years, severity and comorbidity, the recovery rates are similar to a group emetophobia treatment (Ahlen et al., 2015). The 10% deterioration found in both studies is consistent. The recovery rate for emetophobia has been published for group treatment, with 29% of participants recovered (Ahlen et al., 2015). A meta-analysis of anxiety recovery rates for face-to-face treatments averaged 40% (Fisher & Durham, 1999).

The secondary measure of emetophobia (SPOVI) showed good recovery rates of between 28.4% (2 *SD*) and 39.5% (1 *SD*) but relatively high unchanged rates between 71.6% (2SD) and 60.5% (1 *SD*). The unchanged rate is high relative to the EmetQ, and may relate to measurement/psychometric considerations that are further explored in Chapter 7.

***Emetophobia symptom severity and WHOQoL.*** A strong indication that emetophobia symptoms improved to a clinically meaningful extent is that all four of the quality of life dimensions improved significantly after the treatment period, while they had previously remained stable during the baseline period. On this basis it could be concluded that the

improvements reported in emetophobia symptoms, related constructs and mood were associated with improved perceptions of overall health related quality of life. This suggests that a broad range of improvements were sufficiently consistent over time to indirectly improve broader quality of life dimensions during the treatment period. An alternative explanation of these results is that the improvements in mood may have been a contributing factor to the improvements in WHOQoL rather than the improvements in emetophobia symptoms. The evidence to support this hypothesis is discussed in detail below.

In summary, treatment substantially reduced emetophobia symptoms for around a third of the participants, with benefits that were clinically meaningful. The direct effects on emetophobia symptoms appear consistent across all symptom assessment tools and the benefits were dose related (see Chapter 7). Over the course of the treatment, depression, anxiety and stress also substantially improved.

Although on average the treatment reduced emetophobia symptom severity, the treatment's direct effect on improving mood was more complex. Simply stating that the treatment period substantially reduced all mood symptoms hides the inconsistencies of the improvements that spontaneously occurred during the waitlist period. It is hypothesised that for the long-term sufferers with clinical levels of emetophobia, the substantial improvements in mood during the six months may have been in part a placebo effect (hope for change) and a valid treatment effect because the treatment program targeted anxiety and delivered substantial improvement for the emetophobia symptoms.

**Waitlist Period.** During the 90-day waitlist period between registration and starting the intervention program, no treatment related contact was provided to the participants of the study. During this period reported emetophobia symptoms were expected to remain stable. On the primary outcome measure, the EmetQ, there was no significant change in symptoms from

baseline to pre-test for all of the participants who attempted treatment and for the subgroup of treatment completers.

The secondary measure of symptom severity, the SPOVI was inconsistent with the EmetQ for the 90-day waitlist period. The SPOVI showed symptom improvement with, on average, a 3.4 point reduction in symptom severity for all participants. This waitlist improvement was even greater (6.1 SPOVI points) for those participants that continued on with treatment. To clarify this inconsistency between EmetQ stability and SPOVI improvements the EmetCog, GISQ, and the DASS-21 results provide a context for interpretation. The two new emetophobia measures assess emetophobia-related cognitions (EmetCog) and gastro-intestinal sensitivity (GISQ). A significant but small improvement was found in scores on the EmetCog, with symptoms significantly deteriorating on the GISQ during the 90-day waitlist period. These targeted assessment tools indicated that emetophobia cognitions can improve independently of vulnerability to somatic sensitivity. In addition, there were moderate correlations between depression, anxiety and stress symptoms and the SPOVI and the EmetQ and depression, anxiety, and stress symptoms. During the baseline period there were small but significant reductions in symptoms of depression, anxiety and stress. Together these findings suggest that improvements in the SPOVI may be related to a greater sensitivity to fluctuations in mood than that found for the EmetQ.

**Main Treatment Follow-Up.** After treatment was completed there was a period of three months during which participants were not contacted by the therapist. At the three-month follow-up, the primary measure of emetophobia severity (EmetQ) and the SPOVI remained unchanged from post-test. The sample sizes of the new severity measures (EmetCog and GISQ) were too small and unreliable, consequently the data were not reported during follow-up. The symptom severity results show that improvements remained stable for a period of at least three months after the completion of treatment. Other symptoms remained less stable

with depression and stress increasing after three months. Anxiety remained stable and this may relate to the participants' ability to apply those skills learned in relation to anxiety for a longer period. The protocol used drew heavily on other anxiety treatment programs and this outcome is consistent with transdiagnostic approaches (Craske, 2012; Paulus & Norton, 2015). All WHOQoL dimensions (physical health, psychological health, social relationship and environment) had remained unchanged three months after the conclusion of treatment. Overall the results indicate that treatment gains were retained for a period of at least three months.

**Main Study Treatment Summary**

A total of 459 participants registered for treatment with a three month waitlist period, with 172 commenced treatment. A total of 81 participants were defined as completing the treatment program and only 23 (28%) participants completed the full 12 weeks of treatment. Despite only completing an average of 8.1 (*SD* = 6.1) weeks of treatment, participants reported significant and clinically meaningful decreases in emetophobia severity. Secondary and new measures of emetophobia-related constructs (Emetcog and GISQ) also showed decreases. Additional measures of mood symptoms and quality of life showed improvements in multiple areas with the exception of anxiety which remained unchanged after treatment. Approximately one-third of participants recovered, using a criterion of 2 *SD*s which is consistent with face-to-face CBT programs, which showed an average of 40% for face-to-face treatments (Fisher & Durham, 1999) and 29% for a group emetophobia treatment (Ahlen et al., 2015).

Three months after treatment, the primary measure (EmetQ) indicated that the gains were retained. The SPOVI and WHOQoL were also stable. Only stress and depression showed a small increase in symptoms in the follow-up period. In summary, the EmetStudy treatment was effective and sustained three months after treatment. Further improvements are required to increase relatively low clinically reliable change outcomes. The following three chapters explore in detail key elements of the treatment program and these include predicting

treatment outcome (Chapter 7), predicting attrition (Chapter 8) and the influence of the social environment on the treatment participants (Chapter 9).

## Predicting Treatment Outcome

The ability to predict treatment outcomes is important because it can save valuable resources and help maximise the capacity to produce positive change for the greatest number of participants. This chapter explored the possible emetophobia-related treatment predictors in a CBT context by exploring known predictors for other phobias in a similar context for face-to-face and internet treatments. The possible predictors of treatment response are evaluated by using binary logistic regression analysis. How these identified predictors might influence treatment outcomes is discussed.

### Treatment Outcome

The EmetStudy treatment program was an effective treatment program with 34.6% of treatment completers showing evidence of recovery using measures of clinical significance and reliable change. This still leaves approximately two thirds of the treatment completers who did not achieve clinically significant and reliable change. Knowledge of the pre-treatment predictors permits identification of individuals who are most likely to achieve treatment success. For those individuals who are more likely to achieve reduced treatment outcomes, additional resources or alternative treatments could be employed to improve positive outcomes for the individual.

None of the currently published peer reviewed treatment studies of emetophobia have identified predictors of treatment outcome, either before treatment commences or during the course of the treatment. Due to the absence of known emetophobia treatment predictors, this chapter first explores the predictors found in other specific phobias and predictors for conditions that were identified by Boschen (2007) as having diagnostic similarities. The conditions identified were panic disorder, social phobia and OCD. The analysis is broken down into predictors that occur prior to treatment, and predictors during treatment as they serve

different functional roles. The similarities and differences of internet and face-to-face predictors are examined for systemic differences.

**Comparing Internet and Face-to-face Treatments**

Internet and face-to-face based CBT treatment for specific phobias may use the same fundamental theoretical framework but the treatment outcome predictors are different both before treatment commences and during the course of the treatment. This may be because the two types of treatments are neither identical or attract the same type of participants (Arnberg et al., 2014; van Straten et al., 2014; Wagner, Knaevelsrud, & Maercker, 2006).

**Treatment Attributes.** Factors such as a desire for anonymity (Shepherd & Edelmann, 2005; Ström, Pettersson, & Andersson, 2004) or reduced levels of social interaction, and reading ability (Andersson, Carlbring, & Grimlund, 2008; Hedman et al., 2013) may all influence preference for a particular method of treatment delivery. For this reason, predictors for individuals who participate in internet treatments may differ from individuals who engage in face-to-face treatments. These attributes may include education, IQ and adherence to treatment.

**Internet Participant Attributes.** One of the frequently cited differences in pre-treatment attributes was the higher level of education found in internet treatment participants (Arnberg et al., 2014; van Straten et al., 2014; Wagner et al., 2006). J. Richards, Carlbring, and Klein (2003) have suggested that education level may influence treatment success as it was found to predict outcome in self-help treatments. Individuals with a higher level of education may on average have a higher IQ (Barber, 2005), but they may also have other success orientated attributes that contribute towards successful treatment outcomes or adherence (Farrer, Griffiths, Christensen, Mackinnon, & Batterham, 2014). The attributes of task adherence and higher IQ may aid the participant in a predominately self-supported internet treatment.

**Types of Predictors.** Treatment predictors identified before treatment commences (pre-treatment) are useful, as they can assist in identifying who can best benefit from the treatment program and facilitate cost effective treatment strategies. Predictors that occur during treatment (treatment related) enable early identification of treatment failure and permit early corrective action. Treatment related predictors including dose and participant engagement are addressed separately.

**Current knowledge: Predicting Treatment Outcomes for emetophobia.**

***Emetophobia face-to-face treatment predictors***. The treatment of emetophobia uses similar treatment principles as other specific phobias, and so treatment predictors may also be expected to be similar. They may also be predictors specific to the condition.

***Pre-Treatment Predictors of Face-to-face Treatment Response for specific phobias.*** In a meta-analysis with a total of 138 participants, Hellstrom and Öst (1995) examined 14 potential predictors for spider, and blood and injection phobias. The independent variables that they examined included demographics and health related attributes including age, treatment expectations, treatment credibility, heart rate, systolic blood pressure (SBP) and diastolic blood pressure (DBP), environmental attributes (family prevalence of the same phobia) and symptom severity. The symptom severity IVs were extensive and included age of onset, duration, method of acquisition, phobia severity (the Fear Survey Schedule-III, FSS-III; Wolpe & Lang, 1964) and severity of complaints based on an assortment of phobia specific assessments. Comorbidity IVs included level of anxiety (Beck Anxiety Inventory, BAI; Beck, Epstein, Brown & Steer, 1988 (Beck, Epstein, Brown, & Steer, 1988) and depression (BDI; Beck et al., 1961). Despite this very rich pool of predictors, pre-treatment DBP was the only reliable predictor of outcome, accounting for 10 to16% of the treatment outcome variance (Hellstrom & Öst, 1995). Treatment related measures were not assessed.

A risk when combining a range of specific phobias in one meta-analysis is that the multiple types of data assessment tools are likely to cover a broader range of factors than use of single assessment tests. Large separate specific phobia studies reduce this issue but it may also reduce the generalizability of the results. The predictability of treatment outcomes from a stepped treatment protocol for spider phobia was conducted with 103 participants (Öst, Stridh, & Wolf, 1998). The pre-treatment IVs assessed included assessor rating of phobic severity, self-rating of anxiety, Spider Phobia Questionnaire (SPQ; Klorman et al., 1974), the Spider Questionnaire (Watts & Sharrock, 1984), assessor based life handicap score, FSSIII, STAI-T, STAI-S BDI, BAI, Nijmen Motivational List (NML; Keijsers, 1994), Credibility Scale (Nau, Caputo, & Borkovec, 1974), behavioural approach test, systolic blood pressure, diastolic blood pressure and heart rate. The two strongest predictors were pre-treatment measures of credibility and motivation for psychotherapy but these only accounted for 18% of the variance in the regression analysis.

Direct somatic measurements have the advantage that they are not self-reported and are not subject to cognitive bias. Heart rate (Meuret, Seidel, Rosenfield, Hofmann, & Rosenfield, 2012; Moratti, Keil, & Miller, 2006) and galvanic skin response (Esteves, 1994; Hyman & Gale, 1973) have been used to provide immediate measures of fear for specific phobias. These measures have not been consistent predictors and two heart rate measurement variants were explored on 54 flight phobic individuals (Bornas, Llabrés, Tortella-Feliu, & Fullana, 2007). Bornas et al. used high frequency mediated heart rate variability and heart rate entropy at pre-treatment and during treatment to predict treatment outcome. When combined they predicted 18.9% of the treatment outcome variance.

In summary, some researchers conclude that face-to-face specific phobia treatment outcome predictors are inconsistent (Hellstrom & Öst, 1995; Öst et al., 1998). Evaluating the inconsistencies is difficult because the data are collectively based on an assortment of different

specific phobias treated by multiple therapists using various exposure based protocols with study participants having different clinical profiles.

***Predictors of treatment response in panic disorder.*** Panic disorder is a second anxiety disorder described by Boschen (2007) as has having phenomenological similarity to emetophobia. A recent study examining the predictors of panic disorder evaluated a randomised control trial of 104 participants between face-to-face and internet CBT treatments (El Alaoui et al., 2013). The authors identified a comprehensive range of demographic variables including; age, sex, employment status, number of sick-leave days, and number of impaired performance days during the last 30 days. Based on previous studies the authors concluded that none of these variables would be an effective predictor. Other measures included severity, age of onset, duration of illness, co-morbidity and psychotropic medication use. Panic-related constructs and comorbidity measures included the Anxiety Sensitivity Index (ASI; Reiss et al., 1986), the Montgomery-Asberg Depression Rating Scale (MADRS; Svanborg & Åsberg, 1994) and the Sheehan Disability Scale (SDS; Leon, Olfson, Portera, Farber, & Sheehan, 1997). Therapy related measures included treatment type (internet or face-to-face) and treatment adherence. Treatment adherence was defined as completing greater than 4 of 10 sessions. The dependent variables in the study were the Panic Disorder Severity Scale (PDSS: Shear et al., 2001) and diagnostic status based on the Mini-International Neuropsychiatric Interview (MINI: D. Sheehan et al., 1998). Several predictors were identified and they included the number of sick leave days prior to treatment, pre-treatment functional impairment in work/school, pre-treatment functional impairment in family relationships/home responsibilities and the panic related construct, the anxiety sensitivity index (ASI: Reiss et al., 1986). The predictors of positive treatment outcome after six months were an initial low severity as measured by the PDSS and low functional impairment. An increased level of anxiety sensitivity was found to aid in treatment outcome.

A smaller study of 49 participants (Andersson et al., 2008) found that agoraphobic avoidance in panic disorder predicted treatment outcome for face-to-face treatment but not in the internet treatment sample. Individuals who self-reported that they had an anxious personality benefited from face-to-face treatment, but had poorer outcomes for internet treatment. The random allocation of participants to the treatment delivery condition indicates that the result was not related to participant self-selection, but to inherent features of the delivery mode.

***Predictors of treatment response in social phobia .*** Social phobia is a further anxiety disorder with phenomenological similarity to emetophobia (Boschen, 2007). A meta-analysis of 24 studies examined the treatment outcome predictors for social phobia. Mululo, Menezes, Vigne, and Fontenelle (2012) identified a range of outcome predictors. Those that could lead to a reduced treatment outcome included early onset, severity and duration, presence of generalized subtype, a family history of social phobia and being male. Mululo, et al. found that a decrease in the treatment related IV, group cohesion, decreased treatment outcomes. The authors identified that early onset and severity predictors were the most consistent across the studies. It was concluded that none of the predictors consistently predicted treatment outcome across all 24 studies.

A large single study not included in the Mululo et al. (2012) review identified the predictors in a sample of 244 adults (Hoyer, Wiltink, Hiller, & Miller). The predictor categories included symptom severity, comorbidity and interpersonal attributes. Social phobia symptom severity was assessed using the Liebowitz Social Anxiety Scale (LSAS), depression and personality and relationship measures. In addition, demographic variables including age, sex and education were analysed. The data was analysed using a general linear model with the primary treatment outcome measure, the LSAS as the DV. Demographic and personality variables were entered into the analysis in blocks. The strongest predictor of treatment

outcome (post-treatment LSAS) was the pre-treatment LSAS score. This severity measure accounted for 26% of the variance. The demographic variables did not account for any additional variance but the balance of the IVs including comorbidity improved the predictability to 37.5% of the treatment outcome variance. The authors concluded that the best predictors of treatment outcome were the initial severity of the disorder and the severity of comorbid conditions. Other psychological variables were identified as being of minor predictive value.

***Predictors of treatment response in obsessive compulsive disorder.*** OCD is another disorder with a phenomenological similarity to emetophobia (Boschen, 2007). In a comprehensive review of the treatment predictors of OCD from 38 studies, (Knopp, Knowles, Bee, & Lovell, 2013) examined a large pool of predictors that they grouped into seven categories; clinical, demographic, interpersonal, OCD symptom specific, psychological and treatment specific. The most frequently occurring predictors were OCD symptom severity, illness duration, symptom subtypes, obsessive–compulsive beliefs, and age of illness onset. Clinical variables included severity of depression and anxiety, medication use and past treatment. Demographic variables (age, sex, employment, and educational status), the interpersonal factor (marital/relationship status) and a psychological measure (treatment expectancy) were all used as predictors.

Despite the comprehensive analysis of OCD predictors, Knopp et al. concluded that consistent predictors of treatment outcomes were rare. The inconsistent group of IVs included; OCD symptom severity, subtyping, duration, age, sex, relationship status, past treatments and comorbidity including depression and anxiety. The conclusion of inconsistency of OCD predictors was also reached by Keeley, Storch, Merlo, and Geffken (2008) in an earlier review on OCD treatment outcome predictors. They identified symptom severity, symptom subtype, severe depression, the presence of comorbid personality disorders and family dysfunction

predict a poorer outcome. Keeley et al. did report that the therapeutic alliance was a treatment related predictor. Knopp et al.'s main conclusion was that the variability in the quality of the OCD research is the source of the unreliability of the predictive data. In summary, the predictors for face-to-face OCD treatment outcomes were inconsistent but initial severity and comorbidity emerge as the key variables that would apply to emetophobia.

**Treatment Response Related Predictors**. Activities that occur during the treatment process are generally harder to quantify compared to predictors that can be measured prior to the start of treatment. In a CBT framework, there are many variables that occur during treatment that may relate to the treatment outcome, for example therapist skill, number of therapists and difficulty level of the content. A second type of treatment related predictor relates to the extent to which the participant engages with the treatment. These could include the number of activities completed, total time engaged with the treatment, level of therapist engagement and homework tasks completed. Measuring the quality of participant engagement during treatment can be a complex task.

***Number of exposures completed.*** Engagement in an exposure based CBT program could potentially be measured by the number of exposures undertaken with a higher count indicating a higher or better commitment to treatment. Problems with this approach may include ceiling effects where participation after a set number of exposures does not reflect additional commitment to treatment. The measure is only a potentially valid linear measure of commitment if the participant continues beyond the commencement of exposure (week 6). The measure of the number of exposures completed as an indirect measure of participant engagement has inherent limitations.

***Number of treatment sessions as a predictor.*** A key predictor for treatment outcome is referred to as dose dependency or the dose-response curve. The stronger the dose, the more effective the drug treatment will be until it reaches a maximal level. For CBT therapy dose

dependency typically translates to the number of weekly sessions of treatment. The dosage rate can be reported binomially (completed all sessions / partial completion) or in a continuous measure (number of weeks completed), the latter being more useful as it might identify when extra sessions yield no further increase in treatment outcome. The medical analogy of drug dosage also alludes to the need for accuracy in the drug titration. A complete treatment session may vary from a single session (de Jongh et al., 1995; Öst, 1989; Thorpe & Salkovskis, 1997) up to six (Farrer et al., 2014), eight (Hardy et al., 1995), nine (Esther de Graaf, Hollon, & Huibers, 2010), twelve (Morgenstern, Blanchard, Morgan, Labouvie, & Hayaki, 2001) to more than twelve sessions (Hardy et al., 1995). In addition, sessions vary in duration, intensity and presentation style. A lack of standardisation makes treatment comparisons difficult.

The numbers of weekly sessions (dosage) has been identified as a treatment outcome predictor in a broad range of anxiety and depression related conditions (Hedman, Andersson, Lekander, & Ljótsson, 2015; Opriş et al., 2012; Stiles-Shields, Kwasny, Cai, & Mohr, 2014). Dosage as a predictor has not been adequately investigated in conditions that Boschen (2007) identified as being phenomenologically similar to emetophobia. These studies have included the research listed in Table 7.1.

Table 7.1

*Predictor summary*

| Diagnosis | Predictors | Authors |
|---|---|---|
| Specific Phobia | Baseline Diastolic blood pressure | |
| | Duration of the phobia, self-assessed avoidance, credibility, expectancy, motivation, BDI, and STAI-S for self-help group. | |
| | Credibility, motivation, phobic avoidance, phobic duration, STAI-S, BDI and expectancy for self-exposure | Öst et al. (1998) |
| | Credibility and motivation | Hellstrom and Öst (1995) |
| | High frequency mediated heart rate variability and heart rate entropy | Bornas et al. (2007). |
| Panic disorder | (severity and comorbidity) and two moderators (onset and functional impairment in family life/home responsibilities) | El Alaoui et al. (2013). |
| | agoraphobic avoidance | Andersson, Carlbring, and Grimlund (2008) |
| Social phobia | Overall inconsistent with early onset, severity more consistent<br>Decrease in group cohesion an identified moderator | Mululo et al. (2012) |
| | Pre-treatment LSAS score (severity) | Hoyer et al. (2014) |
| OCD | Inconsistent but OCD symptom severity, subtyping, duration, age, sex, relationship status, past treatments and comorbidity including depression and anxiety were best predictors | Knopp et al. (2013) |
| | Inconsistent but symptom severity, symptom subtype, severe depression, the presence of comorbid personality disorders, family dysfunction. Therapeutic alliance was a treatment related predictor. | Keeley et al. (2008) |

**Predictor Summary.** In summary, the pre-treatment response predictors for specific phobias, panic disorder, social phobia and OCD have been examined in face-to-face and

internet contexts. Although the predictors are highly inconsistent, symptom severity and comorbidity could be two important pre-treatment variables that predict outcome. Dosage is similarly inconsistent but a probable treatment response related predictor. Three hypotheses were tested where the treatment outcome was operationally defined as the presence of recovery calculated using one standard deviation from the post-test mean rather than two to ensure a balanced comparison sample. The first two hypothesis address pre-treatment predictors and the third addresses treatment related predictors.

***Hypothesis 1: Initial severity.*** Pre-treatment emetophobia severity will predict treatment response.

***Hypothesis 2: Comorbidity.*** Treatment response can be predicted by the addition of a set of pre-treatment comorbidity predictors (DASS-21: depression, anxiety, stress).

***Hypothesis 3: Participant engagement.*** Treatment recovery can be predicted by the degree of participant engagement that is defined by dose (number of weeks of treatment) and total the number of items in the exposure hierarchy after the initial severity measures were accounted for.

## Method

Treatment participants from the Main Study ($N$ = 81) discussed in Chapter 5 were used to predict treatment outcomes.

### Analysis Approach

Based on a review of the predictors of treatment outcome for conditions that are phenomenologically similar to emetophobia and were correlated to changes in emetophobia severity for treatment completers, two categories of pre-treatment predictors and two categories for treatment related predictors were identified. The pre-treatment predictors, based on high correlations are shown in Table 7.2, were emetophobia severity (EmetQ and GISQ) and comorbidity (mood: depression, anxiety and stress). The treatment-related predictors were

related to participant engagement and included dose (number of weeks of treatment defined by the last week of the EmetQ) and number of items in the exposure hierarchy.

## Results

Table 7.2 shows the correlations in the change in EmetQ treatment scores for treatment completers and a range of possible predictor variables.

Table 7.2

*Correlations with the Change in EmetQ Treatment Score for Treatment Completers (N=81).*

| Variable | *r* | *p* |
|---|---|---|
| Dose[a] | .46** | <.001 |
| Number of EmetQ completed | .46** | <.001 |
| GISQ | -.29* | .01 |
| Number of linked family and friends | .24* | .03 |
| Number of logins | .27* | .02 |
| Number of experiments tested | .29** | .01 |
| Number of items in the exposure hierarchy | .26* | .02 |
| Age problem started | -.23* | .04 |
| EmetQ treatment start | .22 | .05 |
| SPOVI treatment start | -.15 | .18 |
| Depression | -.05 | .64 |
| Anxiety | -.14 | .23 |
| Stress | -.18 | .12 |
| WHOQoL physical | .09 | .46 |
| WHOQoL psychological | .10 | .37 |
| WHOQoL social | .08 | .50 |
| WHOQoL environmental | .15 | .19 |
| Number of experiments recorded | .15 | .17 |
| EmetCog | -.07 | .59 |
| Days sick per week | .07 | .54 |
| Fear days per year | -.22 | .05 |
| Fear time per day | -.19 | .08 |
| Age aware | -.04 | .72 |
| Number of goals set | .21 | .06 |
| Number of events recorded | .17 | .14 |
| Number of chats | .20 | .08 |
| Total treatment activity time | .16 | .15 |

[a] Dose refers to the duration of treatment defined by the week of the last EmetQ assessment.

The dose and the number of EmetQ questionnaires completed had similar correlations with changes in EmetQ scores as for all practical purposes they were similar measures due to

the high completion rate each treatment week. The GISQ negative correlation with change in EmetQ treatment outcome indicated that a higher initial GISQ score is associated with poorer treatment outcome measured by the EmetQ.

**Pre-treatment Related Predictors**

**Hypothesis 1: Initial Severity** It was hypothesised that pre-treatment emetophobia severity would predict treatment response. The binomial logistic regression used the EmetQ and the GISQ to predict treatment outcome. A total of 70 participants were included in the analysis and were split approximately evenly (recovered = 33 and not recovered = 37). The results show that the pre-test severity measure GISQ predicted the final treatment response, $\chi^2(2, N = 70) = 11.9$, $p < .01$. Nagelkerke $R^2$=.21 and pre-treatment severity predicted 61.4% of the outcome measure. The initial severity of the GISQ score predicted a poorer recovery. The predictive ability of the EmetQ pre-test score was not significant and as such it was not retained for further analysis.

Table 7.3

*Predicting Recovery: Initial Severity*

| Independent variable | *B* | *SE* | Wald | *p* | Odds ratio |
|---|---|---|---|---|---|
| EmetQ | -.06 | .03 | 3.09 | .08 | .95 |
| GISQ | -.09 | .04 | 3.97 | .05* | .92 |

**Hypothesis 2: Comorbidity** The hypothesis being tested is that the treatment response can be predicted by the addition of a set of pre-treatment comorbidity predictors (DASS-21: depression, anxiety, stress). A total of 70 participants were included in the analysis and were split approximately evenly (recovered = 33 and not recovered = 37). The results in Table 7.4 showed that the addition of pre-treatment comorbidity measure's (DASS-21: depression, anxiety and stress) were not significant but the model was still significant overall due to the GISQ, $\chi^2(4, N = 70) = 12.5$, $p = .01$, Nagelkerke $R^2$=.22. The model predicted 68.6% of the

outcome measure. Depression, anxiety and stress were not retained for further predictive analyses.

Table 7.4

*Predicting recovery: Initial severity and Mood (n = 70)*

| Independent variable | *B* | *SE* | Wald | *p* | Odds ratio |
|---|---|---|---|---|---|
| $GISQ_{pre\text{-}test}$ | -.09 | .04 | 4.17 | .04* | .91 |
| DASS-21 $depression_{pre\text{-}test}$ | .02 | .04 | .14 | .71 | 1.02 |
| DASS-21 $anxiety_{pre\text{-}test}$ | -.01 | .03 | .03 | .86 | 1.00 |
| DASS-21 $stress_{pre\text{-}test}$ | -.06 | .04 | 2.04 | .15 | .94 |

**Treatment related predictors**

**Hypothesis 3: Participant Engagement** It was hypothesised that the treatment recovery can be predicted by the degree of participant engagement that was defined by dose (number of weeks of treatment) and the total number of items in the exposure hierarchy after the initial severity measures were accounted for.

A total of 70 participants were included in the analysis and were split approximately evenly (recovered = 33 and not recovered = 37). The results showed that the addition of post-treatment dose and the number of items in the exposure hierarchy were significant for the model, $\chi^2(3, N = 70) = 25.3$, $p < .001$. Nagelkerke $R^2 = .41$ but the number of items in the exposure hierarchy did not produce a significant unique contribution to outcome. The number of items in the exposure hierarchy was removed from further analysis. Participant's with a higher number of sessions of treatment were 1.39 times more likely to recover than participants with lower number of treatment sessions.

Table 7.5

*Predicting recovery: severity, mood and participant engagement*

| Independent variable | *B* | *SE* | Wald | *p* | Odds ratio |
|---|---|---|---|---|---|
| $GISQ_{pre\text{-}test}$ | -.12 | .05 | 6.17 | .01 | .89 |
| Dose | .33 | .11 | 8.51 | < .01 | 1.39 |
| Number of items in hierarchy | .04 | .06 | 0.52 | .47 | 1.04 |

After the removal of the number of items in the hierarchy, the final model is shown in Table 7.6. The results showed that this very simple model that incorporated the GISQ and the number of weeks of treatment predicts correctly the overall 72.9% of the recovery rate. There were 75.8% of individuals showed significant improvement correctly classified and 70.3% of treatment failures correctly classified, $\chi^2(2, N = 70) = 24.7$, $p < .001$. The approximate variance of the model calculated using Nagelkerke $R^2$ is .40. The binary logistic model shows that as dose (weekly sessions of treatment) increases the greater the recovery, however the higher the initial GISQ score the poorer is the predicted recovery.

Table 7.6

*Predicting recovery: severity, mood and participant engagement*

| Independent variable | *B* | *SE* | Wald | *p* | Odds ratio |
|---|---|---|---|---|---|
| $GISQ_{pre\text{-}test}$ | -.12 | .05 | 6.15 | .01 | .89 |
| Dose | .36 | .10 | 12.26 | < .01 | 1.43 |

**Treatment Prediction Conclusion**

Three hypotheses were tested and two were confirmed with modifications. The GISQ proved to be an adequate pre-treatment measure that predicted treatment outcome in 68.6% of cases. The second hypothesis was rejected and pre-treatment comorbidity of mood did not significantly predict treatment outcome. Finally the third hypothesis was supported indicating

that participant engagement did predict treatment outcome and increased the predictive capacity of the model to 72.9%. The small sample size may underestimate the effect of less influential IV's and so these conclusions need to be interpreted cautiously.

**Severity** The baseline EmetQ scores did not significantly predict treatment outcomes but the GISQ did. Participants with a lower perceived gastro-intestinal sensitivity had a greater chance of achieving a better treatment outcome. There are at least two possible reasons for this outcome. First, the GISQ may measure an underlying and relatively intractable emetophobia vulnerability, and a high GISQ score is an early marker for the resistance to recovery. Second, although this study does not have evidence to support this there is a possibility that the GISQ may also measure symptoms of people with a comorbid condition such as irritable bowel syndrome (IBS). The somatic sensitivity from IBS may lower the effectiveness of cognitive restructuring to engage in logical decision making because somatic sensations may have a strong potency (Batson, Engel, & Fridell, 1999).

**Comorbidity** The measures of depression, anxiety and stress explained no additional variance in the recovery outcome above that that was explained by the severity measures. These findings indicate that comorbidity appears to have little influence on recovery rates in the current study. The presence of depression, anxiety and stress symptoms did not collectively seem to provide a barrier to treatment. This would suggest that internet treatment programs like the EmetStudy may not need to exclude all registrants that have complex mood related comorbidities. Further investigation with a larger sample size is required to assess the practicalities of treating more complex cases.

**Participant Engagement** Participant engagement was initially defined as a combination of the number of weeks of treatment (dose) and the number of items on the exposure hierarchy. Items on the exposure hierarchy are added in week 6 and are a list of progressively challenging tasks that the participant must overcome. Dose was found to be a

predictor of treatment outcome and this is consistent with the wider literature regarding treatments for anxiety and depression (Hedman et al., 2015; Opriş et al., 2012; Stiles-Shields et al., 2014). The results indicate that for an extended weekly CBT treatment protocol like the EmetStudy, a participant with emetophobia can expect that treatment outcomes will improve with an increase in the number of treatment sessions.

While dose is a measure of the depth and duration that the participant engages with the treatment, the number of items on the exposure hierarchy is a measure of motivation and independence in relation to the CBT task. The number of items on the exposure hierarchy was not significant and was complicated by a dose effect as items were only created from week 6 onwards. This meant that it did not reflect participation activity before week 6. The more intuitive measure of participant engagement; total time spent using the treatment program was not selected, as it had a poor correlation to changes in EmetQ treatment. The algorithm that gave equal weight to time spent passively reading and time spent entering data for CBT assessments and tasks was probably a poor analogue for active participant engagement. The need to distinguish the quality of the time spent was not required by Muroff, Steketee, Himle, and Frost (2010) who found that total internet active group time for OCD therapy predicted outcome. The small sample size and lack of a definitive active task measures indicates that further research is required to clarify the productiveness of a participation measure.

In conclusion, the demographic, symptom severity and comorbidity data did not yield any useful pre-treatment predictors of treatment outcome. At this key milestone financial resources are allocated and treatment performance indicators are initiated. The difficulties in identifying predictors before treatment commences was broadly consistent with meta-analysis findings for a range of common conditions that share symptoms with emetophobia. The predictors of treatment outcome after treatment commences explored symptom severity, comorbidity and participant engagement. Somatic vulnerability as measured by the GISQ and

dose (number of sessions of treatment) predicted the treatment outcome. Dose was found to be the strongest predictor. The findings are generally consistent with other dose related predictors (Hedman et al., 2015; Opriş et al., 2012; Stiles-Shields et al., 2014) and did not support the mixed evidence that symptom severity and additional depression, anxiety, or stress symptoms are a treatment outcome predictor. The relatively small sample size limits the evidence that symptom severity and comorbidity could be treatment outcome predictors.

## An Internet Treatment Attrition Model

Attrition from a treatment program is a problem as the participant may not achieve the maximum possible treatment benefit (Pekarik, 1985), it can prolong participant suffering (Wierzbicki & Pekarik, 1993), and other people who may fully benefit from the treatment may be prevented from participating as treatment resources are limited. In addition, the performance indicators of the treatment program could be reduced due to decreased participant outcomes and that may have financial implications for the treatment provider (Pekarik, 1985). The desirability of predicting attrition therefore relates to the need to manage attrition outcomes for the participants and the therapist. EmetStudy and other internet treatment programs that are easily accessible and free have very high attrition rates (Richards & Richardson, 2012). Although there have been several attempts to identify the causes of attrition in internet therapy treatments, these studies have not developed a theoretical framework to explain the nature of attrition for these programs. This chapter uses the Transtheoretical model (TTM) of motivation or readiness to change as a framework to interpret attrition from the internet therapy program. This Chapter first explores the rates and predictors of attrition between face-to-face and internet therapy and identifies substantial differences. Second, the TTM model is briefly discussed as it has been applied to face-to-face treatment. Finally, an internet model of attrition using a TTM framework is presented and discussed in relation to the EmetStudy treatment program.

### Dropout for Internet and Psychotherapy Programs

The rates of attrition are reviewed based on a combination of face-to-face and internet studies as both provide slightly different perspectives, as internet studies have higher rates of dropouts but lack the depth and breadth of dropout analysis compared to face-to-face treatments.

**Rates of Attrition.** There are a small number of relatively large meta-analyses of face-to-face therapy attrition rates. The trend from 1993 to 2013 appears to be a reduction in attrition rates. A meta-analysis of 125 face-to-face psychotherapies in 1993 identified a 47% dropout rate (Wierzbicki & Pekarik, 1993) and a meta-analysis of anxiety recovery rates for face-to-face treatments, averaged 40% (Fisher & Durham, 1999). A more recent study of general face-to-face psychotherapies based on 669 studies encompassing 83,834 participants reported approximately 20% attrition after registration (Swift & Greenberg, 2012). Meta-analyses for a variety of anxiety related and depressive disorders consistently report similarly low face-to-face dropout rates. The most recent meta-analysis of 71 non-randomised face-to-face CBT anxiety treatment programs identified an average dropout rate of 15% (Hans & Hiller, 2013). Internet attrition rates are consistently higher than face-to-face treatments. Meta-analyses for internet treatments vary substantially depending on the nature of the CBT program. The estimated dropout rate for unguided interventions is 74% and 28% for guided interventions (Richards & Richardson, 2012).

**Predictors of Attrition for Internet Treatment.** The presence of the therapist in treatment may increase retention due to the implied social contract with the therapist (D. Richards & Richardson, 2012). The participant's self-selection into a treatment program where a therapist is not physically present may confound the results as they may seek a treatment without a binding social contract. The role of the therapist in the EmetStudy program had a strong research administrative component (e.g. structured clinical interviews) and the therapist component was relatively low with the majority of participants matching the criteria for self-guided therapy.

***Guided internet treatment.***. In a telephone supported online treatment for depression, Farrer et al. (2014) found that lower pre-treatment depression (severity) was related to greater treatment adherence to an online treatment for depression.

***Self-guided Internet Treatment.*** In a meta-analysis of 2705 participants across ten depression treatments, it was identified that lower educational levels, anxiety symptoms, gender (male) and older age were predictors of treatment dropout (Karyotaki et al., 2015).

**Predictors of Attrition in Face-To-Face Treatment.**

***General psychotherapy.*** Demographic variables have been inconsistent predictors of psychotherapy dropout (Barrett, Chua, Crits-Christoph, & Gibbons, 2008). Barrett et al. suggest that age, educational level, and lower SES were possible predictors. Swift and Greenberg (2012) in a meta-analysis of 669 psychotherapy studies similarly identified inconsistencies among the variables that were predictive of dropout. More specifically, face-to-face CBT for anxiety related disorders and depression studies report similar predictors as internet studies (Issakidis & Andrews, 2004).

***Anxiety related.*** At the Clinical Research Unit for Anxiety Disorders (St Vincent's Hospital in Sydney), data were collected on two years of anxiety related admissions to primarily group based treatments. The assessment measures included the DASS, Fear Questionnaire, and disorder-specific symptom measures that included the Agoraphobic Cognitions Questionnaire, the Body Sensations Questionnaire, the Social Phobia Scale, the Social Phobia Interaction Scale and the Penn State Worry Questionnaire. Pre-treatment attrition was found to be predicted in a sample of 731 outpatients by the following demographic variables; the presence of one or more children, type of treatment (group/individual) and referral method (Issakidis & Andrews, 2004). For face-to-face anxiety CBT treatments the attrition rate was found to be between 27% to 40% (Issakidis & Andrews, 2004). During treatment attrition predictors identified included symptom severity, physical disability, comorbidity (depression) and gender (women). In a meta-analysis of 28 social phobia studies (Eskildsen, Hougaard, & Rosenberg, 2010) pre-treatment variables did not predict dropout rate. These variables included severity, comorbidity, expectancy and

demographic variables that included age, age of onset, prior treatment experience, gender, marital status, educational level, family income, ethnicity, and employment status.

**Review Summary.** This review has identified that internet treatment have much higher attrition rates than face-to-face treatments and the rates increase if the internet program is open and is self-guided. The predictors of attrition are inconsistent, but frequently treatment participants may drop-out of treatment if severity and comorbidity is high, with the implication that high risk participants are unable to manage, and are overwhelmed by the additional burden of the treatment challenges.

**Transtheortical Model of Readiness to Change**

The Transtheortical Model of Readiness to Change (TTM: Prochaska & DiClemente, 1994) proposes that motivation to change behaviour is not a single step but a multi-staged process that cycles through different stages. The model identified five stages; pre-contemplation, contemplation, preparation, action and maintenance. In the pre-contemplation stage an individual is engaging in thoughts and cognitions that support the status quo (e.g., emetophobia), so they do not consider making changes that might improve health. At this stage there is no motivation to change behaviour, with the individual failing to even consider the positive benefits of change (Prochaska, Redding, & Evers, 2007). Individual's transition to the contemplation stage occurs with awareness of the negative aspects of the mental health problem. During this stage, the individual begins to evaluate the positive and negative benefits of behavioural change and might explore treatment options for emetophobia. A more recently added stage, the preparation stage occurs when individuals' begin to take positive steps to change behaviour, for example they might register interest in an internet treatment program, such as the EmetStudy or seek medical advice (Prochaska et al., 2007). In the action stage an individual commences new patterns of behaviour/cognitions and finally might actively participate in a psychotherapeutic program (Derisley & Reynolds, 1999). During this phase

individuals' begin to progress toward better health. The final stage, the maintenance stage is a consolidation stage in which individuals' maintain the positive changes made and continue to improve (Derisley & Reynolds, 1999).

This model has been applied to face-to-face treatment for IBS, an anxiety related somatic disorder. The authors attempted to survey 268 outpatient clients and 60 volunteered for treatment. The participants were assessed three times during treatment for change readiness using the Stages of Change questionnaire (SoC: McConnaughy, DiClemente, Prochaska, & Velicer, 1989). The participant's change readiness helped to predict treatment attrition. Internet treatment orientated adaptations of the TTM that take into account the challenges of internet treatment have not yet been made.

**Internet Treatment and an Integrated Stages of Change Model**

The stages of change model shown in Figure 8.1 describes how individuals progress through the five stages but also predicts how they may leave a stage due to a trigger that returns them back one or more levels. For example, the setting of treatment goals would indicate that an individual is in the action stage but failure to complete exposure tasks during the exposure module would indicate a return to a lower level such as preparation or contemplation. At each stage there are recognisable behaviours that are displayed by EmetStudy participants. Finally on the left of the figure are the three logical cut-off attrition points; before registration, before treatment but after registration and during treatment. For the EmetStudy and other internet treatments there is a proposed overlap that reflects participants who are in the preparation and contemplation stages but are registered and are technically engaged in treatment.

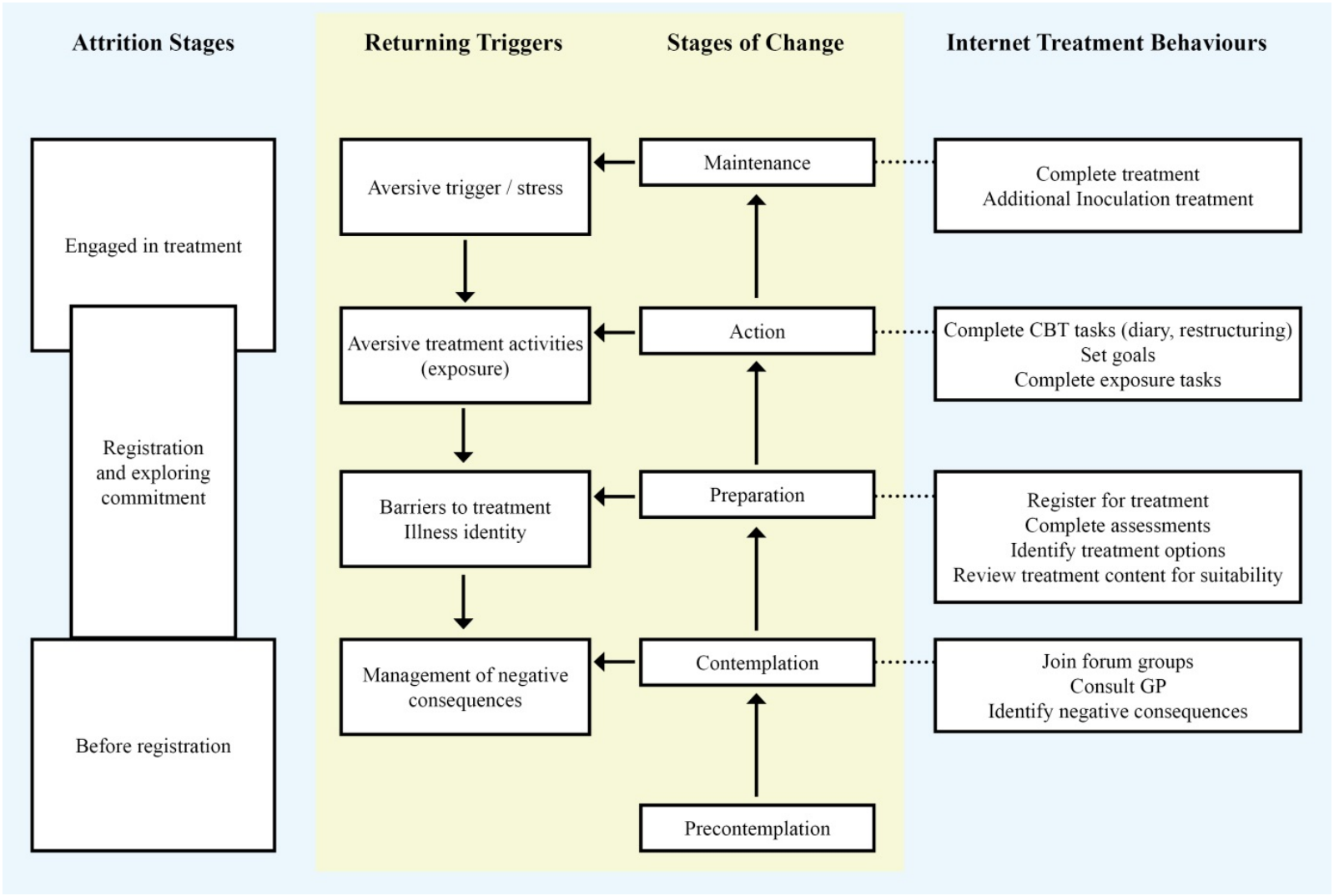


*Figure 8.1* Stages of Change Applied to Internet Treatments.

Prior to registration the individual with emetophobia may become aware of the treatment, but chooses not to register, indicating that the individual is in the precontemplation stage of the TTM (DiClemente, Prochaska, & Gibertini, 1985; McConnaughy et al., 1989). The failure to move to the contemplation stage in this context refers to a failure to register for treatment. In internet based treatments the initial registration is the common starting point for measuring treatment attrition in meta-analyses because data is readily available at this stage (Karyotaki et al., 2015).

In contrast to initial registration for a free internet therapy which has few barriers (Cuijpers, van Straten, & Andersson, 2008), entry into face-to-face therapy has a number of barriers including lack of accessibility, motivation, poor acceptability and lack of affordability, that can all restrict the individual from making an appointment with a therapist (Lombardi, Button, & Westra, 2014; Saxena et al., 2007; Stefl & Prosperi, 1985). Individuals contemplating change may progress to the second milestone of attrition and register for an internet program, a quick and simple step; then fail to further participate. The ease with which registration can occur might result in higher numbers of people in the contemplation stage registering interest in participation in treatment. This is consistent with findings from a face-to-face psychotherapy program that found individuals who dropped out of treatment in the early stages had lower contemplation scores than those who remained in treatment (Derisley & Reynolds, 1999). In the EmetStudy, the lack of barriers to registration could result in an increased number of individuals who register for treatment. The registration process is a key attrition milestone used in statistical reporting. These individuals in a waitlist treatment like EmetStudy may respond to questionnaires at baseline, but fail to continue to the second pre-treatment assessments because while in the contemplation stage, the negatives of undergoing treatment fail to exceed to positives of maintaining current levels of functioning. These individuals, while contemplating the need for change, and preparing to change through the

registration process have failed to progress to the action stages of the TTM of behaviour change. During the second stage of internet attrition, participants do not progress to active treatment even though treatment registration is a significant milestone and may be seen as a commitment to treatment. Attrition for internet treatments in the early weeks of treatment could be explained in the TTM model as a failure to progress or consolidate the action stage with possibly a transition back to preparation or contemplation. Measuring the furthest milestone reached by an individual regardless of treatment type appears as an objective measure. However, comparisons between treatment programs need to take in account the barriers in progressing through the milestones. Early attrition rates in particular may be an indirect measure of the barriers to registration rather than the suitability of the treatment.

A waitlist research program may permit individuals to return to a contemplative stage during the delay for treatment as they have both an extended period of inaction and assessment tasks that can maintain their curiosity, but do not require cognitive or behavioural change. The similar dropout rates for the Pilot and the waitlist group indicates the waitlist control just delays the inevitable decision making for many of the participants. Participants can continue in a predominately contemplative stage for an extended period, and individuals in the EmetStudy program who initially registered for treatment but failed to complete the second baseline assessment three months later would be assessed as not progressing to an active stage under the TTM. These individuals have reached the second attrition milestone.

The third milestone of attrition (during treatment) in the EmetStudy program occurs after individuals have undertaken the second set of pre-treatment assessments. This milestone is further divided into two segments. The first segment occurs in the first 21 days of treatment where relatively non-threatening treatment material was presented that included administration, Skype assessments, online assessments, research interviews, goal setting and relaxation training. During this time, participants were motivated to make a commitment through active

engagement with self-guided therapy or return to a contemplation stage. Individuals who dropped out at this stage were defined as treatment attempters and within the TTM framework they would likely have returned to a preparation/contemplative stage but the furthest milestone reached was an active stage activity. After 21 days, participants were deemed to be predominately in the active phase and people who exited at this stage were called treatment completers. The use of LOCF reporting may give a false impression of stages of change progression and these participants may not reach the maintenance stage.

One important indicator of treatment success was goal setting, a critical behavioural and motivational task undertaken in week 1. An odds analysis conducted using treatment completers and those who dropped out prior to the 21-day cut-off found that treatment completers were twice as likely to set goals than those who dropped out of treatment. This is an important finding which indicates that while participants were motivated to begin treatment, the perceived negative consequences of treatment such as raised anxiety during exposure and the pre-emptive fear of exposure therapy tasks (a negative event) reduced readiness or motivation to change. On this basis, these individuals might have dropped out of treatment.

**Barriers to Change.** Over half of the participants undertook the time consuming task of completing long and detailed assessments at registration, but did not transition to the active phase of treatment. During the clinical interviews with participants some displayed characteristics consistent with a long-term "illness identity" (Roe, Yanos, & Lysaker, 2010). For example, participants have referred to themselves as emetophobes; an informal collective term for a group of people with emetophobia used widely within the internet forum group. This may have been in part because many of the participants were recruited from an internet forum where an emetophobia community is fostered and having an illness identity that may act as a socially cohesive element. Roe et al.suggest that maintaining this illness identity could be a barrier to recovery. Despite this, the people who sought treatment in the EmetStudy were

predominately chronic suffers with substantial symptom severity, indicating that those that were motivated to seek treatment had reached a readiness for change because the negatives of the condition outweighed the illness identity. The social construct of an illness identity (Howard, 2008) could be supported or diminished by the social networks of the participant. The nature of the family and friends of the participants are explored in Chapter 9.

Within the TTM model an illness identity could be a factor that hinders the movement to the preparation and active stages, and a driver to transition individuals out of the active phase of treatment and back into the contemplative stage. During the active phase of treatment, participants have the unique ability to be 'in treatment' but not get treated. It is a passive state that is much more achievable with an anonymous internet treatment than face-to-face treatment where both the social contract with the therapist (Issakidis & Andrews, 2004) and the professionalism of the therapist may reduce such behaviour.

**Other Barriers.** In addition to the psychological aspects of attrition due to change readiness, the treatment program may simply be a poor match for some participants. Satisfaction with the EmetStudy treatment program was not evaluated. A small survey of an internet anxiety treatment (Fearfighter; N = 12) found a third rated it as either poor or fair (MacGregor et al., 2009). The perceived quality of the treatment should in future versions be incorporated in the modelling of the causes of attrition.

## Conclusions

Attrition in the context of face-to-face therapy inherently has a treatment evaluative component. This chapter argues that the high rates of attrition for internet treatments highlights that attrition needs to be seen in the context of a process that commences even before participant registration. It is argued that the TTM provides a coherent framework in which to analyse attrition. A stages of change approach would shift the focus of tracking from recording just the furthest milestone reached in treatment to seeing attrition as a cyclic process.

In this approach attrition may move away from a single point measure to reflecting the distribution of participants in each of the stages of change during the course of treatment. If possible, this would ideally include conventional treatment dropouts. From a treatment process perspective, the management of participants should move away from the traditional face-to-face model where registrants undergo a single treatment program. This approach only works because face-to-face treatments have more barriers to entry and therefore tend to have participants predominately at the active stage of change. Internet treatments first engage with the majority of registrants predominately in the contemplative stage requiring a process orientated approach that assists registrants to progress to the active stage, and eventually for participants who dropout to renter when they chose to transition back to an active stage. Improved interventions would focus on assessment of the readiness for change at the treatment registration milestone with separate treatment pathways depending on motivation. As individuals progress through TTM stages towards the active stage the content and tasks presented would be stage appropriate. For example, non-interactive psychoeducational material is valid for most registrants but could be even further scaled down where words such as vomit are omitted for those in the contemplative stage. In addition to targeting the content at the correct stage, there is also a role for bridging activities that aim to help individuals transition into the active stage of treatment. Key to this approach is for the treatment content and tasks to be flexible and when participants move down a readiness stage, the content and interactive tasks are modified to encourage re-engagement. This is a substantially different treatment strategy where registrants are frequently treated as always being in the active phase. Finally, if participants do drop-out of treatment a revised EmetStudy program could introduce a clear pathway and expectation that a return to treatment is integrated into the program.

## Family and Friends Contribution

This chapter takes a biopsychosocial perspective and explores the contributions of genetics and the social environment to the participant's condition. The biopsychosocial (Engel, 1978) model is a framework that includes the contribution of family and friends as parts of a wider system that contributes to the individual's mental health status. This systems perspective avoids placing the affected individual in isolation from the contributing web of genetic and environmental factors. The genetic contribution to the development of emetophobia has been previously investigated by Lipsitz et al. (2001). However, the social environment that forms a key component of the biopsychosocial model as it may apply to emetophobia has not been examined. The EmetStudy treatment program offered a chance to gain indirect access to family members and friends of people with emetophobia.

### Genetics

Lipsitz et al. (2001) identified that genetics makes a significant contribution to the development of symptoms of emetophobia. Over half (57%) of the respondents with emetophobia surveyed were found to have a first-degree relative with a diagnosed psychiatric disorder and 7% reported a first degree relative with emetophobia. One method used to evaluate the contribution of genetics for an individual is to measure and compare the symptom severity of close and distant relatives to the affected individual. More distant relatives are less likely to have shared genes (Claes et al., 2003) and therefore may be less likely to have phobia symptoms and other anxiety disorders (Hettema, Neale, & Kendler, 2001). The Lipsitz survey suggests that there is a constellation of genes which comprise a vulnerability factor. These genes can be transmitted from parents to children and the more direct the familial relationship the greater is the chance that genetic material is passed on. The presence of a wide variety of mental health issues in the Lipsitz survey may also suggest that the vulnerability factor may result in emetophobia or other mental health issues.

This idea is operationalised in the following two hypotheses. First, scores on the EmetQ, DASS-21, and WHOQoL from close and distant relatives of participants in the current intervention study will be significantly higher than scores in a control population. Second, close family members of the participant with emetophobia will have significantly higher EmetQ, DASS-21, and lower WHOQoL scores than distant family members due to the higher proportion of shared genes that contribute to vulnerability to emetophobia and other mental health issues.

**Social Environment**

Social support from family and friends has been identified as contributing to the mental health of an individual (Cohen & Wills, 1985). The mechanisms of positive support have been categorised into two types: direct or main effects and stress buffering. People with strong supportive social networks tend to have fewer mental health problems than those with less supportive networks (Lakey & Orehek, 2011). This is referred to as a direct or main effect. Social support can also occur during periods of crisis and the positive support is referred to as stress buffering. The main effects of social support have consistently been found to support mental health whereas the evidence for stress buffering has been inconsistent (Lakey & Orehek, 2011). Not all social support is positive. Negative social support has been found to contribute to a reduction in mental health (Lakey, Tardiff, & Drew, 1994; Lincoln, 2000). Social support may be dysfunctional in that it may maintain or degrade the mental health condition. Bullying is a clear example of this process (Verkuil, Atasayi, & Molendijk, 2015). An understanding of the mental health of a person's social network may give an indication to the capacity and effectiveness of the social support received by individuals with emetophobia in the current study (Pernice-Duca, 2008).

### Social Mental Health Context

Limitation of the scope of this research project did not permit an examination of the social interactions between the participant, family and friends. This has previously been undertaken to examine the supportive nature of social interactions by using diaries to capture detailed interactions (Neff & Benjamin, 2005). The current approach uses a broader perspective and examines the presence of mental health disorders in the social networks of individuals with emetophobia. It is hypothesised that the symptoms of emetophobia may be maintained by social networks that share similar cognitive and behavioural symptoms. Conversely the participant's social network could be comprised of people who have no emetophobia symptoms and they can model normal behaviour and thinking that may assist the participant towards recovery. This same healthy modelling assumption underpins the support for community integration for individuals with severe mental health issues (Bond, Salyers, Rollins, Rapp, & Zipple, 2004).

The treatment sample was self-selected from an internet forum. Given that some forums can be destructive rather than supportive (Johnsen, Rosenvinge, & Gammon, 2002), it is hypothesised that chronic emetophobia sufferers might partially maintain their condition by forming social networks with people who share similar identity, symptoms and mental health issues. This idea is operationalised in the following hypothesis: Friends will have higher EmetQ, DASS-21, and lower WHOQoL scores than a healthy control group.

## Method

Participants ($N$ = 172) were asked on a volunteer basis if they would like to invite friends and relatives (close and distant) to complete the same set of registration questionnaires as the participant. The participant was given a unique linking code which was embedded in an email which they could then forward on to their friends and relatives. These were referred to as linked participants. Linked participants that included 45 friends, 33 close relatives and 5

distant relatives completed a standard set of questionnaires in the same manner as the 119 participants in the student sample which was used as a symptom free control group in the current study (See Chapter 4). Immediate family (siblings and parents) were defined as close family and other relatives such as aunts and uncles were defined as distant family. Participant responders self-defined their categorical membership.

## Results

Table 9.1 shows a comparison of friends, close family, distant family and a control group of students who represent a non-emetophobia community sample. The ANOVAs for independent groups shown in Table 9.2 report that close and distant relatives do not differ on most measure compared to the control group. The control group was higher than the close relatives by 3.6 EmetQ points but this was relatively small compared to the treatment seekers who were 18.4 EmetQ points higher than the control group. There were no significant differences between distant relatives and the control group on the EmetQ. Table 9.2 shows that there were no significant differences between close and distant relatives on all the reported measures (emetophobia severity, mood and quality of life). Table 9.3 shows that the friends of the participants and the participant's entire social network were overall functioning in a similar way to the control group for most measures. Unexpectedly the control group showed significantly higher scores on the EmetQ than that reported by close family. The control group consisted predominately of undergraduate female psychology students and they exhibited greater emetophobia symptoms than even close family members did. The small difference in EmetQ scores may be related to the EmetQ moderate correlation with mood highlighting the need to cautiously interpret EmetQ and SPOVI scores.

Table 9.5 shows that treatment participants are significantly different on almost all measures when compared to their friends or entire social network. Only the perceived quality of the environment remained the same for participants and their social network.

Table 9.1

*Comparison of Participant Category and Assessments. The means and standard deviations for participants, friends, close and distant family members and a control group are included.*

| Test[a] | Participants (TA) | | | Friends | | | Close family | | | Distant family | | | Control | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *N* | *M* | *SD* | *N* | *M* | *SD* | *N* | *M* | *SD* | *N* | *M* | *SD* | *N* | *M* | *SD* |
| EmetQ | 172 | 46.7 | 8.7 | 45 | 24.7 | 11.1 | 33 | 24.7 | 7.4 | 5 | 32.6 | 18.5 | 119 | 28.3 | 8.0 |
| Dep. | 170 | 17.3 | 11.7 | 45 | 12.4 | 12.0 | 30 | 6.9 | 9.6 | 5 | 14.0 | 10.7 | 117 | 8.5 | 8.9 |
| Anx | 170 | 19.1 | 11.2 | 45 | 7.7 | 9.0 | 30 | 6.2 | 7.2 | 5 | 9.6 | 15.1 | 117 | 6.5 | 7.1 |
| Stres | 170 | 23.5 | 10.4 | 45 | 13.2 | 9.5 | 30 | 13.7 | 11.1 | 5 | 11.2 | 7.6 | 117 | 12.4 | 9.8 |
| Phys | 171 | 25.5 | 5.3 | 42 | 27.5 | 5.7 | 28 | 27.5 | 4.2 | 5 | 26.0 | 8.9 | 114 | 27.5 | 4.1 |
| Psyc | 171 | 18.1 | 4.3 | 42 | 20.5 | 4.0 | 28 | 20.4 | 4.8 | 5 | 20.4 | 3.5 | 114 | 22.0 | 3.9 |
| Soc | 171 | 9.6 | 2.7 | 42 | 11.2 | 2.3 | 28 | 11.2 | 2.5 | 5 | 10.6 | 2.9 | 114 | 10.6 | 2.5 |
| Env. | 171 | 29.2 | 5.2 | 42 | 29.3 | 5.7 | 28 | 30.8 | 5.3 | 5 | 34.4 | 5.3 | 114 | 30.6 | 4.6 |
| ECog | 146 | 85.5 | 16.3 | 37 | 39.6 | 19.3 | 21 | 37.0 | 14.0 | 3 | 66.3 | 44.8 | 101 | 41.4 | 14.1 |

[a] Dep: DASS-21-depression, Anx: DASS-21-anxiety, Stres: DASS-21-Stress, Phys: WHOQoL – Physical health; Psyc: WHOQoL – psychological health, Soc: WHOQoL – social health, Env: WHOQoL – Social health, Env: WHOQoL – Environment; ECog: EmetCog.

Table 9.2

*Genetics: Close and Distant Family Compared to Controls ANOVA*

| Test | Close relatives verses controls | Distant relatives verses controls |
|---|---|---|
| EmetQ | $F(1,149) = 5.98$, $p = .02$* | $F(1,122) = 1.25$, $p = .27$ |
| Depression | $F(1, 149) = 1.09$, $p = .30$ | $F(1, 122) = 1.47$, $p = .23$ |
| Anxiety | $F(1, 149) = 0.03$, $p = .86$ | $F(1, 122) = 0.83$, $p = .36$ |
| Stress | $F(1, 149) = .38$, $p = .54$ | $F(1, 122) = 0.07$, $p = .79$ |
| Physical | $F(1, 149) = .00$, p =.96 | $F(1, 122) = 0.58$, $p = .45$ |
| Psychological | $F(1, 149) = 3.46$, $p = .07$ | $F(1, 122) = 0.85$, $p = .36$ |
| Social | $F(1, 149) = 1.27$, $p = .26$ | $F(1, 122) = 0.00$, $p = .98$ |
| Environmental | $F(1, 149) = 0.02$, $p = .90$ | $F(1, 122)= 3.21$, $p = .08$ |

Table 9.3

*Genetics: Close* verses *Distant Family Compared ANOVA*

| Test | Close verses distant |
|---|---|
| EmetQ | $F(1,35)=3.32$, $p = .08$ |
| Depression | $F(1,33)=2.29$, $p = .14$ |
| Anxiety | $F(1,33)=0.67$, $p = .42$ |
| Stress | $F(1,33)=0.23$, $p = .64$ |
| Physical | $F(1,31)=0.36$, $p = .56$ |
| Psychological | $F(1,31)=0.00$, $p = .99$ |
| Social | $F(1,31)=0.25$, $p = .62$ |
| Environmental | $F(1,31)=2.02$, $p = .17$ |

Table 9.4

*Social networks: ANOVA*

| Test | Friends verses controls | Social network verses controls |
|---|---|---|
| EmetQ | $F(1,162)=5.27$, $p = .02$* | $F(1,199)=6.10$, $p = .02$* |
| Depression | $F(1,160)=2.97$, $p = .09$ | $F(1, 199)=.76$, $p = .38$ |
| Anxiety | $F(1,160)=0.83$, $p = .36$ | $F(1, 199)=.48$, $p = .49$ |
| Stress | $F(1,160)=0.22$, $p = .64$ | $F(1, 199)=.36$, $p = .55$ |
| Physical | $F(1,154)=0.00$, $p = .99$ | $F(1, 199)=0.03$, $p = .86$ |
| Psychological | $F(1,154)=4.82$, $p = .03$* | $F(1, 199)=6.93$, $p <.01$** |
| Social | $F(1,154)=1.94$, $p = .17$ | $F(1, 199)=2.38$, $p = .12$ |
| Environmental | $F(1,154)=2.13$, $p = .15$ | $F(1, 199)=0.32$, $p = .57$ |

Table 9.5

*Social networks: Treatment participants and social networks ANOVA*

| Test | Participants verses friends | Participants verses social network |
|---|---|---|
| EmetQ | $F(1,215)=200.75$, $p <.01$** | $F(1,252)=299.20$, $p <.01$** |
| Depression | $F(1,215)=7.81$, $p <.01$** | $F(1, 252)= 21.70$, $p <.01$** |
| Anxiety | $F(1,215)=37.53$, $p <.01$** | $F(1, 252)=65.71$, $p <.01$** |
| Stress | $F(1,215)=32.73$, $p <.01$** | $F(1, 252)=149.56$, $p <.01$** |
| Physical | $F(1,211)=4.70$, $p = .03$* | $F(1, 252)=6.59$, $p = .01$* |
| Psychological | $F(1,211)=10.40$, $p <.01$** | $F(1, 252)=15.51$, $p <.01$** |
| Social | $F(1,211)=13.38$, $p <.01$** | $F(1, 252)=19.69$, $p <.01$** |
| Environmental | $F(1,211)=0.02$, $p = .90$ | $F(1, 252)=1.77$, $p = .19$ |

## Discussion

Contrary to expectation the results generally indicate that individuals with emetophobia have family and friends with emetophobia symptoms at the levels no greater than that which can be found in the community. The key finding was that chronically affected emetophobia suffers may maintain their condition surrounded by friends and family who do not show evidence of the participant's emetophobia or mood comorbidities.

### Social Network Emetophobia Symptoms

It was hypothesised that a combination of genetics and the desire to be surrounded by people who have shared attributes would result in a social network for individuals with emetophobia with correspondingly higher emetophobia symptoms than those reported by an independent control group. The family (close and distant relatives) did not show higher emetophobia symptoms than the controls. The small sample size for the distant relatives ($n$ = 5) limits the reliability of the results between close and distant relatives. No significant differences were found between close and distant relatives on any of the measures used. The friends of treatment participants had a slightly lower perception of psychological health than a control group. The small differences when taken in perspective indicate that family and friends had a similar mental health profile as the controls. There were significant differences between the treatment participants and everyone else. The friends of the treatment participants and the entire social network were substantially better than treatment participants on all measures except quality of the environment. The treatment participants have a very different mental health profile than family and friends. Based on this very limited data there is no supporting evidence for a genetic contribution from the family and no supporting evidence that social networks with similar mental health issues maintain the condition.

**Further Improvements**

Much of the treatment research for emetophobia has focused on the individual's treatment in isolation from the wider systemic social influences that could also contribute to the development and maintenance of the condition. The biopsychosocial aspects of emetophobia is an under-researched area and the current EmetStudy exploration is limited by methodological and generalisability issues. The three key areas for improvement focus on improving the sample representation, improving the assessment approach and improving the tools for assessment.

**Sample Representation.** The EmetStudy participant sample had a number of limitations and these included participant selection and attrition issues that potentially limited generalisability. In addition, a strategy where social networks were evaluated based on a biased pre-selection by the participants leads to considerable generalisability issues. The sample selection process especially of the broader social network is a more complex statistical and ethical difficulty that needs to be resolved.

**Assessment Approach.** The family and friends analysis used an assessment strategy that used only data from a non-random selection process to make inferences about their social networks. The size and supportive valence of the relationships in the social networks was not captured from the participant. An assessment strategy that documents both a history of family mental health of the first and second degree relatives and social network map would help to identify trends that were not evaluated in the current study. Social networks can be documented from the perspective of the affected person and even combined with social networks of others in the network to explore the sociometric attributes of the group (Sykes, Gillespie, Chaboyer, & Kang, 2015).

**Assessment Tools.** The presence of eating disorders and OCD was not directly assessed and would have been a valuable insight. Moreover, the impacts of social support

would be more directly assessed by detailing the affected individual's familial and social networks utilising a tailored assessment tool such as the multidimensional social support questionnaire (Hardesty & Richardson, 2012).

In summary, the assessment of family and friends contributed to the knowledge of emetophobia in two ways. While the current study failed to replicate the biopsychosocial effects posited by Lipsitz et al., this might be due to methodological shortcomings of this study and to the highly educated nature of the sample of the participants who participated. Consequently, this area of research invites further study which would enable the biopsychosocial influences to be incorporated in the Boschen model (2007). In particular, the CBT framework emphasises the affected individual's contribution rather than external factors such as the contribution from emetophobia internet forum groups who may assist in supporting dysfunctional cognitive beliefs. Second, the data obtained suggests that the presence of emetophobia symptoms in the family is surprisingly low. For this treatment group of highly educated participants a picture of chronic emetophobia is counterbalanced by a network of family and friends who have few symptoms of emetophobia but with friends who are mildly depressed. Overall the data suggests the participants in this study may achieve social support through relatively healthy behavioural and cognitive modelling from a high functioning social network. The affected person is relatively unique in their social network in regard to emetophobia symptoms. Further research is needed to determine if these results can be replicated and to assess the degree to which the uniqueness is isolating or supportive. In addition, there is a need to understand what contribution the individual makes back to their social network that is of value so that these networks can be strengthened.

## Boschen Model Evaluation

The Boschen (2007) cognitive-behavioural model of emetophobia has developed and expanded from early CBT models of other anxiety disorders that have a somatic component such as panic disorder (Clark, 1988) and social phobia (Clark & Wells, 1995; Rapee & Heimberg, 1997). This and other models have the common element of cognitive misappraisal of somatic stimuli. These models are also framed within the common elements of the CBT model in that they have an avoidant behavioural component and cognitive misappraisal that maintains the problem. The models vary in their scope, some focus on the acute phase of an immediate crisis from an external observer perspective (Rapee & Heimberg, 1997) and others can focus internally at primarily a neurochemical level (Beck, 2008). The Boschen model timescale describes the acquisition of emetophobia through to the daily maintenance of the condition. It does not identify a separate recovery process and treatment interventions are therefore targeted at stopping and reversing the outlined processes. The Boschen model will therefore be evaluated on its capacity to reflect the results that were achieved during treatment. Two treatment intervention tests are evaluated.

First, the Boschen model proposes that the vulnerability factor is stable and that changes in anxiety will not affect gastrointestinal sensitivity. It is hypothesised that changes in anxiety and emetophobia symptoms during treatment are uncorrelated with changes in GISQ scores during treatment.

Second, an intervention that reduces the strength of belief in unhelpful emetophobia cognitions should lead to improvements in GI hypervigilance as suggested in the maintenance phase. It is therefore hypothesised that changes in emetophobia cognitions (EmetCog) will be correlated with the changes in EmetQ scores during treatment.

## Results

**Hypothesis one:**

The changes in anxiety and EmetQ are not correlated with changes in GISQ scores. GISQ scores dropped only 2.2 (*SD* = 4.8) points from the start (*M* = 27.8, *SD* = 7.0) to the end of treatment (*M* = 25.6, *SD* = 7.9), *F*(1,23) = 5.1 *p* =.03). Anxiety scores, as measured by the DASS-21, decreased by 4.0 (*SD* = 10.0) points from the start of treatment (*M* = 14.7, *SD* = 10.4) to the end of treatment (*M* = 10.8, *SD* = 9.9, F(1,70) = 12.1, p < .001, but the change in anxiety scores was uncorrelated with the change in GISQ scores (*N* = 23, *r* = -.27, *p* = .22). Changes in EmetQ scores were also uncorrelated with GISQ scores (*N* = 24, *r* = -.30, *p* = .15).

**Hypothesis two:**

The changes in the EmetCog (emetophobia cognitions) are correlated with changes in EmetQ scores. EmetCog scores decreased by 17.3 (*SD* = 12.8) during treatment *F*(1,26) = 49.7 *p* = .001, and the change in EmetCog scores was correlated with the change in EmetQ scores (*N* = 27, *r* = .68, *p* < .001).

## Discussion

The existing Boschen model describes the theoretical process of emetophobia acquisition and this chapter confirms that the data from the treatment study confirms that this conceptualisation also models treatment recovery. As predicted by the model there was no significant association between the change in GISQ scores and change in emetophobia symptoms or anxiety. Applied relaxation may act to reduce the symptoms of anxiety but it may not affect the gastrointestinal sensitivity. Applied relaxation does not have a direct effect gastrointestinal sensitivity but it has been shown to reduce anxiety (Manzoni, Pagnini, Castelnuovo, & Molinari, 2008).

Insights into gastrointestinal recovery could possibly be drawn from research into IBS. The symptoms of IBS and emetophobia gastrointestinal sensitivity appear to have substantial

overlap and IBS achieves recovery using CBT (Blanchard, Schwarz, & Neff). It is tentatively proposed that IBS and the gastrointestinal sensitivity found in emetophobia may share similar stress related acquisition and biological and cognitive recovery mechanisms.

**Vulnerability Factor Expanded.** The Boschen model uses the term, vulnerability factor as a stable attribute of an individual with emetophobia. The term somatic vulnerability used in this model refers to the constellation of genes inherited from the parents (genotype) and a set of external and internal events that contribute to the individual's expression of the genes (phenotype). External events experienced by people with emetophobia may include witnessing or experiencing a vomit related event and chronic stress. This chapter proposes to expand why somatic vulnerability described in the Boschen model is relatively stable due to the action of internal (body related) events in response to all forms of external events. Key to the gastrointestinal sensitivity stability is the idea that biological changes in response to external events may occur slowly and the effects are delayed from the immediacy of stress or recovery.

A close analogue to somatic vulnerability is the condition called irritable bowel syndrome (IBS: Whitehead, Palsson, & Jones, 2002). It has a genetic component, it is associated with anxiety and if untreated it is a chronic condition (Fukudo et al., 2011). The biological component of IBS affects gut motility, sensitivity, inflammation and gut flora. Gut motility that affects the frequency of defecation and stool consistency (Barreau et al., 2004; Fukudo, Nomura, Muranaka, & Taguchi, 1993) is heightened during stress for IBS patients (Fukudo et al., 2011). Gastrointestinal sensitivity as determined by gastrointestinal pain threshold was lower in IBS patients (Ness, Metcalf, & Gebhart, 1990; Ng, Malcolm, Hansen, & Kellow, 2006). Intestinal mucosal inflammation may play a role in IBS and this inflammation may be prolonged (De Silva et al., 2012; Kim, Lim, Park, & Lee, 2010). Gut bacteria has been found to influence gut sensitivity, an altered immune response against gastrointestinal bacteria and motility (Jancin, 2006; Sundin, Rangel, Repsilber, & Brummer, 2015). Gastrointestinal

sensitivity was replicated in mice by transferring gut flora of IBS patients into mice. The human IBS gut flora increased gastrointestinal sensitivity in the normally sensitive mice (Crouzet et al., 2013). The trigger for the short and longer term affects described above includes the intestinal motor, sensory and CNS activity that connects the brain and the gut. The brain-gut axis is connected to the limbic system that forms part of the hypothalamic, pituitary, adrenal (HPA) axis. The dysfunctional effects impact a broad set of physical systems (Fukudo et al., 2011) and the physical damage may not be reversed within the short timeframe of the CBT treatment. In addition, cognitive reappraisal may have limitations as somatic communication is bi-directional between the gut and the CNS via neural, endocrine and neuroimmune pathways (Fichna & Storr, 2012). Cognitive restructuring has its limitations as a result of the physical damage to the gastrointestinal system.

The GISQ did not change as dramatically as the EmetQ, SPOVI, and anxiety indicating a degree of stability and independence from anxiety and emetophobia. The relatively small changes in gastrointestinal sensitivity during the waitlist and treatment program indicate substantial gastrointestinal sensitivity recovery is not achieved in 12 weeks. Improvements in the EmetCog scores indicate that positive changes to cognitions contribute to improvements in sensitivity. This is consistent with improvements for IBS using CBT treatments (Lackner et al., 2012; Ljótsson et al., 2013). This is also consistent for other anxiety conditions and depression where symptom change is correlated with change in cognitive measures (Niles, Burklund, Arch, & Lieberman, 2014; R. Schneider & Schulte, 2008).

In summary the treatment data supports the Boschen (2007) conceptualisation as both an acquisition and a treatment model. It was proposed that stability of somatic sensitivity is achieved by slow and consistent damage to the gastrointestinal system. This biological damage may smooth out changes despite fluctuations in emetophobia symptom severity and stressful events. Ultimately, a biological damage perspective extends the current reliance on

psychological pathways and may lead to the managing chronic gastrointestinal damage directly. This may not address emetophobia symptoms directly but it may facilitate treatment recovery in a CBT framework.

## General Discussion

The research conducted during the EmetStudy treatment program has extended emetophobia related knowledge in seven key areas, and EmetStudy has achieved three milestones in the treatment of emetophobia. First, it is currently the largest emetophobia treatment study with a total of 107 participants completing treatment using an online cognitive behavioural therapy (CBT) program. Second, two new measures of emetophobia related symptoms were developed and validated utilising the largest published pool (N = 459) of emetophobia treatment seekers. Finally EmetStudy led to the publication of the first and currently the only non-retrospective structured clinical interviews (N = 64) to ascertain emetophobia comorbidity rates indicating that comorbidity rates are in general much lower than previously suggested.

Overall this thesis examined seven key research areas that included two treatment goals and five theory related goals. The two treatment goals were; (1) to assess the effectiveness of a cognitive behavioural internet therapy developed specifically for the treatment of emetophobia and (2) understand the progress of participants during treatment quantifying commencement, dropout and completion of treatment. The treatment program was conducted in two phases with a Pilot and Main Study.

### Two Treatment Related Goals

**Treatment Efficacy**. In the Pilot Study 26 participants completed treatment. There was a statistically significant interaction between the treatment group and time for emetophobia severity and simple effects analysis revealed no significant difference between a control and treatment groups at pre-treatment. For the Main Study 172 participants completed the three month waitlist with no change in EmetQ or quality of life measures but reported small changes in the SPOVI, and symptoms of depression, anxiety and stress. After treatment 81 participants showed a reduction in all measures that included emetophobia symptoms, depression, anxiety,

stress, and four quality of life dimensions (psychological, physical, social and environmental). After a three month follow-up (N = 22) only depression and stress increased. Depression, anxiety and stress was found to be moderately correlated with the two validated emetophobia measures and emetophobia symptom changes therefore results need to be interpreted cautiously. The study demonstrated that an internet treatment for emetophobia can be as effective as face-to-face treatments.

**Predicting Treatment Outcomes and Attrition**. Prior to the EmetStudy the predictors of emetophobia treatment outcome and attrition have not been extensively researched. There were three important predictors of successful outcomes found in the current study. The first was number of goals set. Using a predictor defined early in the treatment protocol (week 1), the number of goals set predicted 79.1% of the treatment completers. The second was the score on the GISQ at pre-test. The EmetStudy treatment outcome was also predicted based on the initial presenting GISQ score in 68.6% of cases. Lower GISQ scores predicted a better outcome. This makes the GISQ a useful treatment decision making tool and so when GISQ scores are high at registration, it may indicate that additional participant support is required as these participants were less likely to achieve reliable change. Finally, the number of treatment sessions completed (dose) also predicted better treatment outcomes in the EmetStudy. A challenge for future research will be to develop approaches to increase retention during the treatment phase to yield more positive outcomes.

## Five Theoretical Goals

**A New Model of Attrition**. A new model of attrition was proposed that was contextualised in a framework of motivation or readiness to change behaviour using the Transtheortical Model (DiClemente et al., 1985). The trend towards large scale internet therapies with few treatment entry barriers highlighted from the existing paradigm's historical focus on face-to-face treatment attrition was discussed. A key feature of the new attrition

model is recognising that attrition takes place from treatment registration and that the stage of change is time based. On this basis traditional methods that only assess the furthest point reached in a treatment program are in part measuring the strength of the barriers to treatment progression rather than the change readiness of the participant.

**New and old Emetophobia Measures**. Until the publication of two new emetophobia measures from 2013 there have not been validated emetophobia severity measures. The EmetQ and the SPOVI both have demonstrated reliability and validity as measures of the severity of emetophobia. However, both of these measures when used in the current study were found to be linearly correlated with depression, anxiety and stress, and therefore some caution needs to be applied when interpreting the results as the scores on these scales may be related to changes in mood. The validation of two new emetophobia-related assessment measures increases the flexibility of the assessment to investigate emetophobia cognitions using the EmetCog and gastrointestinal sensitivity using the GISQ. The GISQ in particular was found to be the only assessment measure that was found to predict treatment outcome. Both assessments measure specific aspects of the condition rather than global severity, and this permits researchers to observe changes in parts of the system rather than just the whole.

**Social Networks**. The social network of individuals with emetophobia has not previously been explored and was an innovative third theoretical goal that expanded the breadth of knowledge in the emetophobia domain. The results tentatively indicate that people with emetophobia have family and friends who have relatively normal levels of emetophobia symptoms, and depression, anxiety and stress. Although people with emetophobia report substantially different mental health than their social network, all groups including controls shared a common perception of their environmental quality of health. How the social networks influence the presence of emetophobia symptoms in the participants remains unknown. The

preliminary study has significant limitations due to participant recruitment but may act as a starting point for further investigation.

**A Confirmation of the Conceptual Model of Emetophobia.** An investigation into the fourth theoretical goal of assessing the dominant conceptualisation of emetophobia drew upon the two new assessment measures (GISQ and EmetCog) and emetophobia severity measures to identify somatic vulnerability. Gastrointestinal sensitivity was found to be stable and this was consistent with the Boschen (2007) model's predictions for somatic vulnerability. Changes in emetophobia cognitions were found to be closely associated with changes in emetophobia severity.

Using the analogue of IBS, the stability of somatic vulnerability was speculatively attributed to biological damage to the gastrointestinal system. The role of biological damage to the gastrointestinal system needs to be confirmed through detailed assessments of gastrointestinal health and functioning in individuals with emetophobia.

**Quantifying Comorbidities.** Prior to 2014 studies that investigated the rates of comorbidities in emetophobia did not use validated emetophobia measures and were not reliable, due to the limitations of the assessment tools used to identify emetophobia and distinguish these symptoms from other comorbidities. A relatively large (N = 64) number of gold standard structured clinical interviews were undertaken in this study and these results have formed the first published comorbidity rates that are generally consistent with a newly published study (Veale et al., 2015).

## Limitations of the Research and Improvements

EmetStudy was a treatment program that achieved considerable benefit for 43% of the participants who completed at least 3 weeks of treatment. In a group that had suffered with emetophobia for an average of 15 years, many experienced meaningful symptom changes. However, significant challenges were found during the study. Large numbers of participants

dropped out of the program during the 90-day waitlist period and, more disconcertingly, participants continued to drop-out of the program during treatment. While many participants assessed their symptom severity from week to week, they omitted completing many of the classic CBT forms that documented their beliefs, events, and exposures. In face-to-face therapy, the client is gently guided through these processes during the session. When the same tasks are to be completed outside of the session, individuals frequently fail to complete 'homework' tasks (Kazantzis, Deane, & Ronan, 2004). Therapists encourage clients to complete these self-assisted (homework) tasks because they work (Huppert, Roth Ledley, & Foa, 2006; Kazantzis, Deane, & Ronan, 2000; Mausbach, Moore, Roesch, Cardenas, & Patterson, 2010). In the context of the EmetStudy, the participant can clearly choose whether they wish to comply with treatment tasks. In retrospect, it should not have come as a surprise that the use of traditional homework formats that had a record of poor compliance in face-to-face CBT treatments would also result in poor online compliance. Follow-up interviews with participants could have helped identify the barriers to undertaking and reporting these activities. One possible explanation for this might have been the relatively complicated and time consuming user interface for completing the forms.

A number of issues problematic for the research emerged that were related to how the treatment study was designed and conducted. These include participant recruitment, identifying treatment module effectiveness, assessment tools, technical issues and resourcing.

**Participant Recruitment.** As discussed in Chapter 7 a sample composed primarily of internet forum participants was recruited into the current study. This form of recruitment has some limitations that reduces the generalisability of the results. A future research task would be to compare a sample referred by doctors and outpatient clinics with a self-referred internet recruited sample. This could highlight any differences between the two recruitment methods,

particularly in relation to readiness to change and possibly differences in historical treatment experiences.

**Assessment Tools**. The research agenda for the study resulted in a high volume of assessment that led to the development of assessment sequencing that introduced additional problems. The large number of assessment tools including two new untested tools that had a large set of statements that the registrants were asked to complete. This issue was identified as a possible problem before recruitment and the participants were informed that the research assessment component would take up to 30 minutes. The most important questionnaires were placed at the top of the list (EmetQ and SPOVI) and the most experimental were placed at the bottom (EmetCog and GISQ). The result was that assessment compliance decreased toward the end of the assessment batteries, shown by the smaller numbers of completed GISQ's and EmetCog questionnaires. The variable assessment regime that helped to manage the assessment load by presenting a smaller core assessment set more frequently with the intention to limit attrition, but it resulted in poor GISQ and EmetCog completion rates.

**Detailed Evaluation of Eating Disorders and IBS.** The psychologist conducting the structured clinical interviews had limited experience with eating disorders and IBS. Symptomatology of possibly co-morbid eating disorders are underrepresented in the SCID assessments compared to data gathered by Veale et al. (2012). IBS was a medical condition that was discussed frequently in the interviews, but was not formally assessed because it is not a recognised DSM-IV-TR psychological disorder. Both of these conditions are areas that need to be properly assessed in future research into emetophobia.

**Technical Problems as a Point of Failure.** The EmetStudy was a software application written using several combinations of leading edge open-source technology. The program could send out automated emails to ask participants to complete follow-up assessments but such systems can trigger hosting spam alert systems that disrupt these activities. The

organisation was upholding its ethical standards but this had implications for the research. The difficulty in contacting participants in the follow-up stage resulted in poor follow-up data that was underpowered. Further research should ensure that this is not a difficulty.

**Treatment Module Assessment**. Imaginal exposure was a treatment module incorporated into the treatment and is an established CBT treatment regime for phobias (Rentz, Powers, Smits, Cougle, & Telch, 2003; Richards, 1988). This technique has not been previously evaluated for emetophobia. Feedback from one participant indicated that this exposure technique was highly effective. Unfortunately it was not possible to compare the effectiveness of each separate module due to the fixed linear design of the weekly sessions presented in the program, and an inconsistent measure of module participation.

## Conclusion

The EmetStudy treatment program delivered on its core objective of delivering an emetophobia treatment that was as effective as face-to-face CBT treatments. As may be expected with similar treatment programs, the data collected during intake interview and treatment assessments progressively added to the existing body of knowledge in the area. The development and creation of two new assessment measures, one of which (GISQ) demonstrated a capacity to predict treatment outcome may prove to be a valuable treatment decision making tool. In addition, the study adds to the theoretical body of knowledge in regards to proposing that biological damage that may slow down changes to gastrointestinal sensitivity and a proposal of an integrated model of attrition that is highly relevant for internet treatments but also applicable for face-to-face treatments. Taken as a whole, the thesis has added substantially to the body of practical and theoretical knowledge of emetophobia and internet treatments. Most importantly this study has shown that an effective online treatment program can be delivered to anyone in the world with internet access who suffers from emetophobia.

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# Appendix DVD

For simplicity multimedia files including Adobe portable document format (pdf) files were placed on a DVD for a printed copy of the thesis. These files were also placed in a single compressed file (DVD.zip) so they can be extracted in the same directory structure as the DVD for electronic copies of the thesis. This appendix lists the directory structure of the DVD so files can be found easily.

## DVD Directory Structure

**Chapter 3 approval.** Approval from Mark Sykes and co-authors; Dr Mark Boschen and Elizabeth Conlon for the use of material in Chapter 3.

**Eduxxx.pdf content files**. Adobe pdf files relating to instructional content. Each of the files are numbered as referenced in the text.

**Miscellaneous video.** Video files not referenced in the thesis directly but were examples of video content used in the study.

**Participant consent.** Adobe pdf files relating to participant consent.

**Relaxation audio.** Two audio files by recorded by Mark Sykes and Dr Allie Ernst.

**Virtual exposure audio.** A set of audio files recorded by treatment participants, Mark Sykes and Dr Allie Ernst and was used for virtual exposure during the course of treatment.