**School of Psychology and Speech Pathology**

# A Randomised Controlled Trial Investigating Online Cognitive Behavioural Therapy for Perfectionism to Prevent Eating Disorder Symptoms

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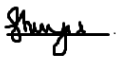
## Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Human Ethics

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee (EC00262), Approval Number HR187/2013

Signature: 

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**Abstract**

Individuals with eating disorders hold extremely high standards regarding their body shape, weight, and eating. These individuals also judge their self-worth predominately on their ability to achieve shape and weight control, often through rigid extreme dietary restraint. Clinical perfectionism is a risk factor for the development and maintenance of eating disorders. Although there is evidence that clinical perfectionism is an important risk factor for eating disorders, prevention programs for eating disorders have placed little emphasis on this risk factor. The present research consists of two linked studies which aimed to first validate a measure of clinical perfectionism for female youth, and then to develop and examine the efficacy of an online prevention program that targeted clinical perfectionism in the prevention of eating disorders and comorbid psychological symptoms.

The first study aimed to assess the factor structure and construct validity of the Clinical Perfectionism Questionnaire (CPQ; Fairburn, Cooper, & Shafran, 2003) in female youth. The CPQ was administered to 267 females aged 14 to 19 years. The CPQ demonstrated sound internal consistency, construct validity and incremental validity. The confirmatory factor analysis confirmed the two-factor model of the CPQ with Factor 1 relating to Perfectionistic Strivings and Factor 2 relating to Perfectionistic Concerns. The two-factor model of the CPQ fits with the theoretical definition of clinical perfectionism where the key elements are the determined pursuit of personally demanding, self-imposed standards and the overdependence of self-worth on achievement. This study supported the use of the CPQ to assess clinical perfectionism in female youth, providing new opportunities for evaluating the impact of prevention and intervention programs targeting perfectionism in youth, and for refining theoretical models of personality and psychopathology.

The second part of the research aimed to develop and examine the efficacy of a selective prevention program consisting of eight sessions of online self-help which targeted clinical perfectionism. A randomised controlled trial involving 94 females without eating disorders aged 14 to 19 years was conducted. Participants were randomised into one of three groups: online cognitive behaviour therapy (CBT) for perfectionism (CBT-P), online CBT for nonspecific stress management (CBT-S) or waitlist control. CBT-P resulted in large reductions in clinical perfectionism (CPQ Factor 1 [Perfectionistic Strivings] and CPQ Factor 2 [Perfectionistic Concerns]), moderate decreases in eating disorder, anxiety and depressive symptoms, and large increases in self-esteem, with changes  maintained at 6 month follow- up. Changes in clinical perfectionism, eating disorder symptoms, depressive symptoms, anxiety symptoms and self-esteem were significantly larger in CBT-P than CBT-S and waitlist control. Some clinically significant prevention effects were found, with CBT-P being superior to CBT-S in preventing deterioration of clinical perfectionism (CPQ Factor 2 [Perfectionistic Concerns]), and depressive symptoms, and CBT-P being superior to waitlist control in preventing deterioration of eating disorder symptoms over 6-month follow-up.

The findings support the notion of clinical perfectionism as a transdiagnostic process and suggest that it may be a useful target for prevention of eating disorders in female youth. The use of technology to promote and engage young women in prevention programs are increasingly popular and accessible, suggesting that online programs may be useful for the prevention of eating disorders, particularly in a stepped care model.

*Keywords:* eating disorders, perfectionism, prevention, online, transdiagnostic

# CHAPTER 1 Literature Review

This chapter covers key concepts relating to eating disorders such as impact of eating disorders, aetiology and treatment approaches. In particular, the chapter provides an exploration of the prevention approaches for eating disorders, and proposes clinical perfectionism as a risk factor to be targeted in prevention research. The chapter concludes with a summary of literature, aims and rationale for the current body of research.

## Eating Disorders

Eating disorders are serious psychological problems that involve extreme cognitive and behavioural disturbances in eating, weight and shape (American Psychiatric Association [APA], 2013). They carry significant medical and psychological risks and usually do not resolve on their own accord (Arcelus, Mitchell, Wales, & Nielsen, 2011). Eating disorders usually have an onset in early adolescence and have the highest mortality rates of all psychological disorders (Arcelus et al., 2011). If left untreated, they have a negative impact on physical and psychological outcomes into adulthood, with psychological comorbidities such as anxiety and depression being common (APA, 2013; Samnaliev, Noh, Sonneville, & Austin, 2015). Despite the serious consequences of eating disorders and the increasing prevalence in young females, prevention of eating disorders in young people remains an under researched area and new evidence-based approaches need to be found (Stice, Becker, & Yokum, 2013).

The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; [DSM-5]; APA, 2013) has classified eating disorders into seven categories, namely anorexia nervosa, bulimia nervosa, binge eating disorder, rumination disorder, avoidant/restrictive food intake disorder, other specified feeding or eating disorder and unspecified feeding or eating disorder. According to DSM-5 (APA, 2013), Anorexia nervosa involves a persistent restriction of energy intake leading to low body weight, intense fear of weight gain, and a disturbance in the way one's body weight or shape is experienced, undue influence of body shape and weight on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight. Bulimia nervosa is diagnosed when a person displays recurrent

episodes of binge eating, and inappropriate compensatory behaviours to prevent weight gain such as self-induced vomiting, laxative or diuretic misuse, fasting or excessive exercising at least once a week for three months and their self-evaluation is unduly influenced by body shape or weight (APA, 2013). Binge eating disorder comprises recurrent episodes of binge eating, accompanied with marked distress. These episodes occur at least once a week for three months (APA, 2013). Avoidant/restrictive food intake disorder presents as an eating or feeding disturbance where there is persistent failure to meet appropriate nutrition needs and it is not better explained by a lack of available food, cultural practices, medical or psychological condition (APA, 2013). Other specified feeding or eating disorder includes feeding or eating behaviours that cause clinically significant distress and impairment but may not meet the full criteria for anorexia nervosa, bulimia nervosa, binge eating disorder or avoidant/restrictive food intake disorder (APA, 2013). For example, atypical anorexia nervosa can be diagnosed when all criteria of anorexia nervosa are met, but the individual's weight is within or above the normal range. Bulimia nervosa and binge eating disorder of low frequency and/or limited duration can be diagnosed when all criteria for bulimia nervosa or binge eating disorder are met except that the binge eating and/or compensatory behaviour occurs at a lower frequency and/or for less than three months. Purging disorder involves recurrent purging behaviour to influence weight or shape in the absence of binge eating while night eating syndrome comprise recurrent episodes of night eating where the behaviour is not better explained by environmental influences, social norms, another mental health disorder and causes significant distress or impairment. Unspecified feeding or eating disorder applies to behaviours that cause significant distress or impairment but do not meet the full criteria of any of the abovementioned categories (APA, 2013).

While nomenclatures such as the DSM can be helpful, such as supporting funding for treatment programs, there are significant problems in the categorisation of eating disorders. For example, the DSM-IV (APA, 2000) has been critiqued for failing to adequately classifying individuals with eating disorder, with this issue being more severe for children and adolescents. Most importantly, the eating disorder not otherwise specified (EDNOS) was the most frequently diagnosed eating disorder when using DSM-IV criteria in children and adolescents (41% to 68%; Chui et al., 2008; Eddy et al., 2010; Fisher et al., 2001; Nicholls, Chater, & Lask, 2000;

Peebles, Wilson, & Lock, 2011). Also, many features of eating disorders are overlapping rather than distinct entities (Fairburn, Cooper, & Shafran, 2003). Moreover, it is not uncommon for individuals with eating disorders to migrate between diagnoses across the lifespan, with anorexia nervosa like symptoms being more common in mid adolescence and bulimia nervosa like symptoms being more prevalent in late adolescence and early adulthood (Fairburn et al., 2003). These problems have led to arguments for a 'transdiagnostic approach' (Fairburn et al., 2003) as well as a shift away from the assessment and treatment of categorical eating disorders, to dimensional eating disorder symptomatology (Becker, 2016). This will allow researchers to examine and understand subclinical eating disorder symptomatology that still causes pain and suffering to individuals, who may not meet the categorical diagnosis of an eating disorder according to nomenclatures such as the DSM-5 (Becker, 2016).

**Prevalence Rates**

The lifetime prevalence of eating disorders for females ranges from 0.9% to 3.5% and 0.3% and 2.0% in males, with the lifetime prevalence of anorexia nervosa, bulimia nervosa and binge eating disorder consistently being 1.75 to 3 times higher among women than men (Hudson, Hiripi, Pope, & Kessler, 2007). Multiple epidemiological studies have established the age of onset for anorexia nervosa and bulimia nervosa peaks between 14 to 19 years for adolescent females, with a trend toward earlier age of onset and increasing prevalence (Allen, Byrne, Oddy, & Crosby, 2013; Lewinsohn, Striegel-Moore, & Seeley, 2000; Smink, Van Hoeken, & Hoek, 2012; Stice, Marti, & Rohde, 2013b). Adolescence is the most vulnerable time for developing an eating disorder due to biological and physical changes in the body during puberty, peer pressure and increased body image preoccupation (e.g., Ferreiro, Seoane, & Senra, 2011; Torstveit, Aagedal-Mortensen, & Stea, 2015).Given that eating disorders most commonly develop in adolescence and affect females more than males, prevention efforts for females during this period of developmental risk is crucial so as to minimize the negative consequences associated with eating disorders (Arcelus et al., 2011; Hudson et al., 2007; Samnaliev et al., 2015; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011).

## Impact of Eating Disorders

Eating disorders are associated with serious medical complications. Individuals with anorexia nervosa are prone to bradycardia, severe dehydration, osteoporosis and malnutrition associated lanugo. Individuals with bulimia nervosa may experience electrolyte and chemical imbalances such as hypokalemia, tooth decay, peptic ulcers and pancreatitis, which are associated with the binge-purge cycle. High blood pressure, high cholesterol levels, and type II diabetes mellitus are associated with binge eating disorder (Westmoreland, Krantz, & Mehler, 2016). Eating disorders frequently involve inpatient hospitalisation and carry the highest mortality rates of all psychological disorders (Arcelus et al., 2011). Eating disorders are also highly comorbid with psychological problems such as anxiety, major depressive or other mood disorders, suicide attempts, substance abuse and cognitive impairments (Hudson et al., 2007; Swanson et al., 2011). The functional impairment of eating disorders is concerning, given that individuals with eating disorders are noted to have greater annual health care costs, lower rates of employment and earnings than individuals without eating disorders, with comorbid psychological problems contributing substantially to these disparities (Samnaliev et al., 2015). Consequently, there is a pressing need to implement effective prevention and treatment of eating disorders that is evidence-based and readily accessible to reduce the burden of this disease for individuals with eating disorders as well as broader society.

## Aetiology

To develop effective prevention and treatment of eating disorders, it is crucial to understand the risk factors associated with eating disorders. The definition of a risk factor, the various models of aetiology and maintenance, and the empirical risk factors identified in prospective studies are reviewed below.

### Definition of a Risk Factor

Two criteria are needed for a factor to be a risk factor for a disorder: First, the factor must temporally precede the onset of the disorder. Second, the factor must be correlated with the disorder (Kraemer, 2010; Kraemer et al., 1997). A pertinent issue in identifying true risk factors for eating disorders is that most “risk” factors have been identified using cross-sectional studies and lack appropriate comparison groups

(Pike et al., 2008; Stice et al., 2012). These methodologies do not establish causality, which makes it difficult to determine if the putative "risk" factor is a predisposing vulnerability and thus a true risk factor, a consequence of eating disorders, or related to some other characteristic common to eating disorders such as anxiety or depression (Stice et al., 2012). Conversely, prospective studies or randomised controlled trials are able to establish causality (Stice et al., 2012).

The Oxford Risk Factor Interview for eating disorders (Fairburn et al. 1999) is another method that has been used to improve on the methodological limitations of earlier studies. It is a semi-structured interview that examines specific risk factors such as biological, psychological and social factors thought to place a person at risk of developing an eating disorder. The Oxford Risk Factor Interview uses behavioural definitions of key concepts and a timeline for sequences of events to minimise bias associated with retrospective reporting so as to establish temporal precedence of putative risk factors. Conducting the Oxford Risk Factor Interview in a case-control study design that includes psychiatric and non-psychiatric control groups, and where eating disorder and control cases are matched for current age and developmental period assessed (e.g., in Pike et al., 2008) can provide further information regarding risk factors for eating disorder, that are currently lacking. The three studies (Fairburn et al. 1999; Karwautz et al. 2001; Pike et al., 2008) that have used the Oxford Risk Factor Interview to establish the risk factors for anorexia nervosa have convergent findings: Negative affectivity, maternal and paternal parenting problems, family discord, parental mood and substance disorder, and physical and sexual abuse were found to be general risk factors for psychiatric disorders. Risk factors that are more specific to anorexia nervosa as compared to other psychiatric disorders were negative affectivity, perfectionism, family discord, and high parental demands. And perhaps the most interesting finding of all is that the relative contribution of family history of weight, shape and dieting concerns are significant in predicting the onset of anorexia nervosa when considered in isolation, but their relative contribution became insignificant when evaluated in comprehensive models including other personal vulnerability factors (Fairburn et al. 1999; Karwautz et al. 2001; Pike et al., 2008). This is particularly interesting, given the centrality of weight and shape concerns in anorexia nervosa. While the Oxford Risk Factor Interview has been used to understand the risk factors of anorexia nervosa, it will be beneficial to use it to understand the risk factors for all eating disorders, given its methodological rigor.

From the above research, several recommendations arise regarding the research and definition of a risk factor. First, the risk factor should temporally precede the onset of the disorder and be correlated to the disorder (Kraemer, 2010; Kraemer et al., 1997; National Eating Disorders Collaboration, [NEDC], 2010). Second the risk factor should be able to separate individuals according to high- and low-risk status (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004). Third, using rigorous methodologies such as the prospective studies or randomised controlled trials or Oxford Risk Factor Interview can help identify true risk factors that precede a disorder. Fourth, targeting a single risk factor in prevention studies can provide a strong empirical test of aetiologic theories (Stice et al., 2007).

**Models of Aetiology and Maintenance**

Several models have been proposed to understand the aetiology and/or maintenance of eating disorders. They include the cognitive- interpersonal model of anorexia nervosa (Schmidt & Treasure, 2006), the dual-pathway model (Stice & Agras, 1998), the three-factor interactive model of bulimia nervosa (Bardone-Cone, Abramson, Vohs, Heatherton, & Joiner, 2006), the cognitive-behavioural model of eating disorders (Fairburn, Cooper, & Cooper, 1986; Fairburn, Cooper, & Shafran, 1999; Fairburn, Cooper, & Shafran, 2003; Garber & Bemis, 1982; Vitousek & Hollon, 1990), the family based model for anorexia nervosa (Le Grange, 2005), and heritability and biological mechanisms (Duncan et al., 2016).

According to the cognitive-interpersonal model of anorexia nervosa (Schmidt & Treasure, 2006; Treasure & Schmidt, 2013), the symptoms are maintained by intra- and interpersonal factors. The model includes four key maintaining factors, namely perfectionism, experiential avoidance, pro-anoretic beliefs and response to close others. In this model, anorexia nervosa is proposed to be maintained by intrapersonal factors including beliefs about the positive function of the illness for the person such as a temporary improvement in an individual's mood and well-being upon restraining their diet (Schmidt & Treasure, 2006). The rigid adherence to strict dietary rules and over-attention to details such as calorie counting can also lead to a sense of mastery and being in control over their bodies, and consequently a false sense of mastery and control over their lives (Fairburn et al., 1999). Perfectionism can maintain anorexia nervosa through the enduring dietary restriction and persistent control of appetite (Fairburn et al., 1999).

Moreover, when individuals with anorexia nervosa eat outside of a self-imposed, restricted range of low-calorie foods, it can evoke extreme negative emotions in those who are perfectionistic and have a fear of making mistakes, perpetuating perfectionism and restriction (Schmidt & Treasure, 2006). The physical starvation can intensify perfectionism, leading to more rigidity, perfectionism, rituals and obsessional behaviours (Anderluh, Tchanturia, Rabe-Hesketh, & Treasure, 2003). The preoccupation with food and eating also results in emotions becoming less salient, with many individuals reporting feeling numb (Ward et al., 2001). Hence, powerful, positive pro-anorectic beliefs are perpetuated, with many patients expressing a belief that anorexia nervosa helps them cope with their emotions (Schmidt & Treasure, 2006). Apart from these intrapersonal mechanisms of perfectionism, experiential avoidance, pro-anoretic beliefs, and the responses of close others are highly relevant (Treasure et al., 2001). Peers often compliment individuals at the early stage of anorexia nervosa about their weight loss, thereby reinforcing pro-anoretic beliefs (Branch & Eurman, 1980). Later on, close others become concerned, with families organising their needs around the person with anorexia nervosa (Schmidt & Treasure, 2006). The positive experiences of care and attention from families again perpetuates the intrapersonal mechanisms maintaining the illness (Schmidt & Treasure, 2006). Alternatively, the illness can arouse strong negative emotions in family members, with conflicts, criticism, or hostility being expressed toward the individual with anorexia nervosa (Treasure et al., 2001). The person may then distance himself or herself from others because of his or her intolerance to negative emotions and sensitivity to criticism, which again maintains the avoidant and perfectionistic beliefs and behaviours of the person, with an increased perceived value of anorexia nervosa (Schmidt & Treasure, 2006).

The revised cognitive-interpersonal model of anorexia nervosa (Treasure & Schmidt, 2013) emphasised the complexity of the model. The evidence base relating to the model was reviewed, and additional cognitive, socio-emotional and interpersonal factors were added to the model (for a review, see Treasure & Schmidt, 2013): First, certain risk factors such as strong detail, set shifting and social communication difficulties are found to be not solely cognitive and socio-emotional risk factors. Rather, these risk factors tend to be familial vulnerability traits and can have wider effect by creating maladaptive responses amongst

family members, becoming an interpersonal predisposing and perpetuating factor of eating disorder as well (Treasure & Schmidt, 2013). Second, carers' accommodating and/or enabling behaviours were also found to maintain eating disorder symptoms (Treasure et al., 2008). Consequently, the revised model included the complex interactions of risk factors such as strong detail, set shifting, social communication difficulties within cognitive, socio-emotional and interpersonal contexts (Treasure & Schmidt, 2013). The interpersonal component of the model has expanded to include not only carers' high expressed emotions, but also carers' accommodating and/or enabling behaviours (Treasure & Schmidt, 2013).

The empirical evidence for the cognitive-interpersonal model of anorexia nervosa has been examined by one known study, although the aim of the study was to test the interpersonal component of the model rather than the entire model (Goddard et al., 2013). The sample included adolescents and adults hospitalised for the treatment of anorexia nervosa and their carers (Goddard et al., 2013). There was some support for the interpersonal component of the model where high levels of expressed emotion and psychological control by carers were associated with higher eating disorder symptoms in patients (Goddard et al., 2013). However, this was not a direct relationship but was mediated through high carers' distress and high patients' distress (Goddard et al., 2013). The relationship between accommodating and enabling behaviours of carers and patient eating disorder symptoms was not supported, but the findings suggested that carers with eating problems themselves may be vulnerable to high levels of distress and accommodating and enabling behaviours (Goddard et al., 2013). Based on these findings, there is some evidence for the specific risk factors, as well as the interpersonal component of the model. However, given that little research has been conducted to examine the validity of the entire model, empirical testing of the model should be a priority for future research.

Several treatment implications have been proposed from the cognitive-interpersonal model of anorexia nervosa (Schmidt & Treasure, 2006; Treasure & Schmidt, 2013). Specifically, it has been recommended that treatment should start with the exploration of pro-anoretic beliefs, and how they may interact with beliefs about self, others and the world (Treasure & Schmidt, 2013). This

leads to an understanding of the core beliefs an individual has, and that pro-anoretic beliefs conflict with their core beliefs by using techniques of motivational enhancement therapy and externalizing the eating disorder (Treasure & Schmidt, 2013). These techniques have assisted adolescents with anorexia nervosa in being more motivated to engage with treatment and early behavioural changes, and a greater increase in weight gain compared to a control group of patients not receiving motivational intervention (Gowers & Smyth, 2004). As treatment progresses, the focus can be on shifting the balance between positive and negative beliefs of anorexia nervosa, with a focus on negative beliefs regarding the illness to help enhance motivation to change (Schmidt & Treasure, 2006). Techniques such as structured writing tasks can help the individual develop the expression of and processing of emotionally salient material without avoiding them by giving them control over what and how much they are comfortable sharing, ultimately decreasing emotional avoidance (Schmidt & Treasure, 2006). Constructed writing tasks can help individuals shift away from cognitive rigidity and perfectionism by helping them express the advantages and disadvantages of change, and to consider a future with and without eating disorders (Schmidt, Bone, Hems, Lessem, & Treasure, 2002). Finally, involving families in treatment through family therapy and family skills workshop (Schmidt & Asen, 2005) can modify the interpersonal factors that maintain the illness. The importance of family interventions in the treatment of adolescents with anorexia nervosa has been emphasised, evident in it being proposed as the treatment of choice in the National Institute for Health and Care Excellence guideline for eating disorders (National Institute for Clinical Excellence, 2011).

The dual-pathway model of bulimic pathology (Stice & Agras, 1998) posits that the thin- ideal internalisation, and the pressure to be thin by family, peers and media leads to body dissatisfaction in women (Stice & Shaw, 1994; 2002). Body dissatisfaction then contributes to dieting and negative affect, which increases the risk of bulimic pathology (Stice & Agras, 1998). Body dissatisfaction can also lead to negative affect because most cultures place a heavy emphasis on the appearance of women. The common but unfounded belief that dieting is an effective weight control technique leads women who are dissatisfied with their body to engage in dieting (Stice & Shaw, 2002). Dieting can also result in negative affect through failures of

weight control effort and caloric deprivation. Dieting may lead to a higher risk of bulimic pathology because individuals may binge eat to counteract restriction, or engage in disinhibited eating when breaking strict dietary rules (Fairburn et al., 2003a). Negative affect can result in comfort eating as a way of distracting oneself from negative emotions (Heatherton & Baumeister, 1991), perpetuating bulimic pathology.

The dual-pathway model was prospectively tested among 231 adolescent girls and confirmed the mediational mechanisms of the risk factors that predict bulimia pathology: Initial pressure to be thin and thin-ideal internalisation predicted subsequent body dissatisfaction; initial body dissatisfaction predicted dieting and negative affect, which then predicted bulimic pathology (Stice, 2001). Still, the model only accounted for 23% of the variance in growth in bulimic symptoms in the study, and the researchers advocated for future studies to consider additional risk factors and explore how they might work together to promote bulimic pathology (Stice, 2001).

Van Strien et al. (2005) included two additional variables, interoceptive deficits and emotional eating as an extension of the negative affect pathway of the original model. It was suggested that overeating may occur in some individuals in response to emotional distress due to early learning experiences where food was used as a way to cope with distress or where there was confusion between hunger and internal emotional states due to poor interoceptive awareness or deficits in recognizing, accurately identifying and discriminating internal cues of hunger, satiety and emotional states (Van Strien et al., 2005). The original and extended models were compared using prospective data from 361 adolescent females (Dakanalis et al., 2014). Both models provided a good fit to the data, with all proposed mediational pathways of both models being supported, and the extended model accounting for a larger variance in binge eating (Dakanalis et al., 2014), demonstrating empirical evidence of the dual-pathway model,

Another well-known aetiological model is the three-factor interactive model of bulimia nervosa (Bardone-Cone et al., 2006). It was proposed that high levels of perfectionism, self- perceptions of being overweight and low self-efficacy do not work independently in predicting binge eating. Rather, the three factors interact to predict bulimia nervosa. Low self-efficacy is defined as a distrust in one's own abilities, where one feels daunted and easily discouraged by perceived discrepancies

between standards and attainments (Bandura & Cervone, 1986). Individuals with high self-efficacy are confident in their own abilities and respond to such discrepancies with further efforts and perseverance until they succeed (Bandura & Cervone, 1986).

This model was empirically tested on a non-clinical sample of women and results showed that the three factors interacted to predict binge eating, where women who were highly perfectionistic, who felt they were overweight, and who had low self-efficacy reported the most binge eating episodes (Bardone-Cone et al., 2006). The model however was not able to predict inappropriate compensatory behaviours such as vomiting, laxative use, fasting and diet pill use (Bardone-Cone et al., 2006) and it was suggested that there may be a fourth factor that differentiate individuals who only binge from those who binge and purge such as impulsivity or the use of compensatory behaviours as a mood modulation strategy. Still, the three-factor model improves on the two earlier models of bulimia nervosa, namely the dual pathway model (Stice & Agras, 1998) and the spiral model (Heatherton & Polivy, 1992). The spiral model proposes that dieting usually leads to failed attempts at dieting, which can lead to lower self-esteem and increased negative affect that then contribute to further dietary failures (Heatherton & Polivy, 1992). The three-factor model goes beyond focusing on the behavioural factors of dieting and negative affect that were explored and confirmed in the previous models, to include psychosocial factors and explains the vulnerabilities such as perfectionism and self-efficacy that interact with body dissatisfaction, which contributes to binge eating. The treatment implication of this model is the proposition that decreasing perfectionism and body dissatisfaction and/or increasing self-efficacy should reduce binge eating. These factors are reflected in the treatment of choice for bulimia nervosa, the enhanced cognitive-behavioural therapy of eating disorders (Fairburn, 2008). The enhanced cognitive-behavioural therapy of eating disorders include the treatment targets of clinical perfectionism and core low self-esteem, where an emphasis on increasing self-efficacy can create hope in patients about their capacity to change (Fairburn, 2008).

One of the most well-known models is the transdiagnostic model of eating disorders (Fairburn et al., 2003a), which forms the theoretical basis for the cognitive behavioural therapy of eating disorders (CBT-E) (Fairburn, 2008). The transdiagnostic theory of eating disorder posits that individuals with eating disorders

judge themselves largely or even exclusively based on their eating, shape or weight and their ability to control them (Fairburn et al., 2003a). This core psychopathology results in extreme weight control behaviours such as dietary restraint, compensatory behaviours such as self-induced vomiting, laxative and diuretic misuse, overexercising, body checking and avoidance, and preoccupation with eating disorder related thoughts. In certain patients, additional processes may interact with the core psychopathology that further perpetuates the eating disorder. This includes clinical perfectionism, low self-esteem, mood intolerance and interpersonal difficulties (Fairburn et al., 2003a) which have all been noted in the earlier models of eating disorders be it in anorexia nervosa or bulimia nervosa. Clinical perfectionism is a form of psychopathology that is similar to the core psychopathology of eating disorders, where both involve dysfunctional systems for self-evaluation. For example, the fear of failure of individuals with clinical perfectionism is expressed in eating disorders as fears of overeating, fatness and/or weight gain. The frequent and selective attention to performance is noted in eating disorder behaviours of repeated calorie counting, and frequent checking of shape and weight. Patients with eating disorders who have clinical perfectionism also set demanding standards of their eating, shape and weight and their control, and when unable to meet them, are self-critical and see themselves as being at fault rather than their standards being too hard. The resulting secondary negative self-evaluation encourages even more determined striving to meet the valued goals, that is, controlling eating, shape and weight, which maintains the eating disorder (Fairburn et al., 2003a). Clinical perfectionism has been associated with other models of eating disorders, such as the cognitive-interpersonal model of anorexia nervosa (Schmidt & Treasure, 2006) and the three-factor interactive model of bulimia nervosa (Bardone-Cone et al., 2006). Core low self-esteem is relevant to individuals who hold a global negative view of themselves, and can obstruct treatment as it creates hopelessness in their capacity to change (i.e., low self-efficacy as mentioned in the three-factor interactive model of bulimia nervosa), and perpetuates the determined pursuit of control over eating, shape and weight, maintaining the eating disorder. Mood intolerance is defined as an inability to cope appropriately with certain emotions, and may result in unhelpful emotion regulation strategies such as binge eating, self- induced vomiting and intense exercising. Again, this mechanism has been noted in other aetiological models of eating disorders, such as the cognitive-interpersonal model of anorexia

nervosa (Schmidt & Treasure, 2006), the three-factor interactive model of bulimia nervosa (Bardone-Cone et al., 2006), the dual pathway model (Stice, 2001) and the spiral model (Heatherton & Polivy, 1992). Interpersonal difficulties have also been proposed to maintain eating disorders where certain interpersonal environments can magnify concerns about controlling eating, shape and weight, or a preoccupation to be thin (Cooper & Fairburn, 2011). This can include families where other members have an eating disorder, or in professions where there is a pressure to be thin such as ballet dancing, marathon running, or fashion modelling (Cooper & Fairburn, 2011). There is also evidence suggesting that in child and adolescent patients, family tensions often increase the young patient's need for a sense of control exhibited by dietary restraint (Fairburn, Shafran, & Cooper, 1999). Moreover, stressful interpersonal events often precede binge eating episodes and individuals with bulimia nervosa have heightened sensitivity to social interactions (Steiger, Gauvin, Jabalpurwala, Seguin, & Stotland, 1999).

Long-term interpersonal difficulties can also undermine self-esteem which results in a stronger avoidance of emotion laden interpersonal situations, and a further preoccupation with striving to achieve valued goals of achieving control over eating, shape and/or weight (Cooper & Fairburn, 2011). This mechanism has been explored in- depth in another aetiological model, the cognitive-interpersonal model of anorexia nervosa (Schmidt & Treasure, 2006) which emphasises the interaction of intra- and interpersonal factors that maintain eating disorders. The importance of targeting interpersonal difficulties have been made more prominent by the research on interpersonal psychotherapy, which is one of two most effective approaches to treating adults with bulimia nervosa and binge eating disorder (Peterson, Becker, Treasure, Shafran, & Bryant-Waugh, 2016). The model was tested to determine whether relationships between the core and additional maintaining factors were transdiagnostic across 1451 patients with anorexia nervosa, bulimia nervosa or eating disorder not otherwise specified (Lampard, Tasca, Balfour, & Bissada, 2013). Results provided some support for the transdiagnostic model of eating disorders: Low self-esteem was associated with greater overevaluation of shape and weight, which was associated with greater dietary restraint across all three diagnostic groups. Mood intolerance was associated with binge eating in all diagnostic groups (Lampard et al., 2013). Still, there were maintenance processes that were specific to diagnoses: interpersonal problems in eating disorder not otherwise specified dietary

restraint in bulimia nervosa and perfectionism in anorexia nervosa and eating disorder not otherwise specified (Lampard et al., 2013). The findings show that the overevaluation of shape and weight is a core maintenance process in all eating disorder diagnoses, and fits with the core psychopathology in the transdiagnostic model of eating disorder (Fairburn et al., 2003a). From the transdiagnostic theory, a transdiagnostic treatment was suggested: the enhanced cognitive-behavioural therapy of eating disorders (Fairburn, 2008). The details of the treatment are explained in the section on Treatment Approaches.

Research for paediatric eating disorders lag behind that for adult eating disorders, despite the onset of eating disorders being in early adolescence (Allen et al., 2013; Lewinsohn et al., 2000; Smink et al., 2012; Stice et al., 2013b). A family based model for anorexia nervosa (Le Grange, 2005) focuses exclusively on eating disorders for children and adolescents. It was built on the findings of early theorists, who noted that families with children with eating disorders tended to have family characteristics of enmeshment, overprotectiveness, rigidity, lack of conflict resolution, and the child with eating disorders being involved in martial and family conflicts (Minuchin et al., 1975). Structural family interventions such as a family meal were found to enhance parent authority, correct inappropriate alignments between children and parental figures and encourage sibling subsystem development (Minuchin et al., 1975). Drawing on early theories, the family based model focuses on parents taking charge of the child's eating. Its effectiveness at improving distorted thinking around eating, weight and shape lies in normalizing eating patterns, treating malnutrition and its effects on cognition and behaviour, and restoring weight. This has led to the leading treatment of eating disorders for children and adolescents, family based treatment (FBT, Le Grange, 2005). There are also a variety of family skills training approaches, that do not required the patient to be present, that have also been found to be effective (Goodier et al., 2014; Le Grange, Dare, & Russell).

Heritability and biological mechanisms also play a part in the aetiology and maintenance of eating disorders. Twin and family studies have supported the genetic basis of eating disorders (Steinhause, Jakobsen, Helenius, Munk-Jørgensen, & Strober, 2015), with heritability estimates of anorexia nervosa ranging from 48 to 74% (Yilmaz, Hardaway, & Bulik, 2015). Eating disorders are understood to be highly polygenic diseases, and while there is no conclusive evidence for the molecular mechanisms involved, large genome-wide association analysis studies are

underway to characterize the genetic architecture so that the underlying biological mechanisms can be discovered (Duncan et al., 2016).

### Risk Factors Identified from a Review of Prospective Studies

Having explored several dominant aetiological and/or maintenance models of eating disorders, it is helpful to review prospective studies to determine the empirical evidence of risk factors for eating disorders, and evaluate whether they fit with the proposed models. A recent review examined prospective studies that provided clear evidence of risk factors that predated the onset of eating pathology and eating disorders (Stice, 2016). Low body mass index was a consistent predictor of future onset of clinical or subclinical anorexia nervosa (Stice, Rohde, Shaw, & Gau, 2015b), which converged with the predictive effects for low birth weight, childhood eating conflict, and struggles around meals. Impaired psychosocial functioning and perfectionism (Tyrka, Waldron, Graber, & Brooks-Gunn, 2002) were implicated as risk factors for anorexia nervosa, as noted in the two aetiological models of anorexia nervosa, the cognitive- interpersonal model of anorexia nervosa (Schmidt & Treasure, 2006) and the transdiagnostic theory of eating disorders (Fairburn et al., 2003a). The predictors of onset of bulimia nervosa were consistently identified as thin-ideal internalization, perceived pressure to be thin, body dissatisfaction, dieting/fasting and negative affect (Stice, 2016). A small number of studies also identified eating too little during childhood (Kotler, Cohen, Davies, Pine, & Walsh, 2001), ineffectiveness (i.e., feelings of general inadequacy, ineffectiveness, worthlessness), alcohol use, low interoceptive awareness (Killen et al., 1996), psychiatric symptoms (Patton, Selzer, Coffey, Carlin, & Wolfe, 1999), and mental health service utilisation (Stice et al., 2015b). Likewise, these factors have been proposed in the two aetiological models of bulimia nervosa, the three- factor interactive model of bulimia nervosa (Bardone-Cone et al., 2006) and the transdiagnostic theory of eating disorders (Fairburn et al., 2003a). As for purging disorder, the consistent predictors were body dissatisfaction and dieting, although there is some support for factors such as low parental education, thin-ideal internalisation, positive expectancies regarding thinness, denial of the costs of pursuing the thin ideal, fasting and impaired social functioning (Stice, 2016). The evidence is less clear for binge eating disorder, with only two studies investigating the predictors of binge eating disorder: One study found that social pressure for

thinness predicted onset of subclinical or clinical binge eating disorder in a community sample (Stice, Marti, & Durant, 2011a). Another study found factors such as thin-ideal internalization, body dissatisfaction, dieting, denial of the costs of pursuit of the thin ideal, loss of control when eating, impaired social functioning, mental health service utilisation, and negative affect predicted the onset of binge eating disorder in a sample of high-risk young women with body dissatisfaction (Stice et al., 2015b).

Taken together, there are common predictions arising from the aetiological models of eating disorders and the empirical findings of prospective studies that examined the risk factors of eating disorders. Apart from looking at specific risk factors that predict the onset of specific eating disorders, it is also valuable to examine factors that predict the onset of any eating disorder as this can help inform the design of prevention programs that aim to target the full spectrum of eating disorders. The most consistent risk factors that predicted any eating disorder onset were body dissatisfaction, negative affect, thin-ideal idealisation, perceived pressure to be thin, dieting, and family support deficits (Stice, 2016). Having identified the risk factors that predict the onset of eating disorders, it is helpful to look into the treatment and prevention approaches for eating disorders so as to understand the success rates of various approaches and put forth the notion that the  notion that prevention approaches need to be prioritised. The approaches will be examined through the lens of empirical evidence and theoretical conceptualisations.

## Treatment Approaches

### Treatment for Adults

CBT approaches such as enhanced cognitive behavioural therapy (CBT-E; Fairburn, 2008), and interpersonal psychotherapy (IPT) are common approaches to treating adults with eating disorders, with CBT targeting unhelpful thoughts and behaviours relating to eating disorders and IPT addressing interpersonal difficulties that maintain eating disorders symptoms (Galsworthy-Francis & Allan, 2014; Kass, Kolko, & Wilfley, 2013; National Institute for Clinical Excellence, [NICE], 2004; Peterson et al., 2016). As mentioned in the above section, enhanced cognitive behavioural therapy for eating disorders was derived from the transdiagnostic theory

of eating disorders (Fairburn et al., 2003a). CBT-E treatment has four stages, with stage one focusing on engaging and educating the patient. This includes educating the patient about the treatment and the disorder, introducing collaborative weighing, establishing regular eating and learning to complete food diaries (Fairburn, 2008).Stage two involving a detailed review of progress and identifying barriers to changes such as the mechanisms of clinical perfectionism, low self-esteem, mood intolerance and interpersonal difficulties (Fairburn, 2008). Stage three focuses on modifying the core psychopathology of over-evaluation of eating, shape and weight and their control and addressing additional mechanisms (Fairburn, 2008). Stage four focuses on maintaining progress after the treatment ends (for details, see Fairburn, 2008).

IPT has been proposed to be helpful as many individuals with eating disorders frequently encounter interpersonal problems that may predate eating disorder, or as a consequence of the disorder (Murphy, Straebler, Basden, Cooper, & Fairburn, 2012). It is not uncommon for patients to become more isolated from peers. Certain eating disorder behaviours such as binge eating and dietary restraint also tend to occur or worsen by adverse interpersonal events. Interpersonal difficulties can also exacerbate low self-esteem, where patients then turn to their control of eating, shape or weight to feel more in control (Fairburn et al., 2003a). IPT consists of three phases, with the first phase aiming to engage patients in treatment. Phase one aims to describe the rationale and nature of treatment, and jointly identify and agree on the current interpersonal problems that maintain the eating disorders. Phase two seeks to help patients to understand the nature of the identified interpersonal problems and work on them. It includes protocols for four problem areas of grief, interpersonal role disputes, role transitions and interpersonal deficits. Phase three seeks to ensure that changes are maintained posttreatment and to minimise risk of relapse. A detailed description of treatment is noted by Murphy et al. (2012).

When comparing the efficacy of CBT-E and IPT, a randomised controlled trial of 130 patients with any eating disorders (Fairburn et al. 2015) showed that at posttreatment, participants in the CBT-E group had a higher rate of remission compared to participants in the IPT group (65.5% versus 33.3%, $p < .001$). At 60 weeks follow-up, the proportion of participants meeting criteria for remission increased, particularly in the IPT group, but the remission rate for CBT-E remained higher (69.4% for CBT-E versus 49.0% in IPT, $p = .028$). This suggested that CBT-E

was helpful for most patients, and IPT is a good alternate treatment, although CBT-E had more pronounced treatment response and was faster to be expressed (Fairburn et al. 2015). The long-term efficacy of CBT-E and IPT for treating adults with anorexia nervosa is slightly different (Carter et al., 2011), with no specific treatment shown to be superior, and only 49% of patients evidencing minimal or no anorexia nervosa symptoms at long term follow-up (mean follow-up is 6.7 years). Given the severe and enduring nature of anorexia nervosa, with about half of adults with anorexia nervosa remaining symptomatic approximately 6.7 years post treatment, prevention and early interventions with youths should be the ideal, particularly prior to the onset of anorexia nervosa, which occurs typically in adolescence.

Consistent with the findings by Fairburn et al. (2015), earlier guidelines by NICE (2004) and more recently the Royal Australian & New Zealand College of Psychiatrists (RANZCP, 2014) recommended that CBT has the best evidence for the treatment of eating disorders, including CBT-E, CBT for bulimia nervosa (CBT-BN) and CBT-for binge eating disorder (CBT- BED). These recommendations were based on at least one randomised controlled trial as part of a body of literature of overall good quality and consistency. Still, alternate therapies such as IPT, and dialectical behaviour therapy have a small but growing evidence base as a treatment approach for eating disorders (NICE, 2004; RANZCP, 2015).

Treatments for anorexia nervosa for adults include Maudsley Model Anorexia Nervosa Treatment for Adults (MANTRA) (Schmidt, Wade, & Treasure, 2014); CBT-E (Fairburn, 2008) and Specialist Supportive Clinical Management (SSCM) (McIntosh et al., 2005, 2006, 2010; Schmidt et al., 2015). MANTRA addresses factors in the cognitive-interpersonal theory of anorexia nervosa such as cognitive style, emotional/relational style, responses of close others to the person's illness and beliefs about the usefulness of anorexia nervosa in the person's life (Treasure & Schmidt, 2013). SSCM includes clinical management and supportive psychotherapy, with an emphasis on normal eating and weight restoration, specialist psychoeducation, and key symptoms such as purging or overexercising (McIntosh et al., 2005, 2006, 2010; Schmidt et al., 2015). A randomised controlled trial to compare CBT-E, MANTRA and SSCM for adults with anorexia nervosa was recently undertaken (Byrne et al., 2017). Results suggested that all three treatments resulted in weight gain and reduction in eating disorder symptoms that were maintained at 12-month follow-up (Byrne et al., 2017). There were no significant

differences across the three treatments in rates of improvement of weight gain and eating disorder psychopathology at 12-month follow-up (Byrne et al., 2017). All treatments were also associated with a significant reduction in depressive and anxious symptoms, stress, and psychosocial impairment (Byrne et al., 2017). This suggests that CBT-E, MANTRA and SSCM can improve outcomes for adults with anorexia nervosa despite their different treatment foci. It may also be that certain treatment components that are common to all three treatment approaches, for example, weekly weigh-in are helpful in improving outcomes for adults with anorexia nervosa. Nonetheless, the remission rate was low: at the end of treatment, 25.8% ($n$ = 31 of 120) were in remission. This reduced to $n$ = 25 at 12 months follow-up, highlighting the difficulty in treatment of anorexia in adults, the chronicity of illness, (Stice et al., 2013) and the need for early prevention and treatment.

**Treatment for Adolescents**

Amongst adolescents, family based treatment (FBT; Le Grange, 2005) has been one of the most researched treatments in adolescents with anorexia nervosa and bulimia nervosa symptoms. FBT involves intensive outpatient care and three phases of treatment. The first phase emphasises refeeding the patient, where parents actively help restore their child's weight to normal levels and other psychological issues are not explored. The second phase serves to explore more generic adolescent-family issues, and the adolescent gradually takes more control over eating. The third phase aims to explore adolescent issues such as separation from the family, peer relationships and sexuality, and focuses on encouraging a healthy adolescent identity for the individual with eating disorder and for parents to give up attitudes that were previously adaptive at earlier stages of their child's life but no longer appropriate. FBT has been compared to individual adolescent focused therapy, and greater remission was noted for individuals engaged in FBT than adolescent focused therapy (Le Grange et al., 2012). However, outcomes of the FBT are modest at best, with 50% remission rate for youths with anorexia nervosa and 30% remission rate for youth with bulimia nervosa (Couturier, Kimber, & Szatmari, 2013; Kass et al., 2013; Stiles-Shields, Rienecke Hoste, Doyle, & Le Grange, 2012). There remain a substantial proportion of adolescents with eating disorders who do not respond to FBT (Hurst, Zimmer-Gemback, 2015; Kass et al., 2013) and there is growing interest

in exploring alternative treatment approaches (Lock, 2011).

CBT is a potential alternative to FBT (Lock et al., 2010) given that it is the leading empirically supported treatment for bulimia nervosa (NICE, 2004; RANZCP, 2015) and a specific CBT, CBT-E, has been adapted to make it suitable for all eating disorders (Fairburn, 2008). There have been three case series have explored the potential of CBT-E in treating adolescents with anorexia nervosa (Dalle Grave, Calugi, Doll, & Fairburn, 2013; Dalle Grave, Calugi, El Ghoch, Conti, & Fairburn, 2014; Dalle Grave, Calugi, Sartirana, & Fairburn, 2015). The first study recruited 49 adolescents with anorexia nervosa, who were offered 40 weekly sessions of CBT-E (Dalle Grave et al., 2013). Two-thirds of the patients completed treatment and demonstrated a substantial increase in weight and a significant decrease in eating disorder psychopathology, which were maintained at 60-week follow-up. These findings suggest that CBT-E is an efficacious alternative to FBT. The second study recruited 27 adolescents with anorexia nervosa, who were receiving a 20-week inpatient treatment based on CBT-E (Dalle Grave et al., 2014). All but one patient completed the program, and significant improvements in weight, eating disorder and general psychopathology, were maintained at 12-month follow-up. The third study recruited 68 adolescent patients with eating disorders, who were not underweight, and 67% had minimal residual eating disorder psychopathology by the end of the 20 sessions of CBT-E (Dalle Grave et al., 2015). All three studies demonstrated that CBT-E can be a promising alternate treatment approach for adolescents with anorexia nervosa. Nevertheless, there is a need to focus on prevention in adolescence to decrease the psychological, medical and economic impact of eating disorders that persist into adulthood.

To summarise, there is some success in the treatment of eating disorders for adults although the treatment of anorexia nervosa is less effective, with approximately 50% of adults with anorexia nervosa remaining symptomatic many years later (Carter et al., 2011). For adolescents, there remains a substantial proportion who does not respond to FBT (Hurst & Zimmer-Gemback, 2015; Kass et al., 2013), and while newer treatment approaches are being trialled, the pressing need to implement effective prevention is of high priority, particularly given the serious medical and psychological complications (Arcelus et al., 2011; Hudson et al., 2007; Swanson et al., 2011) and the lifelong functional impairment associated with eating disorders (Samnaliev et al., 2015). We now turn our attention to current prevention

approaches.

## Prevention Approaches in Eating Disorders

### Defining and Assessing Prevention Effects

Eating disorder prevention has made great advances in the past two decades (see Austin, 2015). Still, the work is debated within the eating disorder community (Becker, 2016; Levine, 2015). There is debate with community stakeholders regarding the possibility of eating disorder prevention and whether targeting risk factors such as body image will reduce the prevalence or onset of eating disorders (Becker, 2016). Because community stakeholders do not engage as actively in academic forums, these discussions are rarely published in academic journals (Becker, 2016), but often arise in conferences (e.g., Becker, Lyster-Mensch, Banker, & Klump, 2015), in blogs (e.g., Lyster-Mensh, 2015), and advocacy organizations (e.g., International Eating Disorders Action [IDEACTION], 2015).

Consistent with other health prevention researchers, prevention programs for eating disorders aim to modify risk factors, enhance protective factors, reduce early warning signs and reduce the incidence of eating disorders (National Eating Disorders Collaboration, 2010). Approaches to prevention have included CBT, cognitive dissonance, media literacy, psychoeducation, self-esteem enhancement and multicomponent work. Commonly targeted factors include body dissatisfaction, thin-ideal internalisation, negative affect, dieting, and eating psychopathology. Intervention formats can be delivered in a group or individual basis, face-to-face or online (Dalle Grave, 2003; Fingeret et al., 2006; Newton & Ciliska, 2006; Pratt & Woolfenden, 2002; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016; Yager & O'Dea, 2008). Researchers aim to reduce or prevent risk factors under the assumption that reducing or preventing these risk factors will decrease the onset of eating disorders, thereby preventing eating disorders.

However, the majority of prevention studies in the eating disorder field have examined risk factor reduction studies rather than true prevention due to insufficient scientific rigor (Becker, 2016; Watson et al., 2016). First, the prevention of new-onset eating disorders is costly and has not had the financial support to recruit very large numbers of participants (Becker 2016; Watson et al., 2016). Second, the very

large numbers of participants to detect a difference in onset of eating disorders is difficult due to a low prevalence rate of eating disorders (Becker et al., 2016). Third, long term follow-ups (e.g., minimum of 6 months and preferably many years to examine whether an eating disorder does develop) are needed based on the incident rate of the illness make it difficult to financially sustain such research (Becker 2016; Watson et al., 2016). Fourth, the gold standard interviewer assessment of eating disorders (at pre-test, post-test and follow-up) is ideal but requires trained professionals and time consuming for both researchers and participants (Becker, 2016). Fifth, eating disorder prevention studies have not yet been sufficiently powered to analyse whether prevention interventions prevent the onset of new cases, (Cuijpers, 2003; Watson et al. 2016). Consequently, most studies, as with other areas of health research, measure reductions in the targeted risk factors and eating disorder symptoms (i.e., dimensional assessment of eating disorder symptomatology) rather than the DSM-5 or ICD-10 categorical eating disorder per se (Becker, 2016). Examining the dimensional measures of eating disorders is advantageous for prevention research as it increases statistical power, is valid, and an inexpensive assessment of eating disorder symptoms. It also captures subclinical eating disorder symptomatology that cause pain and suffering to individuals who may yet meet the categorical diagnosis of an eating disorder according to the DSM-5 or ICD-10 (Becker, 2016). Still, researchers need to be mindful that prevention, particularly in the eyes of community stakeholders, is viewed as the prevention of the onset of a categorical eating disorder, and remains a frequent term of contention. Becker (2016) proposes for researchers to increase transparency by calling such research as "risk factor reduction" studies rather than "prevention" studies when they reduce dimensionally assessed eating disorder symptoms versus categorical eating disorders. This can improve clarity, and also motivate researchers to identify better ways to conduct true prevention trials (Becker, 2016). Still, given that the current research aims to inform academics and researchers, it will adhere by the term "prevention" as is defined by academics to minimize confusion.

In addition to the controversy surrounding the definition of prevention research, the assessment of prevention effects is also debatable. In the assessment of prevention effects , it is common for researchers to use omnibus repeated-measures analysis of variance (ANOVA) models to test whether there are differential changes in outcomes between intervention and control groups, and effect sizes to measure the

efficacy of interventions. However, this approach alone cannot distinguish between treatment effects and prevention effects (Gillham, Shatté, & Freres, 2000; Horowitz & Garber, 2006; Nehmy, 2010). A treatment effect is defined as improvements in symptomatology or diagnoses in comparison to controls in pre- to post-intervention analyses (Gillham et al., 2000). A prevention effect is defined as a true decrease in prospective risk if the control group demonstrates increased symptomatology and/or diagnosis compared to the intervention group which has an absence of an increase in symptoms over time (Gillham et al., 2000). Given that most of the existing meta-analyses on prevention (Dalle Grave, 2003; Fingeret, Warren, Cepeda-Benito, & Gleaves, 2006; Newton & Ciliska, 2006; Pratt & Woolfenden, 2002; Stice & Shaw, 2004; Stice, Shaw, & Marti, 2007; Yager & O'Dea, 2008; Watson et al., 2016) have noted that the primary studies tended to measure treatment effects (i.e., reduction in mean symptom levels) rather than prevention effects, it is difficult to determine whether interventions are truly preventive. To accurately capture prevention effects, it needs to be clearly defined as a significantly lower prospective incidence of symptoms and/or diagnosis over a follow-up period where there is an absence of an increase in symptoms (Nehmy, 2010).

Another issue that plagues prevention research is that while it is standard practice for treatment outcome studies to examine clinical significance (Jacobson & Truax, 1991), there is no predefined approach to examine this issue with respect to prevention (Shochet et al., 2001). Determining clinical significance is important as it demonstrates that an intervention has produced a clinically important change that is reliable, not just one that is statistically significant (Jacobson & Truax, 1991; Watson et al., 2017). This is measured using clinical significance and reliable change indices (RCIs), which are explained in detail in Chapter 3, under the Statistical Analyses section. A clinically significant change has to first be statistically reliable, which is assessed with the RCI (Jacobson, Follette, & Revenstorf, 1986). Once the RCI has been calculated to determine that the intervention has produced a statistically reliable change in a particular client, it is important to determine whether the change is clinically significant, that is whether an individual may have moved across a clinical or subclinical to a non-clinical range. Participants are then classified into one of four categories for clinical significance, namely “recovered”, “improved”, “unchanged”, or “deteriorated” (Jacobson & Truax, 1991). Researchers examining treatment effects commonly measure clinically significant change by focusing on the

participants who ‘recovered’ and ‘improved’, consistent with the definition of treatment effect where there are improvements in symptomatology or diagnoses in the intervention group as compared to the control group (Gillham et al., 2000). By extension, prevention effects, which is defined as the intervention group having an absence of an increase in symptoms over time as compared to the control group (Gillham et al., 2000), suggests that researchers examining prevention effects should measure clinically significant changes by focusing on the participants who ‘deteriorated’. Several researchers in the prevention field have examined clinically significant change (Stice, Rohde, Shaw, & Gau, 2011b; Wilksch, Durbridge, & Wade, 2008) where they observed the migration of participants who were healthy at pre-test but developed clinical or subclinical symptoms at post-test and follow-up (Shochet et al., 2001). A recent review of the quality of randomised controlled trials of eating disorder prevention called for prevention studies to establish that the intervention is not just statistically reliable, but also clinically reliable in preventing deterioration of symptoms (Watson et al., 2017).

To summarise, the efficacy of prevention programs are best captured through analyses that measure prevention effects rather than treatment effects. A good practice would be to adopt the inclusion of reliable change and clinically significant changes when determining prevention effects, which is already standard practice when examining treatment effects.

### Design of Prevention Studies

To develop an efficacious prevention study, the research design of prevention studies should be theoretically driven (Stice, South, & Shaw, 2012). For example, early prevention programs focused on the provision of psychoeducational knowledge about eating disorders even though no theoretical models highlighted the lack of knowledge about eating disorders as a risk factor (Shaw, Stice, & Becker, 2009; Watson et al., 2016). Indeed, meta-analyses of psychoeducational programs showed that they were ineffective (Stice & Shaw, 2004). Cognitive behavioural therapy that focused on altering maladaptive attitudinal and behavioural risk factors such as thin-ideal internalisation, body dissatisfaction, and dieting have found small but promising effects in decreasing risk of eating disorders (Stice & Shaw, 2004). These factors have been implicated in theoretical models of eating disorder aetiology and maintenance (Cooper, Wells, & Todd, 2004; Fairburn, 2008). Prevention programs

are recommended to target a single risk factor to provide a strong empirical test of aetiologic theories (Stice et al., 2007).

Prevention studies should include eating disorder symptoms as their primary dependent variable to measure efficacy. Most prevention studies have used risk factors as their sole dependent variables, assuming that a change in the risk factors would reduce eating disorder symptoms. For example, in the meta-analyses conducted by Stice and Shaw (2004) and Stice et al. (2007), only 25% to 29% of the preventive studies showed a reduction in eating disorder symptoms, despite 51% to 53% of the evaluated programs demonstrating reductions in the risk factors. Including the level of eating pathology and clinical status of eating disorders as a dependent variable, will provide a better understanding regarding the type and strength of the relationship between risk factors and eating disorders and the effectiveness of prevention studies.

### Prevention Taxonomy

A three-tiered prevention intervention classification system in accordance with the Institute of Medicine (IOM) is used in considering the levels of prevention in eating disorders (Gordon, 1987), namely universal, selective and indicated. Universal prevention is designed to reach the general population, without regard to individual risk factors, such as via schools or communities. Selective prevention focuses on subgroups of the general population at risk of developing eating disorders, such as female adolescents who are ten times more likely than male adolescents to develop eating disorders (Allen et al., 2013; Lewinsohn et al., 2000; Smink et al., 2012; Stice et al., 2013b). Indicated prevention targets those who are already displaying symptoms of eating disorders but do not meet a clinical diagnosis.

Universal prevention tended to yield modest effects, likely due to floor effects relating to starting with a reasonably healthy population and a low base rate of eating disorders in males, thereby making it difficult to observe prevention effects. Low-risk individuals may also be less motivated to engage with the content compared to individuals in selective and indicated programs, which may result in lesser measurable benefits (Dalle Grave, 2003; Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016). Given the modest effects found in universal prevention, many researchers have instead focused on selective or indicated prevention.

Indeed, meta-analyses of prevention programs have found larger effects for selective prevention studies of females compared to universal prevention studies of mixed sex (Dalle Grave, 2003; Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016), suggesting a strong rationale to focus efforts on selective prevention. The most recent meta- analysis examined 13 randomised controlled trials of universal prevention, 85 randomised controlled trials of selective prevention and eight randomised controlled trials of indicated prevention for eating disorders (Watson et al., 2016), demonstrating that most prevention efforts have focused on the level of selective prevention. Selective prevention may be ideal for eating disorders as it is less costly to implement than universal prevention, yet can target a large-scale population prior to them developing subclinical symptoms, particularly given the chronicity, medical and psychological comorbidities of eating disorders. As such, the current research has chosen the approach of selective prevention, focusing on the subpopulation of female adolescents, when the incidence of onset of anorexia nervosa and bulimia nervosa peaks (Allen et al., 2013; Lewinsohn et al., 2000; Smink et al., 2012; Stice et al., 2013b).

### Meta-analyses of Prevention Programs for Eating Disorders

This section aims to present the best approaches for universal, selective and indicated prevention and moderators of outcomes based on the nine meta-analyses examining the prevention of eating disorders (Dalle Grave, 2003; Fingeret et al., 2006; Long, Barendregt, Hay, & Mihalopoulos, 2016; Newton & Ciliska, 2006; Pratt & Woolfenden, 2002; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016; Yager & O'Dea, 2008). This section will review the findings from the latest meta-analyses by Long et al. (2017) and Watson et al. (2016) that include all studies to date.

#### *Approaches for universal prevention.*

For universal prevention, media literacy has demonstrated the most promising approach (Long et al., 2017; Watson et al., 2016). Media literacy involves critically evaluating the body image messages that people encounter in the media on a daily basis, in light of the increasing emphasis on beauty, appearances and thinness. Body image messages such as unhealthy, retouched body images in photos and products endorsed by celebrities and advertisement can contribute to body dissatisfaction and disorder eating (Wade, Davidson, & O'Dea, 2003; Wilksch et al., 2015; Wilksch &

Wade, 2009).

An example of the media literacy program is Media Smart (Wilksch & Wade, 2010). It comprises eight face-to-face sessions that targets media internalisation and perceived pressure to be thin which are risk factors for dietary restriction, binge eating, and implicated in the dual pathway model of bulimia nervosa (Stice, 2001). Media internalisation refers to the extreme, rigid degree to which an individual invests in societal ideals of size and appearance (Wilksch & Wade, 2010). Perceived pressure to be thin refers to external pressure from family, peers, and dating partners that contribute to media internalisation and an over-evaluation of the importance of appearance (Wilksch & Wade, 2010). Although the clinical status of eating disorders amongst participants were not measured, small effect sizes in preventing the worsening of body dissatisfaction were found at 6 months follow-up in boys, and at 30 months follow-up in girls who participated in the media literacy intervention as compared to participants in a no intervention control group, whose body dissatisfaction worsened (Wilksch & Wade, 2009).

***Approaches for selective prevention.***

For selective prevention, a dissonance based approach has demonstrated the strongest efficacy, along with CBT, which demonstrated efficacy in comparison to waitlist and non-specific control (Long et al., 2017; Watson et al., 2016). A dissonance based approach involves encouraging individuals who endorse the thin-ideal to critique it in a series of verbal, written and behavioural group-based exercises. This aims to produce dissonance, and thereby reduce endorsement of the thin-ideal and improve body dissatisfaction, negative affect, dieting and eating disorder symptoms (Stice, Shaw, Becker, & Rohde, 2008). CBT encourages individuals to have helpful, balanced attitudes on body image, eating, shape and weight, and reduce the over-evaluation of shape and weight for defining one's self-worth. It aims to modify unhelpful thinking styles and behaviours around body shape and weight, dieting, thin-ideal internalisation, and supports balanced nutrition and physical activity (Dev, Winzelberg, Celio, & Taylor, 1999).

The dissonance based approach and CBT were also the two most commonly evaluated programs (Watson et al., 2016). The effects were typically small for CBT while moderate-to-large for dissonance based approach, although both approaches maintained efficacy to an average 6 to 18 months follow-up (Watson et al., 2016). A common dissonance based approach is the Body Project (Stice & Presnell, 2007),

which is a four session face-to-face program where participants critique the thin-ideal, and learn skills that increase body satisfaction, decrease unhealthy weight control behaviours, and ultimately, prevent eating disorder symptoms. They also make gradual and permanent lifestyle changes to achieve a healthy body weight by incorporating healthy food choices, and physical exercise (Stice & Presnell, 2007). Participants in the Body Project showed a greater decrease in risk factors, such as thin-ideal internalisation, body dissatisfaction, dieting, negative affect, eating disorder symptoms and psychosocial impairment at 3-year follow-up than control participants who read an educational brochure, but did not differ in eating disorder onset (Stice, Rohde, Butryn, Shaw, & Marti, 2015a). The lack of delayed eating disorder onset may imply either Type II error attributable to lack of statistical power, or other factors beyond thin body idealisation contribute to eating disorders, and other risk factors need to be targeted.

For CBT, a commonly used program for eating disorder prevention is Student Bodies (Dev, Winzelberg, Celio, & Taylor, 1999). It is a structured eight week online self-help program that is based on social learning, cognitive behavioural and psychoeducational theories. The psychoeducational component describes the development and consequences of eating disorders. The skill development component addresses factors that lead to eating pathology such as cognitive and emotional factors (e.g., nutritional and exercise knowledge and attitudes, perceived social support), psychological factors (e.g., body image, drive for thinness, self-efficacy), behavioural factors (e.g., coping, goal setting, food preparation, exercise patterns) and sociocultural factors (e.g., thin body idealisation, media internalisation). It aims to improve body image through discussions of media internalisation, and uses cognitive-behavioural strategies to improve body dissatisfaction through self-monitoring journals and behaviour change exercises. It has been proposed that the skill development component is more effective than the psychoeducation component (Newton & Ciliska, 2006) since prevention programs that focus on psychoeducation have been found to be ineffective (Stice & Shaw, 2004). Student Bodies was effective in significantly reducing weight and shape concern for up to 2 years and decreased the risk of onset of eating disorders in subgroups such as participants with elevated body mass index (BMI; i.e., $\geq$25) and participants with some compensatory behaviours as compared to waitlist controls (Taylor, Bryson, Luce, et al., 2006). A more detailed evaluation of the effectiveness

of Student Bodies is reviewed in the subsection "Meta analyses of online prevention" of this chapter.

***Approaches for indicated prevention.***

CBT (Student Bodies) was supported, with moderate to large effect sizes for CBT completers at post-test that were maintained at 6-month follow-up (Watson et al., 2016). Similar to findings in selective prevention, CBT completers showed greater decreases in eating disorder behaviours such as subjective and objective bulimic episodes, restrictive eating, and purging episodes as compared to waitlist controls. However, true prevention effects could not be accurately measured given that no trials analysed the number of clinical eating disorders developed at post intervention and follow-up.

***Moderators of prevention outcomes.***

Moderators can affect the strength and direction of the relationship between the targeted risk factor and desired outcome, and it is important to maximise program outcomes (Cohen, Cohen, West, & Aiken, 2013). There is a consistent finding that stronger effects were found for selective or indicated prevention (versus universal), female sex (versus mixed), and interactive (versus didactic) programs. The use of validated measures (versus unvalidated) and multisession (versus single session) were associated with stronger effects. The age of participants can also moderate outcomes, with studies observing stronger effects when participants were over the age of 15 as compared to participants who were younger (Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007).

As mentioned, selective and indicated prevention may yield larger outcomes than universal prevention due to floor effects and lack of motivation in low-risk individuals. Female adolescents are at elevated risk of developing eating disorders compared to males, or at a younger or older age (Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007). Given that the most common age of onset of eating disorders occurs around 14 to 19 years in girls, prevention programs may be most effective when delivered to this subpopulation. The use of validated measures enables a valid and reliable way to detect sensitive changes in outcomes that are essential in prevention programs (Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007).

Multisession programs, compared to single session programs, yield larger outcomes as they allow participants to reflect and internalise learnt material through

repetition, and a chance to try new skills and return to the group for troubleshooting advice, allowing more lasting attitudinal and behavioural changes (Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016). Interactive programs are more effective than didactic programs as it allows participants to be more engaged in the program content. Interactive programs frequently involve exercises that allow participants to apply the new skills, which enable skill acquisition and attitudinal change, which is not done in didactic programs (Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007). There is growing interest in using computers and the Internet as a way to deliver interactive, multisession eating disorder prevention programs (Dalle Grave, 2003; Watson et al., 2016; Yager & O'Dea, 2008) and this is discussed in the next section.

**Online Prevention Programs for Eating Disorders**

The proliferation of pro-eating disorder websites (Gotthelf, 2001) that encourage the development and maintenance of eating disorders by providing tips on fasting, purging and other unhealthy weight regulation attitudes and behaviours, has made them highly accessible to adolescents. Online prevention has the capacity to enhance the availability of support and promotion of healthier eating attitudes and behaviours.

Online programs have several advantages over traditional face-to-face programs. These include broader dissemination in a cost-effective manner, allowing participants to access material conveniently, and anonymity that allows users to think about sensitive information that they may not feel comfortable disclosing in a face-to-face situation (for a review, see Zabinski, Celio, Jacobs, Manwaring, & Wilfley, 2003). Further, the Internet is highly accessible to the targeted population of adolescents and they are skilled and confident in using it. Australian adolescents are likely to use the Internet to seek help when they are going through tough times (Nicholas, Oliver, Lee, & O'Brien, 2004) and at the same rate as they seek help from mental health professionals such as school counsellors, psychiatrists, and psychologists (Australian Psychological Society, 2005). Online programs can be particularly helpful for eating disorder prevention as it offers confidentiality and anonymity to individuals who may be reluctant to seek help due to shame (Leibert, Archer, Munson, & York, 2006). Anonymity also reduces pressures to conform to societal norms that focus heavily on appearance, enabling participants to openly

examine weight and shape concerns (Zabinski et al., 2003).

Online interventions also have the potential to increase accessibility and scalability (Zabinski et al., 2003). It is consistent with the stepped care approach (see Chapter 4 for an in-depth discussion) that has been implemented in the United Kingdom since 2007 under the Improving Access to Psychological Therapies (IAPT) scheme (Clark et al., 2009) and more recently introduced in Australia (Australia Department of Health, 2016). The aim of stepped care is to increase accessibility of evidence-based psychological therapy to the public, ultimately improving the general psychological health of the entire population (Australia Department of Health, 2016; Clark et al., 2009). This includes people that are well, those who are at risk, and those with mild, moderate or severe mental illness. Online self-help has been identified as a suitable resource for the entire population, ranging from prevention and early intervention, to varying degrees of psychological problems; either as a stand-alone treatment or as an adjunct to face-to-face services, ultimately maximizing cost effectiveness and clinical effectiveness (Australia Department of Health, 2016; Clark et al., 2009). Online self-help has been identified as a relevant service for at risk groups, and can have the potential to improve early treatment through the use of lower cost, evidence-based alternatives to face-to-face psychological treatment (Australia Department of Health, 2015).

Online self-help can be particularly helpful in light of a shortage of psychologists who can provide face-to-face cognitive behavioural therapy (Clark et al., 2009).Although there are a number of clear advantages, the limitations of online interventions must also be acknowledged, along with possible risk management plans (for a review, see Zabinski et al., 2003). Specifically, the lack of facial expressions and visual cues may limit the understanding of words, phrases and concepts possible in face-to-face contact. It is, however, possible to overcome this by including emoticons, and actively checking in with participants with follow-up questions (Zabinski et al., 2003). Confidentiality may also be compromised when information is transferred over the Internet (Zabinski et al., 2003). This can be overcome by providing participants with an anonymous name to protect their identity and to remind them to close the browser window after logging out. In addition, interventions can be run on secure servers that are password protected to limit access only to approved participants (Zabinski et al., 2003). Further, crisis management can be limited in online interventions (Zabinski et al., 2003). Researchers and

practitioners are recommended to carefully screen participants in person prior to recruitment to, and to maintain extensive contact information on all participants (Zabinski et al., 2003). Crisis management can be enhanced in online interventions through the frequent monitoring of participants by a licensed mental health professional (Zabinski et al., 2003).

Notably, a common difficulty encountered by online interventions is high attrition rates, so common that it was termed "the law of attrition", referring to the phenomenon of participations ceasing participation, and/or being lost to follow-up in online interventions (Eysenbach, 2005). For example, a meta-analysis of 20 online studies aiming to reduce eating disorders had a dropout rate ranging from 2% to 41%, with a mean dropout rate of 17% (Melioli et al., 2016). However most of these studies were set in specific schools or universities rather than a larger general population, which may result in a lower attrition rate. The set structure and times of interventions in schools or universities (e.g., during class, or being in a university research pool where it is obligatory to participate in a certain number of research studies) may minimise dropout rates as compared to the general population where participants can access the programs at times of convenience. A larger meta-analysis examining adherence in online interventions for anxiety and depression demonstrated dropout rates ranging from 43% to 99% (mean attrition rate not reported), with poorer retention rates for open access sites as compared to randomised controlled trials. Attrition rates for randomised controlled trials ranged from approximately 1 to 50%, and poorer retention rates were associated with longer follow-ups (Christensen, Griffiths, & Farrer, 2009). Despite the phenomenon being common, very few studies have formally examined reasons for dropout (Christensen et al., 2009; Eysenbach, 2005), and many even choose to not publish their study results at all and see it as a failure rather than a natural and typical feature of online interventions (Eysenbach, 2005). Several hypothetical factors have been proposed to influence attrition rates (for a review, see Eysenbach, 2005): Inappropriate information given prior to a trial may lead to unrealistic expectations that can lead to disenchantment discontinuation (Eysenbach, 2005). Participants may be more likely to drop out if they realise that there are many questionnaires to complete, or realising that there is more work involved than they thought (Eysenbach, 2005). Compliance may be poor if there are no reminders and if the research team uses more virtual contact rather than regular face-to-face or phone contact (Eysenbach, 2005). Few/no

positive feedback or encouragement by health professionals or care providers can also lead to dropouts (Eysenbach, 2005). External personal events may also lead to distractions and discontinuance especially if the interventions are not perceived to be essential (Eysenbach, 2005). While these factors have yet to be confirmed to affect attrition rates for online interventions, they should be considered in the development of online interventions. The present research will consider these factors in the development of the online prevention programs to minimise attrition rates.

### Meta-analyses of Online Prevention Programs

To date, four meta-analyses on the online prevention of eating disorders have been conducted (Beintner, Jacobi, & Taylor, 2012; Loucas et al., 2014; Melioli et al., 2016; Newton & Ciliska, 2006). The latest meta-analysis (Melioli et al., 2016) included five new studies that were not included in prior meta-analyses (Beintner et al., 2012; Loucas et al., 2014; Newton & Ciliska, 2006) and excluded programs delivered by CD-ROM. It examined 20 studies, with 19 based on CBT such as Student Bodies (Dev et al., 1999) and one on motivational interviewing (Hötzel et al., 2014) and reported their efficacy in reducing eating disorder symptoms. Small effects were found in reducing body dissatisfaction ($d$ = 0.28), internalization of thin ideal ($d$ = 0.36), shape concern ($d$ = 0.35), weight concern ($d$ = 0.25), dietary restriction ($d$ = 0.36), bulimic symptoms ($d$ = 0.27) and purging frequency ($d$ = 0.30), and negative affect ($d$ = 0.32). Moderate effect sizes were observed for drive for thinness ($d$ = 0.47) and combined shape and weight concerns ($d$ = 0.42). It was also the first meta-analysis that conducted moderation analysis, although no differences were found between nonclinical/mixed and high-risk participants on all outcomes, aside from shape concern where a larger decrease was found for shape concern among high-risk participants (Melioli et al., 2016). However, this meta-analysis only examined pre- and post-intervention changes and did not include follow-up data. Follow-up data were not explored in part due to the varying lengths of follow-up and therefore it is worth mentioning some of the findings at follow- ups from earlier meta-analyses.

An earlier meta-analysis (Loucas et al., 2014) evaluated 10 online prevention randomised controlled trials, eight of which were Student Bodies (Dev et al., 1999). When compared with a waitlist control at follow-up (ranging from 4.5 to 15 months post intervention), Student Bodies had small improvements in weight concerns ($d$ =

0.30), shape concern ($d$ = 0.17), dietary restriction ($d$ = 0.37), drive for thinness ($d$ = 0.37), bulimia ($d$ = 0.13), global eating disorder psychopathology ($d$ = 0.33), binge eating ($d$ = 0.43), vomiting and/or diuretic/laxative misuse ($d$ = 0.33).

Taken together, the meta-analyses suggest that there is a small but growing evidence-base for online prevention programs of eating disorders. Most online prevention programs were CBT based and successful in reducing eating disorder symptoms at post-intervention and follow-up (ranging from 4.5 to 15 months post intervention). However, it is not known whether a change of this type and magnitude can reduce the risk of developing an eating disorder. It is essential to capture truer indications of prevention effects, by tracking the migration of participants who began with healthy or subclinical symptoms that moved into healthy, clinical or subclinical ranges at post-test and follow-up. Identifying the mechanisms that prevent eating disorder symptoms is also important so as to target the identified risk factors. The present research will focus on a single risk factor, clinical perfectionism.

**A Transdiagnostic Approach for Prevention Studies**

Optimal prevention studies are based on aetiological frameworks that target empirically supported risk factors (Jacobi et al., 2004; Stice et al., 2007; Stice et al., 2012). Despite the discrete, categorical diagnoses of eating disorders in the Diagnostic and Statistical Manual of Mental Disorders -5th edition (DSM-5; American Psychiatric Association, 2013), experts have identified many common features between anorexia nervosa, bulimia nervosa, other specified feeding or eating disorders, and unspecified feeding or eating disorders, noting that most patients migrate between these diagnoses over time (Brown, Klein, & Keel, 2015; Castellini et al., 2011; Eddy et al., 2008; Fairburn, 2008; Fairburn & Cooper, 2007; Fairburn et al., 2003a).

Given the high diagnostic crossovers in eating disorders, Fairburn et al. (2003, 2008) proposed that eating disorders such as anorexia nervosa and bulimia nervosa may present in different clinical manifestations (e.g., severe restraint; binge eating episode; compensatory behaviours), but are maintained by a common transdiagnostic mechanism characterised by the over-evaluation of eating, body shape, weight and their control in the judgement of one's self- worth. Transdiagnostic mechanisms refer to a cognitive and behavioural process occurring across multiple disorders that contributes to the development and maintenance of a

disorder (Egan, Wade, & Shafran, 2011). The transdiagnostic approach seeks to identify common mechanisms that occur across disorders and explain their onset or maintenance (Mansell, Harvey, Watkins, & Shafran, 2009).

Given that CBT prevention programs such as Student Bodies have shown possible effects in in preventing eating disorder symptoms (Melioli et al., 2016; Watson et al., 2016), targeting transdiagnostic mechanisms that underlie different types of eating disorders and comorbid psychological problems such as anxiety and depression (Hudson et al., 2007; Swanson et al., 2011) is an important next step for CBT prevention studies in eating disorders. A transdiagnostic approach in preventing eating disorder symptoms would augment the efficacy, generalisability and cost-effectiveness of prevention programs (Mansell et al., 2009). The transdiagnostic approach is appealing because of its potential impact on various emotional domains, and may prevent related comorbidity such as anxiety and depression which are influenced by the same transdiagnostic mechanisms (Dozois, Seeds, & Collins, 2009).

There is growing evidence that transdiagnostic risk factors exist across eating disorders, depression and anxiety, particularly given that the time of onset of these psychological problems coincides with the period of early to late adolescence (Johnson, Burke, Brinkman, & Wade, 2016). Transdiagnostic risk factors include, for example, difficulties in regulating emotions (Aldao, Nolen-Hoeksema, & Schweizer, 2010), repetitive negative thinking (McEvoy, Watson, Watkins, & Nathan, 2013), and clinical perfectionism (Egan et al., 2011).

**Clinical Perfectionism as a Putative Transdiagnostic Risk Factor**

One transdiagnostic mechanism of interest is clinical perfectionism, a risk factor for multiple disorders, such as depression, anxiety and eating disorders (Egan et al., 2011). Perfectionism has been implicated in the development and maintenance of eating disorders, where individuals with eating disorders hold extremely high standards regarding their body shape, weight and eating, and ability to control these (Fairburn, 2008; Fairburn et al., 2003a). They judge their self-worth largely or even exclusively on their ability to achieve shape and weight control, often through rigid extreme dietary restraint (Fairburn, 2008; Fairburn et al., 2003a).

## Defining Perfectionism

### *History of the construct of perfectionism*

Research in perfectionism has burgeoned over the last two decades (Sirois & Molnar, 2016) with numerous empirical and theoretical advances in understanding perfectionism and mental health. Perfectionism can be widely conceptualised in two ways: multidimensional (Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991) and clinical perfectionism (Shafran, Cooper, & Fairburn, 2002).

### *Multidimensional perfectionism*

The multidimensional construct of perfectionism has been developed and conceptualised in two major ways as described by Frost et al. (1990) and Hewitt and Flett (1991). Hewitt and Flett (1991) proposed that perfectionism consists of intrapersonal and interpersonal dimensions and constructed a scale (Hewitt Multidimensional Perfectionism Scale, HMPS; Hewitt & Flett, 1991). The HMPS incorporated Self-Oriented Perfectionism as an intrapersonal construct, and Socially-Prescribed Perfectionism, and Other- Oriented Perfectionism as interpersonal constructs. Self-Oriented Perfectionism involves setting high personal standards and becoming self-critical if they are not met. Interpersonal dimensions of Socially-Prescribed Perfectionism involve meeting standards and perceived standards set by significant others, and Other-Oriented Perfectionism is defined similarly to Self-Oriented Perfectionism but directed towards other people.

Frost et al. (1990) postulated that perfectionism is more than setting high personal standards, since that does not distinguish people with perfectionism from those who are highly competent and successful. Frost et al. (1990) developed a scale (Frost Multidimensional Perfectionism Scale, FMPS) measuring six dimensions of perfectionism. The subscales of the FMPS included Personal Standards (setting high personal standards), Concern over Mistakes (tendency to react negatively to mistakes, to interpret mistakes as equivalent to failure, to believe one will lose the respect of others following failure), Doubts about Actions (doubting the quality of performance), Parental Expectations (high parental expectations were placed on the individual), Parental Criticism (parental criticism for perceived failure of meeting parental expectations), and Organisation (focus on precision, order and organisation).

A debate that has emerged from the perfectionism literature is whether perfectionism has adaptive components, and this topic remains controversial both conceptually and empirically (Bieling, Israeli, & Antony, 2004; Flett & Hewitt,

2006; Sirois & Molnar, 2016; Stoeber & Otto, 2006). Two higher-order factors of perfectionism have been consistently identified in research on the FMPS and HMPS, with one dimension having both maladaptive and adaptive aspects and the other having primarily maladaptive aspects (Dunkley, Blankstein, Masheb, & Grilo, 2006). They are commonly identified as Perfectionistic Strivings and Perfectionistic Concerns respectively. Perfectionistic Strivings involves setting high standards and goals for oneself while Perfectionistic Concerns involves overly critical evaluations of one's own behaviour, an inability to be satisfied from successful performances, and longstanding concerns about other's criticism and expectations. Perfectionistic Strivings perfectionism is associated with the Self-Oriented Perfectionism subscale of the HMPS and Personal Standards subscale of the FMPS that is not considered maladaptive. Conversely, the Socially-Prescribed Perfectionism subscale of HMPS and Concern over Mistakes, Doubts about Actions subscales of the FMPS are associated with Perfectionistic Concerns perfectionism that is considered maladaptive (Dunkley et al., 2006).

The multidimensional conceptualisation of perfectionism has distinguished the types of perfectionism that are associated with mental well-being, allowing more targeted prevention and treatments (Sirois & Molnar, 2016). For instance, Perfectionistic Concerns perfectionism is consistently associated with depression, anxiety, and suicidal ideation (Burgess & DiBartolo, 2016) and long term psychosocial maladjustment (Dunkley, Mandel, & Ma, 2014). However, Perfectionistic Strivings perfectionism is not consistently found to be predictive of adaptive well- being (Sirois & Molnar, 2016). While it is associated with greater positive affect (Bieling et al., 2004) and life satisfaction (Bergman, Nyland, & Burns, 2007), it remains a risk factor for eating disorders (Bardone-Cone et al., 2007; Wade, O'Shea, & Shafran, 2016), and is associated with greater decrease in positive affect, cognitive rumination after a performance failure compared to those with Socially-Prescribed Perfectionism or Other-Oriented Perfectionism (Besser, Flett, & Hewitt, 2004).

However, a meta-analysis of 284 studies examining the relationship of Perfectionistic Strivings and Perfectionistic Concerns with psychopathology (Limburg, Watson, Hagger, & Egan, 2017) revealed that both dimensions of perfectionism were associated with various forms of psychopathology (a detailed discussion is noted in the section on "Empirical evidence of perfectionism as a risk

factor for eating disorders"). This highlighted the clinical significance of both dimensions of perfectionism, as well as the transdiagnostic process of perfectionism, that has prompted a shift in the field to focus on aspects of perfectionism that are most pertinent in the prevention and treatment of psychopathology, such as clinical perfectionism (Shafran et al., 2002).

***Clinical perfectionism***

Clinical perfectionism focuses on the maladaptive form of perfectionism that is related to psychopathology. It is defined as "the overdependence of self-evaluation on the determined pursuit of personally demanding, self-imposed, standards in at least one highly salient domain, despite adverse consequences" (Shafran et al., 2002, p. 778). Two features are emphasised in this definition: First, individuals set personally demanding standards and strive to meet these high standards despite negative consequences. Second, their self-worth is based on meeting these high personal standards.

Several processes maintain clinical perfectionism as seen in Figure 1. The fear of failure and relentless pursuit of success mean that any perceived failure results in self-criticism, negative self-view, and strengthens the dependence of self-worth on striving and goals achievement. People with clinical perfectionism also have "all-or-nothing" thinking and hold rigid rules about what should or should not be allowed, often demonstrating guilt and shame when these rules are broken. They also tend to evaluate their standards and performance in a biased way where they selectively attend to "failures" and discount "successes". This involves hypervigilant monitoring for times when they have not met their standard through overt (e.g., re-reading work) or covert (e.g., replaying a competition in one's head and scrutinizing one's performance) checking behaviours. The fear of failure may also be so aversive for some that they avoid tasks through procrastination, abandoning them midway, maintaining the anticipation of failure. These unhelpful thinking styles and behaviours maintain self-criticism and the tendency to evaluate the self negatively after failing to meet high personal standards.

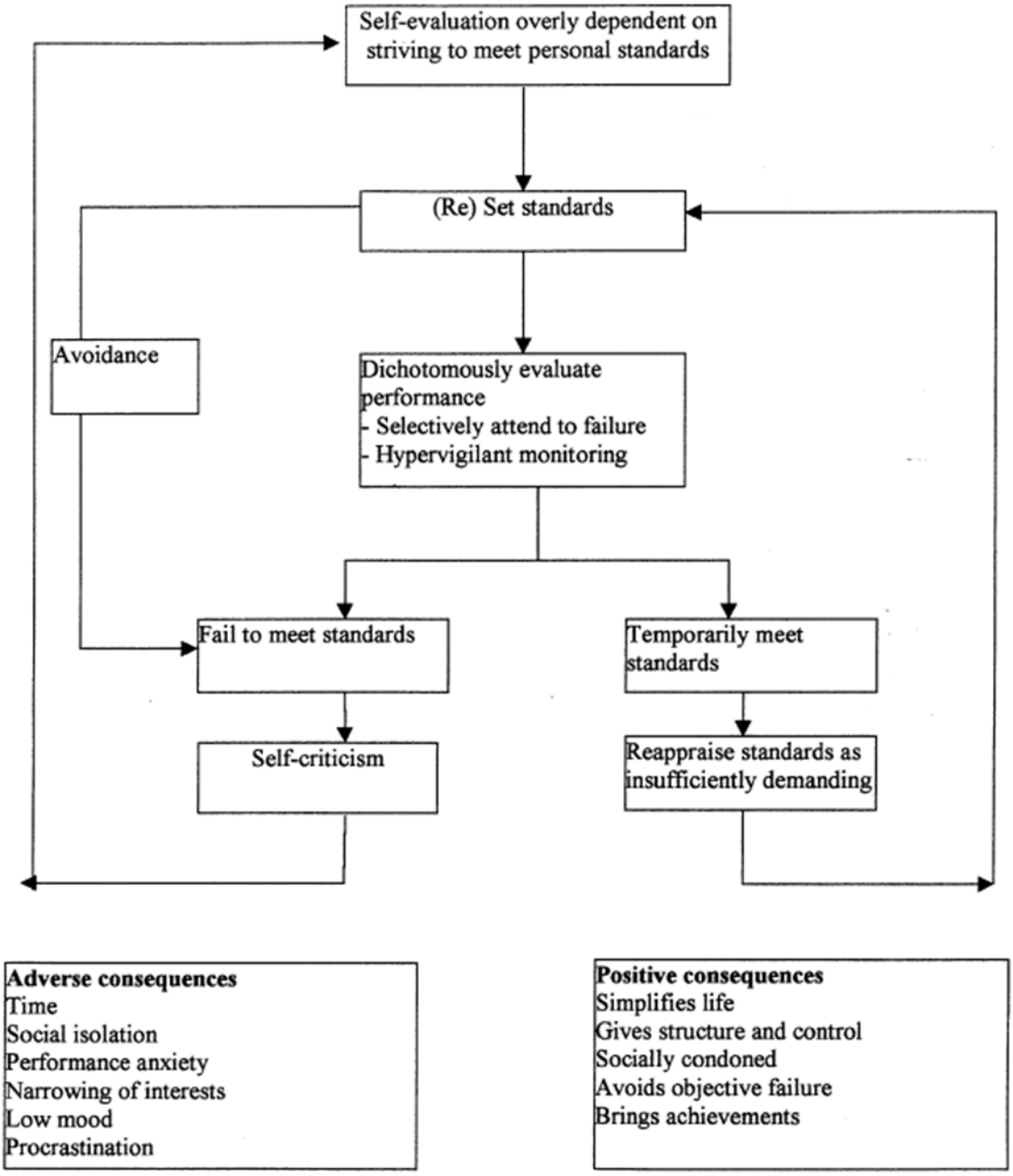


*Figure 1.* The maintenance of perfectionism. Reprinted from "Clinical perfectionism: a cognitive-behavioural analysis," by R. Shafran and Z. Cooper, 2002, *Behaviour Research and Therapy, 40,* p. 780. Copyright 2002 by Elsevier Science Ltd. Reprinted with permission.

When people with perfectionism do meet their stringent standards, it temporarily improves self-worth and reinforces pursuit of these standards. However, the standards are also re-appraised as insufficiently demanding and are re-set to a higher one. This leads to an increased likelihood of experiencing failure and maintains self-criticism.

Clinical perfectionism is maladaptive because when self-evaluation is overly

dependent on one area failure to meet those standards results in self-criticism and negative self-worth. This can lead to fear of failure, and difficulties in relinquishing standards even when they are not met, which can result in adverse consequences such as low mood, anxiety, low self-esteem, and social isolation (Shafran et al., 2002).

The model of clinical perfectionism is the first model to focus on the maintaining factors of perfectionism, and therefore the first clinically relevant model that could lead to the treatment of perfectionism, which previous multidimensional definitions could not arrive at. Clinical perfectionism is measured by the Clinical Perfectionism Questionnaire (CPQ; Fairburn, Cooper, & Shafran, 2003), a 12 item self-report measure. A two-factor structure has been consistently found in university students (Dickie, Surgenor, Wilson, & McDowall, 2012; Stoeber & Damian, 2014) and non-clinical and clinical eating disorder samples (Egan et al., 2016). Factor 1 represented Perfectionistic Strivings and correlated with the Personal Standards subscale of the FMPS while Factor 2 represented Perfectionistic Concerns and correlated with the Concern over Mistakes subscale of the FMPS (Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014). Of clinical relevance, the total CPQ score has been found to be positively correlated with depression, anxiety, stress and negative affect, and accounted for significant variance in these psychopathology measures beyond that accounted for by the HMPS and FMPS (Chang & Sanna, 2012; Egan et al., 2016). This suggests that clinical perfectionism capture the aspects of perfectionism that are most pertinent to psychopathology, above and beyond traditional multidimensional perfectionism constructs, and should be studied in the prevention and treatment of psychopathology.

## Theoretical and Empirical Support of Clinical Perfectionism

This section reviews the theoretical and empirical support of clinical perfectionism in the development and maintenance of eating disorders.

### *The "enhanced" cognitive behaviour therapy: model and outcomes*

Clinical perfectionism closely relates to the transdiagnostic theory of eating disorders (Fairburn et al., 2003a) and the treatment CBT-E (Fairburn, 2008), which has strong research and empirical support (Galsworthy-Francis & Allan, 2014; Kass et al., 2013; NICE, 2004; Peterson et al., 2016; RANZCP, 2014). CBT-E is based on the transdiagnostic theory that the over-evaluation of shape and weight and their

control is the core psychopathology that maintains all eating disorders (Fairburn, 2008). This resulted in the development of a treatment targeting the core psychopathology by focusing on the over-evaluation of shape and weight, and control over eating; dietary restraint and restriction; efforts to maintain low weight; and event- or mood- triggered changes in eating (Fairburn et al., 2003a). Treatment was enhanced to include modules to address clinical perfectionism, low self-esteem and interpersonal difficulties when they are elevated and maintain the eating disorders (Fairburn, 2008).

Clinical perfectionism closely relates to eating disorders because both emphasise the over-evaluation of achieving and achievement. Clinical perfectionism can intensify aspects of eating disorders where an individual sets personally demanding standards on controlling their body shape and weight. This results in the pursuit of weight loss, strict dietary restraint and weight-control behaviours such as fasting, compulsive exercise, and purging (Fairburn, 2008). Their self-worth is based largely or exclusively on shape, weight and eating, and their ability to control these. They strive to meet these high standards despite negative consequences such as interferences with psychological, physical and social functioning (Arcelus et al., 2011; Hudson et al., 2007; Samnaliev et al., 2015; Swanson et al., 2011; Westmoreland et al., 2016).

CBT-E in the treatment of eating disorders has been found to have a substantial and sustained effect for adult outpatients with eating disorders (Byrne, Fursland, Allen, & Watson, 2011), up to 60-week post-treatment (Fairburn et al., 2015; Fairburn et al., 2009). At the end of treatment, 56% of patients who completed treatment were in full remission (Byrne et al., 2011). At follow-up, 51% to 69% of patients in CBT-E achieved remission (Fairburn et al., 2015; Fairburn et al., 2009). Further, patients with difficulties in clinical perfectionism, low self-esteem or interpersonal difficulties responded better to the more complex CBT-E treatment with the additional modules (Fairburn et al., 2015; Fairburn et al., 2009). Similar findings were also replicated when examining the efficacy of CBT-E in adolescents with eating disorders, as reviewed earlier in the subsection “treatment for adolescents”. This further suggests that clinical perfectionism is an important construct in eating disorders, particularly because the multidimensional conceptualisation of perfectionism is effective in distinguishing the types of perfectionism that are associated with eating disorder pathology (Wade et al., 2016).

***Empirical evidence of perfectionism as a risk factor for eating disorders***

Extensive reviews have examined the role of perfectionism in eating disorders (Bardone-Cone et al., 2007; Egan et al., 2011; Jacobi et al., 2004; Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2006; Lloyd, Schmidt, Khondoker, & Tchanturia, 2015; Stice, 2002). Earlier empirical work was mostly cross-sectional and retrospective, and proposed that perfectionism is a likely correlate of eating disorders (Jacobi et al., 2004) that may interact with other risk factors in producing and maintaining eating pathology (Stice, 2002). Two studies confirm the association between perfectionism and eating pathology in nonclinical adolescents: High levels of perfectionism are associated with abnormal eating behaviours such as drive for thinness, bulimic related behaviour and social pressure to eat (Bento et al., 2010). A combination of high personal standards and evaluation concerns, rather than the presence of one dimension alone, is most strongly correlated with eating disorder symptoms (Boone, Soenens, Braet, & Goossens, 2010). A study examined perfectionism in children and adolescents with anorexia nervosa (Castro et al., 2004) and found that youths with anorexia nervosa had higher scores in self-oriented perfectionism and perfectionistic self-presentation as compared to children and adolescents without anorexia nervosa. Further significant positive correlations existed between perfectionism and eating disorder attitudes and depressive symptoms in the sample of children and adolescents with anorexia nervosa (Castro et al., 2004). Together, the findings support the role of perfectionism in eating disorders.

Limited prospective research has confirmed that perfectionism preceded and increased the risk for developing an eating disorder (Bardone-Cone et al., 2007; Lilenfeld et al., 2006), with both Perfectionistic Concerns and Perfectionistic Strivings perfectionism being elevated in patients with anorexia nervosa and bulimia nervosa (Bardone-Cone et al., 2007). Prospective studies have examined the role of perfectionism in predicting eating disorders in nonclinical adolescents. One study showed that body dissatisfaction, depressive symptoms, low BMI and perfectionism predicted disordered eating in young girls (baseline mean age = 11 years) at 4-year follow-up (Ferreiro, Seoane, & Senra, 2011). A 3-wave longitudinal study conducted with 455 female adolescents (mean age = 13 years) found that both personal standards perfectionism and evaluative concerns perfectionism correlated with eating disorder symptoms concurrently and longitudinally (Boone, Soenens, & Luyten,

2014). Further, body dissatisfaction moderated the relationship between perfectionism and eating disorder symptoms in female adolescents (Boone, et al., 2014). Another study of adolescent inpatients with anorexia nervosa showed that higher baseline perfectionism was associated with higher eating disorder pathology at 3-month follow- up, with elevated perfectionism predicting a greater likelihood of readmission into hospital within three months post-discharge (Vall & Wade, 2016). Taken together, this suggests that perfectionism can predict eating disorders in adolescents, and may be a useful target to improve psychological outcomes amongst adolescents.

To the best of the author's knowledge, two experimental studies have ascertained the causal role of perfectionism in eating disorder symptoms (Boone, Soenens, Vansteenkiste, & Braet, 2012; Shafran, Lee, Payne, & Fairburn, 2006). Both studies were conducted in non-clinical samples. The first study randomly assigned adolescents to either a high standards or a low standards group (Shafran et al., 2006). Participants in the high standards group were asked to set high personal standards and pursue perfection for a 24 hour period in a self-defined life domain. Participants in the low standards group were asked to function to the lowest possible standard. Participants in the high standards group, as compared to the low standards group, were more likely to eat less high-calorie foods, attempted more dietary restraint and experienced more regret after eating during the day. This suggests a causal role of perfectionism in relation to eating disorder symptoms experienced in the day (Shafran et al., 2006). The second study (Boone et al., 2012) built on the Shafran et al. (2006) study and examined the multidimensional perfectionism construct by randomly assigning university student participants into one of three conditions: Personal Standards condition, Personal Standards perfectionism and Evaluative Concerns perfectionism condition and non-perfectionist condition. Participants in the Personal Standards condition were asked to set high personal standards, while participants in the Personal Standards perfectionism and Evaluative Concerns perfectionism condition were asked to set high standards and to avoid failing or disappointing themselves or others for a 24 hour period in a self-defined life domain. Participants in the non-perfectionist condition were asked to function to the lowest possible standards for the next 24 hours. Results showed that participants in both perfectionist conditions reported high state perfectionism, higher dietary restraint and bingeing over the 24-hour period as compared to those in the non-

perfectionist condition. Together, both studies demonstrated that perfectionism is a causal risk factor for eating disorder symptoms. Further, perfectionism is more elevated in individuals with eating disorders than healthy controls (Egan et al., 2011; Sutandar-Pinnock, Blake Woodside, Carter, Olmsted, & Kaplan, 2003) and has been found to result in poorer outcomes and treatment drop-out in adult patients with anorexia nervosa (Sutandar-Pinnock et al., 2003), even up to 10 years after treatment (Bizeul, Sadowsky, & Rigaud, 2001). Adult individuals who have recovered from anorexia nervosa continued to exhibit high levels of perfectionism (Bardone-Cone, 2007; Lilenfeld et al., 2000). Given that perfectionism remains elevated even after treatment in adults, it is likely that perfectionism is not merely a state effect associated with the active phase of eating disorders, but a risk factor for eating disorders that needs to be addressed (Bardone-Cone et al., 2007). It is important to understand the role of perfectionism in adolescence prior to the onset of eating disorders and focus on preventative efforts for adolescents in the area of perfectionism and eating disorders.

Importantly, individuals with eating disorders and comorbid psychopathology tend to have higher perfectionism than individuals with eating disorders but without comorbidity (Bardone-Cone et al., 2007). When comparing mean levels of perfectionism across different disorders, individuals with anorexia nervosa had the highest scores on both Perfectionistic Strivings and Perfectionistic Concerns dimensions (Bardone-Cone et al., 2007). The primarily maladaptive dimension Perfectionistic Concerns, was more elevated across individuals with eating disorders, depression and anxiety disorders (Bardone-Cone et al., 2007). For the Perfectionistic Strivings dimension that have both maladaptive and adaptive aspects, elevations were found in individuals with eating disorders and depression, but not for anxiety disorders (Bardone-Cone et al., 2007), suggesting that both dimensions are transdiagnostic.

While the above-mentioned narrative reviews are extremely helpful in understanding the role of perfectionism in eating disorders, they do not involve a systematic search of the literature, and may therefore only include a subset of studies that may result in selection bias (Uman, 2011). In contrast, systematic reviews are detailed and comprehensive, and aim to reduce bias by identifying, evaluating and summarising all studies on a specific topic. They also frequently involve a meta-analysis which uses statistical analyses to summarise the data from multiple studies

into one quantitative effect size that measures the strength of relationship between two variables (Uman, 2011). Hence, systematic reviews and meta-analyses provide a more accurate summary of trials as compared to narrative reviews.

In addition to narrative reviews, a recent meta-analysis examining the relationship between perfectionism and psychopathology supported the transdiagnostic nature of both Perfectionistic Strivings and Perfectionistic Concerns dimensions (Limburg et al., 2017). Specifically, both Perfectionistic Strivings and Perfectionistic Concerns dimensions were associated with clinical disorders of depression, anxiety and bulimia nervosa, with Perfectionistic Concerns explaining a larger variance than Perfectionistic Strivings in these disorders. Likewise, both dimensions were associated with symptoms of psychopathology, where Perfectionistic Concerns explained a larger variance than Perfectionistic Strivings in depressive symptoms, anxiety, social phobia symptoms, worry, obsessive-compulsive symptoms, obsessive beliefs, global eating pathology, binge eating, and body dissatisfaction. Interestingly, the meta-analysis showed that Perfectionistic Strivings but not Perfectionistic Concerns was significantly related to the clinical disorder of anorexia nervosa, and both Perfectionistic Strivings and Perfectionistic Concerns had an equal contribution in eating disorder features such as dietary restraint, drive for thinness and thin ideal internalisation. This suggests that both Perfectionistic Concerns and Perfectionistic Strivings are associated with psychopathology, although to different extents depending on the type of disorder and/or symptoms. The two dimensions of perfectionism were also found to be positively correlated, indicating substantial overlap in the two constructs. Whilst Perfectionistic Concerns tends to explain a larger variance than Perfectionistic Strivings across most disorders, they tend to contribute equally in some eating disorder outcomes. It is crucial to change the traditional mindset that Perfectionistic Concerns is the primarily maladaptive dimension while Perfectionistic Strivings consists of both maladaptive and adaptive aspects. Importantly, Perfectionistic Strivings but not Perfectionistic Concerns was significantly related to anorexia nervosa which has debilitating consequences. Similarly, prevention and treatment approaches need to ensure that interventions target both Perfectionistic Strivings and Perfectionistic Concerns dimensions when seeking to reduce psychological disorders and/or symptoms through perfectionism.

### *Efficacy of Cognitive Behavioural Therapy for Perfectionism*

Numerous studies have shown that reducing clinical perfectionism using CBT (CBT-P) can alleviate symptoms of depression, anxiety and disordered eating (for reviews, see Egan et al., 2011; Lloyd et al., 2015). Meta-analyses found large effect sizes for pre-post treatment reductions in perfectionism and medium effects for pre-post treatment reductions in depression and anxiety (Lloyd et al., 2015). Specifically, guided and pure self-help CBT-P resulted in predominantly large effects in reducing perfectionism and psychopathology, as defined by Cohen (1988) conventions. Large effects have been found for perfectionism as measured by the CPQ ($d$ = 1.20 - 1.31; Handley, Egan, Kane, & Rees, 2015; Riley, Lee, Cooper, Fairburn, & Shafran, 2007), small to moderate effects on the Personal Standards subscale of the FMPS ($d$ = 0.39 - 0.77; Egan et al., 2014a; Handley et al., 2015; Steele & Wade, 2008) and large effects on the Concern over Mistakes subscale of the FMPS ($d$ = 0.84 - 2.11; Egan et al., 2014a; Handley et al., 2015; Steele & Wade, 2008). Small to large effects were found for reducing eating disorders symptoms ($d$ = 0.30 - 1.73; Handley et al., 2015; Steele & Wade, 2008), with moderate to large effects for decreasing depression ($d$ = 0.74 - 0.86; Handley et al., 2015; Steele & Wade, 2008), moderate effects for lowering anxiety ($d$ = 0.59 - 0.69; Handley et al., 2015; Steele & Wade, 2008), and large effects for increasing self-esteem ($d$ = 0.97 - 1.39; Egan et al., 2014a; Handley et al., 2015). This suggests that CBT-P has efficacy as a transdiagnostic treatment for psychological disorders such as eating disorders, depression and anxiety and also helps to improve low self-esteem, a known risk factor of eating disorder (Fairburn et al., 2003a; Schmidt & Treasure, 2006).

## A Review of Prevention Studies Targeting Perfectionism

While there is an evidence base regarding targeting perfectionism to treat psychological disorders, there is a paucity of prevention studies examining the effects of targeting perfectionism on mental wellbeing, particularly in adolescents. Yet, recent studies show that three out of 10 Australian adolescents (Sironic & Reeve, 2015), and one of four Australian adolescent girls (Hawkins, Watt, & Sinclair, 2006) struggle with some form of maladaptive perfectionism. Perfectionism has been implicated in a wide range of psychopathology in adolescents, including anxiety disorders (Hewitt et al., 2002), depression (Huggins, Davis, Rooney, & Kane, 2008), obsessive compulsive disorder (Soreni et al., 2014), suicide ideation

(Boergers, Spirito, & Donaldson, 1998), self-harm (O'Connor, Rasmussen, & Hawton, 2010), and eating disorder symptoms (Boone et al., 2010). The difficulties associated with maladaptive perfectionism have led to a proposed framework for the prevention of perfectionism in young people (Flett & Hewitt, 2014). The framework advocates for extensive, multifaceted prevention programs that directly targets perfectionism as the small but growing evidence base suggests that prevention programs that explicitly focus on reducing perfectionism (Wilksch et al., 2008) may be more effective than programs without an explicit, extensive focus on perfectionism (e.g., Coughlin & Kalodner, 2006; McVey, Davis, Tweed, & Shaw, 2004).

Three studies have examined the efficacy of perfectionism-focused programs in preventing psychological problems (Fairweather-Schmidt & Wade, 2015; Nehmy & Wade, 2015; Wilksch et al., 2008). Fairweather-Schmidt and Wade (2015) evaluated a two-lesson school-based universal prevention program, "Minding Young Minds" program that aimed to reduce perfectionism in pre-adolescent children aged 9 to 14 years. The material was based on the model of clinical perfectionism (Shafran et al., 2002), with the first session describing perfectionism, the good and bad aspects of mistakes, and challenging the overdependence of self-evaluation on personally demanding standards. The second session aimed to teach participants skills to manage self-criticism, and paying attention and celebrating successes. Compared to a control group who had regular classes, the intervention group had lower self- oriented perfectionism at post-intervention and at four-week follow-up ($d$ = 0.47, $d$ = 0.40 respectively), but not in other-oriented perfectionism or socially prescribed perfectionism. The intervention group also showed a greater decrease of hyperactivity and emotional problems than the control group, particularly at post-intervention, supporting the transdiagnostic process of perfectionism (Egan et al., 2011). Nehmy and Wade (2015) compared the efficacy of an eight- session universal prevention classroom based program "Healthy Minds" targeting clinical perfectionism to a control group who had regular classes, for female adolescents aged 11 to 18years old. The material was based on the model of clinical perfectionism (Shafran et al., 2002), with each lesson emphasising the link between unhelpful behaviours associated with perfectionism, and emphasising realistic and balanced thinking, exposure and avoidance prevention. There were no significant group differences at post-test but at 6-month follow-up, the intervention group had

significantly lower unhelpful perfectionism, self-criticism and negative affect than the control group. Further analyses of a subgroup lower in negative affect at pre-test showed that the intervention group was less likely to have elevated negative affect at 6- month follow-up than controls, suggesting a prevention effect. This supported the utility of targeting clinical perfectionism in universal prevention of negative affect in children and adolescents.

With regard to evaluating eating disorder specific outcomes, Wilksch, Durbridge, and Wade (2008) compared the efficacy of an eight-session classroom based perfectionism prevention program for female adolescents targeting perfectionism based on the self-help book *"When Perfect Isn't Good* Enough*"* (Antony & Swinson, 1998) to a media literacy program and a control group receiving no intervention. There was an interaction effect favouring the perfectionism program at 3-months follow-up for Concern over Mistakes subscale on the FMPS ($d$ = 0.45), a main effect for group favouring the perfectionism program for Personal Standards on the FMPS ($d$ = 0.44). While the programs did not reduce the primary outcome variable of shape and weight concern across the entire sample, moderator analyses indicated that 57% of participants at high risk of developing an eating disorder in the perfectionism program had clinically significant reductions in dieting at 3-months follow-up, whereas the media literacy and control participants experienced a smaller rate of change.

The present study will build on the previous studies and evaluate a perfectionism program based on empirically supported and theoretically driven material as a selective prevention program to prevent eating disorder symptoms. The study will use the CPQ as a measure of perfectionism given its sensitivity in detecting changes in perfectionism. The perfectionism program for the present study will be based on a published CBT self-help manual for perfectionism "*Overcoming Perfectionism: A self help guide using cognitive behavioural techniques*" by Shafran, Egan, and Wade (2010). The material is strongly tied to the transdiagnostic theory of clinical perfectionism (Shafran et al., 2002), the transdiagnostic theory of eating disorders (Fairburn et al., 2003a) and the treatment techniques used in the clinical perfectionism module of CBT-E (Fairburn, 2008). Multiple studies have evidenced its efficacy, including on reducing eating disorder symptoms (Egan et al., 2014a; Egan et al., 2011; Glover, Brown, Fairburn, & Shafran, 2007; Handley et al., 2015; Lloyd et al., 2015; Riley et al., 2007). Targeting clinical perfectionism can be helpful

in reducing general psychopathology such as anxiety (Hewitt et al., 2002), depression (Huggins et al., 2008), suicidal ideation (Boergers et al., 1998); self-harm (O'Connor et al., 2010), and its potential maintaining role in early eating disorder symptoms (Boone et al., 2010). Hence, targeting perfectionism to reduce it in its own right and its potential maintaining role in early eating disorder symptoms is an important goal given the potential impairment and suffering caused by eating disorder symptoms (Arcelus et al., 2011; Hudson et al., 2007; Samnaliev et al., 2015; Swanson et al., 2011).

**Summary of Literature, Aims and Rationale**

While treatment of eating disorders has significantly advanced in recent decades, there remains a substantial proportion (50% to 80%) of adolescents with eating disorders who do not respond to treatment (Kass et al., 2013). These adolescents continue to experience significant psychological, medical and economic disadvantages that persist through to adulthood (Samnaliev et al., 2015). Effective prevention of eating disorders, particularly during the critical age of onset is essential to reduce the burden of this disease for the individuals with eating disorders as well as broader society.

Meta-analyses of prevention studies found that selective prevention focusing on females yielded larger effects than universal prevention studies of mixed sex (Dalle Grave, 2003; Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016). Selective prevention is less costly to implement than universal prevention, and captures a larger population at risk of eating disorders as compared to indicated prevention. Given the chronicity, medical and psychological comorbidities of eating disorders and the research evidence suggesting large effects for selective prevention, this study has chosen the approach of selective prevention, focusing on the subpopulation of female adolescents aged 14 to 19 years, where the onset of anorexia nervosa and bulimia nervosa peaks (Allen et al., 2013; Lewinsohn et al., 2000; Smink et al., 2012; Stice et al., 2013b).

Online programs, as compared to face-to-face programs may be particularly appealing to female adolescents, who are skilled and confident in using the Internet to seek help for mental health related problems (Australian Psychological Society, 2005; Nicholas et al., 2004). Online programs can be particularly helpful for eating disorder prevention as it offers confidentiality and anonymity to individuals who

may be reluctant to seek help due to shame (Leibert et al., 2006). Meta-analyses of online prevention of eating disorders have shown a small but growing evidence base in reducing eating disorder symptoms at post-intervention and follow-up (Beintner et al., 2012; Loucas et al., 2014; Melioli et al., 2016; Newton & Ciliska, 2006). The present study will develop an online prevention program that is suitable to the targeted population. To develop an efficacious prevention study, it is recommended that the intervention protocol is theoretically driven (Stice et al., 2012) and to target a single risk factor so as to provide a strong empirical test of aetiologic theories (Stice et al., 2007). There is growing interest in a transdiagnostic approach toward preventing eating disorder symptoms, particularly given the high comorbid rates of psychological problems such as anxiety and depression that accompany eating disorders (American Psychiatric Association, 2013; Samnaliev et al., 2015). Transdiagnostic prevention approaches may enhance the efficacy, generalisability and cost-effectiveness of prevention programs (Mansell et al., 2009) by targeting a single cognitive or behavioural process that contributes to the development and maintenance of eating disorders, and comorbid disorders (Egan et al., 2011).

Clinical perfectionism is a transdiagnostic mechanism that has been implicated in the development and maintenance of eating disorders, anxiety and depression (Egan et al., 2011). There is strong theoretical and empirical support of clinical perfectionism in the development and maintenance of eating disorders, where it is described in the transdiagnostic theory of eating disorders (Fairburn et al., 2003a) and CBT-E for eating disorders (Fairburn, 2008), both of which have accumulated the most empirical support (Galsworthy-Francis & Allan, 2014; Kass et al., 2013; NICE, 2004; Peterson et al., 2016; RANZCP, 2014). Clinical perfectionism is a strong risk factor for eating disorders yet its potential to prevent the onset of eating disorders and associated comorbidities has not been thoroughly examined in the field of prevention. The present study will adopt a well-evaluated intervention protocol (Shafran et al., 2010) for the perfectionism program. If the study yields clinically significant findings, it would suggest that online interventions can be used for the prevention of eating disorders in adolescents. The research will comprise two studies: Psychometric evaluation of the CPQ and a randomised controlled trial that examines the efficacy of the perfectionism program.

### Rationale for Study 1 (Psychometric evaluation of the Clinical Perfectionism Questionnaire)

Study 1 will evaluate the CPQ, which measures clinical perfectionism, among female youths. A valid and reliable measure of clinical perfectionism is needed to detect changes in perfectionism and to measure the impact of interventions targeting clinical perfectionism. This includes examining the factor structure and construct validity of the CPQ in female youth, as

well as investigating the convergent validity of the CPQ with an existing measure of perfectionism (FMPS), and psychological constructs such as depression, anxiety, disordered eating and compulsive exercise, known to precede eating disorders (Davis, Kennedy, Ravelski, & Dionne, 1994). Convergent and divergent validity of the CPQ with personality dimensions will also be tested to further our understanding of the CPQ and the latent clinical perfectionism construct.

### Rationale for Study 2 (Randomised Controlled Trial)

Once the psychometric properties of the CPQ are established and it is deemed a suitable measure of clinical perfectionism for female youths, we will be able to conduct a study that examines the efficacy of targeting clinical perfectionism to prevent eating disorder symptoms as well as associated comorbidities such as anxiety, depression and low self-esteem. Randomised controlled trials are the gold standard in evaluating health care interventions (Schulz, Altman, & Moher, 2010), reducing bias when trialling a new intervention through randomisation. Randomised controlled trials compare groups receiving the experimental treatment with control groups receiving no treatment (waitlist control group) or a previously tested treatment (active control group). We aim to conduct a randomised controlled trial comparing three groups: the online cognitive behaviour therapy for perfectionism (CBT-P), online cognitive behaviour therapy for nonspecific stress management (CBT-S) which serves as an active control, and a waitlist control where participants do not receive either intervention. Employing a randomised controlled trial will provide a rigorous test of the efficacy of targeting clinical perfectionism in preventing eating disorder symptoms and associated comorbidity, and comparing two active treatments (CBT-P versus CBT-S) with a waitlist control group is consistent with CONSORT guidelines (Schulz et al., 2010).

The randomised controlled trial aims to compare the efficacy of CBT-P to CBT-S and waitlist control in decreasing clinical perfectionism, preventing eating disorder symptoms, depression symptoms, anxiety symptoms, and increasing self-esteem up to 6-month follow-up. This will contribute to the theory of clinical perfectionism as a transdiagnostic process in psychological problems, particularly in female youths who are at risk of developing these disorders.

# CHAPTER 2 Study One: Factor Structure and Construct Validity of the Clinical Perfectionism Questionnaire in Female Youth

Perfectionism has been implicated in a wide range of psychopathology in children and adolescents, including anxiety disorders (Hewitt et al., 2002), depression (Huggins et al., 2008), obsessive compulsive disorder (Soreni et al., 2014), suicide ideation (Boergers et al., 1998), self- harm (O'Connor et al., 2010), and eating disorder symptoms (Boone et al., 2010). Perfectionism has also been linked to poorer treatment outcome in youth with anxiety (Mitchell, Newall, Broeren, & Hudson, 2013).

While numerous studies have shown that reducing perfectionism using cognitive- behavioural strategies can alleviate symptoms of depression, anxiety and disordered eating in adults (for reviews, see Egan et al., 2011; Lloyd et al., 2015), there is a paucity of studies in children and adolescents (Flett & Hewitt, 2014). To date, prevention studies have shown that school-based interventions for perfectionism can reduce unhelpful perfectionism in children (Fairweather-Schmidt & Wade, 2015) and adolescents (Nehmy & Wade, 2015; Wilksch et al., 2008).

Many studies report on the validity of perfectionism measures (Egan, Wade, Shafran, & Antony, 2014b), predominately on the two Multidimensional Perfectionism Scales (Frost Multidimensional Perfectionism Scale, FMPS; Frost et al., 1990; Hewitt Multidimensional Perfectionism Scale, HMPS; Hewitt & Flett, 1991). However, FMPS and HMPS are not sensitive to changes in perfectionism. The Clinical Perfectionism Questionnaire (CPQ; Fairburn et al., 2003b) has been proposed as a clinically relevant measure of perfectionism which was designed to measure change in perfectionism due to the impact of an intervention. Clinical perfectionism is defined as "the overdependence of self-evaluation on the determined pursuit of personally demanding, self-imposed, standards in at least one highly salient domain, despite adverse consequences" (Shafran et al., 2002; p.778). Adverse consequences include low mood, anxiety and low self-esteem (Shafran et al., 2002). Given the strong relationship between clinical perfectionism and disordered eating, it is crucial to examine CPQ in relation to disordered eating, and common comorbid anxiety and depressive symptoms as well as low self-esteem. The impact of clinical perfectionism on eating disorders can be observed in compulsive exercise, a

behaviour commonly seen in individuals with eating disorders where they use exercise for weight and shape reasons, are rigid with their exercise routine, and continue to exercise despite illness, injury, and lack of enjoyment (Meyer, Taranis, Goodwin, & Haycraft, 2011). There is a strong association between compulsive exercise and both perfectionism (Meyer et al., 2011; Taranis & Meyer, 2010) and eating disorders (Boyd, Abraham, & Luscombe, 2007; Davis, Blackmore, Katzman, & Fox, 2005). Moreover, rigidity and self-criticism are key components in both perfectionism and compulsive exercise (Meyer et al., 2011). A recent study (Egan et al., 2017) has shown that compulsive exercise can mediate the relationship between clinical perfectionism and eating disorders, but the construct of compulsive exercise has yet to be examined in previous CPQ validation studies and its relation with clinical perfectionism will be explored in the current study. Another construct which is theoretically related to clinical perfectionism that has not yet been examined in previous CPQ validation studies is self-compassion. Self-compassion has been known to be negatively correlated to perfectionism (Neff, 2003) given that individuals with high perfectionism levels tend to be self-critical, and find it difficult to demonstrate kindness and compassion to oneself, and accept that humanity is imperfect by nature (Neff, 2003). Self-compassion is also a central treatment component in CBT for perfectionism (Egan et al., 2014b), and it is helpful to clarify the relationship between clinical perfectionism and self-compassion.

Studies investigating the CPQ have supported its validity. A two-factor structure has been consistently found in samples of university students (Dickie et al., 2012; Stoeber & Damian, 2014) and adult non-clinical and clinical eating disorder samples (Egan et al., 2016). Similar items loaded onto Factors 1 and 2 in each study where Factor 1 represented perfectionistic strivings and correlated with the Personal Standards subscale of the FMPS (Frost et al., 1990), and Factor 2 represented perfectionistic concerns (Egan et al., 2016) and correlated with the Concern over Mistakes subscale of the FMPS (Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014). There were some issues however with cross-loadings of the two reverse scored items, and the item relating to “have you judged yourself on the basis of your ability to achieve high standards?” has also been problematic in some studies. A valid measure of clinical perfectionism is necessary to measure the efficacy of perfectionism interventions in this group, and to understand the unique contribution clinical perfectionism may provide in explaining pathology over and

above existing perfectionism measures. We were particularly interested in examining the relationship between the CPQ and disordered eating, and therefore have chosen to study female youth, given that disordered eating predominately affects young women rather than males. We were also interested in extending previous research to understand the relationship between clinical perfectionism and various types of psychopathology and have included additional measures relating to compulsive exercise, self-esteem and self-compassion. Further, no studies have investigated the divergent validity of CPQ. Thus, the study aimed to fill this gap by examining the divergent validity of the CPQ with a measure of impulsivity, given that disinhibition and rigid perfectionism are opposite ends of a dimension (Widiger, 2011), and impulsivity does not have a significant relationship with obsessive compulsive personality disorder where clinical perfectionism is a key construct (Widiger, 2011). Finally, this is the first known study to validity the CPQ in a population including adolescents.

The first aim of the current study was to examine the factor structure and construct validity of the CPQ in female adolescents and young adults. We hypothesised that a two-factor structure will be the best fit. The second aim was to investigate convergent validity with an existing measure of perfectionism (FMPS). It was predicted that the CPQ Factor 1 (perfectionistic strivings) will be strongly correlated with the Personal Standards subscale of the FMPS and Factor 2 (perfectionistic concerns) will be strongly correlated with the FMPS Concern over Mistakes subscale. Further, we hypothesised convergent validity will be demonstrated by positive correlations with measures of depression and anxiety, disordered eating, and compulsive exercise, which have been found to precede eating disorders (Davis et al., 1994). We also hypothesised convergent validity will be shown through the CPQ being negatively correlated with self-esteem and self-compassion. Finally, we predicted divergent validity will be demonstrated by the CPQ factors having a low correlation with impulsivity.

## Method

### Participants

Participants were 267 females aged 14 to 19 years ($M$ = 17.8, $SD$ = 1.48).

There were 64 participants (24.0%) who were below 18 years old. All participants resided in Australia and were through a non-clinical sample.

### Procedure

The study was approved by the Human Research Ethics Committee at Curtin University (HR187/2013). Convenience sampling was used by posting a link on Facebook to personal contacts and asking them to forward the survey to their own contacts. Participants were given the option to enter a prize draw to win one of 10 $20 shopping vouchers upon survey completion.

For potential eligible participants who were under 18 years of age, their parents/caregivers had to read the information sheet and completed an online parental consent form. Participants were also recruited via Curtin University's School of Psychology research participation pool scheme where they needed to fulfil their course requirements. Participants were directed to the online survey page, provided informed consent, and given brief instructions followed by the measures. In total, $n$ = 67 (25%) were recruited online and $n$ = 200 (75%) were undergraduate students.

### Measures

#### *Clinical Perfectionism Questionnaire (CPQ; Fairburn et al., 2003b)*

This is a 12-item self-report measure of clinical perfectionism. Items 2 and 8 are reverse-scored. Participants rate the extent to which each item describes them over the past month. Examples of items are "Have you pushed yourself really hard to meet your goals?" and "Have you felt a failure as a person because you have not succeeded at meeting your goals?". Previous studies have demonstrated good convergent validity of the CPQ with other measures of perfectionism in adult populations. Among university students, the total CPQ score was strongly associated with the Personal Standards, Concern over Mistakes, and Doubts about Action subscales of the FMPS (Stoeber & Damian, 2014), and the self-oriented perfectionism, and socially-prescribed perfectionism subscales of HMPS (Hewitt & Flett, 1991) (Chang & Sanna, 2012; Stoeber & Damian, 2014). Similarly, in a non-clinical sample, the total CPQ score positively correlated with the Personal Standards, Concern over Mistakes, and Doubts about Action subscales of the FMPS (Egan et al., 2016).

The construct validity of the CPQ has also been examined with psychopathology measures in adult samples. Chang and Sanna (2012) found the total CPQ score was positively correlated with depression, anxiety and stress, and incremental validity was shown by the CPQ accounting for additional variance in these psychopathology measures beyond that accounted for by the HMPS. Similarly, in a non-clinical sample, the total CPQ score was positively correlated with negative affect, demonstrating good convergent validity, and accounted for significant variance in negative affect over and above the FMPS (Egan et al., 2016). The CPQ also demonstrated convergent validity through significant correlations with a measure of eating pathology, and discriminant validity with individuals with eating disorders scoring higher on the CPQ total and factor scores than controls (Egan et al., 2016). To date, the internal consistency of the CPQ has been found to be satisfactory, ranging from $\alpha$ = .63 to .83 (Chang & Sanna, 2012; Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014).

***Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990)***

The FMPS consists of 35 items divided into six subscales; Personal Standards, Concern over Mistakes, Doubts about Actions, Parental Expectation, Parental Criticism, and Organisation. The Personal Standards and Concern over Mistakes subscales have been argued to be closest to the construct of clinical perfectionism (Shafran & Mansell, 2001). The FMPS has good reliability and validity (Frost et al., 1990). Internal consistency of the total FMPS score (that does not include the Organisation subscale) for the entire sample in this study was $\alpha$ = .92, with $\alpha$ = .92 and $\alpha$ = .84 for the Concern over Mistakes and Personal Standards subscales respectively.

***Eating Disorder Examination – Questionnaire (EDE-Q; Fairburn & Beglin, 1994)***

The self-report EDE-Q has 28 items that measure eating psychopathology over the past 28 days on four subscales; restraint, eating concern, shape concern and weight concern, which can be summed to a global score. The EDE-Q is reliable and valid for female adolescents (Carter, Stewart, & Fairburn, 2001) and young adults (Mond, Hay, Rodgers, & Owen, 2006). The internal consistency of the global EDE-Q in this study for the total sample was excellent, $\alpha$ = .96.

***Compulsive Exercise Test (CET; Taranis, Touyz, & Meyer, 2011)***

The 24-item self- report CET assesses core features of compulsive exercise;

avoidance and rule-driven behaviour, weight control exercise, mood improvement, lack of exercise enjoyment, and exercise rigidity. It was included as a measure to assess convergent validity of the CPQ given the strong link between compulsive exercise, eating disorders, and perfectionism (Taranis et al., 2011). It has good internal consistency, content validity, and concurrent validity (Taranis et al., 2011). Internal consistency in this study for the total sample was $\alpha$ = .89.

***Revised Child Anxiety and Depression Scales (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000)***

The 47-item self-report RCADS has subscales measuring separation anxiety disorder, social phobia, generalised anxiety disorder, panic disorder, obsessive compulsive disorder, and major depressive disorder based on the Diagnostic and Statistical Manual fourth edition (American Psychiatric Association, 2000). Participants rate how often each item applies to them on a 4 point Likert scale. Total Anxiety Scale (sum of 5 anxiety subscales) and Total Internalizing Scale (sum of all subscales) can also be derived. A *T* score below 65 on the RCADS suggests a normal range, while a *T* score of 65 to 69 indicates a borderline clinical range, and a *T* score of 70 or above indicates a clinical range. The internal consistency for overall scales and subscales was found to be adequate in a sample of Australian youths (de Ross, Gullone, & Chorpita, 2002). The internal consistency in this study for the total sample was $\alpha$ = .96.

***Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965)***

The RSES is a 10-item self- report measure of global self-esteem, and has good reliability and validity with female adolescents and adults. It was included as a measure because self-esteem has been implicated in the theory of clinical perfectionism (Shafran et al., 2002), and is seen as a treatment target for eating disorders (Fairburn, 2008). The internal consistency for the total sample was $\alpha$ = .89.

***Self-Compassion Scale (SCS; Neff, 2003)***

The SCS is a 26-item self-report measure of compassion towards self. It has three dimensions: Self-Kindness versus Self-Judgment, Common Humanity versus Isolation, and Mindfulness versus Over-Identification. The SCS has excellent internal consistency in adolescent ($\alpha$ = .90) and young adult ($\alpha$ = .93) samples (Neff & McGehee, 2010). The SCS was included as a measure of convergent validity given the hypothesised importance of low self-compassion in perfectionism (Egan et

al., 2014b). The internal consistency in the current study for the total sample was $\alpha$ = .90.

***Barratt Impulsiveness Scale 11 Adolescent version (BIS-11-A; Fossati, Barratt, Acquarini, & Ceglie, 2002)***

This is a 30-item self-report questionnaire that measures impulsivity in adolescents. It has been modified from an adult version (BIS-11). Higher scores indicate greater impulsivity. The BIS-11-A has demonstrated satisfactory internal consistency ($\alpha$ = .78) in samples aged 13 to 19 years (Fossati et al., 2002). The internal consistency for the total sample in this study was $\alpha$ = .76.

**Statistical Analyses**

A confirmatory factor analysis (CFA) using LISREL 8.8 (Jöreskog & Sörbom, 2006) was conducted on the 12-item CPQ to test the two-factor solution proposed by Dickie et al. (2012) and Stoeber and Damian (2014). In order to reliably test a factor model CFA, 10 participants for each free parameter in the model are required (Kline, 2005). There are 26 free parameters in the proposed two-factor model of the CPQ. A minimum sample size for testing this model would therefore be 260, thus the sample size of $N$ = 267 was appropriate.

A range of fit statistics, each evaluating fit from a different perspective, was used to test model fit. These included the relative or normed $\chi^2$ (i.e., $\chi^2$ divided by its degrees of freedom), the comparative fit index (CFI), the non-normed fit index (NNFI), the standardised root mean square residual (SRMR), and the root mean square error of approximation (RMSEA). $\chi^2$ /*df* values no higher than 5 but preferably less than 3 indicate adequate fit (Hooper, Coughlan, & Mullen, 2008); CFI and NNFI values greater than .9 indicate adequate fit (Byrne, 1998; Hu & Bentler, 1999); SRMR values less than .08 indicate adequate fit (see also Hooper et al., 2008); and RMSEA 90% confidence intervals that encompass .08 indicate adequate fit (Hooper et al., 2008). To compare the goodness of fit of the non-nested CFA models, the Akaike Information Criterion (AIC; Akaike, 1987) and the Bayesian Information Criterion (BIC; Schwarz, 1978) were used. Smaller AIC and BIC values indicate a better fit (Long & Freese, 2006).

The composite reliability index (CRI; Graham, 2006) evaluated whether the items comprising each factor of the CPQ were measuring the same latent variable.

The CRI, like Cronbach's alpha, is a measure of internal consistency. Unlike Cronbach's alpha, which tends to underestimate internal consistency, the CRI corrects for measurement error and therefore provides a more accurate estimate of internal consistency (Graham, 2006). Convergent validity was tested by determining whether the CPQ total score and factor scores showed theoretically appropriate associations with measures of perfectionism, psychopathology, and personality traits. Hierarchical multiple regressions were then conducted to assess the incremental validity of the CPQ factor scores, after adjusting for the FMPS, in predicting the EDE-Q total score, the CET, the RSES, and the RCADS measures of major depression, total anxiety, and total internalising behaviours.

## Results

### Descriptive Statistics

Descriptive statistics for the sample are shown in Table 1. The means and standard deviations across all measures were not significantly different between the total sample and the subsample of adolescents (all *p*s ≥ .176). Seventy-two percent of the sample scored less than 1 standard deviation above the community EDE-Q mean for young adult women (i.e., < 2.77; Mond et al., 2006) on the EDE-Q Global score, meaning that the majority of the sample did not exhibit clinical levels of eating psychopathology. Eighteen percent of the sample was classified in the clinical range on the EDE-Q. On the RCADS Depression subscale, 84% scored within the normal range, 4% in the borderline clinical range, and 12% in the clinical threshold range. On the RCADS Anxiety subscale, 80% were in the normal range, 5% in the borderline clinical range, and 15% in the clinical range. On the RCADS Total Internalizing Scale, 78% scored within the normal range, 6% in the borderline clinical range, and 15% in the clinical range. To summarize, the sample was predominately non-clinical, however a small percentage did meet the clinical cut-offs on the RCADS.

Table 1

*Descriptive Statistics of Measures*

| Measures | *M* (SD) | Correlation with CPQ Total | Correlation with CPQ Factor 1 | Correlation with CPQ Factor 2 |
|---|---|---|---|---|
| FMPS Concern over Mistakes | 26.7 (7.52) | .60** | .46** | .61** |
| FMPS Personal Standards | 23.6 (4.83) | .68** | .71** | .40** |
| FMPS Parental Expectations | 14.4 (4.47) | .10 | .07 | .13* |
| FMPS Parental Criticism | 9.70 (3.72) | .22** | .12* | .29** |
| FMPS Doubts about Actions | 13.0 (3.21) | .52** | .38** | .54** |
| FMPS Organisation | 23.1 (4.38) | .25** | .36** | -.03 |
| EDE-Q Global score | 1.92 (1.39) | .22** | .05 | .42** |
| Compulsive Exercise Test Total | 2.29 (0.69) | .28** | .23** | .28** |
| RCADS Major Depression (T score) | 53.6 (13.8) | .39** | .21** | .53** |
| RCADS Total Anxiety (T score) | 54.2 (13.9) | .47** | .30** | .53** |
| RCADS Total Internalising (T score) | 54.4 (14.2) | .47** | .29** | .55** |
| Rosenberg Self-Esteem Scale | 16.2 (4.49) | -.37** | -.14* | -.56** |
| Self-Compassion Scale Mean Score | 1.65 (0.41) | -.51** | -.33** | -.58** |
| Barratt Impulsiveness Scale 11 Adolescent version | 68.6 (11.3) | -.08 | -.23** | .22** |

*Note*. CPQ = Clinical Perfectionism Questionnaire; FMPS = Frost Multidimensional Perfectionism Scale; EDE-Q = Eating Disorder Examination Questionnaire; RCADS = Revised Child Anxiety and Depression Scales.

*$p < .050$ **$p < .001$ level (two-tailed)

**Confirmatory Factor Analysis of the CPQ**

The CFA statistical model assumes multivariate normality across the items. Violations of multivariate normality inflate the chi-square statistic that is normally used to test model fit (Jöreskog & Sörbom, 1989). In these circumstances, Jöreskog and Sörbom (1989) recommend testing for model fit with a chi- square statistic that corrects for the inflation. Jöreskog (2004) argues that the Satorra-Bentler Scaled chi-square (SBS $\chi^2$) provides such a statistic. Because multivariate normality was violated in the current study ($\chi^2 = 39.15$, $p < .001$), the SBS $\chi^2$ was used to test model fit.

Model results are shown in Table 2. As anticipated, fit indices suggested that a one factor (i.e., unidimensional) model was not a good fit. The two-factor model suggested by previous studies (Dickie et al., 2012; Stoeber & Damian, 2014), with a factor representing perfectionistic strivings (Factor 1) and a factor representing perfectionistic concerns (Factor 2), provided a better fit according to the AIC and BIC indices but was a poor fit according to the other fit indices. An inspection of the item loadings revealed, as previous research has (Dickie et al., 2012; Stoeber & Damian, 2014), that Item 2 "Over the past month, have you tended to focus on what you have achieved, rather than on what you have not achieved?" (reverse scored) had a relatively low factor loading of .25 on Factor 2. Item 8 "Have you done just enough to get by" (reverse scored) also had a relatively low factor loading of -.11 on Factor 2. A corrected item- total correlation (CITC), which examined the correlation of each item with the sum of the remaining items, showed relatively weak CITCs for Item 2 (reverse scored, CITC = .105) and Item 8 (reverse scored, CITC = .076), providing further evidence that neither item contributed significantly to the perfectionistic concerns factor of the CPQ. Another CFA was conducted to determine whether the removal of Items 2 and 8 improved fit.

Table 2

*Confirmatory Factor Analyses – Model Fit Comparisons*

| Model | SBS$\chi^2$ | *df* | SBS$\chi^2$/*df* | CFI | NNFI | SRM R | RMSEA (90% CI) | AIC | BIC |
|---|---|---|---|---|---|---|---|---|---|
| 1-factor | 291.2 | 54 | 5.39 | .81 | .77 | .10 | .13 (.11, .14) | 2709 | 2796 |
| 2-factor | 189.0 | 53 | 3.57 | .89 | .87 | .09 | .10 (.08, .12) | 2612 | 2702 |
| 2-factor (without CPQ2r, CPQ8r) | 71.0 | 34 | 2.09 | .98 | .97 | .07 | .10 (.09, .12) | 1882 | 1958 |
| Second order factor (without CPQ2r, CPQ8r) | 70.9 | 33 | 2.15 | .98 | .97 | .07 | .11 (.09, .12) | 1884 | 1963 |

*Notes*: SBS$\chi^2$: Satorra-Bentler scaled chi-square; CFI: Comparative fit index; NNFI: Non-normed fit index; SRMR: Standardised root mean square residual; RMSEA: Root Mean Square Error of Approximation; CI: Confidence Interval; AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion; CPQ: Clinical Perfectionism Questionnaire.

All fit statistics indicated that the two-factor model without Items 2 and 8 provided a better fit than the two-factor model with Items 2 and 8 (see Table 2). Although the AIC and BIC for the two models were not directly comparable, because the models were derived from different albeit overlapping data sets, the other fit statistics clearly favoured the 10-item version of the two-factor model. The composite reliability estimates for Factors 1 and 2 were .78 and .82 respectively, indicating good internal consistency for these factors. All factor loadings were > |0.43|, and the correlation between factors was $r = .61$, $p < .001$. The parameter estimates for this model are presented in Figure 2.

Due to the relatively strong correlation between the two factors, a hierarchical factor model of the 10-item CPQ was tested. A model consisting of a second-order factor of clinical perfectionism driving two lower order factors of perfectionistic strivings and perfectionistic concerns was thus tested. This more complex hierarchical model provided a better fit for the data according to the Satorra-Bentler scaled chi-square ($SBS\chi^2$), but the improvement in fit was negligible (70.87 versus 70.97; see Table 2). When the chi-square was normed (i.e., divided by its degrees of freedom), the advantage was lost (2.15 versus 2.09). The simpler model also has marginally lower AIC and BIC values. These analyses dictate that the simpler two-factor model be selected.

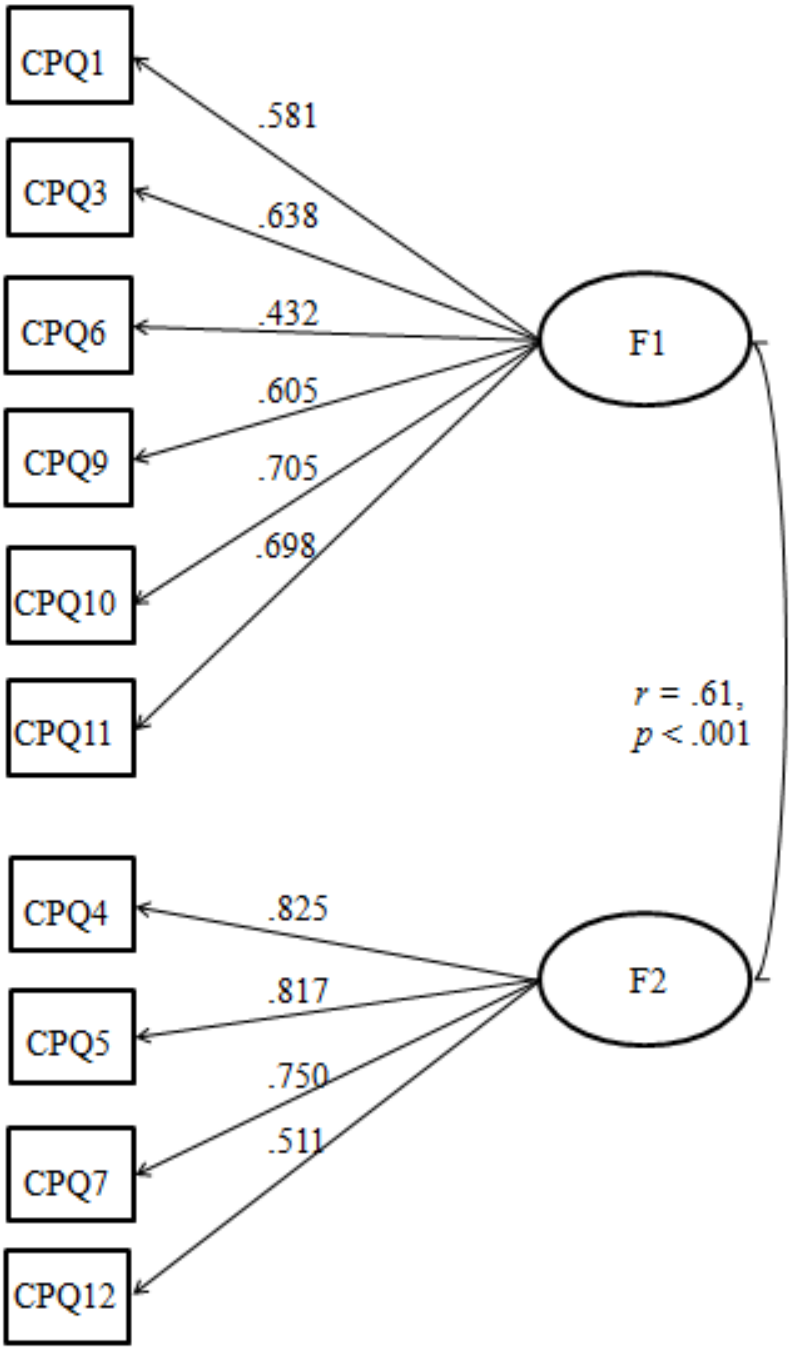


*Figure 2.* Best fitting model for CPQ. Standardised robust maximum likelihood parameter estimates are reported.

## Validity

### *Construct validity*

Consistent with our hypothesis, the CPQ demonstrated convergent validity through large significant correlations with Personal Standards and Concern over Mistakes on the FMPS (all *r*s ≥ .60, all *p*s < .001). The CPQ demonstrated weaker correlations with the Parental Expectations, Parental Criticism, and Organisation

subscales of the FMPS (all *r*s ≤ .25) (see Table 1).

As hypothesised, clinical perfectionism (CPQ total, that includes items 2 and 8) was positively correlated with eating disorder symptoms (EDE-Q Global), compulsive exercise (CET total), anxiety and depression (RCADS) (all *r*s ≥ .22, all *p*s < .001). Furthermore, the CPQ total score was negatively correlated with self-esteem (RSES) and self-compassion (SCS) (all *r*s ≤ - .37, all *p*s < .001). The CPQ demonstrated divergent validity through a weak, non-significant correlation with impulsivity (BIS-11-A) (*r* = -.08, *p* = .17).

Further, CPQ Factor 1 was more strongly correlated with Personal Standards subscale of the FMPS, while CPQ Factor 2 was more strongly correlated with Concern over Mistakes subscale of the FMPS, as expected. CPQ Factor 2 as compared to CPQ Factor 1 was more strongly correlated with psychopathology measures of EDE-Q Global, CET, RCADS Major Depression, RCADS Total Anxiety and RCADS Total Internalising. CPQ Factor 2 also had a stronger negative correlation with self-esteem and self-compassion than CPQ Factor 1 (see Table 1).

***Incremental validity***

A multiple hierarchical linear regression model showed that the FMPS total score accounted for 4.3% of variance in EDE-Q total (*p* = .001), CPQ Factor 1 accounted for an additional 0.5% of variance (*p* = .002), and CPQ Factor 2 accounted for an additional 16.5% of variance (*p* < .001). For the CET, FMPS accounted for 5.2% of the variance and CPQ Factor 1 accounted for an additional 1.9% variance, while CPQ Factor 2 accounted for an additional 2.2% variance (all *p*s < .001). In predicting RCADS Major Depression, the FMPS accounted for 23.8% of the variance, CPQ Factor 1 accounted for an additional 0.1% of the variance and CPQ Factor 2 accounted for an additional 11.5% of variance (all *p*s < .001). For RCADS Total Anxiety, FMPS accounted for 30.0% of the variance, CPQ Factor 1 accounted for an additional 0.1% of variance and CPQ Factor 2 accounted for an additional 7.2% (all *p*s < .001). In RCADS Total Internalising, the FMPS accounted for 30.7% of the variance, with CPQ Factor 1 accounting for an additional 0.1% of variance and CPQ Factor 2 accounted for an additional 8.6% (all *p*s < .001). For the RSES, FMPS accounted for 22.8% of the variance and CPQ Factor 1 accounted for an additional 1.1%, while CPQ Factor 2 accounted for an additional 16.5% of variance (all *p*s < .001).

**Discussion**

The results demonstrated the factorial validity, internal consistency, construct validity and incremental validity of a revised 10-item version of the CPQ in female late adolescents. Reliability results were similar to previous studies in adult samples (α range = .63 to .83, Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014) indicating acceptable internal consistency of the CPQ in community samples across males and females, adolescents and adults.

Consistent with previous exploratory factor analyses in adults (Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014), the confirmatory factor analysis in the present study indicated a two-factor model of the CPQ. CPQ Factor 1 was more strongly correlated with the Personal Standards subscale of the FMPS and measured the Perfectionistic Strivings dimension of determined pursuit of personally demanding, self-imposed standards (Dunkley et al., 2006), as represented by item 1 "Have you pushed yourself really hard to meet your goals?" and item 11 "Over the past month, have you kept trying to meet your standards, even if this has meant that you have missed out on things?". This is similar to the terms coined by previous researchers such as "personal standards" (Dickie et al., 2012), "perfectionistic strivings" (Stoeber & Damian, 2014) or "over-evaluation of striving" (Egan et al., 2016). Conversely, CPQ Factor 2 was more strongly correlated with the Concern over Mistakes subscale of the FMPS and measured the Perfectionistic Concerns dimension of overdependence of self-evaluation on pursuit of high standards (Dunkley et al., 2006), evidenced in item 4 "Over the past month, have you felt a failure as a person because you have not succeeded in meeting your goals?" and item 7 "Have you judged yourself on the basis of your ability to achieve high standards?". This is similar to previously identified constructs of "emotional concerns and consequences" (Dickie et al., 2012), "perfectionistic concerns" (Stoeber & Damian, 2014) or "concern over mistakes" (Egan et al., 2016). The two-factor model fitted with the two higher-order dimensions of perfectionism that have been consistently identified in research on the FMPS and HMPS, that is, Perfectionistic Strivings and Perfectionistic Concerns (Dunkley et al., 2006). The model also fitted with the theoretical definition of clinical perfectionism where the determined pursuit of personally demanding, self-imposed standards and overdependence of self-worth on achievement are key elements (Shafran et al., 2002).

The CPQ demonstrated good construct validity in this female adolescent and young adult sample through its large positive, significant correlations with the Personal Standards and Concern over Mistakes subscales of the FMPS and weak significant correlations with the Parental Expectation, Parental Criticism, Doubts about Action and Organisation subscales of the FMPS, consistent with previous studies in adults (Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014). The CPQ was positively correlated with measures of psychopathology, such as depression and anxiety symptoms in adolescents, as observed in previous studies with adults (Chang & Sanna, 2012; Egan et al., 2016). The present study extended previous research to include more measures of psychopathology including eating disorder symptoms and compulsive exercise, where positive correlations were found, and self-esteem and self-compassion where negative correlations were found. Further, this study is the first to demonstrate divergent validity for the CPQ, evident through a weak, non-significant correlation with impulsivity. Still this finding needs to be interpreted with caution: While impulsivity was not significantly correlated with CPQ total, impulsivity was negatively correlated with CPQ Factor 1, and positively correlated with CPQ Factor 2. The non-significant correlation between CPQ total and impulsivity may be a result of the effects of the two factors cancelling each other out. It is also interesting that a positive correlation was found between impulsivity and CPQ Factor 2, given that it would not be predicted for impulsivity to be positively correlated with any aspects of the CPQ. Given the caveats regarding the factor score results, further research is required to determine divergent validity of the CPQ as the current results cannot provide full support for divergent validity.

The incremental validity of the CPQ on measures of psychopathology and self-esteem suggested that the CPQ, in particular CPQ Factor 2, was able to explain variance in psychopathology above and beyond the FMPS. This is similar to the finding that CPQ Factor 2, but not CPQ Factor 1 was able to discriminate individuals with high negative affect scores among adults on the PANAS (Egan et al., 2016). This result fitted with the theory of clinical perfectionism (Shafran et al., 2002), given that CPQ Factor 2 (Perfectionistic Concerns) was strongly associated with psychopathology and low self-esteem and self-compassion. A clinical implication of this finding is that the CPQ is able to capture clinically relevant aspects of perfectionism, such as basing one's self-worth on achievement which is associated with depression, anxiety, disordered eating and lower self-esteem. There

are several cognitive- behavioural interventions that target perfectionism, as a problem in itself or as part of the treatment and prevention of psychological disorders (Dalle Grave et al., 2013; Egan et al., 2014b; Fairburn et al., 2003a; Musiat et al., 2014; Wilksch et al., 2008). Future research should investigate if the CPQ is a more suitable measure than the typically used MPS measures for prevention and treatment approaches that address perfectionism, and whether it is sensitive in capturing changes in perfectionism levels over time in intervention studies. Further, the CPQ may be able to assist in refining theoretical models of psychological disorders that include perfectionism as a predisposing or maintaining factor (Bardone-Cone et al., 2007; Egan et al., 2011; Fairburn et al., 2003a; Obsessive Compulsive Cognitions Working Group, 1997; Schmidt & Treasure, 2006). Since perfectionism has also been longitudinally predicted by the conscientiousness dimension of the "Big Five" (McCrae & Costa Jr, 1999; Stoeber, Otto, & Dalbert, 2009), the CPQ may be helpful in characterising how broad personality dimensions develop into clinically maladaptive character traits.

In line with previous research, items 2 and 8 did not make a significant contribution to the CPQ, evident in its low factor loadings and CITC values (Dickie et al., 2012; Stoeber & Damian, 2014). Items 2 and 8 are both the only reverse-scored items, consequently this finding may reflect general issues related to the measurement method. Reverse coded items perform poorly on factor analyses in a diverse range of samples (e.g., Bardeen, Fergus, & Orcutt, 2012; Cooper, O'Shea, Atkinson, & Wade, 2014; Idaszak & Drasgow, 1987; Rodebaugh et al., 2004), and this may be even more so in young people. Data suggest that reverse-scored items may lack fit with positively-scored items and can even generate artefactual factors (Spector, Van Katwyk, Brannick, & Chen, 1997). This is perhaps because they pose greater difficulty for the reader to interpret and carelessness in reading items.

Several recommendations arise from this study: First, it is recommended for future researchers to only use the 10 items of the CPQ as it has been demonstrated in the present study and previous studies (Dickie et al., 2012; Stoeber & Damian, 2014) that the reverse scored items 2 and 8 do not make a significant contribution to the CPQ. Further, in the present study, removing the two items provided a better fit for the two-factor model. Second, it is recommended that the CPQ can be used both as a total score and a two-factor scale. The total score fits with the definition of clinical perfectionism (Shafran et al., 2002) where the self-evaluation based on

striving is central to perfectionism associated with pathology, whereas the two-factor model fits with the perfectionism literature that focuses on perfectionistic strivings and perfectionistic concerns (for a review, see Limburg et al., 2017). As seen in Figure 1, CPQ Factor 1 includes CPQ Items 1, 3, 6, 9, 10 and 11, and represents Perfectionistic Strivings while CPQ Factor 2 includes CPQ items 4, 5, 7 and 12, and represents Perfectionistic Concerns. Third, it may be helpful to label CPQ Factor 1 as "Perfectionistic Strivings" and CPQ Factor 2 as "Perfectionistic Concerns" in future studies given that they map onto those two dimensions of perfectionism that are commonly identified by the researchers in the perfectionism field (Dunkley et al., 2006; Limburg et al., 2017).

The limitations of the study included recruitment through convenience sampling, which may have led to a more homogenous, biased sample. Furthermore, the RCADS was used to measure depressive and anxiety symptoms for university students up to 19 years old in the sample despite it being designed for students from Year 3 to Year 12 (approximately 9 to 18 years old). This was because the original aim was to recruit participants under 18 years old, but recruitment was difficult and the study was expanded to also include those up to 19 years old given the age of onset of eating disorders peak between 14 to 19 years for adolescent female (Allen et al., 2013; Lewinsohn et al., 2000; Smink et al., 2012; Stice et al., 2013b). Still, the excellent internal consistency of the RCADS in this study suggested that it was a reliable measure for our sample. Another limitation related to the cross-sectional nature of the data, and we were thus unable to assess test-retest reliability. Also, the study only examined the CPQ in a sample of females so the findings cannot be generalised to males. Finally, the mean age of the sample (17.8 years) were not much lower than previous adult studies examining the psychometric properties of the CPQ. Still, it is the first study of the psychometric properties of the CPQ to have included adolescents, which is crucial given that the age of onset of eating disorders peak between 14 to 19 years for female adolescents, with a trend toward earlier age of onset and increasing prevalence (Allen et al., 2013; Lewinsohn et al., 2000; Smink et al., 2012; Stice et al., 2013b). Moreover, there were no differences between means and standard deviations across all measures between the adolescent sample and total sample (all $ps \geq .176$), suggesting possible similarities between the adolescent and adult samples. Future studies can recruit younger participants to specifically study the psychometric properties of the CPQ in a child and/or

adolescent sample and confirm the factor structure in a younger population.

## Conclusion

In conclusion, this study demonstrated the reliability and validity of the CPQ in a female adolescent and young adult community sample. Findings afford promising new opportunities for using the CPQ to hone theoretical models of personality and psychopathology.

# CHAPTER 3 Study Two: A Randomised Controlled Trial Investigating Online Cognitive Behavioural Therapy for Perfectionism to Prevent Eating Disorder Symptoms

Perfectionism has been implicated in the development and maintenance of eating disorders, where individuals with eating disorders hold extremely high standards regarding their body shape, weight and eating, and ability to control these (Fairburn, 2008; Fairburn et al., 2003a). Individuals with eating disorders judge their self-worth largely or even exclusively on their ability to achieve shape and weight control, often through rigid extreme dietary restraint (Fairburn, 2008; Fairburn et al., 2003a). Further, perfectionism is a risk factor for psychological problems that are often comorbid with eating disorders, such as depression and anxiety (Egan et al., 2011). Hence, perfectionism is a transdiagnostic mechanism, herein defined as a process occurring over multiple disorders and is a cognitive or behavioural process contributing to the development and maintenance of a disorder (Egan et al., 2011).

Numerous studies have examined the efficacy of cognitive behaviour therapy for perfectionism (CBT-P) and found it reduced symptoms of depression, anxiety and eating disorders (for reviews, see Egan et al., 2011; Lloyd et al., 2015). This suggested that CBT-P can reduce a range of psychological symptoms including eating disorders and improve low self- esteem, a known risk factor of eating disorders (Fairburn et al., 2003a; Schmidt & Treasure, 2006).

While there is a growing evidence base regarding targeting perfectionism to treat psychological disorders, there is a paucity of prevention studies which have examined the effects of targeting perfectionism on eating disorders and associated comorbidities, particularly in adolescents. The difficulties associated with perfectionism led to a framework being proposed for the prevention of perfectionism in young people (Flett & Hewitt, 2014). The framework advocated for extensive, multifaceted prevention programs that directly targets perfectionism, given that prevention programs that explicitly focus on reducing perfectionism (Wilksch et al., 2008) were more effective than programs without an explicit and extensive focus on perfectionism (e.g., Coughlin & Kalodner, 2006; McVey et al., 2004) in preventing eating disorder symptoms.

As far as the author is aware, there is only one study to date in the literature

targeting perfectionism to prevent eating disorder symptoms. It compared the efficacy of a perfectionism program to a media literacy program and a no intervention control group for 127 female adolescents with a mean age of 15 years (Wilksch et al., 2008). The perfectionism program was a face-to-face classroom intervention comprising eight 50 minute lessons. It was interactive, rather than didactic, and was developed based on a self-help book "When Perfect Isn't Good Enough" (Antony & Swinson, 1998). The content of the perfectionism program included the introduction of perfectionism, the unhelpful effects associated with perfectionism, the causes and maintenance of perfectionism, ways to challenge unhelpful thinking and behaviours associated with perfectionism, reframing failure and the negative impact of avoiding mistakes, and developing a coping plan to overcoming perfectionism. Results showed that the perfectionism group had significantly lower scores on the Concern over Mistakes subscale of the FMPS as compared to both the media literacy and control groups at 3-month follow-up ($d$ = 0.45). The perfectionism group also had a lower score on the Personal Standards subscale on the FMPS as compared to the media literacy group ($d$ = 0.44). While both programs did not reduce the primary outcome variable of shape and weight concerns across the entire sample, moderator analyses suggested that female adolescents who were at high risk of developing an eating disorder (defined by the authors as shape and weight concern score ≥ 4 on the EDE-Q) and in the perfectionism group experienced the greatest amount of improvement at 3-month follow-up as compared to high-risk participants in the media literacy or control groups. Specifically, 57% of high-risk participants in the perfectionism program experienced clinically significant reductions in shape and weight concerns at 3-month follow-up, whereas only 38% of the high-risk participants in the media literacy group and 33% of the high-risk participants in the control group experienced clinically significant reductions in shape and weight concerns. Likewise, at 3-month follow-up, 57% of high-risk participants in the perfectionism program experienced clinically significant reductions in dieting, as compared to 25% of high risk participants in the media literacy group and 17% of high risk participants in the control group. This suggested that targeting perfectionism can help reduce Perfectionistic Strivings and Perfectionistic Concerns in female adolescents, and can reduce eating disorder risk factors such as shape and weight concerns, and dieting in female adolescents at high risk of developing an eating disorder. Wilksch et al.

(2008) provided several directions for future studies. First, extend the follow-up period of three months to at least six months, which is the recommended minimum follow-up period for prevention studies (Stice & Shaw, 2004). Second, include a measure of eating disorder symptoms, not just dieting, shape and weight concern to accurately determine whether the eventual outcome of eating disorders can be prevented. Third, conduct a controlled evaluation of prevention programs to understand the type of programs that best suit specific populations.

Indeed, the tendency for the majority of prevention studies to only measure risk factors as their dependent variables, and exclude levels of eating pathology and clinical status of eating disorders as primary dependent variables has been noted in meta-analyses such as Stice and Shaw (2004) and Stice et al. (2007). Therefore, the majority of prevention studies in the eating disorder field have examined risk factor reduction studies rather than true prevention due to insufficient scientific rigor (Becker, 2016; Watson et al., 2016). This can lead to an erroneous conclusion of the efficacy of prevention studies because a reduction in risk factors does not necessarily result in reduction of eating disorder symptoms and clinical statuses (for details, see the Defining and Assessing Prevention Effects section in Chapter 1).

Moreover, researchers in the prevention field tend to only measure effect sizes to determine the efficacy of interventions. However, that does not distinguish between treatment effects and prevention effects (Gillham et al., 2000; Horowitz & Garber, 2006; Nehmy, 2010). A treatment effect is defined as improvements in symptomatology or diagnoses in comparison to controls in pre- to post-intervention analyses (Gillham et al., 2000). A prevention effect is defined as a true decrease in prospective risk if the control group demonstrates increased symptomatology and/or diagnosis compared to the intervention group which has an absence of an increase in symptoms over time (Gillham et al., 2000). Moreover, it is not standard practice for prevention studies to examine clinical significance (Watson et al., 2017), despite it being routine for treatment studies, and there is no predefined approach to examine this issue in prevention research (Shochet et al., 2001). Again, this brings into question whether an intervention is truly preventative, given that most prevention studies have only described statistical significance in terms of effect sizes, but not clinical significance that involve clinically important changes that capture whether an individual may have moved between categories of “recovered”, “improved”, “unchanged”, or “deteriorated” (Jacobson & Truax, 1991). These issues have been

discussed in-depth in Chapter 1, under the section of Defining and Assessing Prevention Effects.

In addition to addressing these gaps in the prevention literature, and taking up the suggestions of Wilksch et al. (2008), the present study aimed to use an online rather than face-to- face delivery of a prevention program. Adolescents tend to use the Internet to seek psychological help and/or information when they require psychological help (Nicholas et al., 2004) and access the Internet as frequently as they seek help from mental health professionals such as school counsellors, psychiatrists and psychologists (Australian Psychological Society, 2005). Online programs can be particularly helpful for eating disorder prevention as it offers confidentiality and anonymity to individuals who may be reluctant to seek help due to shame (Leibert et al., 2006). Anonymity also reduces pressures to conform to societal norms that focus heavily on appearance, enabling participants to openly examine eating, weight and shape concerns (Zabinski et al., 2003). Exploring eating disorder related concerns can be particularly difficult in face-to-face classroom interventions, where there may be implicit or explicit peer pressure to conform to societal norms of thin idealisation, a known risk factor of eating disorder (Stice, 2001).

Therefore, the present study aimed to develop and evaluate the efficacy of an online prevention program. Results from a recent meta-analysis suggested a small but growing evidence base of online prevention of eating disorders, with most online prevention programs being based on cognitive behavioural theory and being successful in reducing eating disorder symptoms at post-intervention and at up to 15-months follow-up (Melioli et al., 2016). Building on the work by Wilksch et al. (2008), the present study developed a perfectionism program that follows an empirically supported and theoretically driven intervention protocol. The perfectionism program for the present study is based on a published CBT self-help manual for perfectionism from the book “Overcoming Perfectionism: A self help guide using cognitive behavioural techniques” by Shafran et al. (2010). The material is tied to the transdiagnostic theory of clinical perfectionism (Shafran et al., 2002), the transdiagnostic theory of eating disorders (Fairburn et al., 2003a) and the treatment techniques used in the clinical perfectionism module of enhanced cognitive behavioural therapy for eating disorders (Fairburn, 2008). Given that the prevention target is clinical perfectionism, it is appropriate to use the Clinical

Perfectionism Questionnaire (CPQ; Fairburn, Cooper, & Shafran, 2003) which is intended to specifically measure clinical perfectionism, to capture changes over time and across groups in this study. Further, it has been validated in a similar population of female youths in the first part of this research as described Chapter 2. Given that eating disorders affect females more than males, and has a peak incidence between 14 to 19 years (Allen et al., 2013; Lewinsohn et al., 2000; Smink et al., 2012; Stice et al., 2013b), and the consistent findings that selective prevention focusing on females yields larger effects than universal prevention studies of mixed sex (Dalle Grave, 2003; Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016), this study targeted the subgroup of female youths aged 14 to 19, making it a selective prevention study.

This study was a randomised controlled trial. It compared three groups: online CBT-P, online CBT for nonspecific stress management (CBT-S) which served as an active control, and a waitlist control where participants did not receive either intervention. It was predicted that participants in the CBT-P group will show significantly lower symptoms in clinical perfectionism, symptoms of eating disorders, depression and anxiety, and higher increases in self-esteem as compared to CBT-S group, which will show significantly greater reductions than the waitlist control group. It was also hypothesised that the pre-post changes in perfectionism will account for the pre-post changes in symptoms. Finally, it was predicted that all changes will be maintained at 3- and 6-month follow-up. The specific hypotheses are as follows:

## Hypotheses

### *Prevention effects of the interventions on perfectionism*

H1. CBT-P will be significantly superior to CBT-S, which will be significantly superior to waitlist control in decreasing CPQ Factor 1 (Perfectionistic Strivings) across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

H2. Reliable and clinically significant deterioration in CPQ Factor 1 (Perfectionistic Strivings) will be significantly greater in waitlist control than CBT-S, which will be significantly greater than CBT-P across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6- month follow-up).

H3. CBT-P will be significantly superior to CBT-S, which will be significantly superior to waitlist control in decreasing CPQ Factor 2 (Perfectionistic Concerns) across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

H4. Reliable and clinically significant deterioration in CPQ Factor 2 (Perfectionistic Concerns) will be significantly greater in waitlist control than CBT-S, which will be significantly greater than CBT-P across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6- month follow-up).

***Prevention effects of the interventions on psychopathology***

Primary outcome: Eating disorder symptoms

H5. CBT-P will be significantly superior to CBT-S, which will be significantly superior to waitlist control in decreasing eating disorder symptoms across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

H6. Reliable and clinically significant deterioration in eating disorder symptoms will be significantly greater in waitlist control than CBT-S, which will be significantly greater than CBT-P across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

Secondary outcome: Depressive symptoms

H7. CBT-P will be significantly superior to CBT-S, which will be significantly superior to waitlist control in decreasing depressive symptoms across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

H8. Reliable and clinically significant deterioration in depressive symptoms will be significantly greater in waitlist control than CBT-S, which will be significantly greater than CBT-P across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

Secondary outcome: Anxiety symptoms

H9. CBT-P will be significantly superior to CBT-S, which will be significantly superior to waitlist control in decreasing anxiety symptoms across time (pre-test to post-test, pre-test to 3- month follow-up, pre-test to 6-month follow-up).

H10. Reliable and clinically significant deterioration in anxiety symptoms will be significantly greater in waitlist control than CBT-S, which will be significant greater than CBT-P across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

Secondary outcome: Self-esteem

H11. CBT-P will be significantly superior to CBT-S, which will be significantly superior to waitlist control in increasing self-esteem across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

H12. Reliable and clinically significant deterioration in self-esteem will be significantly greater in waitlist control than CBT-S, which will be significant greater than CBT-P across time (pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up).

## Method

### Participants

Participants were recruited through advertisements on radio stations, schools, online mental health services and social media seeking young females who experience difficulties with perfectionism (see Appendix A for study flyer). Participants did not have to meet a specific perfectionism cut-off to be included in the study as is common in other studies of CBT for perfectionism (e.g., Rozental et al., 2017; Shafran et al., 2017). In order to be accepted into the study, participants had to meet the inclusion criteria; that is, (a) female, 14 to 19 years old; (b) Internet access either at home or at a location where regular use is possible (e.g., school, library); (c) adequate English language skills; (d) access to a General Practitioner who would be able to monitor their physical health; (e) if applicable, participants on antidepressant medications had to be on a stable dose for at least a month prior to the study and be willing to remain on the same dose during the study. Exclusion criteria were: (a) currently undergoing psychological therapy, (b) current diagnosis of a clinical eating disorder.

Figure 3 illustrates a flow chart of participants according to CONSORT guidelines (Schulz et al., 2010). Of the eight participants who were ineligible, two (25%) scored $\geq 2$ on the SCOFF (Morgan, Reid, & Lacey, 1999), suggesting possible diagnosis of eating disorders, four (50%) had serious suicidality according to the Mini International Neuropsychiatric Interview Kid (MINI-Kid; Sheehan et al., 1998) B1 suicidality module, and two (25%) withdrew. The final sample was 94 (92%) of 102 participants who initially expressed interest. Participants' age ranged

from 14 to 19 years ($M$ = 16.2, $SD$ = 1.81), with 65 participants under the age of 18 years (69.1%). At pre-test, there were 25 participants below the age of 18 in the CBT-P (69.4%), 26 participants under 18 years in the CBT-S (76.5%), and 14 participants below 18 years old in the waitlist control group (58.3%). There were no significant differences in age across the three groups, $F(2, 91) = 1.58$, $p = .212$.

### Procedure

Prior to recruitment, ethics approval was obtained from the Human Research and Ethics Committee of Curtin University (HR187/2013) and the study was registered as a clinical trial on the Australian New Zealand Clinical Trials Registry (ANZCTR), ACTRN: 12615000128594. Potential participants who responded to the study advertisement were directed to the study website (www.be-you-tiful.com.au) where they read the study information sheet and completed an online adolescent consent form. For potential eligible participants who were under 18 years of age, their parents/caregivers had to read the information sheet and complete an online parental consent form. Participants were then contacted by telephone to briefly discuss the study, to be screened for eating disorders and suicidality.

#### *Screening*

Participants who expressed an interest in participating in the study were screened for eating disorders using the SCOFF questionnaire (Morgan et al., 1999) and suicidality using the B1 suicidality module of MINI-Kid (Sheehan et al., 1998). The SCOFF (Morgan et al., 1999) is a screening tool for eating disorders with five questions addressing the core features of anorexia nervosa or bulimia nervosa. A point is scored for every "yes" response and a score of two or greater indicates a likely case of anorexia nervosa or bulimia nervosa. In primary care and community settings, the two-item cut-off point has yielded a sensitivity ranging from 53 to 85%, specificity ranging from 73 to 90% and positive predictive value ranging from 24 to 67% for females (Cotton, Ball, & Robinson, 2003; Hill, Reid, Morgan, & Lacey, 2010; Luck et al., 2002; Mond et al., 2008; Parker, Lyons, & Bonner, 2005). Potential participants who endorsed two or more items were excluded from the study and advised to contact their local GP for a full assessment. Parents of at-risk adolescents below 18 years of age were notified.

The Mini International Neuropsychiatric Interview Kid (MINI-Kid; Sheehan

et al., 1998) B1 suicidality module was used to screen for suicidality in the past week. It is a short, valid and reliable diagnostic measure of suicidality in the population aged 6 to 17 years which has a high interrater reliability and good retest reliability (Sheehan et al., 2010). To participate in the study, participants could not endorse any of the three questions on the module. Participants who endorsed these questions were advised to be fully assessed by their local GP, and provided with state and national helplines, as well as online help. Parents of at-risk adolescents below 18 years of age were notified, provided with helplines and encouraged to monitor the adolescent's safety. Parents were also advised to discuss the safety of their adolescent, to ensure that they were supervised in the near future and to see their GP should there be any changes in their behaviour.

***Randomisation***

After the adolescents were screened and deemed eligible for the study, they were registered as participants for the trial and each individual participant's data was assigned a unique identification number. They were then asked to complete the outcome measures for pre-test assessment online. After pre-test assessment, participants were randomly assigned to one of the three groups (CBT-P, CBT-S, waitlist control). The study was a randomised controlled trial comparing two active treatments: CBT-P, CBT-S with a waitlist control group which conformed to CONSORT guidelines (Moher, Schulz, & Altman, 2001).

Participants were assigned following block randomisation procedures to try to ensure equal numbers among the groups. The random allocation sequence list was generated by a clinical psychologist trainee at Curtin University (SM), who was independent of the study, using the Random Allocation Software (Saghaei, 2004). The randomisation sequence was a fixed block size of six for the three groups. The allocation sequence was concealed from the researcher and supervisors by having SM keep the list. SM contacted the participants who completed the pre-test assessments via email and provided them with the group they were randomly assigned to, as well as the method to access the password-protected CBT-P and CBT-S programs.

Participants in the CBT-P and CBT-S groups were informed of the general expectations of the active interventions (e.g., one to two hours weekly, for four to eight weeks) and were recommended to complete their program over four weeks,

averaging two sessions per week. Weekly generic emails and text messages, with only changes made to names of participants were sent to remind participants (and parents of participants under 18) to complete their sessions. If participants were not responsive, phone calls were made to encourage continuation of the program. If participants were under 18 years of age parents in the CBT-P (*n* = 25, 69.4%) and CBT-S (*n =26*, 76.5%) groups received a parent newsletter via email to support the young participant to apply the skills learnt in the sessions to daily living. Participants in the waitlist control group were informed that they have been allocated to the control group and were offered the intervention of their choice after the 6-month follow-up period.

All participants were asked to complete outcome measures for pre-test assessments, post- treatment (or four weeks from pre-test assessment for those in waitlist control group) and at 3- and 6-month follow-up from post-treatment using a secure online web-hosting platform (Qualtrics, 2015). To encourage completion of post-treatment and follow-up questionnaires, participants in the active interventions received a feedback report that compared the level of clinical perfectionism at pre-test with the respective time points. Participants in the waitlist control group were encouraged to complete the questionnaires by sending a generic email and text explaining the time taken (approximately 20 minutes), the purpose of the waitlist control, and how they were contributing to the research, and sending them a text message to thank them for their time after they had completed the questionnaire.

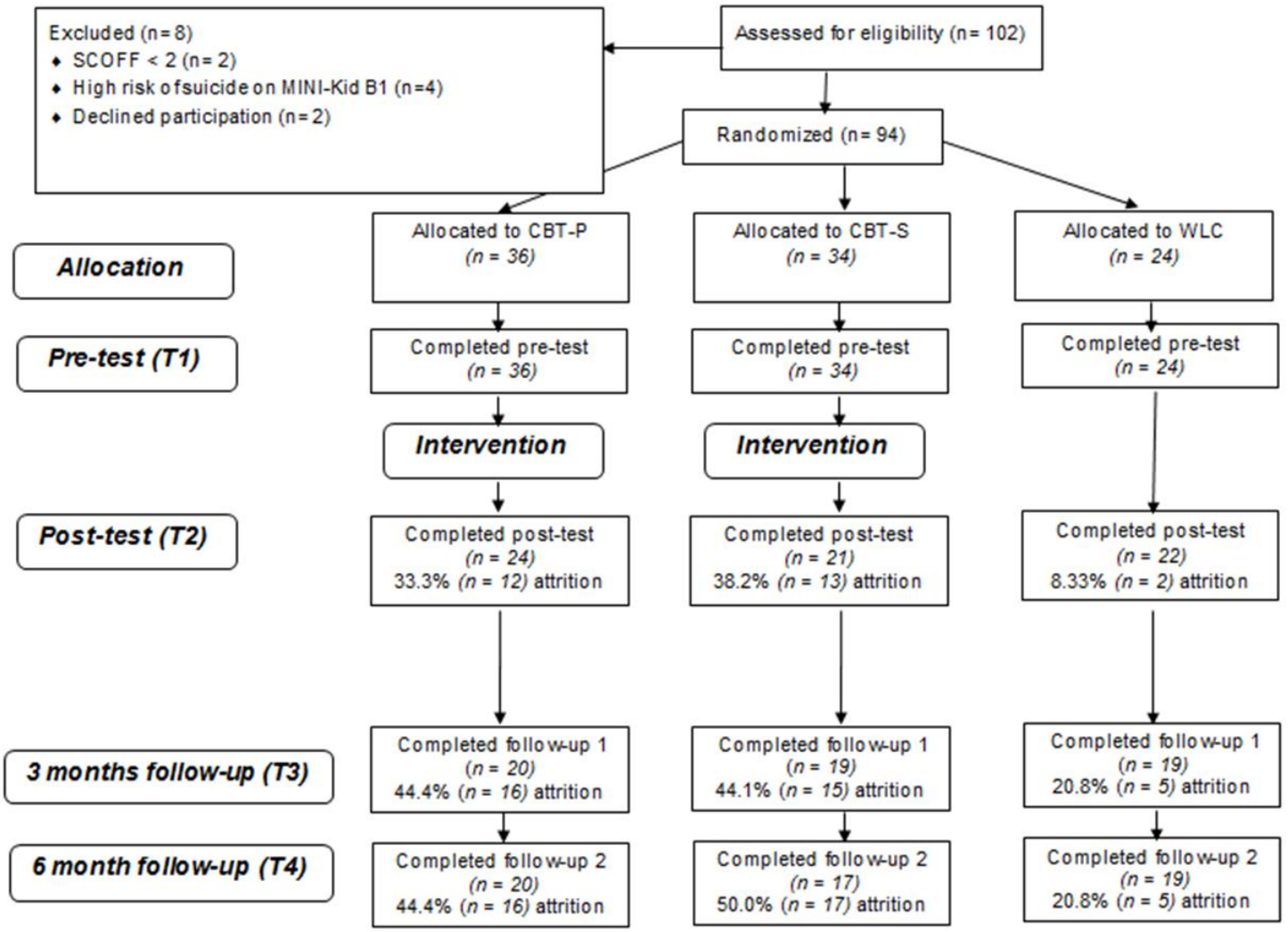


*Figure 3.* CONSORT diagram of participants' progress through the phases of the randomised controlled trial indicating total attrition rates at each stage.

**Measures**

The Clinical Perfectionism Questionnaire (CPQ; Fairburn et al., 2003b) is a 12-item self- report measure of clinical perfectionism (Shafran et al., 2002). Participants rated items using a four-point Likert scale to indicate the extent to which each item describes them over the past month. Scores range from 12 to 48, where higher scores indicate greater clinical perfectionism. The CPQ has sufficient internal consistency, convergent validity and predictive validity (Chang & Sanna, 2012; Dickie et al., 2012; Steele, O'Shea, Murdock, & Wade, 2011). A Confirmatory Factor Analysis (see Chapter 2) confirmed the two-factor model of the CPQ with CPQ Factor 1 representing Perfectionistic Strivings (items 1, 3, 6, 9, 10 and 11), and CPQ Factor 2 representing Perfectionistic Concerns (items 4, 5, 7 and 12). Items 2 and 8 were not included as they did not make a significant contribution to the CPQ model fit. The internal consistency of CPQ Factor 1 (Perfectionistic Strivings) and CPQ Factor 2 (Perfectionistic Concerns) were $\alpha$ = .68 and $\alpha$ = .75 respectively in this study. These were considered acceptable because for scales with less than 10 items, a Cronbach's alpha of around .6 will generally suffice (Loewenthal, 2001). Comparatively, for scales with 10 or more items, a Cronbach's alpha of greater than or equal to .7 indicates good internal consistency (Tabachnick & Fidell, 2007).

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) is a self-report version of the "gold standard" Eating Disorder Examination (EDE) clinician- administered interview (Fairburn & Cooper, 1993). It measures eating psychopathology over the past 28 days. The 28 items in the EDE-Q are divided into four subscales of eating psychopathology; restraint, eating concerns, shape concerns and weight concerns, which can be added together to form a global score of overall eating psychopathology. All items are measured using a seven-point Likert scale. Global EDE-Q score, rather than the subscale scores was used in the statistical analysis: First, global EDE-Q score is more reliable than subscale scores, with Cronbach's alpha values ranging from .65 to .93 for subscale scores and $\geq$ .90 for the global score (Penelo, Negrete, Portell, & Raich, 2013). Second, cut-offs for clinically significant eating disorder psychopathology have been based on the global score, rather than subscale scores (Carter et al., 2001; Mond et al., 2004). This is particularly important in determining the effect sizes and clinically significant changes across the three conditions. A cut-off point for clinical significance of four or more points on the global score has been suggested (Carter et al., 2001), while an

empirically derived threshold ≥ 2.30 for the global score has also been noted (Mond, Hay, Rodgers, Owen, & Beumont, 2004). Given that the cut-off of four or more points were based on data from female adolescents aged 12 to 14 years, and the empirically derived threshold to be derived from females aged 18 to 45 years, it would be more suitable, although not ideal, to use the latter cut- off because the age range overlaps partially with our sample. The EDE-Q is reliable and valid (Fairburn & Beglin, 1994), including among adolescents (Binford, Le Grange, & Jellar, 2005). The EDE-Q has been used for online interventions in adolescents (Celio et al., 2000; Doyle et al., 2008). The internal consistency of the global EDE-Q was excellent in this study, $\alpha$ = .96.

The Revised Child Anxiety and Depression Scales (RCADS; Chorpita et al., 2000) is a 47-item self-report questionnaire, with scales corresponding to separation anxiety disorder, social phobia, generalised anxiety disorder, panic disorder, obsessive compulsive disorder, and major depressive disorder. Participants rate how often each item applies to them on a four-point Likert scale. It also yields a Total Anxiety Scale (sum of the five anxiety subscales) and a Total Internalising Scale (sum of all six subscales). A T-score ≥ 65 indicates scores within a borderline threshold, while a T-score of ≥ 70 indicates clinical threshold of a disorder. Several studies have demonstrated support for the RCADS in non-referred samples of youth (Chorpita et al., 2000; de Ross et al., 2002). The internal consistency for the major depressive disorder subscale was good in this study, $\alpha$ = .88 while the internal consistency of the Total Anxiety scale was excellent in this study, $\alpha$ = .94.

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) is a 10-item self-report measure of global self-esteem. The items are answered on a four-point Likert scale, ranging from 0 to 30, with higher scores indicating higher self-esteem. Scores ranging from 0-15 indicates Low Self Esteem, 15-25 Normal Self-Esteem, and 25-30 High Self-Esteem (Rosenberg, 1965). It has good reliability and validity for use with female adolescents (Rosenberg, 1965). The internal consistency of the RSES was $\alpha$ = .87 (good).

### Treatment Credibility

The Credibility/Expectancy Questionnaire (CEQ; Devilly & Borkovec, 2000) was administered at pre-test assessment. It is a 6-item questionnaire that assesses cognitions and affect regarding credibility of treatment. Participants

indicated on a 9-point Likert scale what they think or feel about the programs. It has acceptable internal consistency for the credibility ($\alpha$ = .79) and expectancy ($\alpha$ = .81) scales (Devilly & Borkovec, 2000). Each scale can have a score ranging from 3 to 27, with a higher score indicating greater credibility and expectancy of treatment. The internal consistency of the credibility and expectancy subscales in this study were good ($\alpha$ = .81, $\alpha$ = .84 respectively).

Adherence to treatment was measured at the end of each session using the feedback questionnaire which has four questions measuring the compliance in completing the readings (e.g., "How much of the readings did you read?") and is derived from a compliance measure in a self-help book for treating bulimia nervosa (Thiels, Schmidt, Treasure, Garthe, & Troop, 1998).

**Interventions**

The interventions were unguided online self-help. Therapist contact only involved reminders to complete the program during the intervention, and a therapist feedback report at post intervention. The CBT-P program was based on "*Overcoming perfectionism: A self help guide using cognitive behavioural techniques*" (Shafran et al., 2010) while the CBT-S program which served as an active control was based on a published CBT self-help manual for stress "*Overcoming Stress: A self-help guide using cognitive-behavioural techniques*" (Brosan & Todd, 2009). Each book had two major components: psychoeducation and learning new skills to overcome perfectionism or stress. They were reviewed and modified by Dr Sarah Egan and A/Prof Hunna Watson who are experts in the area of eating disorders, perfectionism and CBT, as well as the author to produce two eight-session online programs that were interactive and suitable for adolescents. The programs included text and graphics (e.g., illustrations, charts, photographs, videos) to stimulate learning (Clark, Mayer, & Thalheimer, 2003). The topic of content for each session of the CBT-P and CBT-S programs are outlined in Table 3 and 4 respectively.

It is worth mentioning that there may appear to be some areas of overlap between the CBT-P and CBT-S programs, such as procrastination and time management. However, the CBT- P program encouraged participants to monitor their own procrastination behaviours in the context of their perfectionistic thinking, feelings and behaviours. The program also encouraged participants to explore

various perfectionistic beliefs that perpetuated procrastination before introducing the solutions of exploring the pros and cons of procrastination and challenging the perceived benefits; breaking the tasks into smaller, manageable, steps; and using problem solving. In the CBT-S program, the component addressing procrastination was much smaller, hence the emphasis was not on exploring the reasons for procrastination. Rather the session focused on providing solutions to procrastination, which included the same solutions proposed in CBT-P namely weighing the pros and cons of procrastination, breaking a task down and problem solving. Therefore, there was overlap between the programs in the solutions proposed for overcoming procrastination, but not in the degree of in-depth exploration where CBT-P linked it with perfectionistic beliefs and behaviours. Likewise, time management was addressed in both CBT-P and CBT-S programs but was delivered differently. For CBT-P, the emphasis was on balancing achievement and pleasure, and the aim was to encourage participants to actively increase pleasant events and activities and decrease time spent on achievement oriented activities. For CBT-S, the emphasis was on prioritizing tasks by determining their importance and urgency, making a list to plan their time wisely.

Table 3

*Topic of Content for Each Session of Cognitive Behaviour Therapy for Perfectionism*

| Session | Topic |
|---|---|
| 1 | Defining perfectionism and identifying maintaining factors |
| 2 | Individualised formulation of perfectionism |
| 3 | Enhancing motivation to change perfectionism |
| 4 | Psychoeducation, self-monitoring and surveys |
| 5 | Behavioural experiments, challenging dichotomous thinking |
| 6 | Challenging unhelpful thinking styles |
| 7 | Procrastination, time management, pleasant events |
| 8 | Self-criticism versus self-compassion, self-evaluation and relapse prevention |

Table 4

*Topic of content for each session of Cognitive Behaviour Therapy for Stress*

| Session | Topic |
|---|---|
| 1 | Defining stress and its effects on physical health |
| 2 | Recognizing symptoms of stress, the role of thinking in stress |
| 3 | Different coping styles in response to stress |
| 4 | Individualised formulation of stress, challenging Stressful Automatic Thoughts |
| 5 | Identifying and challenging stressful behaviours and stressful relationships |
| 6 | Time management |
| 7 | Procrastination, worry and how to challenge them |
| 8 | Self-care, relaxation techniques and relapse prevention |

**Statistical Analyses**

Generalised Linear Mixed Models (GLMM) was used to test for differential changes in outcomes between intervention and control groups, and effect sizes to measure the efficacy of interventions. GLMM was chosen because it is able to accommodate the violations of normality and homogeneity of variance, and sphericity. It is robust to unequal group sizes, and most importantly, it is less sensitive to participant attrition which is common in interventions because it does not rely on participants providing data at every point, thereby optimising statistical power (Elobeid et al., 2009).

In addition to using GLMM, this research considered clinical significance in order to clearly distinguish between prevention effects and treatment effects. This has yet to be examined in the majority of prevention studies (Watson et al., 2017). Measuring effect sizes and statistical significance does not distinguish between treatment effects and prevention effects (Gillham et al., 2000; Horowitz & Garber, 2006; Nehmy, 2010). Prevention effects occur when the control group demonstrates increased symptoms compared to the intervention group which has an absence of an increase in symptoms over time (Gillham et al., 2000), while treatment effects occurs when there are reductions in symptoms in the intervention group as compared to control in pre- to post-intervention analyses (Gillham et al., 2000). To measure prevention effects, it was crucial to examine clinical significance (Jacobson &

Truax, 1991) so as to accurately determine whether an intervention has produced a clinically important change that is reliable, not just one that is statistically significant (Jacobson & Truax, 1991). Those who did not receive the CBT-P intervention, would be expected to deteriorate over time (i.e., develop greater eating disorder, depression, anxiety symptoms, and lower self-esteem), whereas those who received the CBT-P intervention would be less likely to show such deterioration (i.e., a prevention effect had occurred).

***Generalised Linear Mixed Models (GLMMs)***

A series of GLMMs, one for each of the six outcome measures, was developed in order to test for treatment and prevention effects. The GLMMs were implemented through SPSS's (Version 22) GENLINMIXED procedure. The GLMM represents a special class of regression model. The GLMM is "generalised" in the sense that it can handle outcome variables with markedly non-normal distributions. The GLMM is "mixed" in the sense that it includes both random and fixed effects. Each of the present GLMMs included one nominal random effect (participant), one nominal fixed effect (group: CBT-P, CBT-S, waitlist control), one ordinal fixed effect (pre-test, post-intervention, 3-month follow-up, 6-month follow-up), and one 2-way interaction (Group x Time).

***Statistical assumptions***

One of the assumptions of this approach is that data are missing at random. Little's Missing completely at random (MCAR) test was non-significant, $\chi^2$ (54) = 67.1, $p$ = .109, indicating that the assumption was satisfied. The GLMM "robust statistics" option accommodated violations of normality and homogeneity of variance. Violations of sphericity were accommodated by changing the covariance matrix from the default of compound symmetry to autoregressive (Maronna, Martin, & Yobai, 2006). GLMM was robust to unequal group sizes.

***Participant attrition***

With longitudinal data, participant attrition (i.e., wave non- response) may be problematic, and normally reduces statistical power. The GLMM was less sensitive to participant attrition in the study because it did not rely on participants providing data at every assessment point; the GLMM maximum likelihood procedure was a full information estimation procedure that used all the data present at each assessment point (Elobeid et al., 2009). This led to reduced sampling bias and no need to replace missing data. GLMM was able to use the data present at each

assessment point because time was interpreted as a Level 1 variable that was nested within participants at Level 2.

***Controlling for multiple statistical tests***

In order to optimise the likelihood of convergence, a separate GLMM analysis was conducted for each of the six outcome measures. Analysing each outcome independently of the others inflated the familywise error rate. Hence, the per-test alpha needed to be corrected to control the inflation. To conserve statistical power, alpha corrections were applied within the four groups of conceptually related outcomes (CPQ Factor 1, CPQ Factor 2; EDE-Q; RCADS Depression, RCADS Anxiety; RSES) rather than across the entire set of outcomes (Klockars, Hancock, & McAweeney, 1995). The Bonferroni- adjusted alpha for the perfectionism outcomes and psychopathology outcomes was .0125. All other tests were performed at the conventional alpha level of .05.

***Statistical power***

Each hypothesis predicted a Group x Time interaction. An a priori power analysis was conducted based on data from previous studies that assessed the efficacy of CBT –P, with large effect sizes ($d$ = 1.36-1.90) found with small sample sizes (Riley et al., 2007; Steele et al., 2013). The highest attrition rate of 50% noted in online formats of randomised controlled trials was used (Christensen et al., 2009). An a priori power analysis was used to estimate the sample size range by using the effect sizes. To achieve 80% power at an alpha level of 0.01, with three groups, using a moderate Group x Time interaction ($f$ = .3) at the Bonferroni adjusted alpha power level of .01, the required total sample size was 57 (G*Power 3.1, Faul, Erdfelder, Lang, & Buchner, 2009). After adjusting for attrition rate of 50%, the estimated total sample to be recruited was 86. As mentioned, GLMM did not rely on participants providing data at every assessment point; GLMM used all data present at each assessment point, thereby reducing the impact of subject attrition on statistical power (Elobeid et al., 2009).

***Effect size and clinically significant change***

To supplement statistical hypotheses testing, effect sizes and clinically significant changes were computed. Pre-intervention, post- intervention, 3-month follow-up and 6-month follow-up intervention effect sizes were calculated using Cohen's $d$ (Cohen, 1988) for the three groups. Cohen's $d$ could not be used to measure interaction effects, and partial eta squared (partial $\eta^2$) was used instead. The

formula is $\eta^2 = F/(F+df2)$ where .01 = small, .06 = moderate, .14+ = large. Cohen's *d* (GLMM) was calculated for post-hoc least significant difference (LSD) tests, conducted to locate the source of the significant interactions (i.e., pre- to post-intervention, pre-intervention to 3-month follow-up, pre-intervention to 6-month follow-up). Cohen's *d* was estimated from the LSD *t*-values using the following formula, $d = 2t/sqrt(df)$. Conventions for Cohen's *d* were used, .2 = small, .5 = moderate, .8 = large (Cohen, 1988).

Clinically significant and reliable change indices were used to determine whether the intervention groups produced a clinically important change. Jacobson and Truax (1991) methodology was used to assess the reliability and clinical significance of each participant's pre- to post-treatment and pre-treatment to follow-up change scores. A clinically significant change had to first be statistically reliable, which was assessed with the reliable change index (RCI; Jacobson et al., 1986). The RCI was the degree to which the person changed on the outcome variable divided by the standard error of difference ($S_{diff}$) between the pre-treatment ($X_1$) and post-treament ($X_2$), RCI = $(X_1 - X_2) / S_{diff.}$. Absolute RCIs less than or equal to 1.96 indicate no change. When the absolute value of the RCI exceeded 1.96, it was likely that the pre- to post-treatment change score reflected a *real* or *reliable* change (Jacobson & Truax, 1991).

Once the RCI had been calculated to determine that the intervention had produced a statistically reliable change in a particular client, it was important to determine whether the change were clinically significant (Jacobson & Truax, 1991). Testing for clinical significance involved classifying changes in symptom severity in categories of "recovered", "improved", "unchanged", or "deteriorated" (Jacobson & Truax, 1991). Using the classification system required cut-off points to be calculated. Three possible cut-off points were suggested in this system (Jacobson & Truax, 1991): Cut-off *point a* was where the post-treatment score fell at least two SDs beyond the mean of a dysfunctional population. Cut-off *point b* was where the post-treatment score fell within two SDs of the mean for the functional population. Cut-off *point c* is where the post-treatment score placed that client closer to the mean of the functional population than it did to the dysfunctional population. Jacobson and Traux (1991) suggested that cut-off point c was the most preferable to use when norms are available for both the dysfunctional and functional populations.

The clinical cut-offs were used in conjunction with the RCI (Jacobson & Truax, 1991): A classification of "recovered" was used when the RCI was greater than 1.96 and their post treatment score was in the functional range. If the RCI was greater than 1.96, and the score moved towards the functional mean but still fell within the clinical range, it was classified as "improved". When neither conditions were met, the classification of "unchanged" was used. When the RCI was greater than 1.96, but the score had moved away from the functional mean and toward the clinical population, a classification of "deteriorated" was used. Each individual's scores on the respective outcome variables were tested for reliable change and clinically significant change, and chi-square tests were conducted to determine whether the three groups differed in proportions of cases showing reliable change and clinically significant change.

While there is clear evidence of a two-factor structure of the CPQ, different researchers had included different items in each of the two factors (cf. findings from Chapter 2, Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014). For this study, the data from Chapter 2 with Perfectionistic Strivings (CPQ Factor 1); $M$ = 13.19, $SD$ = 3.40 and CPQ Factor 2 (Perfectionistic Concerns); $M$ = 9.69, $SD$ = 2.49 were used to calculate clinically significant change. Because these data were obtained from a functional population, and no alternate data from a dysfunctional population was currently available, cut-off point b was used. As discussed in the Measures section, the empirical derived threshold ≥ 2.30 for the global score (Mond et al., 2004) was a suitable, but not ideal, cut-off for clinically significant eating disorder psychopathology for the sample. To measure clinically significant changes on the RCADS for anxiety and depression, the study adhered to the manual (Chorpita et al., 2000) where a T-score of ≥ 70 indicated a clinical threshold of a disorder for females aged 14 to 18 years old. To measure clinically significant changes on the RSES, the study used the cut-off of low self-esteem of ≤ 15 as indicative of clinically significant low self-esteem (Rosenberg, 1965). No alternate community or clinical data for females aged 14 to 19 years with eating disorders were available that used the RSES scoring of 0 to 30, as recommended in Rosenberg (1965).

***Z-score test for two population proportions***

Several researchers in the prevention field have examined clinically significant changes where they compared the migration of proportions of

participants who “recovered”, “improved” and “deteriorated” overtime (Shochet et al., 2001; Stice et al., 2011b; Wilksch et al., 2008). The present study adopted the methodology of several prevention studies that compared the proportions of participants who “recovered”, “improved” or “deteriorated” over time and included both prevention and treatment effects (Shochet et al., 2001; Stice et al., 2011b; Wilksch et al., 2008) even though the key research interest of the study concerned prevention effects. Given the low numbers of participants who were categorised as ‘recovered’, ‘improved’ and ‘deteriorated’, the z-score test for two population proportions was used to see whether groups differed significantly in prevention and treatment effects (Shochet et al., 2001; Stice et al., 2011b; Wilksch et al., 2008).

Consistent with the definition of prevention effects, the analysis focused on cases that “deteriorated” in each group across time, so as to determine whether the control groups demonstrated increased symptomatology and/or diagnosis compared to the CBT-P group which has an absence of an increase in symptoms over time (Gillham et al., 2000). Similarly, when examining treatment effects, the analysis focused on cases that “recovered” or “improved” in each group across time, so as to determine whether the CBT-P group showed greater improvements in symptomatology or diagnoses in comparison to controls over time (Gillham et al., 2000).

To measure clinically significant prevention effects, a two-tailed test was conducted. To minimise the number of tests conducted, and therefore type I error, analyses were first conducted on groups collapsed across time (i.e., combined across pre-intervention, post-intervention, 3-month follow-up, and 6-month follow-up). If results yielded non-significant p values, it was assumed that the smaller n differences across groups at each time point would also be non-significant. To further reduce type I error, if the z-test results collapsed across time yielded significant p values, analyses were first conducted on groups with the biggest difference in n in the ‘deteriorated’ categories at each time point. If results yielded non-significant p values, it was assumed that those with smaller n differences at each time point would also be non-significant. The same analysis was repeated for clinically significant treatment effects, but analysing the cases who ‘recovered’ or ‘improved’ in each group over time.

## Results

### Data Screening

Data were screened according to Tabachnick and Fidell (2007) recommendations. There were no out-of-range values and errors in data entry.

### Participant Retention

Figure 3 illustrates the flow of participants through each stage. At post-intervention assessment, there were 27 dropouts (28.7%; CBT-P: 33.3%, CBT-S: 38.2%, waitlist control: 8.33%). At 3-month follow-up, there were 36 dropouts (38.3%; CBT-P: 44.4%, CBT-S: 44.1%, waitlist control: 20.8%). At 6-month follow-up there were 38 dropouts (40.4%; CBT-P: 44.4%, CBT-S: 50.0%, waitlist control: 20.7%). A Pearson's chi-square test of contingencies (with $\alpha = .05$) was used to evaluate whether group type was related to participant attrition at each time point. At post-test, the chi-square was statistically significant, $\chi^2 (2) = 6.75$, $p = .034$, where the attrition was significantly higher in the CBT-P and CBT-S as compared to the waitlist control. At 3-month follow-up, the chi square was not significant, $\chi^2 (2) = 4.16$, $p = .125$, suggesting no significant difference in attrition across all 3 groups. At 6-month follow-up, the chi square was not significant, $\chi^2 (2) = 5.36$, $p = .069$, suggesting no significant difference in attrition across all 3 groups.

### Pre-test Demographic and Clinical Characteristics

Pre-test demographic and clinical characteristics were analysed to determine group equivalence, demonstrated by $p > .05$. One way ANOVAs were used to compare the 3 groups in terms of age, self-reported body mass index (BMI), treatment credibility and treatment expectancy (see Table 5). The Shapiro-Wilk tests for normality were significant for age ($p < .001$) and treatment credibility ($p = .013$) but not for BMI and treatment expectancy, indicating that the assumption of normality was violated for age and treatment credibility but not for BMI and treatment expectancy. However, ANOVA is robust to violations of normality assumption (Tabachnick & Fidell, 2007). Levene's test was non-significant for all 4 variables (all $ps \geq .349$), indicating homogeneity of variance across all 3 groups.

The *F* tests were all not significant (all *ps* ≥ .212), indicating the groups were comparable on these demographic variables.

For clinical variables, the Shapiro-Wilk tests for normality were significant for CPQ Factor 2 (Perfectionistic Concerns; $p = 0.18$), Global EDE-Q ($p < .001$) but not for CPQ Factor 1 (Perfectionistic Strivings), RCADS Total Anxiety T-score, RCADS Major Depression Disorder T-score and RSES Total. The assumption of normality was violated for CPQ Factor 2 (Perfectionistic Concerns) and Global EDE-Q, but ANOVA is robust to such violations. Levene's test was non-significant for all six variables (all *p*s ≥ .199) indicating homogeneity of variance across all 3 groups. With the exception of RCADS Major Depression Disorder T- score, all the *F* tests were all not significant (all *p*s ≥ .053), indicating the groups were comparable on these clinical variables. The F test was statistically significant for RCADS Major Depression Disorder T-score, $F(2, 91) = 3.90$, $p = .024$. Post hoc analyses with Tukey's honest significant difference (HSD) revealed that at pre-test, waitlist control had significantly lower depressive scores than CBT-S ($p = .027$), but there were no significant differences between CBT-P and CBT-S ($p = .929$), CBT-P and waitlist control ($p = .057$).Given that the main interest of the analyses were between CBT-P and the two control groups, rather than between CBT-S and waitlist control, pre-test RCADS Major Depression Disorder T-score was not controlled for in further analysis.

It can be seen that on average at pre-test, participants were a non-clinical sample. Participants were not in the clinical range of eating disorders on the EDE-Q, with a mean score of 1.73 ($SD = 1.39$), being less than the suggested cut-off for clinical significance of 2.30. On average, participants at pre-test were not in the subclinical (*T*-score of 65 and above) or clinical (*T* score of 70 and above) range for depression or anxiety, with $M = 58.7$, $SD = 14.8$ for the RCADS subscale of depression, and $M = 61.0$, $SD = 14.0$ for the RCADS scale of anxiety.

Table 5

*Pre-test Demographic and Clinical Data Comparing CBT-P, CBT-S and Waitlist Control*

| Variables | CBT-P | CBT-S | Waitlist control | Test Statistic |
|---|---|---|---|---|
| | M (SD) | M (SD) | M (SD) | |
| Age | 16.3 (1.85) | 15.8 (1.73) | 16.7 (1.83) | $F$ (2, 91) = 1.58, $p$ = .212 |
| Body Mass Index | 22.0 (3.12) | 21.8 (3.67) | 21.9 (3.52) | $F$ (2, 91) = 0.03, $p$ = .972 |
| Treatment Credibility | 19.7 (4.53) | 18.6 (4.48) | 19.8 (3.70) | $F$ (2, 91) = 0.82, $p$ = .446 |
| Treatment Expectancy | 14.0 (4.69) | 13.2 (4.34) | 14.2 (4.67) | $F$ (2, 91) = 0.41, $p$ = .666 |
| Perfectionistic Strivings | 15.6 (3.37) | 13.7 (3.25) | 15.2 (3.20) | $F$ (2, 91) = 3.03, $p$ = .053 |
| Perfectionistic Concerns | 10.6 (2.29) | 9.62 (2.23) | 10.5 (2.64) | $F$ (2, 91) = 1.59, $p$ = .210 |
| EDE-Q | 1.90 (1.42) | 1.67 (1.41) | 1.56 (1.37) | $F$ (2, 91) = 0.50, $p$ = .611 |
| RCADS Depression | 60.4 (13.9) | 61.7 (15.0) | 51.7 (13.9) | $F$ (2, 91) = 3.90, $p$ = .024 |
| RCADS Anxiety | 61.3 (13.6) | 63.9 (15.0) | 56.4 (12.4) | $F$ (2, 91) = 2.07, $p$ = .132 |
| RSES | 14.3 (4.10) | 14.6 (5.52) | 15.9 (4.94) | $F$ (2, 91) = 0.84, $p$ = .435 |

*Note*: Perfectionistic Strivings = Clinical Perfectionism Questionnaire (CPQ) Factor 1; Perfectionistic Concerns = CPQ Factor 2; EDE-Q = Global score of Eating Disorder Examination Questionnaire; RCADS Depression = T-score for depression subscale on the Revised Child Anxiety and Depression Scales (RCADS); RCADS Anxiety = T-score for total anxiety scale on the RCADS; RSES = Total score of the Rosenberg Self-Esteem Scale.

### Treatment Adherence

Treatment adherence was measured at the end of each session for CBT-P and CBT-S. Table 6 displays results of the self-reported adherence in completing each session. Aside from missing data, most participants completed 100% of each session in both programs and only one participant did not complete one session in CBT-P. There were diminishing numbers of people in each intervention at each session: On average across both CBT-P and CBT-S, the majority of participants (78%) completed all of session 1. By session 4, approximately half of the participants (54%) completed the entire session and the completion rate stayed fairly stable from session 4 through to session 8 (55%).

### Descriptive Statistics

The means and standard deviations of all outcome measures from pre-intervention to 6 months follow-up are reported in Table 7.

Table 6

*Self-reported adherence to completing the CBT programs*

| Session | CBT-P | | | | CBT-S | | | |
|---|---|---|---|---|---|---|---|---|
| | Completed all *n* (%) | Completed part n (%) | Did not complete n (%) | Missing data n (%) | Completed all n (%) | Completed part n (%) | Did not complete n (%) | Missing data n (%) |
| 1 | 30 (83.3) | 3 (8.3) | 0 (0) | 3 (8.3) | 25 (73.5) | 1 (2.9) | 0 (0) | 8 (23.5) |
| 2 | 24 (66.7) | 6 (16.7) | 0 (0) | 6 (16.7) | 25 (73.5) | 1 (2.9) | 0 (0) | 8 (23.5) |
| 3 | 28 (77.8) | 3 (8.3) | 0 (0) | 5 (13.9) | 21 (61.8) | 2 (5.9) | 0 (0) | 11 (32.4) |
| 4 | 24 (66.7) | 6 (16.7) | 0 (0) | 6 (16.7) | 14 (41.2) | 8 (23.5) | 0 (0) | 12 (64.7) |
| 5 | 22 (61.1) | 7 (19.4) | 0 (0) | 7 (19.4) | 23 (67.6) | 0 (0) | 0 (0) | 11 (32.4) |
| 6 | 19 (52.8) | 5 (13.9) | 0 (0) | 12 (33.3) | 17 (50.0) | 4 (11.8) | 0 (0) | 13 (38.2) |
| 7 | 17 (47.2) | 8 (22.2) | 0 (0) | 11 (30.6) | 17 (50.0) | 3 (8.8) | 0 (0) | 14 (41.2) |
| 8 | 20 (55.6) | 3 (8.3) | 1 (2.8) | 12 (33.3) | 19 (55.9) | 2 (5.9) | 0 (0) | 13 (38.2) |

*Note*. CBT-P = Cognitive Behaviour Therapy for Perfectionism; CBT-S = Cognitive Behaviour Therapy for Stress.

Table 7

*Means (standard deviations) of outcome variables across groups over times*

| Variables | CBT-P | | | | CBT-S | | | | Waitlist control | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | 3 months follow-up | 6 months follow-up | Pre | Post | 3 months follow-up | 6 months follow-up | Pre | Post | 3 months follow-up | 6 months follow-up |
| Perfectionistic Strivings | 15.6 (3.37) | 12.7 (3.21) | 11.1 (2.82) | 11.3 (2.07) | 13.7 (3.25) | 12.1 (3.60) | 12.1 (2.94) | 12.2 (2.65) | *15.2 (3.20)* | 14.9 (3.51) | 12.8 (3.25) | 12.8 (3.44) |
| Perfectionistic Concerns | 10.6 (2.29) | 8.13 (2.21) | 7.50 (2.31) | 6.80 (1.85) | 9.62 (2.23) | 9.05 (3.15) | 8.26 (2.73) | 8.06 (2.46) | 10.5 (2.64) | 9.81 (2.95) | 9.05 (2.59) | 8.74 (3.16) |
| EDE-Q | 1.90 (1.42) | 1.29 (1.26) | 0.82 (0.85) | 0.75 (0.89) | 1.67 (1.41) | 1.28 (1.21) | 1.28 (1.05) | 1.21 (0.95) | 1.56 (1.37) | 1.46 (0.99) | 1.41 (1.00) | 1.52 (1.03) |
| RCADS Depression | 60.4 (13.9) | 52.6 (14.0) | 48.6 (15.6) | 46.4 (15.8) | 61.7 (15.0) | 56.4 (12.6) | 53.2 (14.7) | 53.4 (15.8) | 51.7 (13.9) | 52.8 (16.2) | 48.7 (11.6) | 48.1 (13.0) |
| RCADS Anxiety | 61.3 (13.6) | 51.6 (14.9) | 47.6 (13.8) | 47.2 (14.9) | 63.9 (15.0) | 59.6 (13.7) | 54.3 (12.7) | 53.6 (11.6) | 56.4 (12.4) | 57.1 (14.5) | 50.3 (11.7) | 50.4 (13.0) |
| RSES | 14.3 (4.10) | 16.7 (3.80) | 19.3 (5.62) | 20.7 (5.40) | 14.6 (5.52) | 16.1 (5.07) | 17.6 (5.79) | 17.4 (5.56) | 15.9 (4.94) | 16.3 (5.08) | 17.7 (4.44) | 18.0 (6.92) |

*Note.* Perfectionistic Strivings = Clinical Perfectionism Questionnaire (CPQ) Factor 1; Perfectionistic Concerns = CPQ Factor 2; EDE-Q = Global score of Eating Disorder Examination Questionnaire; RCADS Depression = T-score for depression subscale on the Revised Child Anxiety and Depression Scales (RCADS); RCADS Anxiety = T-score for total anxiety scale on the RCADS; RSES = Total score of the Rosenberg Self-Esteem Scale.

**Hypotheses Testing**

Using GLMM, the relationships between fixed effects of Group, Time, Group × Time and outcomes of CPQ Factor 1 (Perfectionistic Strivings), CPQ Factor 2 (Perfectionistic Concerns), EDE-Q, RCADS Depression, RCADS Anxiety and RSES were analysed as shown in Table 8. See Appendix H for graphs of the interactions for each outcome variable.

Table 8

*Results of the Omnibus GLMMs for Each Outcome*

| | Source | Num *df* | Den *df* | *F* value | *P* value | Partial $\eta^2$ |
|---|---|---|---|---|---|---|
| Perfectionistic Strivings | Group | 2 | 263 | 2.31 | .102 | .009 |
| | Time | 3 | 263 | 26.03 | .000* | .090 |
| | Group × Time | 6 | 263 | 3.02 | .007* | .011 |
| Perfectionistic Concerns | Group | 2 | 263 | 2.80 | .062 | .011 |
| | Time | 3 | 263 | 19.81 | .000* | .070 |
| | Group × Time | 6 | 263 | 3.07 | .006* | .011 |
| EDE-Q | Group | 2 | 263 | 0.85 | .428 | .003 |
| | Time | 3 | 263 | 3.85 | .010* | .014 |
| | Group × Time | 6 | 263 | 3.32 | .004* | .012 |
| RCADS Depression | Group | 2 | 263 | 1.88 | .000* | .007 |
| | Time | 3 | 263 | 7.10 | .000* | .026 |
| | Group × Time | 6 | 263 | 3.42 | .003* | .013 |
| RCADS Anxiety | Group | 2 | 263 | 2.87 | .058 | .011 |
| | Time | 3 | 263 | 18.76 | .000* | .067 |
| | Group × Time | 6 | 263 | 3.87 | .001* | .015 |
| RSES | Group | 2 | 263 | 1.79 | .0169 | .007 |
| | Time | 3 | 263 | 11.92 | .000* | .043 |
| | Group × Time | 6 | 263 | 3.75 | .001* | .014 |

*Note.* GLMMs= Generalised Linear Mixed Models; Num *df* = Numerator degree of freedoms; Den *df* = Denominator degree of freedoms; Perfectionistic Strivings = Clinical Perfectionism Questionnaire (CPQ) Factor 1; Perfectionistic Concerns = CPQ Factor 2; EDE-Q = Global score of Eating Disorder Examination Questionnaire; RCADS Depression = T-score for depression subscale on the Revised Child Anxiety and Depression Scales (RCADS); RCADS Anxiety = T-score for total anxiety scale on the RCADS; RSES = Total score of the Rosenberg Self-Esteem Scale. Conventions for partial $\eta^2$ are: .01 = small .06 = moderate .14+ = large * $p < .050$ (two-tailed).

***CPQ Factor 1: Perfectionistic Strivings***

There was a significant Group × Time interaction, $F(6, 263) = 3.02$, $p = .007$, partial $\eta^2 = .011$ (small). A significant interaction indicates that each of the

two main effects could no longer be interpreted independently of the other. Tests of the simple main effects for time indicated a significant time-related decrease of CPQ Factor 1 (Perfectionistic Strivings) for the CBT-P, $F(3, 263) = 29.16$, $p < .001$, partial $\eta^2 = .100$ (moderate), for CBT-S, $F(3, 263) = 3.51$, $p = .016$, partial $\eta^2 = .013$ (small), and for waitlist control, $F(3, 263) = 9.55$, $p < .001$, partial $\eta^2 = .035$ (small). Least significant difference (LSD) contrasts were conducted to locate the source of the interactions across each time period i.e., pre- to post-intervention, pre-intervention to 3-month follow-up, pre-intervention to 6-month follow-up. Results showed a a significant decrease between pre-test and post-test for CBT-P, $t(263) = 4.61$, $p < .001$, $d = 0.57$ (moderate), CBT-S, $t(263) = 2.31$, $p = .022$, $d = 0.28$ (small), but not for waitlist control, $t(263) = 0.48$, $p = .631$. CBT-P was superior to CBT-S and waitlist control in decreasing symptoms of eating disorder at post-test (CBT-P > CBT-S > waitlist control). There was a significant decrease in CPQ Factor 1 (Perfectionistic Strivings) from pre-test to 3-month follow-up for all three groups, CBT-P, $t(263) = 6.49$, $p < .001$, $d = 0.80$ (large), CBT-S, $t(263) = 2.68$, $p = .008$, $d = 0.33$ (small), and waitlist control, $t(263) = 3.80$, $p < .001$, $d = 0.47$ (small). There was a significant decrease in CPQ Factor 1 (Perfectionistic Strivings) between pre-test and 6-month follow-up for all for three groups, CBT-P, $t(263) = 8.99$, $p < .001$, $d = 1.11$ (large), CBT-S, $t(263) = 2.65$, $p = .009$, $d = 0.33$ (small), and waitlist control, $t(263) = 3.73$, $p < .001$, $d = 0.46$ (small). Thus, CBT-P was superior to the two other groups in maintaining significant changes in perfectionism at 3-month and 6-month follow-up, but waitlist control had a larger decrease than CBT-S (CBT-P > waitlist control > CBT-S).

There was a significant decrease in CPQ Factor 1 (Perfectionistic Strivings) between post-test and 3-month follow-up for CBT-P, $t(263) = 2.53$, $p = .012$, $d = 0.31$ (small), and waitlist control, $t(263) = 3.54$, $p < .001$, $d = 0.44$ (small), but no significant change for CBT-S, $t(263) = 0.22$, $p = .824$. Similarly, there was a significant decrease in CPQ Factor 1 (Perfectionistic Strivings) between post-test and 6-month follow-up for CBT-P, $t(263) = 2.42$, $p = .016$, $d = 0.30$ (small), and waitlist control, $t(263) = 4.29$, $p < .001$, $d = 0.53$ (moderate), but no significant change for CBT-S, $t(263) = 0.52$, $p = .601$. There was no significant change for all three groups between 3 month follow-up and 6-month follow-up, all $ps \geq .545$.

Hypothesis 1 was supported where CBT-P was superior to CBT-S and waitlist control in decreasing CPQ Factor 1 (Perfectionistic Strivings) from pre-test

to post-test, pre-test to 3-month follow-up, and pre-test to 6-month follow-up. Moderate to large effect sizes in decreasing CPQ Factor 1 (Perfectionistic Strivings) were found for CBT-P ($d$ = 0.57 – 1.11), while small effect sizes were found for CBT-S ($d$ = 0.28 – 0.33) and waitlist control ($d$ = 0.35 - 0.47).

***CPQ Factor 2: Perfectionistic Concerns***

A significant Group × Time interaction for CPQ Factor 2 (Perfectionistic Concerns) was found, $F(6, 263) = 3.07$, $p = .006$, partial $\eta^2 = .011$ (small). This indicated that each of the two main effects could no longer be interpreted independently of the other. Tests of the simple main effects for time indicated a significant time-related decrease in CPQ Factor 2 (Perfectionistic Concerns) for CBT-P, $F(3, 263) = 18.09$, $p < .001$, partial $\eta^2 = .064$ (moderate), CBT-S, $F(3, 263) = 2.87$, $p = .037$, partial $\eta^2 = .011$ (small), and waitlist control, $F(3, 263) = 3.47$, $p = .017$, partial $\eta^2 = .013$ (small). Least significant difference (LSD) contrasts were conducted to locate the source of the interactions across each time period. Results indicated a significant decrease in CPQ Factor 2 (Perfectionistic Concerns) between pre-test and post-test for CBT-P, $t(263) = 5.99$, $p < .001$, $d = 0.74$ (moderate), but not for CBT-S, $t(263) = 0.58$, $p = .560$, or waitlist control, $t(263) = 1.36$, $p = .176$. There was a significant decrease in CPQ Factor 2 (Perfectionistic Concerns) from pre-test to 3-month follow-up for CBT-P, $t(263) = 6.21$, $p < .001$, $d = 0.77$ (moderate), and waitlist control, $t(263) = 2.13$, $p = .034$, $d = 0.26$ (small), but not for CBT-S, $t(263) = 1.63$, $p = .103$. There was a significant decrease in CPQ Factor 2 (Perfectionistic Concerns) between pre-test to 6-month follow-up for all for three groups, CBT-P, $t(263) = 7.02$, $p < .001$, $d = 0.87$ (large), CBT-S, $t(263) = 2.82$, $p = .005$, $d = 0.35$ (small), and waitlist control, $t(263) = 3.16$, $p = .002$, $d = 0.40$ (small). Thus, CBT-P was superior to the two other groups in maintaining significant changes in perfectionism at 3-month and 6-month follow-up, but waitlist control had a larger decrease than CBT-S (CBT-P > waitlist control > CBT-S).

There was no significant decrease in CPQ Factor 2 (Perfectionistic Concerns) between post-test and 3-month follow-up for all three groups all $p$s $\geq .156$. There was a significant decrease in CPQ Factor 2 (Perfectionistic Concerns) between post-test and 6-month follow-up for CBT-P, $t(263) = 2.79$, $p = .006$, $d = 0.34$ (small), and waitlist control, $t(263) = 1.98$, $p = .048$, $d = 0.24$ (small), but no significant change for CBT-S, $t(263) = 1.55$, $p = .123$. There was a significant decrease between 3 months follow-up and 6-month follow-up for CBT-P, $t(263) = 2.00$, $p = .046$, $d$ =

0.25 (small), but not for CBT-S, $t(263) = 0.66$, $p = .512$, or waitlist control, $t(263) = 1.40$, $p = .162$.

Hypothesis 3 was supported where CBT-P was superior to CBT-S and waitlist control in decreasing CPQ Factor 2 (Perfectionistic Concerns) from pre-test to post-test, pre-test to 3-month follow-up, and pre-test to 6-month follow-up. CBT-P showed moderate to large effect sizes in decreasing CPQ Factor 2 (Perfectionistic Concerns; $d = 0.74 – 0.87$) while CBT-S and waitlist control showed small effect sizes (largest $d = 0.35$ and 0.40 respectively) in reducing Perfectionistic Concerns.

***EDE-Q***

There was a significant Group × Time interaction for the outcome of eating disorders, $F(6,263) = 3.32$, $p = .004$, partial $\eta^2 = .012$ (small), indicating that each of the two main effects could no longer be interpreted independently of the other. Tests of the simple main effects for time indicated a significant time-related decrease in eating disorder symptoms for CBT-P, $F(3, 263) = 6.90$, $p < .001$, partial $\eta^2 = .026$ (small), but no change across time for CBT-S, $F(3, 263) = 1.29$, $p = .278$, partial $\eta^2 = .005$ or waitlist control, $F(3, 263) = 0.54$, $p = .653$, partial $\eta^2 = .002$. LSD contrasts conducted to locate the source of the interactions across each time period for CBT-P indicated a significant decrease in eating disorder symptoms between pre-test and post-test, $t(263) = 2.39$, $p = .017$, $d = 0.29$ (small), a significant decrease between pre-test to 3-month follow-up, $t(263) = 4.38$, $p < .001$, $d = 0.54$ (moderate), a significant decrease between pre-test to 6-month follow-up, $t(263) = 3.42$, $p = .001$, $d = 0.42$ (small), a significant decrease between post-test and 3-month follow-up, $t(263) = 2.47$, $p = .014$, $d = 0.30$ (small), but no significant change between post-test and 6-month follow-up, $t(263) = 1.63$, $p = .105$, and no significant change between 3-month follow-up and 6-month follow-up, $t(263) = -0.14$, $p = .891$.

Hypothesis 5 was supported because CBT-P was superior to CBT-S and waitlist control in decreasing symptoms of eating disorder from pre-test to post-test and the significant decreases in symptoms of eating disorder for the CBT-P group were maintained at 3-month and 6-month follow-up. Small to moderate effect sizes were noted for CBT-P ($d = 0.29 - 0.54$), while small effect sizes were found for CBT-S (largest $d = 0.35$) and waitlist control (largest $d = 0.40$).

***RCADS Depression***

The analysis revealed a significant Group × Time interaction for the outcome of depressive symptoms, $F(6, 263) = 3.42$, $p = .003$, partial $\eta^2 = .013$ (small), indicating that each of the two main effects could no longer be interpreted independently of the other. Tests of the simple main effects for time indicated a significant time-related decrease in depressive symptoms for CBT-P, $F(3, 263) = 8.95$, $p < .001$, partial $\eta^2 = .033$ (small) but no change across time for CBT-S, $F(3, 263) = 1.46$, $p = .225$, partial $\eta^2 = .006$ (small), or waitlist control, $F(3,263) = 1.05$, $p = .371$, partial $\eta^2 = .004$ (small). LSD contrasts conducted for CBT-P indicated a significant decrease in depressive symptoms between pre-test and post-test, $t(263) = 4.53$, $p < .001$, $d = 0.56$ (moderate), a significant decrease between pre-test to 3 months follow-up, $t(263) = 4.23$, $p < .001$, $d = 0.52$ (moderate), a significant decrease between pre-test to 6- month follow-up, $t(263) = 4.38$, $p < .001$, $d = 0.54$ (moderate). There was no change for CBT-P between post-test and 3-month follow-up, $t(263) = 1.44$, $p = .151$, but a significant decrease in depressive symptoms between post-test and 6-month follow- up, $t(263) = 2.22$, $p = .027$, $d = 0.27$ (small). There was no significant change between 3-month follow-up and 6-month follow-up for CBT-P, $t(263) = 1.42$, $p = .157$.

Hypothesis 7 was supported where CBT-P was superior to CBT-S and waitlist control in decreasing symptoms of depression from pre- to post-test, pre-test to 3-month follow-up and pre-test to 6-month follow-up. Moderate effect sizes in reducing depressive symptoms were noted for CBT-P ($d = 0.52$ - $0.56$).

***RCADS Anxiety***

A significant Group × Time interaction was found for the outcome of anxiety symptoms, $F(6, 263) = 3.42$, $p = .003$, partial $\eta^2 = .015$ (small), indicating that each of the two main effects can no longer be interpreted independently of the other. Tests of the simple main effects for time indicated a significant time-related decrease in anxiety symptoms for CBT-P, $F(3, 263) = 15.1$, $p < .001$, partial $\eta^2 = .054$ (small), for CBT-S, $F(3, 263) = 3.78$ $p = .011$, partial $\eta^2 = .014$ (small), and waitlist control, $F(3,263) = 7.89$, $p < .001$, partial $\eta^2 = .029$ (small). LSD contrasts conducted to locate the source of the interaction across each time period indicated a significant decrease in anxiety symptoms between pre-test and post-test for CBT-P, $t(263) = 5.34$, $p < .001$, $d = 0.66$ (moderate), but no significant change for CBT-S,

*t*(263) = 1.38, *p* = .170, or waitlist control, *t*(263) = -0.33, *p* = .743. Thus, CBT-P was superior to CBT-S and waitlist control in reducing anxiety symptoms at post-test.

There was a significant decrease in anxiety symptoms from pre-test to 3-month follow-up for all three groups: for CBT-P, *t*(263) = 5.66, *p* < .001, *d* = 0.70 (moderate), CBT-S, *t*(263) = 2.95, *p* = .004, *d* = 0.36 (small), and waitlist control, *t*(263) = 3.00, *p* = .003, *d* = 0.37 (small), suggesting that CBT-P was superior to the two other groups in maintaining significant decreases in anxiety at 3-months follow- up. There was a significant decrease in anxiety symptoms from pre-test to 6-month follow-up for all three groups: for CBT-P, *t*(263) = 6.26, *p* < .001, *d* = 0.77 (moderate), CBT-S, *t*(263) = 3.06, *p* = .002, *d* = 0.38 (small), and waitlist control, *t*(263) = 3.22, *p* = .001, *d* = 0.40 (small), suggesting that CBT-P was superior to the two other groups in maintaining significant decreases in anxiety at 6-month follow-up.

There was no significant change in anxiety symptoms between post-test and 3-month follow-up for CBT-P, *t*(263) = 1.66, *p* = .098, CBT-S, *t*(263) = 1.58, *p* = .114, but a significant decrease in waitlist control, *t*(263) = 3.19, *p* = .002, *d* = 0.39 (small). There was a significant decrease from post-test to 6 months follow-up for all three groups: for CBT-P, *t*(263) = 2.12, *p* = .035, *d* = 0.26 (small), CBT-S, *t*(263) = 2.12, *p* = .035, *d* = 0.26 (small), and waitlist control, *t*(263) = 4.42, *p* < .001, *d* = 0.55 (moderate). There was no significant change from 3-month follow-up to 6-month follow-up for all 3 groups, all *p*s ≥ .546.

Hypothesis 9 was supported where CBT-P was superior to CBT-S and waitlist control in reducing anxiety symptoms from pre-test to post-test, pre-test to 3- month follow-up, pre-test to 6-month follow-up. Moderate effect sizes in decreasing anxiety symptoms were found for CBT-P (*d* = 0.66 – 0.77), while small effect sizes were found for CBT-S (largest *d* = 0.38) and waitlist control (largest *d* = 0.40).

***RSES***

There was a significant Group × Time interaction on the outcome of self-esteem, *F*(6, 263) = 3.75, *p* = .001, partial $\eta^2$ = .015 (small), indicating that each of the two main effects could no longer be interpreted independently of the other. Tests of the simple main effects for time indicated a significant time-related

increase in self-esteem for CBT-P, $F(3, 263) = 19.10$, $p < .001$, partial $\eta^2 = .068$ (moderate), and CBT-S, $F(3, 263) = 2.86$, $p = .037$, partial $\eta^2 = .011$ (small), but no change across time for waitlist control, $F(3, 263) = 0.68$, $p = .564$. LSD contrasts conducted for CBT-P indicated a significant increase in self-esteem between pre-test and post-test, $t(263) = 2.86$, $p = .005$, $d = 0.35$ (small), between pre-test and 3-month follow-up, $t(263) = 5.16$, $p < .001$, $d = 0.64$ (moderate), between pre-test and 6-month follow-up, $t(263) = 7.43$, $p < .001$, $d = 0.92$ (large), between post-test and 3-month follow-up, $t(263) = 2.94$, $p = .004$, $d = 0.36$ (small), between post-test and 6-month follow-up, $t(263) = 4.65$, $p < .001$, $d = 0.57$ (moderate), between 3-month follow-up and 6-month follow-up, $t(263) = 2.65$, $p = .008$, $d = 0.33$ (small). LSD contrasts conducted for CBT-S showed no significant change in self-esteem between pre-test and post-test, $t(263) = 1.03$, $p = .304$, but a significant increase between pre-test and 3- month follow-up, $t(263) = 2.85$, $p = .005$, $d = 0.35$ (small). There was no significant increase in self-esteem for CBT-S between pre-test and 6-month follow-up, $t(263) = 1.30$, $p = .194$, between post-test and 3-month follow-up, $t(263) = 1.43$, $p = .153$, between post-test and 6-month follow-up, $t(263) = 0.66$, $p = .510$, and between 3- month follow-up and 6-month follow-up, $t(263) = -0.48$, $p = .629$.

Hypothesis 11 was supported where CBT-P was superior to CBT-S and waitlist control in increasing self-esteem levels from pre-test to post-test, pre-test to 3-month follow-up, and pre-test to 6-month follow-up. Small to large effect sizes in improving self-esteem were noted for CBT-P ($d = 0.35$ to $0.92$), and small effect sizes were found for CBT-S (largest $d = 0.35$) and there were no statistically significant effects for waitlist control.

### *Reliable and clinically significant change on perfectionism and psychopathology outcomes*

Reliable and clinically significant changes on perfectionism and psychopathology outcomes were examined for pre-test to post- test, pre-test to 3-month follow-up, and pre-test to 6-month follow-up. RCI scores were calculated for the outcome variables using the Reliable Change Generator (ClinTools, 2008). The test-retest reliability and the standard deviation of the measures used in this sample were required to obtain a 95% confidence (1.96 SD) of clinically significant change (see Table 9). Adhering to the criteria of Jacobson and Truax (1991), participants were classified into four groups: recovered, improved, no change, and deteriorated

as demonstrated in Table 10. Clinical change was computed for data that had an RCI greater than an absolute value of 1.96. A visual inspection of Table 10 suggested that most participants were in the category of "no change", with few in the "recovered", "improved", or "deteriorated" categories. Similarly, Table 11 showed that most participants were healthy from pre-treatment through to 6-month follow-up.

Table 9

*Data used to Calculate Reliable Change and Clinical Significance*

| Outcome | Test-retest Reliability | Standard Deviation | Absolute Value of Reliable Change |
|---|---|---|---|
| Perfectionistic Strivings | .68 | 3.36 | 5.23 |
| Perfectionistic Concerns | .75 | 2.37 | 3.28 |
| EDE-Q | .96 | 1.39 | 0.79 |
| RCADS Depression | | 14.8 | 14.0 |
| RCADS Anxiety | .94 | 14.0 | 9.25 |
| RSES | .87 | 4.86 | 4.87 |

*Note.* Perfectionistic Strivings = Clinical Perfectionism Questionnaire (CPQ) Factor 1; Perfectionistic Concerns = CPQ Factor 2; EDE-Q = Global score of Eating Disorder Examination Questionnaire; RCADS Depression = T-score for depression subscale on the Revised Child Anxiety and Depression Scales (RCADS); RCADS Anxiety = T-score for total anxiety scale on the RCADS; RSES = Total score of the Rosenberg Self-Esteem Scale; negative values smaller than the absolute value suggest improvement, positive values larger than the absolute value suggest deterioration for all outcomes except for RSES.

Table 10

*The Number (and Percentage) of Participants Meeting Clinically Significant Change from Pre-test to 6-Month Follow-up across Outcomes*

| | Pre-test to Post Test | | | Pre-test to 3-Month Follow-up | | | Pre-test to 6-Month Follow-up | | |
|---|---|---|---|---|---|---|---|---|---|
| | CBT-P | CBT-S | Waitlist Control | CBT-P | CBT-S | Waitlist Control | CBT-P | CBT-S | Waitlist Control |
| Perfectionistic Strivings | | | | | | | | | |
| Recovered | 2 (15.3) | 1 (4.8) | 1 (4.5) | 2 (10.0) | 1 (5.3) | 1 (5.3) | 2 (10.0) | 1 (5.9) | 3 (15.0) |
| Improved | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| No Change | 22 (91.7) | 20 (95.2) | 21 (95.5) | 18 (90.0) | 18 (94.7) | 18 (94.7) | 18 (90.0) | 15 (88.2) | 17 (85.0) |
| Deteriorated | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1 (5.9) | 0 (0) |
| Perfectionistic Concerns | | | | | | | | | |
| Recovered | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Improved | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| No Change | 24 (100) | 19 (90.5) | 24 (100) | 20 (100) | 16 (84.2) | 19 (100) | 20 (100) | 16 (94.1) | 19 (100) |
| Deteriorated | 0 (0) | 2 (9.5) | 0 (0) | 0 (0) | 3 (15.8) | 0 (0) | 0 (0) | 1 (5.9) | 0 (0) |
| EDE-Q | | | | | | | | | |
| Recovered | 5 (20.8) | 2 (9.5) | 1 (4.5) | 5 (25.0) | 1 (5.3) | 1 (5.3) | 5 (25.0) | 3 (17.6) | 1 (5.3) |
| Improved | 1 (4.2) | 0 (0) | 0 (0) | 1 (5.0) | 1 (5.3) | 0 (0) | 1 (5.0) | 1 (5.9) | 0 (0) |
| No Change | 16 (66.7) | 18 (85.7) | 16 (72.7) | 14 (70.0) | 14 (73.7) | 15 (78.9) | 13 (65.0) | 10 (58.8) | 16 (84.2) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Deteriorated | 2 (8.3) | 1 (4.8) | 5 (22.7) | 0 (0) | 3 (15.8) | 3 (15.8) | 1 (5.0) | 3 (17.6) | 2 (10.5) |
| RCADS Depression | | | | | | | | | |
| Recovered | 4 (16.7) | 1 (4.8) | 0 (0) | 3 (15.0) | 3 (15.8) | 0 (0) | 5 (25.0) | 3 (17.6) | 0 (0) |
| Improved | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1 (5.3) | 0 (0) | 0 (0) | 0 (0) |
| No Change | 20 (83.3) | 19 (90.5) | 22 (100) | 17 (85.0) | 15 (78.9) | 18 (94.7) | 15 (75.0) | 11 (64.7) | 18 (94.7) |
| Deteriorated | 0 (0) | 1 (4.8) | 0 (0) | 0 (0) | 1 (5.3) | 0 (0) | 0 (0) | 3 (17.6) | 1 (5.3) |
| RCADS Anxiety | | | | | | | | | |
| Recovered | 4 (16.7) | 1 (4.8) | 0 (0) | 4 (20.0) | 2 (10.5) | 1 (5.3) | 3 (15.0) | 3 (17.6) | 1 (5.3) |
| Improved | 0 (0) | 1 (4.8) | 0 (0) | 0 (0) | 2 (10.5) | 0 (0) | 1 (5.0) | 0 (0) | 0 (0) |
| No Change | 19 (79.2) | 17 (81.0) | 20 (90.9) | 16 (80.0) | 13 (68.4) | 18 (94.7) | 16 (80.0) | 13 (76.5) | 17 (89.5) |
| Deteriorated | 1 (4.2) | 2 (9.5) | 2 (9.1) | 0 (0) | 2 (10.5) | 0 (0) | 0 (0) | 1 (5.9) | 1 (5.3) |
| RSES | | | | | | | | | |
| Recovered | 4 (16.7) | 1 (4.8) | 2 (9.1) | 7 (35.0) | 0 (0) | 1 (5.3) | 7 (35.0) | 1 (5.9) | 2 (10.5) |
| Improved | 1 (4.2) | 1 (4.8) | 0 (0) | 0 (0) | 1 (5.3) | 0 (0) | 1 (5.0) | 0 (0) | 0 (0) |
| No Change | 17 (70.8) | 17 (81.0) | 19 (86.4) | 13 (65.0) | 18 (94.7) | 17 (17.7) | 12 (60.0) | 15 (88.2) | 15 (78.9) |
| Deteriorated | 2 (8.3) | 2 (9.5) | 1 (4.5) | 0 (0) | 0 (0) | 1 (5.3) | 0 (0) | 1 (5.9) | 2 (10.5) |

*Note*. CBT-P = Cognitive Behaviour Therapy for Perfectionism; CBT-S = Cognitive Behaviour Therapy for Stress; Perfectionistic Strivings = Clinical Perfectionism Questionnaire (CPQ) Factor 1; Perfectionistic Concerns = CPQ Factor 2; EDE-Q = Global score of Eating Disorder Examination Questionnaire; RCADS Depression = T-score for depression subscale on the Revised Child Anxiety and Depression Scales (RCADS); RCADS Anxiety = T-score for total anxiety scale on the RCADS; RSES = Total score of the Rosenberg Self-Esteem Scale.

Table 11

*The Number (and Percentage) of Healthy Participants at Pre-test Who Developed Subclinical and/or Clinical Disorders at Follow-up*

| | Pre-test | | | Post-test | | | 3-Month Follow-up | | | 6-Month Follow-up | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CBT-P | CBT-S | Waitlist Control | CBT-P | CBT-S | Waitlist Control | CBT-P | CBT-S | Waitlist Control | CBT-P | CBT-S | Waitlist Control |
| EDE-Q | | | | | | | | | | | | |
| Healthy | 22 | 26 | 18 | 15 (100) | 15 (88.2) | 16 (88.9) | 13 (100) | 14 (93.3) | 14 (87.5) | 13 (92.9) | 11 (84.6) | 14 (93.3) |
| Clinical | - | - | - | 0 (0) | 2 (11.8) | 2 (11.1) | 0 (0) | 1 (6.7) | 2 (12.5) | 1 (7.1) | 2 (15.4) | 1 (6.7) |
| RCADS Depression | | | | | | | | | | | | |
| Healthy | 22 | 22 | 22 | 14 (100) | 11 (78.7) | 18 (90.0) | 12 (100) | 12 (92.3) | 18 (100) | 11 (100) | 9 (81.8) | 17 (94.4) |
| Subclinical | - | - | - | 0 (0) | 3 (21.3) | 2 (10.0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1 (5.6) |
| Clinical | - | - | - | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1 (7.7) | 0 (0) | 0 (0) | 2 (18.2) | 0 (0) |
| RCADS Anxiety | | | | | | | | | | | | |
| Healthy | 21 | 20 | 19 | 13 (100) | 13 (81.3) | 15 (88.2) | 11 (100) | 14 (100) | 15 (100) | 11 (100) | 11 (91.7) | 14 (93.3) |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subclinical | - | - | - | 0 (0) | 2 (12.5) | 1 (5.9) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Clinical | - | - | - | 0 (0) | 1 (6.2) | 1 (5.9) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1 (8.3) | 1 (6.7) |

*Note*. CBT-P = Cognitive Behaviour Therapy for Perfectionism; CBT-S = Cognitive Behaviour Therapy for Stress; EDE-Q = Global score of Eating Disorder Examination Questionnaire; RCADS Depression = T-score for depression subscale on the Revised Child Anxiety and Depression Scales (RCADS); RCADS Anxiety = T-score for total anxiety scale on the RCADS. The clinical cut-off for EDE-Q was ≥ 2.30 as noted in Mond et al. (2004). The subclinical cut-off for RCADS Depression and RCADS Anxiety was a T-score ≥ 65, and the clinical cut-off was a T-score of ≥ 70, as stated in Chorpita et al. (2000).

### Clinically Significant Change for Prevention Effects

A prevention effect is defined as a true decrease in prospective risk and if the control group demonstrates increased symptomatology and/or diagnosis compared to the intervention group which has an absence of an increase in symptoms over time (Gillham et al., 2000). From Table 10, it was apparent that very few participants were categorised as "deteriorated". Likewise, as seen in Table 11, most participants remained in the healthy range from pre-test to 6-month follow-up. This suggests that it is likely that there are few, if any, prevention effects that are reliable and clinically significant.

As mentioned in the Statistical Analysis section, a *z*-score test for two population proportions was conducted. To minimise the number of tests conducted, and therefore type I error, analyses were first conducted on groups collapsed across time (combined across pre-test, post-test, 3-month follow-up, 6-month follow-up). If results were statistically non- significant, it was assumed that the smaller *n* differences across groups at each time point would also be non-significant. To further reduce type I error, if the *z*-test results collapsed across time yielded significant *p* values, analyses were first conducted on groups with the biggest difference in *n* in the "deteriorated" categories at each time point. If results were statistically non-significant, it was assumed that those with smaller *n* differences at each time point would also be non-significant. The same analysis was repeated to test for clinically significant treatment effects, but analysing the cases who "recovered" or "improved" in each group over time.

#### *CPQ Factor 1: Perfectionistic Strivings*

Across all time points and groups, there were no participants in the "deteriorated" categories, with the exception of $n = 1$ for CBT-S between pre-test and 6-month follow-up. Comparing CBT-P and CBT-S between pre-test and 6-month follow-up, there was no *significant* differences in proportion of participants who deteriorated, $z = -1.10$, $p = 0.27$. Hypothesis 2 was not supported as there were no clinically significant prevention effects for CPQ Factor 1 (Perfectionistic Strivings).

#### *CPQ Factor 2: Perfectionistic Concerns*

Across all time points for CBT-P and waitlist control, there were no participants in the deteriorated categories. No further tests were thus conducted to compare these two groups. *Comparing* CBT-P and CBT-S across all time points,

there was a significantly faster rate of deterioration for CBT-S, $z$ = -2.66, $p$ = .008. The largest difference in proportion of deterioration was between pre-test and 3-month follow-up, but the result was statistically insignificant, $z$ = -1.85, $p$ = 0.06. No further tests were conducted to compare CBT-P and CBT-S between pre-test and post-test, pre-test and 6- month follow-up. Hypothesis 4 was partially supported because when data was collapsed across all time points, there was a clinically significant prevention effect for CBT-P where CBT-P had a slower rate of deterioration than CBT-S for CPQ Factor 2 (Perfectionistic Concerns). However, the statistical significance disappeared when looking at specific time periods.

***EDE-Q***

Across time, only $n$ = 3 participants had deteriorated in CBT-P, whereas $n$ = 7 and $n$ =10 had deteriorated in CBT-S and waitlist control *respectively*. Comparing CBT-P and waitlist control across time, there was a significantly slower rate of deterioration in eating disorders symptoms favouring CBT-P, $z$ = -2.18.43, $p$ = .029. Comparing CBT-P and waitlist control at each time period of pre-test and post-test, pre-test and 3-month follow-up, pre-test and 6-month follow-up, there were no significant differences in rates of deterioration, $z$ = - 1.36, $p$ = .174; $z$ = -1.85, $p$ = .064; $z$ = -0.65, $p$ = .516 respectively. Comparing CBT-P and CBT-S across time, there was no significant difference in rates of deterioration, $z$ = -1.51, $p$ = .131. Hypothesis 6 was partially supported, where CBT-P was superior to waitlist control in preventing clinically significant deterioration of eating disorder symptoms across time, although the statistical significance disappeared when looking at specific time period.

***RCADS Depression***

Collapsing data across time and comparing CBT-P and waitlist control, there was no significant difference in *rates* of deterioration, $z$ = -1.04, $p$ = .298. No further tests were conducted at specific time periods comparing CBT-P and waitlist control. Comparing CBT-P and CBT-S across time, there was a significantly slower rate of deterioration favouring CBT-P, $z$ = -2.42, $p$ = .016. Comparing CBT-P and waitlist control at each time period of pre-test to post-test, pre-test to 3-month follow-up, pre-test to 6-month follow-up, there were no significant differences in rates of deterioration, $z$ = -1.08, $p$ = .280; $z$ = -1.04, $p$ = .298; $z$ = -1.80, $p$ = .072 respectively. Hypothesis 8 was partially supported, there was a clinically significant prevention effect for CBT-P where CBT-P had a slower rate of deterioration in

depressive symptoms than CBT-S across time, although the statistical significance disappeared when looking at specific time periods.

***RCADS Anxiety***

Collapsing data across time and comparing CBT-P and waitlist control, there was no significant difference in rates of deterioration of anxiety symptoms, $z$ =-1.08, $p$ = .280. Collapsing data across time and comparing CBT-P and CBT-S, there was no significant differences in rates of deterioration $z$ = -1.82, $p$ = .069. No further tests at specific time periods were conducted between the three groups. Hypothesis 10 was not supported and CBT-P was not superior to waitlist control nor CBT-S in preventing clinically significant deterioration of anxiety symptoms.

***RSES***

Collapsing data across time and comparing CBT-P and waitlist control, there was no significant difference in rates of deterioration in self-esteem, $z$ = -0.92, $p$ = .358. Similarly, when collapsing data across time and comparing CBT-P and CBT-S, there was no significant differences in rates of deterioration, $z$ = -0.59, $p$ = .555. No further tests were conducted. Hypothesis 12 was not supported suggesting that CBT-P was not superior to waitlist control nor CBT-S in preventing clinically significant deterioration of self-esteem.

**Treatment Effects**

In addition to examining prevention effects, treatment effects were examined.

***CPQ Factor 1: Perfectionistic Strivings***

By combining data across all four time points (pre-test, post-test, 3-month follow-up and 6-month follow-up), the CBT-P and waitlist control groups were compared. There were no significant differences in proportion of participants in the "recovered" or "improved" categories, $z$ = 0.232, $p$ = .818, suggesting no differences in clinically significant reductions of CPQ Factor 1 (Perfectionistic Strivings) between CBT-P and waitlist control across time. Similarly, comparing CBT-P with CBT-S, no difference in treatment effects were found, $z$ = 0.86, $p$ = .390.

***CPQ Factor 2: Perfectionistic Concerns***

Given that no participants in all three groups were in the "recovered" or "improved categories, no test were conducted.

***EDE-Q***

Comparing CBT-P and waitlist control across time, there was a significant difference in rates of clinically significant improvement favouring CBT-P, $z = 3.43$, $p < .001$. Comparing CBT-P and waitlist control between pre-test and post-test, there was no significant difference in rates of clinically significant improvements, although it was nearing statistical significance, $z = 1.93$, $p = .054$. Comparing CBT-P and waitlist control between pre-test and 3-month follow-up, there was a significant difference in rates of clinically significant improvements favouring CBT-P, $z = 2.01$, $p = .044$. Similarly, comparing CBT-P and waitlist control between pre-test and 6-month follow-up, there was a significant difference in rates of clinically significant improvements favouring CBT-P, $z = 2.08$, $p = .038$. Comparing CBT-P and CBT-S across time, there was no significant differences in rates of clinically significant improvement, $z = 1.88$, $p = .060$. CBT-P was superior to waitlist control in producing clinically significant reductions in eating disorder symptoms between pre-test and 3-month follow-up and pre-test and 6-month follow-up. However, no differences were noted between CBT-P and CBT-S.

***RCADS Depression***

Collapsing data across time and comparing CBT-P and waitlist control, there was a significant difference in rates of clinically significant improvement favouring CBT-P, $z = 2.71$, $p = .007$. CBT-P showed a higher rate of clinically significant improvements between pre-test and post-test, $z = 2.00$, $p = .046$. Between pre-test and 3- month follow-up, as well as between pre-test and 6-month follow-up, there were no differences in rates of clinically significant improvements between CBT-P and waitlist control, $z = 1.00$, $p = .317$; $z = 1.71$, $p = .087$ respectively. Comparing CBT-P and CBT-S across time, there was no significant differences in rates of clinically significant improvement, $z = 0.98$, $p = .327$. CBT-P was superior to waitlist control in producing clinically significant improvements in depressive symptoms between pre-test and post-test but not between pre-test and 3-month follow-up nor between pre-test and 6-month follow-up. No differences were noted between CBT-P and CBT-S.

***RCADS Anxiety***

Across time, CBT-P was superior to waitlist control in rates of clinically significant improvements, $z = 2.71$, $p = .007$. Between pre-test and post-test, CBT-P was superior to waitlist control in rates of clinically significant improvements, $z =$

2.00, $p = .046$. However, between pre-test and 3-month follow-up, and pre-test and 6-month follow-up, there were no differences in rates of clinically significant improvement, $z = 1.38$, $p = .168$; $z = 1.43$, $p = .153$ respectively. Collapsing data across time and comparing CBT-P and CBT-S, there was no significant differences in rates of clinically significant improvement, $z = 0.43$, $p = .667$. CBT-P was superior to waitlist control in producing clinically significant improving of anxiety symptoms between pre-test and post-test but not between pre-test and 3-month follow-up nor between pre-test and 6-month follow-up. No differences were noted between CBT-P and CBT-S.

***RSES***

Comparing CBT-P and waitlist control across time, CBT-P was superior to waitlist control in rates of clinically significant improvement, $z = 3.18$, $p = .001$. There were no significant differences between CBT-P and waitlist control in rates of clinically significant improvements between pre-test and post-test, $z = 1.11$, $p = .267$. However, CBT-P showed a higher rate of clinically significant improvements than waitlist control between pre-test and 3-month follow-up, $z = 2.30$, $p = .021$ and between pre-test and 6-month follow-up, $z = 2.11$, $p = .035$. Across time, CBT-P showed a greater difference in rates of clinically significant improvements than CBT-S, $z = 3.05$, $p = .002$. There was no significant difference in rates of clinically significant improvements between CBT-P and CBT-S from pre-test to post-test, $z = 1.04$, $p = .298$. When looking at pre-test to 3-month follow-up and pre-test to 6-month follow-up, CBT-P showed a higher rate of clinically significant improvements than CBT-S, $z = 2.30$, $p = .021$ and $z = 2.57$, $p = .010$ respectively. CBT-P was superior to both CBT-S and waitlist control in improving self-esteem between pre-test and 3-month follow-up, and between pre-test and 6-month follow-up but not pre-test and post-test.

## Discussion

To the author's knowledge, the current study was the first RCT to assess the efficacy of an online CBT self-help program for clinical perfectionism (CBT-P) in young females. The study explored the efficacy of online CBT-P and compared that with an active control, an online CBT self-help program for stress (CBT-S) as well as a waitlist control. This study provided evidence that online CBT-P is efficacious in reducing clinical perfectionism and the effects were maintained at 6-month

follow-up. Specifically, CBT-P was superior to both CBT-S and waitlist control in reducing CPQ Factor 1 (Perfectionistic Strivings; *d* = 0.57 – 1.11) and CPQ Factor 2 (Perfectionistic Concerns; *d* = 0.74 to 0.87). The current findings also indicated that CBT-P was superior to CBT-S and waitlist control in preventing the increase of eating disorder (*d* = 0.29 -0.54), depression (*d* = 0.52 – 0.56), anxiety (*d* = 0.66 – 0.77) symptoms and decreases in self-esteem (*d* = 0.35 – 0.92), with these changes being maintained at 6 months follow-up: The moderate to large reductions in both CPQ factors from pre-test to 6-month follow-up in the CBT-P group of the present study is consistent with the large effect sizes for pre- to post-test reductions in perfectionism noted in a meta-analysis (Lloyd et al., 2015). Large reductions in perfectionism as measured by the CPQ have been found in studies of face to face CBT-P (*d* = 1.20 - 1.31; Handley et al., 2015; Riley et al., 2007). Likewise, the present study noted moderate to large reductions in the two CPQ factors for the CBT-P group: CPQ Factor 1 (Perfectionistic Strivings; *d* = 0.57 - 1.11) and CPQ Factor 2 (Perfectionistic Concerns; *d* = 0.74 – 0.84). Similar to the most recent meta-analysis examining selective prevention of eating disorders (Watson et al., 2016), small to moderate reductions in eating disorder symptoms were observed in the CBT-P condition of this study, with its efficacy maintained at 6-month follow-up (*d* = 0.29 to 0.54). Likewise, the latest meta-analysis examining online prevention of eating disorders (Melioli et al., 2016) reported small to moderate effects in reducing various psychopathology or symptoms associated with eating disorders (*d* = 0.25 to 0.47).

The transdiagnostic impact of CBT-P in reducing psychological problems such as eating disorder symptoms, depression, anxiety and low self-esteem has been examined in numerous Randomised Controlled Trials (e.g., Egan et al., 2014a; Handley et al., 2015; Steele & Wade, 2008). Egan et al. (2014a) examined two CBT-P formats, a face-to-face CBT-P and unguided online CBT-P, with the face-to-face CBT-P showing moderate to large decreases in perfectionism, large decreases in depressive and anxiety symptoms and large increases in self-esteem while the unguided online CBT-P group showed small to large decreases in perfectionism, but not find any significant changes in depression or anxiety or self-esteem at 6-month follow-up. Compared with the unguided online CBT-P group (Egan et al., 2014a), the present online CBT-P group showed similar reductions in perfectionism as the online CBT-P group but showed significant moderate

decreases in depressive and anxiety symptoms and small to large increases in self-esteem, suggesting a greater intervention effect in the present study. Still, the present unguided online CBT-P showed smaller effect sizes than that noted by the face-to-face CBT-P (Egan et al., 2014a), which can be explained by the evidence that the size of intervention effects are positively related to the amount of therapist support that is provided (Johansson & Andersson, 2012; Pearcy, Anderson, Egan, & Rees, 2016).

Similar to Handley et al. (2015) who examined a group face-to-face CBT-P format, the present online CBT-P intervention showed small to moderate reductions in eating disorder symptoms, moderate reductions in depressive and anxiety symptoms, as well as large increases in self-esteem. Steele and Wade (2008) examined a face-to-face guided self- help CBT-P in individuals with bulimia nervosa and the intervention showed large reductions in perfectionism, eating disorder symptoms, depressive symptoms, moderate reductions in anxiety symptoms and large increases of self-esteem at 6-month follow-up. The present CBT- P intervention showed similar large effect sizes in reducing perfectionism and increasing self- esteem as well as comparable moderate effect sizes in decreasing anxiety, but found smaller effect sizes across the outcomes of eating disorder and depressive symptoms, which were moderate in size. The smaller effect sizes in eating disorder and depressive symptoms may be attributed to the different clinical characteristics of the sample: the present study examined a non-clinical sample of female adolescents (selective prevention), while Steele and Wade (2008) examined a clinical sample of individuals with bulimia nervosa. Larger effect sizes can be expected from samples with clinical symptoms and/or disorders rather than samples with few or no clinical symptoms and/or disorders (Dalle Grave, 2003; Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016).

The outcomes of the prevention trial support the construct of clinical perfectionism as a transdiagnostic process (Egan et al., 2011), that is able to effectively reduce eating disorder symptoms and comorbid psychological problems of anxiety and depression (Hudson et al., 2007; Swanson et al., 2011), as well as increase self-esteem which is also implicated in the treatment of eating disorders (Fairburn, 2008). This randomised controlled trial adds evidence to the literature that has demonstrated CBT-P to be effective in reducing perfectionism, depression, anxiety, stress and increasing self-esteem (Egan et al., 2014a; Egan et al., 2011;

Glover et al., 2007; Handley et al., 2015; Lloyd et al., 2015; Riley et al., 2007).

Inconsistent with our hypotheses, the study found few differences between groups in reliable and clinically significant prevention effects. There were no differences across groups in the prevention of clinically significant deterioration in CPQ Factor 1 (Perfectionistic Strivings), anxiety symptoms and low self-esteem. Nonetheless, several prevention effects were noted: CBT-P was superior to CBT-S in the prevention of clinically significant deterioration in CPQ Factor 2 (Perfectionistic Concerns), and depressive symptoms. CBT-P was superior to waitlist control in the prevention of clinically significant deterioration in eating disorder symptoms.

Examining treatment effects, there were no differences between groups that resulted in reliable and clinically significant improvements in CPQ Factor 1 (Perfectionistic Strivings) and CPQ Factor 2 (Perfectionistic Concerns). Still, CBT-P was superior to waitlist control in achieving reliable and clinically significant improvements in symptoms of eating disorders, depression and anxiety and self-esteem across time. CBT-P was superior to CBT-S in producing reliable and clinically significant improvements in self-esteem.

The few clinically significant prevention effects can be explained by the lack of individuals showing clinically significant deterioration and the low numbers of healthy individuals shifting to clinical disorders at post-intervention and follow-up. This is not surprising, given that most of the participants were in the "healthy" categories at pre-test, with $n$ = 66 (70.2%) for eating disorders, $n$ = 66 (70%) for depression, $n$ = 60 (64%) for anxiety. Further, very few participants deteriorated over time as noted in Table 10, with the maximum n deteriorated found in the CBT-S group for the CPQ Factor 2 (Perfectionistic Concerns) outcome between pre-test to 3-month follow-up ($n$ = 3), in the waitlist group for the eating disorder symptoms outcome between pre to 3-month follow-up ($n$ = 5), in the CBT-S group for the depressive outcome between pre to 6-month follow-up ($n$ = 3). Therefore, it is likely that there may have been a floor effect. Such findings are typical of prevention studies, particularly in studies that involve predominantly healthy participants and that seek to detect differences in the movement of symptom scores away from the mean (Horowitz & Garber, 2006; Nehmy, 2010; Nehmy & Wade, 2015; Pössel, Horn, Groen, & Hautzinger, 2004). So common are these findings that a term "sleeper effect" has been coined, where there is an initial absence of

intervention versus control group differences where most participants remain in the "healthy" category (e.g., at post intervention or short- term follow-up), and significant differences may only become apparent further in the future (e.g., at two years follow-up) where the intervention group is protected from psychopathology (Horowitz & Garber, 2006; Nehmy, 2010; Nehmy & Wade, 2015; Pössel et al., 2004). Indeed, the small to large effect sizes found for CBT-P when examining treatment effects lend support to the possibility of sleeper effects and a potential prevention effect that may become apparent with a longer follow-up period. It was clear that the statistical tests (GLMMs) detected improved outcomes on dimensional outcome measures, whereas the analyses of clinically significant changes appeared to lack statistical power. This may be explained in part by the use of a selective population rather than an indicated population with high risk. Also, the reliance of the clinically significant changes on categorical outcomes may have led to a loss of power.

### Clinical and Research Implications

Several clinical and research implications can be derived from the present study. First, the randomised controlled trial showed that online CBT-P was effective in the prevention of eating disorders and associated comorbidities in female youths aged 14 to 19, providing strong empirical support regarding the efficacy of the intervention. Still, this is the first evaluation of the efficacy of online CBT-P, and further studies would be beneficial. It would also be helpful to test the efficacy of online CBT-P in other populations, such as males, children and adults, which can strengthen the efficacy of the intervention. Under the Standards developed by the Society for Prevention Research (Flay et al., 2005), an efficacious intervention needs to be tested in at least two rigorous trials that (a) involved defined samples from defined populations, (b) used measures and data collection procedures that are psychometrically sound, (c) used rigorous statistical analyses, (d) showed consistent positive effects without serious negative effects, (e) reported at least one significant long- term follow-up. Future studies can strive to meet these standards so as to build an evidence base for the efficacy of online CBT-P. Once the efficacy of CBT-P has been established, effectiveness testing can take place. The Standards recommends for an effective intervention to (a) have manuals, training, and technical support made available so that third parties can adopt and implement the intervention, (b) be

evaluated under real-world conditions and include sound measurement of the implementation and engagement of the target group, (c) demonstrate the practical importance of intervention outcome effects, (d) demonstrate clearly the populations to whom the findings can be generalised (Flay et al., 2005).

Second, the current research informed the as by demonstrating the relevance of the construct of clinical perfectionism in preventing eating disorder symptoms. Previous cross-sectional and retrospective studies (Jacobi et al., 2004; Lloyd et al., 2015; Stice, 2002), some prospective studies (Bardone-Cone et al., 2007; Lilenfeld et al., 2006) and experimental studies (Boone et al., 2012; Shafran et al., 2006) implicated perfectionism, and more recently clinical perfectionism (Egan et al., 2011), in the aetiology and maintenance of eating disorders. However, a weakness of these study designs is that they cannot establish causal effect. Experimental studies are the gold standard for establishing causal effect and the current randomised controlled trial is an important test of previous aetiological and/or maintenance theories of eating disorders that incorporated perfectionism. These models include the cognitive-behavioural model of eating disorders (Fairburn et al., 1986; Fairburn et al., 1999; Fairburn et al., 2003a; Garber & Bemis, 1982; Vitousek & Hollon, 1990); the cognitive-interpersonal model of anorexia nervosa (Schmidt & Treasure, 2006), and the three-factor interactive model of bulimia nervosa (Bardone-Cone et al., 2006). The outcomes of this randomised controlled trial supported the construct of clinical perfectionism as a contributing factor to eating disorder symptoms (Egan et al., 2011), and a transdiagnostic process implicated in multiple disorders including eating disorders, depression, and anxiety (Egan et al., 2011).

Third, the transdiagnostic effects of online CBT-P was observed across a variety of outcomes in the present research, with large effects observed in clinical perfectionism and self-esteem and moderate effects noted in eating disorder, depressive and anxiety symptoms. Unlike some eating disorders prevention programs which target risk factors conceptualised as more specific to eating disorders (i.e., media literacy, cognitive dissonance, CBT targeting body dissatisfaction), online CBT-P targeted a transdiagnostic process that was effective in decreasing the symptoms of multiple disorders at once. The potential benefits of CBT-P include the prevention of possible development of comorbidities associated with eating disorders (Dozois et al., 2009) and greater cost-effectiveness (Mansell et

al., 2009), which may be appealing to individuals who may be at risk of eating disorders as well as its associated comorbidities.

Lastly, the present study contributes to the small but growing evidence base of online prevention programs that aim to prevent eating disorder symptoms (Beintner et al., 2012; Loucas et al., 2014; Melioli et al., 2016; Newton & Ciliska, 2006). Given the research findings in reducing eating disorder outcomes in a relatively healthy population, where floor effects can be expected, it is likely that the online CBT-P program can be a useful clinical intervention, particularly as a low intensity service in a stepped care model (for an example, see Australia Department of Health, 2015). The approach of stepped care models in primary mental health care clinical services has been recently introduced in Australia following a review of mental health programs and services (Australia Department of Health, 2015), with a recommendation for "self-help resources, including digital mental health" (Australia Department of Health, 2015, p. 9) to be made available to well population, at risk groups with early symptoms or previous illness, as well as mild mental illnesses. The online CBT-P intervention developed from this current research fits the Australian Government's shift "away from acute illness and crisis towards primary prevention, early intervention…" (Australia Department of Health, 2015, p. 10) as well as the move toward digital mental health services that can reach people who are living in remote regions, who prefer anonymity, or who are better suited for low intensity support rather than intensive face-to-face clinical services (Australia Department of Health, 2015).

While the use of low intensity services in a stepped care model has only recently been implemented in Australia, the United Kingdom has implemented a large scale initiative for Improving Access to Psychological Therapies (IAPT) for depression and anxiety disorders since 2007. The main aim of IAPT is to make evidence-based psychological therapies for depression and anxiety disorders more widely available in the National Health Service. The IAPT aims to make cognitive behavioural therapy more accessible, as recommended by the NICE (2006, 2011). However, accessing cognitive behavioural therapy can be limited because there is a shortage of psychological therapists to provide the service (for a review, see Clark et al., 2009). NICE (2006, 2011) recommended that for mild to moderate depression and anxiety disorders, with the exception of post-traumatic stress disorder and social anxiety, a stepped care model is ideal. The stepped care model adopted by

IAPT, states that individuals should first be offered a low intensity intervention such as guided self-help and online self-help, and if unresponsive, to step up to a high intensity intervention such as traditional face-to-face therapy. From data of 19,395 patients who had clinical psychological disorders at intake, 40.3% had reliably recovered at post-treatment, 63.7% had reliably improved, and 6.6% showed reliable deterioration (Gyani, Shafran, Layard, & Clark, 2013), suggesting that the stepped care model was successful in improving outcomes of most patients. Importantly, patients who received low intensity treatment who were then stepped up from low intensity to high intensity care had higher overall rates of reliable recovery than those who received high intensity treatment alone (Gyani et al., 2013). This suggests the importance of services making full use of the stepped care approach, and the need to encourage patients to continue from low to high intensity work, if appropriate (Gyani et al., 2013). While the IAPT focused specifically on depression and anxiety disorders, it is possible that the stepped care model can be effective when extended to the management of eating disorders, given that NICE (2011) has suggested a stepped care approach as a possible future direction for the management of eating disorders. At present, NICE (2011) advocates for individuals with bulimia nervosa and binge eating disorders to be treated primarily on an outpatient basis in either primary or secondary services, while individuals with anorexia nervosa be generally treated in secondary care, with a trial of outpatient intervention first, and options of in, out or day patient services depending on severity. Still, it has been recommended that a stepped-care model where patients with eating disorders move from secondary to tertiary care is likely to make clinical sense, especially when considering the long waiting time and extensive training requirements of psychotherapies for the treatment of eating disorders (NICE, 2011). There remains little evidence to guide decisions about service setting for the management of eating disorders (NICE, 2011) and the present study contributes to the small and growing evidence base that online self-help, as a low intensity intervention, can successfully reduce symptoms of eating disorders in female adolescents, and demonstrated that clinically significant prevention and treatment effects for eating disorders can be achieved in this at-risk population.

### Strengths and Limitations

There were several strengths and limitations of the present study. A strength

of the study was the use of a more specific measure of clinical perfectionism – the Clinical Perfectionism Questionnaire (CPQ: Fairburn et al., 2003b), as compared to previous related studies (Pleva & Wade, 2007; Steele & Wade, 2008; Wilksch et al., 2008) that used traditional measures of perfectionism such as FMPS, which may capture additional dimensions unrelated to the two-factor construct of clinical perfectionism, namely Perfectionistic Strivings and Perfectionistic Concerns. By measuring changes in perfectionism over multiple time periods, the study had provided evidence that the CPQ is sensitive in capturing changes in perfectionism levels in intervention studies, although this remains to be explored directly in a validation study. The inclusion of statistical power calculation and adequate sample size were also strengths of the present randomised controlled trial, particularly given that these standards of quality were not frequently fulfilled in randomised controlled trials in eating disorder prevention, with 85% of the 96 studies not reporting power calculation and 75% of studies not having adequate sample size (Watson et al., 2017). Another strength of the study was a reasonable follow up period of 6 months. This is in contrast to the majority of previous prevention studies that use follow-up periods shorter than six months. A recent investigation of the quality of randomised controlled trials in eating disorder prevention showed that only 34% of trials included a long enough follow- up, operationalised as a follow-up period of six or more months (Watson et al., 2017). The inclusion of analyses of clinically significant change in the present study is consistent with calls to improve the quality of randomised controlled trials of eating disorder prevention (Stice & Shaw, 2004; Watson et al., 2017). Finally, the current randomised controlled trial included an active control group (CBT-S) to control for nonspecific effects, as well as a waitlist control group, which is consistent with CONSORT guidelines (Schulz et al., 2010).

Nonetheless, the study also had several limitations. First, we were unable to assess clinical eating disorders as an outcome as this requires an extremely large sample size and lengthy follow-ups that track the onset of new cases of eating disorders. This problem, however, is inherent to all prevention studies in the eating disorder field (Becker, 2016; Watson et al., 2016, 2017). By and large, researchers and meta-analyses in this field considered risk factor reduction studies as prevention studies (Becker, 2016; Watson et al., 2016, 2017). Second, the primary outcome of eating disorders and secondary outcomes of depression and anxiety were assessed

using self-report tools rather than "gold-standard" structured or semi-structured clinical interviews. While the "gold standard" Eating Disorder Examination (EDE) clinician- administered interview (Fairburn & Cooper, 1994) is ideal, the self-report version of the EDE, EDE-Q was used in this study instead. Being an online intervention, it was not feasible to implement a face-to-face clinician-diagnosed interview as participants were recruited all around Australia, and the main goals of online interventions were to help users reflect on information that they may not feel comfortable disclosing in a face-to-face situation, or who may be reluctant to seek help due to shame (Leibert et al., 2006; Zabinski et al., 2003). These reasons, as well as constraints on time and resources led to the use of self-report measures in this study. Still, a systematic review conducted a psychometric evaluation of the EDE and EDE-Q (Berg, Peterson, Frazier, & Scott, 2012) and found evidence that scores on both measures correlated with scores on measures of similar constructs and there was support for using both instruments to distinguish between cases and non-cases of eating disorders. Consistent findings of high correlations of scores on the EDE-Q and EDE had also been observed in nonclinical and clinical populations (Binford et al., 2005; Faiburn & Beglin, 1994; Mond et al., 2004). Nevertheless, the imperfect sensitivity, specificity and positive predictive values noted in the EDE-Q (Mond et al., 2004) suggested the importance of interpreting the current findings with caution. Another limitation of the present research was a lack of exploration of binging and compensatory behaviour outcomes. While the sample was large compared to existing research (Watson et al., 2017), it was underpowered for more detailed exploration of these outcomes, particularly because this was a nonclinical sample. The screening of eligible participants using the SCOFF measure included items "Do you make yourself sick because you fell uncomfortably full?" and "Do you worry that you have lost control over how much you eat?", which would have removed a majority of individuals with subclinical or clinical eating disorders prior to initial assessment. This was consistent with the finding that across all time points, very few participants endorsed binging and compensatory behaviours of purging, laxative and/or diuretic misuse and driven exercise. Still, future studies can examine these outcomes to better understand the prevention effects of interventions.

Another key limitation of the study was a common difficulty of online interventions, that is the "law of attrition", referring to the phenomenon of participants ceasing participation, and/or being lost to follow-up in online

interventions (Eysenbach, 2005). As seen in Figure 3, the study had a dropout rate of 29% ($n$ = 27) at post-intervention and this increased to 38% ($n$ = 36) at 3-month follow-up and 40% ($n$ = 38) at 6-month follow-up. Further, most of the attrition came from CBT-P (44% at 6-month follow-up) or CBT-S (50% at 6-month follow-up), rather than the waitlist control group (21% at 6-month follow-up). These attrition rates were consistent with those noted in the meta-analysis of 20 online eating disorder prevention studies that had a dropout rate ranging from 2% to 41% (Melioli et al., 2016). Further, the missing data were found to be missing at random and an appropriate modelling approach (mixed methods with full information maximum likelihood estimation) was used in this study, thus mitigating this concern. It may be helpful for future researchers to conduct a logistic regression post-study to examine whether certain study variables can contribute to the prediction of dropout beyond demographic variables.

The study had examined and addressed several hypothesised factors that influence attrition rates (Andersson, Carlbring, Berger, Almlöv, & Cuijpers, 2009; Eysenbach, 2005) in order to minimise attrition rates. First, during the screening process, in addition to screening for participants at risk of eating disorders or suicidality, eligible participants were informed of the general expectations of the active CBT-P or CBT-S interventions (e.g., one to two hours weekly, for four to eight weeks) and asked if they were able to commit to it. Such clear deadlines and expectations can foster compliance (Andersson et al., 2009). Second, therapist contact was used to encourage participation, with weekly reminders by text messages were sent to remind participants (and parents if participants were under 18) to complete the program, and if participants were not responsive, phone calls were made to encourage continuation of the program. Participants in the active interventions also received a feedback report that compared the level of clinical perfectionism at pre-test with the respective time points to encourage completion of follow-up questionnaires. Participants in the waitlist control group were encouraged to complete the questionnaires by explaining the time taken (approximately 20 minutes), the purpose of the waitlist control and how they were contributing to the research, and sending them a text message to thank them for their time after they had completed the questionnaire. Therapist support is helpful in increasing participants' engagement in online interventions (Andersson et al., 2009), although it is still unclear the degree of therapist contact required. Based on the experience of

Swedish studies, at least 10 minutes per week of therapist feedback and contact has been recommended to increase uptake (Andersson, 2016; Andersson et al., 2009). It has also been recommended to make it clear to participants that there is a person behind the support, and future studies might benefit from presenting the staff on the program, including names, pictures and brief descriptions of their roles, as well as having telephone contact with participants (Andersson et al., 2009). The steps taken to prevent attrition are more frequently employed in efficacy trials. Under normal conditions attrition is likely to be even greater, suggesting the importance of expanding this research programme to incorporate effectiveness trial testing. In effectiveness designs, the intervention is administered under naturalistic conditions that resemble real- world dissemination to examine the maximal likely benefit that can be achieved under real- world rather than optimal conditions.

### Future Research Implications

While the abovementioned measures may have reduced attrition rates, most of the participants who dropped out of the interventions cited reasons of not being able to find a time to do the program, particularly around exam time. This was a hypothesised barrier that was cited, where external personal events might lead to distractions and discontinuance, especially if the interventions were not perceived to be essential (Eysenbach, 2005). This barrier was particularly relevant to our target population, who were highly perfectionistic, and were likely to spend excessive amounts of time studying for exams due to the overdependence of self-evaluation in the area of pursuing academic excellence despite adverse consequences (Shafran et al., 2002). Qualitative analyses regarding motivation to change clinical perfectionism suggested that individuals with psychological disorders and elevated clinical perfectionism were aware of the numerous negative consequences of their perfectionism. However, they also reported multiple advantages and the majority stated that their preference was to not change their perfectionism. Most continued to engage in dichotomous thinking and preferred to keep the same high standards or reset their standards to a higher level following failure (Egan, Piek, Dyck, Rees, & Hagger, 2013). It was recommended that participants with insufficient motivation might benefit from online motivational interviewing (Andersson et al., 2009). While there was a specific session of CBT-P that was devoted to enhancing motivation (Session 3: Enhancing motivation to change perfectionism), it may be that

individuals with perfectionism require greater therapeutic input. This can include an in-depth motivational interviewing during the screening process with a therapist, and extra therapeutic support between sessions to shift their stages of change from one that is pre-contemplative or contemplative to one of preparation, action and maintenance (Andersson et al., 2009).

Further research is required to formally examine reasons and develop strategies to minimise dropout in online interventions (Andersson et al., 2009; Christensen et al., 2009; Eysenbach, 2005), particularly for people who struggle with clinical perfectionism who may be ambivalent about change as they perceive numerous benefits from clinical perfectionism (Egan et al., 2013). It was recommended that future studies detail the kind of support given, the format of support (e.g., telephone, e-mail), whether the support is manualised, the level of education and experience of the support persons, whether the support is "as required" or scheduled, and the full duration of support in minutes so as to better clarify the level of therapist support required for online self-help to work (Andersson et al., 2009). For example, a protocol of a randomised controlled trial of an Internet based guided self-help CBT-P was recently published (Kothari, Egan, Wade, Andersson, & Shafran, 2016). It explicitly stated the setting, intervention, amount and type of guidance and feedback provided. Such information can clarify the degree of support required for efficacious online interventions.

## Conclusion

In summary, this RCT demonstrated that online CBT-P was efficacious in producing moderate to large reductions in clinical perfectionism, small to moderate reductions in eating disorder symptoms, moderate decreases in depressive and anxious symptoms and small to large increases in self-esteem in young women aged 14 to 19 years, with these changes being maintained at 6-month follow-up, and with all effects being superior to an active control, online CBT-S, and a waitlist control. The RCT also showed that online CBT-P was efficacious in producing clinically significant prevention effects in CPQ Factor 2 (Perfectionistic Concerns), eating disorder and depression as compared to CBT-S and waitlist control. Consistent with the definition of prevention effects, the control groups showed clinically significant deteriorations in CPQ Factor 2 (Perfectionistic Concerns), eating disorder, and

depression as compared to CBT-P that showed an absence of an increase in symptoms over time (Gillham et al., 2000). This suggests that clinical perfectionism is a putative risk factor worth targeting to prevent eating disorder symptoms and associated comorbidities, particularly given it is a transdiagnostic process that enhances efficacy and generalizability (Egan et al., 2011; Mansell et al., 2009). Future research should address if targeting clinical perfectionism can enhance cost-effectiveness given that CBT-P can result in reductions of several psychological symptoms, and therefore reduce the costs of seeking multiple treatments for each specific psychological problem (Mansell et al., 2009).

# CHAPTER 4: General Discussion

This research focused on the prevention of eating disorders in young females by targeting clinical perfectionism, which is thought to be a risk factor in the development and maintenance of eating disorders (Egan et al., 2011; Fairburn, 2008; Fairburn et al., 2003a; Shafran et al., 2002). Despite clinical perfectionism being a known risk factor for eating disorders, and an effective treatment target in eating disorders, few researchers have examined it as a prevention target (e.g., Nehmy & Wade, 2015; Wilksch et al., 2008).

To develop an efficacious prevention program, the research first examined the factor structure and validity of the Clinical Perfectionism Questionnaire (CPQ; Fairburn et al., 2003b) in a younger female sample so as to accurately measure changes in clinical perfectionism. Second, the efficacy of targeting clinical perfectionism was examined to prevent eating disorder symptoms and associated comorbidities of depression, anxiety symptoms and low self-esteem. A randomised controlled trial compared participants who were randomly allocated to online cognitive behaviour therapy for perfectionism (CBT-P), an active control of online cognitive behaviour therapy for nonspecific stress management (CBT-S) or a waitlist control, examining the effects up to 6 months after the intervention.

The first study in this research assessed the factor structure and construct validity of the CPQ in 267 female youth aged 14 to 19 years. The validity of the CPQ had not been previously examined in a young female population, and results indicated sound internal consistency, construct validity and incremental validity of the CPQ. The study was the first known study to conduct a confirmatory factor analysis of the CPQ whereas previous studies had conducted exploratory factor analyses. A two-factor structure of the CPQ was found which is consistent with previous research in community samples of adults (Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014). The first factor, CPQ Factor 1 (Perfectionistic Strivings), was related to the determined pursuit of personally-demanding, self-imposed standards, and was strongly correlated the Personal Standards subscale of the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) while the second factor, CPQ Factor 2 (Perfectionistic Concerns), represented the overdependence of self- evaluation on pursuit of high standards and strongly correlated with the Concern over Mistakes subscale of the FMPS. As noted in a

recent systematic review, both Perfectionistic Strivings and Perfectionistic Concerns dimensions were associated with clinical disorders of depression, anxiety and bulimia nervosa, although Perfectionistic Concerns tended to more strongly associated with these disorders as compared to Perfectionistic Strivings (Limburg et al., 2017). Likewise, the results of study 1 indicated that CPQ Factor 2 (Perfectionistic Concerns), as compared to CPQ Factor 1 (Perfectionistic Strivings) was more strongly correlated with psychopathology measures of eating disorder, depression, anxiety. CPQ Factor 2 (Perfectionistic Concerns) had a stronger negative correlation to self-esteem and self-compassion as compared to CPQ Factor 1 (Perfectionistic Strivings). The two-factor model of the CPQ fits with the theoretical definition of clinical perfectionism that included the determined pursuit of personally demanding, self-imposed standards and the overdependence of self-worth on achievement (Shafran et al., 2002). The two-factor model of the CPQ also maps onto the two higher-order factors of perfectionism that had been consistently identified: Perfectionistic Strivings involving setting high standards and goals for oneself as noted in CPQ Factor 1 and Perfectionistic Concerns involving overly critical evaluations of one's own behaviour, an inability to be satisfied from successful performances, and longstanding concerns about others' criticism and expectations as noted in CPQ Factor 2 (Bieling et al., 2004; Dunkley et al., 2006; Frost et al., 1990; Limburg et al., 2017). Moreover, the incremental validity of the CPQ on measures of psychopathology and self- esteem suggested that the CPQ, in particular CPQ Factor 2 (Perfectionistic Concerns), was able to explain variance in psychopathology above and beyond the typically used FMPS. The present study also contributed to a deeper knowledge of the psychometric properties of the CPQ, where the study included more measures of psychopathology such as compulsive exercise where positive correlations were found, and self-compassion where negative correlations were found. Further, this study was the first to demonstrate divergent validity for the CPQ through a weak, non-significant correlation with impulsivity. Still, this finding needs to be interpreted with caution given the caveats regarding the significant correlations between the factor scores and impulsivity. The clinical implication of the study was that the CPQ may be a more suitable measure to capture changes in perfectionism levels over time in intervention studies as compared to typically used MPS measures: The CPQ was able to capture clinically relevant aspects of perfectionism, such as basing one's self-worth on achievement,

which was associated with depression, anxiety, disordered eating and lower self-esteem. Given the relevance of the CPQ in explaining psychopathology, future research can determine whether the CPQ is sensitive in capturing changes in perfectionism levels in intervention studies, as this had not been directly examined in a validation study.

Having examined the factor structure and validity of the CPQ, the second study in this research developed and examined the efficacy of a selective prevention program consisting of eight sessions of online guided self-help that targeted clinical perfectionism. The material for CBT-P was based on a CBT self-help manual for perfectionism that was founded on the transdiagnostic theory of clinical perfectionism (Shafran et al., 2002), the transdiagnostic theory of eating disorders (Fairburn et al., 2003a), and the treatment module from the enhanced cognitive behaviour therapy for eating disorders (Fairburn, 2008). The study design was a randomised controlled trial involving 94 females without eating disorders aged 14 to 19 years who were randomised into CBT-P, an active control CBT-S or waitlist control. The results indicated that CBT-P led to moderate to large reductions in clinical perfectionism (CPQ Factor 1; Perfectionistic Strivings; d = 0.57 – 1.11), moderate to large reductions in clinical perfectionism (CPQ Factor 2; Perfectionistic Concerns; d = 0.74 to 0.87), small to moderate decreases in eating disorder symptoms (*d* = 0.29 -0.54), moderate decreases in depressive symptoms (*d* = 0.52 – 0.56), moderate decreases in anxiety symptoms (*d* = 0.66 – 0.77), and small to large increases in self-esteem (*d* = 0.35 – 0.92), with changes being maintained at 6-month follow-up. The reductions in clinical perfectionism, eating disorder, depression and anxiety, as well as increases in self-esteem were significantly larger in CBT-P than the CBT-S and waitlist control groups, both of which only had small effect sizes across all outcomes (the largest *d* = 0.38 for CBT-S was in reducing anxiety symptoms, largest *d* = 0.47 for waitlist control was in reducing Perfectionistic Strivings).

In addition to calculating the effect sizes to determine the efficacy of interventions, the present research clearly distinguished between treatment effects and prevention effects (Gillham et al., 2000; Horowitz & Garber, 2006; Nehmy, 2010). The present study incorporated the analyses of clinically significant change (Stice & Shaw, 2004; Watson et al., 2017) by examining the proportions of clinically significant deteriorations (Jacobson & Truax, 1991) across all three

groups. This was consistent with the definition of prevention effects, where the intervention group showed an absence of an increase in symptoms over time, as compared to the control group (Gillham et al., 2000). Despite the small numbers of participants who deteriorated, leading to floor effects, three prevention effects were found: CBT-P was superior to CBT-S in the prevention of clinically significant deterioration in CPQ Factor 2 (Perfectionistic Concerns), and depressive symptoms. CBT-P was superior to waitlist control in the prevention of clinically significant deterioration of eating disorder symptoms.

The research findings suggest two major implications: First, the study supported the notion of clinical perfectionism being a transdiagnostic process, where a range of psychological symptoms were successfully reduced. This suggests that clinical perfectionism is a useful target in decreasing a range of psychological problems at once in female youths. Second, an online CBT program targeting clinical perfectionism for the prevention of eating disorders was efficacious. Therefore, online self-help programs such as online CBT-P might be a useful and scalable prevention program, and can be incorporated into stepped care models as a low intensity service such as those used in United Kingdom and Australia. The next step is for the findings from the present study to be replicated to confirm its efficacy across various populations, and tested in an effectiveness trial design. Unguided self-help interventions have a larger possibility for scalability, making the development and confirmed success of such programs even more important. These implications and future directions are discussed in detail below.

**Clinical Perfectionism as a Prevention Target**

This research shows that online CBT-P reduces clinical perfectionism, symptoms of eating disorders, depression, anxiety, and increases self-esteem in a sample of young females up to 6 months after participating in the intervention. The findings support the construct of clinical perfectionism as a transdiagnostic process (Egan et al., 2011) and that transdiagnostic interventions such as CBT-P can significantly decrease a wide range of psychological symptoms such as eating disorder, depression and anxiety through its impact on clinical perfectionism (for reviews, see Egan et al., 2011; Lloyd et al., 2015), and enhance self-esteem (Egan et al., 2014a; Handley et al., 2015). This research contributes to the small but growing evidence base that CBT-P is effective in reducing perfectionism and psychological

symptoms in healthy participants (Fairweather-Schmidt & Wade, 2015; Nehmy & Wade, 2015; Wilksch et al., 2008). It is crucial to compare the findings of the present study to the findings of previous studies Fairweather-Schmidt and Wade (2015), Nehmy and Wade (2015) and Wilksch et al. (2008) so as to understand why certain interventions may be more or less efficacious. The present study found moderate to large reductions in clinical perfectionism while Fairweather-Schmidt and Wade (2015) found small reductions in self-oriented perfectionism at post-test and four-week follow-up ($d$ = 0.47, $d$ = 0.40 respectively) and a decrease in hyperactivity and emotional problems. The larger effect sizes noted in the present study may be attributed to the greater number of sessions (eight sessions) of CBT-P used, whereas Fairweather-Schmidt and Wade (2015)'s intervention was only two sessions. Briefer sessions are insufficient to produce lasting attitudinal and behavioural change, and multisession interventions allow participants to reflect on the material and maximise internalisation of learnings from the sessions (Stice & Shaw, 2004). Moreover Fairweather- Schmidt and Wade (2015) targeted pre-adolescent children aged 9 to 14 years whereas the present study targeted older adolescents and young adults. Meta-analysis suggests that participants aged younger than 15 may have limited insight as their abstract reasoning skills have yet to develop, which may limit their ability to maximally benefit from interventions (Stice & Shaw, 2004) which may explain the larger effect sizes in the present study. The present study also found larger reductions in perfectionism and depressive and anxious symptoms as compared to Nehmy and Wade (2015). They delivered an eight-session classroom intervention targeting perfectionism for female adolescents aged 11 to 18 years of age (mean age = 15 years), and found small reductions of unhelpful perfectionism at 12 months follow-up and lower negative affect at 6 months follow-up (Nehmy & Wade, 2015). The larger effect sizes found in the present study may be explained by the level of prevention that the respective studies chose. The present study is a selective prevention intervention focusing on female youths who are at the age that coincides with the average age-of-onset of eating disorders, while Nehmy and Wade (2015) evaluated a universal prevention intervention targeting females aged 11 to 18 years. The current findings fits with the literature review that suggests that universal prevention tended to yield smaller effect sizes than selective or indicated prevention, floor effects are more likely when conducting prevention interventions with a reasonably healthy population.

Low-risk individuals in universal programs may be less motivated to engage as compared to individuals in selective and indicated programs, which consequently results in lesser benefits post-intervention (Dalle Grave, 2003; Fingeret et al., 2006; Stice & Shaw, 2004; Stice et al., 2007; Watson et al., 2016). Comparing the present study to that of Wilksch, Durbridge, and Wade (2008), the present study also found a larger effect size in reducing perfectionism, whereas they found a small reduction in Concern over Mistakes subscale on the FMPS ($d$ = 0.45), and Personal Standards on the FMPS ($d$ = 0.44) at 3-month follow-up, and no reduction in the primary outcome of shape and weight concern. The smaller effect sizes noted by Wilksch et al. (2008) may be attributed to the shorter follow-up they have used, whereas 6 months is the recommended minimum follow-up period for prevention studies (Stice & Shaw, 2004). This study also shows that CBT-P is effective in reducing psychological symptoms in healthy and subclinical participants, extending beyond previous research that have focused primarily on the efficacy of CBT-P in subclinical or clinical participants (Egan et al., 2014a; Handley et al., 2015; Riley et al., 2007; Steele & Wade, 2008).

**Formats of Delivery and the Impact on Effect Size**

To date, five randomised controlled trials have examined the efficacy of CBT-P, albeit in different formats and with different effect sizes found (Egan et al., 2014a; Handley et al., 2015; Pleva & Wade, 2007; Riley et al., 2007; Steele & Wade, 2008). In these randomised controlled trials, small to large effects were found for CBT-P in reducing eating disorder symptoms ($d$ = 0.30 - 2.33), with moderate to large effect sizes decreases in depression (d = 0.73 – 1.16), moderate to large decreases in anxiety ($d$ = 0.56 – 1.16), and large effect sizes in increasing self-esteem ($d$ = 1.03 - 1.39). Comparatively, the effect sizes across outcomes for CBT-P in the present randomised controlled trial appear to be slightly smaller than the previous trials. This is consistent with meta-analytic findings where smaller effect sizes can be expected from the current study given that the nature of the study was selective prevention, consisting of a subgroup of healthy, non-clinical female adolescents, whereas larger effect sizes can be expected from samples that are already displaying symptoms of psychological problems or clinical samples (Watson et al., 2016). However, it is also important to consider the format that CBT-P was delivered across the various randomised controlled trials and the impact

of format on effect size.

In the randomised controlled trial (Pleva & Wade, 2007) comparing pure self-help CBT-P (where participants were given a book to work through on their own), and guided self-help CBT-P (where there was minimal contact with a therapist to guide the client through the book), both formats reduced perfectionism, depressive and obsessional symptoms, although the guided self-help condition was associated with significantly larger improvements in obsessive compulsive symptoms than the pure self-help group at 3-month follow-up. The superiority of guided self-help to pure self-help was again replicated in another randomised controlled trial (Egan et al., 2014a) that compared face-to-face and unguided online self-help versions of CBT-P, where the face-to-face group reported a greater decrease in perfectionism than the pure online self-help group ($d$ = 1.77 – 2.11 for face-to- face CBT-P versus $d$ = 0.73 -0.74 for pure online self-help CBT-P). The face-to-face group demonstrated significant reductions in depression, anxiety and stress, and increase in self- esteem at 6-month follow-up while the pure online self-help group experienced no significant changes on theses outcomes. From these two randomised controlled trials, it is evident that unguided self-help conditions experience smaller effect sizes in perfectionism and psychopathology outcomes as compared to groups with therapist input, such as face-to-face or guided self-help. This may explain the smaller effect sizes noted in the current randomised controlled trial which used unguided online self-help CBT-P group as compared to previous randomised controlled trials where CBT-P were delivered using face-to-face or guided self- help formats.

A meta-analysis of 33 online psychological treatments (Johansson & Andersson, 2012) confirmed a positive correlation between level of support and effect size of intervention with a Spearman correlation of $\rho = 0.64$, $p < 0.01$. Specifically, interventions with no human contact had an average small effect size of 0.21, interventions with pre- intervention contact had an average small effect size of 0.44, interventions with contact during the intervention had an average moderate effect size of 0.58, and interventions with contact pre-, during, and post-intervention had an average moderate effect size of 0.76. The meta-analysis demonstrated strong evidence that guided online CBT treatments are more effective than unguided online CBT treatments, and therapist contact before and/or after treatment can enhance both guided and unguided online CBT treatments (Johansson &

Andersson, 2012). The present study involved consistent contact with participants at pre, during (reminders to complete the program only) and post intervention (a therapist feedback report), which may explain the moderate to large effect sizes noted in the outcomes of interest. Pure unguided self-help programs potentially have greater scalability, to reach even more people of interest and thus have a greater population effect overall, than guided self- help programs which are dependent on specialists to offer and implement.

Little is known about the role of therapist factors in online CBT treatments, which is complicated by the varying degrees of support across guided treatments and the difficulty in conceptualising and measuring therapist effects (Johansson & Andersson, 2012; Palmqvist, Carlbring, & Andersson, 2007). There is no gold standard as to how online treatments should be delivered. Guidance was previously defined as support provided during treatment, however as noted in the abovementioned meta-analysis, contact with a therapist pre-, during, and post-treatment significantly impact treatment outcomes (Andersson, 2016; Andersson et al., 2009; Johansson & Andersson, 2012). Several recommendations about therapist involvement in online interventions have been suggested: displaying the names, pictures and brief descriptions of the staff behind interventions programs on websites (Andersson et al., 2009); therapist support either through e-mail or telephone calls that can be scheduled or needs-based (Andersson, 2016; Andersson et al., 2009); using automated reminders can be included in guided treatments (Andersson, 2016); including forms of encouragement and support that are short text messages sent once a week (Andersson, 2016); having the therapist spend approximately ten minutes per week commenting on the participants' homework and provide any feedback to the participants' concern (Andersson et al., 2009); establishing clear deadlines to encourage compliance and potentially decrease the need for continuous feedback from the therapist (Andersson et al., 2009); using laypersons to provide support for participants, with experienced clinicians supervising and managing more complex cases (Andersson, 2016). Future studies can shed light on this issue by clearly documenting the protocol of the guidance provided in the online treatments, such as the training and/or supervision undertaken by the guides; the type and frequency of feedback that will be provided to participants. For example, a protocol of a randomised controlled trial of online guided self-help CBT-P has been recently published (Kothari et al., 2016), where

the researchers clearly documented the guidance and feedback process. They stated that guidance and feedback will be delivered by psychological students, and trainee clinical psychologists, and based upon the recommended manual for the intervention (Kothari et al., 2016). The guides will receive supervision by a qualified clinical or research psychologist, and have monthly supervision meetings (Kothari et al., 2016). Each participant will receive feedback from at least two guides, with four evidence-based recommendations guiding the feedback: First, guides will summarise and reflect the information, thoughts and experiences provided by the participants. Second, guides will personalise feedback, making references to specific experiences and examples that the participants have provided when responding. Third, guides will directly address the thought challenging, behavioural experiment and cognitive behavioural tasks that participants engage with to assist them in consolidating the learnings and transfer their new skills to other situations. Guides will also assist participants in the design of behavioural experiments to maximize the benefit gained from challenging unhelpful behaviours or thinking. Finally, guides will remind participants of their goals and personal motivations for change, and engage in motivational interviewing to strengthen continued engagement (Kothari et al., 2016). By clearly documenting the intervention protocol, the type and degree of guidance can be accurately captured and replicated in future studies.

This randomised controlled trial contributes to the literature in several ways: First, this is the largest randomised controlled trial that has examined the efficacy of CBT-P (N = 94), while previous randomised controlled trials examining CBT-P ranged from 20 to 52 total participants (Egan et al., 2014a; Handley et al., 2015; Pleva & Wade, 2007; Riley et al., 2007; Steele & Wade, 2008). From a statistical perspective, the comparatively larger sample size in this study allows for a narrower margin of error, higher confidence level and greater power to detect intervention effects that previous studies may not be able to capture. Second, this randomised controlled trial is the first to examine the efficacy of CBT-P with adolescents for eating disorder prevention. It provides direct evidence that CBT-P is suitable for adolescents and can reduce perfectionism, symptoms of eating disorder, depression and anxiety as well as increase self-esteem in a young population. Third, this is the second randomised controlled trial that compared CBT-P to two control groups; an active control (CBT-S) as well as a waitlist control, confirming its superiority to

both active and waitlist control groups. This is important as no other studies to date have examined the efficacy of CBT-P and compared it with an active control group and a waitlist control. Other randomised controlled trials have either only compared CBT-P to a waitlist control or to alternate formats of CBT-P: Riley et al., (2007) compared face to face CBT-P with a waitlist control, and Handley et al., (2015) compared group CBT-P to a waitlist control. Pleva and Wade (2007) compared guided self- help CBT-P to pure self-help CBT-P whereas Egan, Van Noort et al. (2014) compared online CBT-P to face-to-face CBT-P. Only one other study to date (Steele & Wade, 2008) has examined the efficacy of CBT-P and compared it with two active treatments: CBT for bulimia nervosa, and a placebo condition where various techniques of mindfulness were provided. However, it is essential to compare the target intervention with both an active control and waitlist control so as to ascertain how participants fare when they are not receiving the target intervention and controlling for nonspecific effects of any intervention (i.e., the active control group). Comparing the target intervention to another active control treatment is a standard way to assess the efficacy of psychological treatments.

**Using Online Self-Help Interventions in Stepped Care Models**

While guided online interventions are more efficacious than unguided online interventions, there is debate that unguided online interventions are more cost effective, and can reach more people (Johansson & Andersson, 2012). Conversely guided treatments are more effective, but may better suit specific population groups (Johansson & Andersson, 2012). A stepped care approach may be able to address the debate of cost effectiveness versus clinical effectiveness by matching the level of intensity of interventions to the individual's needs (Australia Department of Health, 2016). Stepped care is "an evidence-based, staged system comprising a hierarchy of interventions, from the least to the most intensive, matched to the individual's needs. While there are multiple levels within a stepped care approach, they do not operate in silos or as one directional steps, but rather offer a spectrum of service interventions" (Australia Department of Health, 2016, p. 2). By stratifying the population into different needs ranging from mental health prevention to longstanding complex psychological problems, the services can be aligned to an individual's needs and maximise cost effectiveness as well as clinical effectiveness. Stepped care approaches have been implemented in the United Kingdom since

2007, under the Improving Access to Psychological Therapies (IAPT) scheme for depression and anxiety, and proposed more recently in Australia (Australia Department of Health, 2016). The aims of both initiatives are to increase the availability of evidence-based psychological therapies to the public, thereby improving the health, mental well-being of the population. The initiatives also seek to be more cost-efficient mental health care pathways, leading to greater savings for the wider health economy (Australia Department of Health, 2016; Clark et al., 2009).

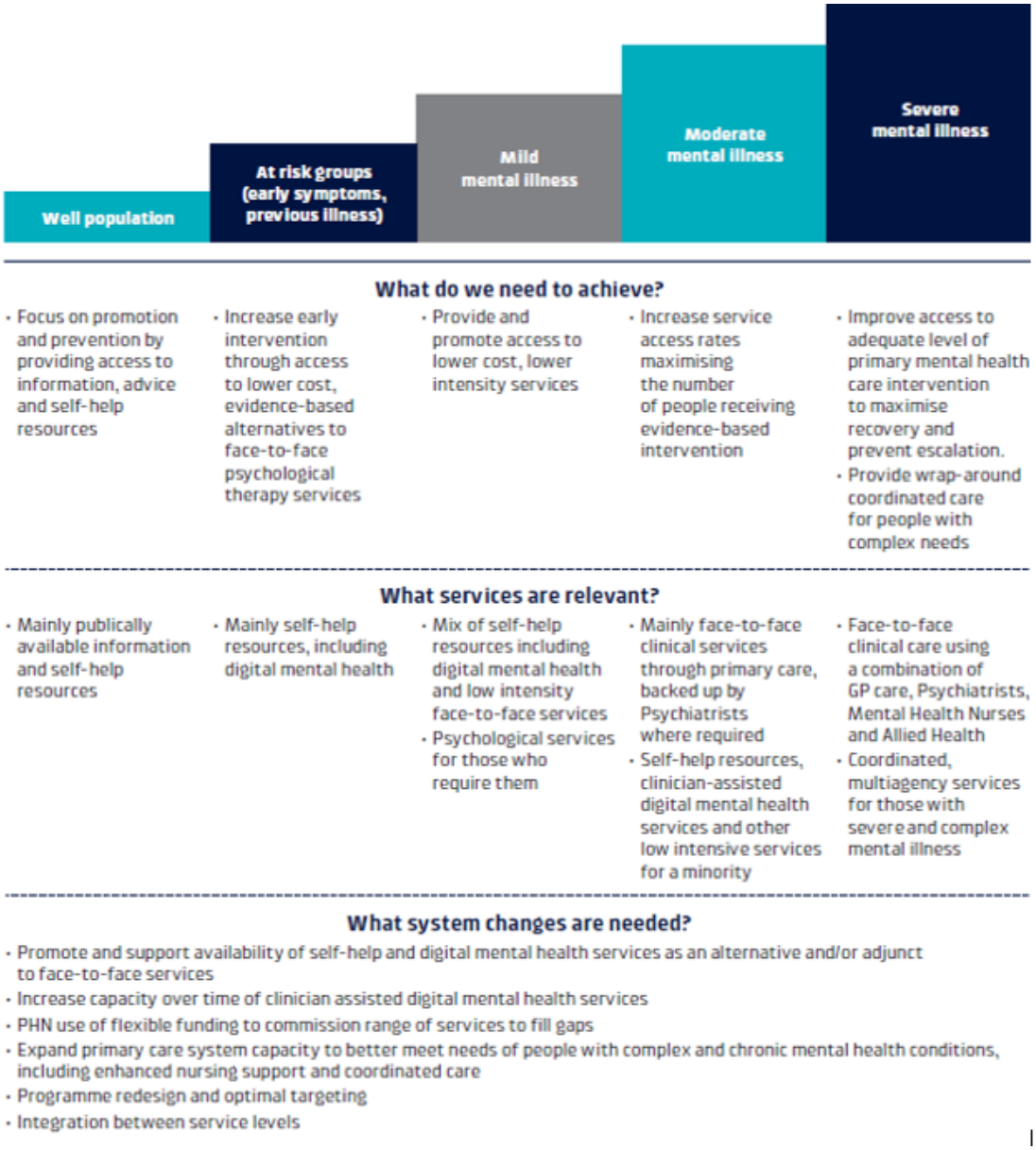


*Figure 4.* System changes to strengthen the stepped care model in primary mental health care clinical service delivery. Reprinted from "Australian Government Response to Contributing Lives, Thriving Communities – Review of Mental Health Programmes and Services," by Australian Department of Health, 2015, p. 9. Copyright 2015 by Commonwealth of Australia.

Figure 4 shows the stepped care model that Australia's Department of Health proposed in 2015. As seen in the above figure, online self-help is a suitable resource across a continuum of services ranging from low intensity, prevention and early intervention, through to higher levels of care for more severe psychological problems. It can be used on its own, or as an adjunct to low- and high-intensity face-to-face services. By accurately identifying issues and engaging the right level of interventions for each population, the population can benefit from both guided and unguided online interventions, achieving the maximal cost effectiveness and clinical effectiveness. Linking it back to the present research, the online self-help CBT-P is well suited for the well population and at risk groups within the stepped care approach, such as young females who may be at risk of developing eating disorders. The online self-help CBT-P has shown efficacy in the reduction of psychological problems, and demonstrated prevention effects and treatment effects, implying that it can potentially be a useful step-up or adjunct to face-to-face psychological therapy, although its efficacy remains to be examined in a clinical population. Further, it fits with the proposed system changes of using digital mental health services as an alternative to face-to-face services. While it remains to be evaluated by future studies as to whether online self-help CBT-P can be an adjunct to face-to-face services, the intervention still fits within the stepped care model, such as that proposed by Australia Department of Health (2016), where self-help resources are recommended for mild and moderate mental illnesses.

### Enhancing Uptake, Reducing Attrition

While there is a compelling argument for the use of online self-help interventions that would be economically and clinically beneficial under a stepped care model, only a minority choose to engage in these interventions to begin with, and a smaller proportion of those engaged actually complete them (Waller & Gilbody, 2009). Further, engagement is likely to be far more challenging for prevention programs in at risk populations compared to clinical populations, which may not be experiencing functional impairment or morbidity sufficient enough to motivate engagement in intervention programs. Addressing these issues is key to ensuring the successful utilisation of online self-help interventions that are currently embedded in stepped care models. Until recently, there has only been one known guideline developed for the use of online interventions with young people. NEDC

partnered with ReachOut.com to create a guide of using online interventions for young people by conducting a literature review and two interactive workshops with young people aged 16 to 22 years (for full report, see National Eating Disorders Collaboration & ReachOut.com, 2014).

***Developing online interventions***

A set of User Experience Guidelines were developed by young people to help researchers and clinicians better understand their goals to make the user experience easy, straightforward and useful for young people (National Eating Disorders Collaboration & ReachOut.com, 2014). Specifically, the guideline emphasised the importance of providing young people with online resources that helps them make sense of what is happening, and providing this information through accessible means such as smartphones, giving practical solutions to manage difficulties, reminding them that they are not alone in these struggles and giving them the choice to remain anonymous when accessing information (National Eating Disorders Collaboration & ReachOut.com, 2014). Participants also stated that the online intervention should be tailored to attract them. The language should be simple, to the point, easy to comprehend, with minimal statistics and complex terminology. Messages should be clear, with emphasis on letting users know that they are not alone in their experiences, while avoiding confronting terms such as mental illness. Resources should also be accessible on a smartphone, easy to navigate, include visuals such as infographics and videos, and gender neutral (National Eating Disorders Collaboration & ReachOut.com, 2014).

Therefore, when creating future online self-help interventions for young people, it would be useful to ensure simple wording that is easy to read for young people, that uses data minimally, and avoids technical terminology. Language that is straight to the point, with minimal preamble, use of bullet points and short paragraphs can help them stay engaged. Having easy-to-navigate tabs that are easy to understand, and similar stories of other young people can encourage uptake. Highly visual information, videos, gender neutral presentations, with quick page load times and ability to save or download content to phones or devices are also aspects that developers of online interventions can be mindful of to increase uptake and participation. Developing online interventions that are suitable for smartphones is critical, given that most young people access help through their mobiles.

To maintain engagement, it is advantageous to include quizzes,

questionnaires and stories of similar young people that allow young people to improve their understanding of psychological problems, decrease sense of isolation and build their own story to individualise interventions. Content that has practical information and is solution-focused is more likely to be revisited, particularly if deemed to be helpful in their recovery process, thereby reducing attrition rate. Anonymity and the ability to access free resources are also noted to encourage uptake and reduce attrition so that young people can participate independently without having to inform an adult. However, the challenge remains, especially for research trials, to balance the wants of young people and the ethical obligations of informed consent to parents and other stakeholders, risk assessment and risk management, as well as protecting the client's confidentiality and privacy, particularly given their young age (Australian Psychological Society, 2007).

The present study has attempted to include as many of the previously described recommendations as possible by avoiding complex terminology, for example using the term "unhelpful perfectionism" in intervention content instead of "clinical perfectionism". The present study has also incorporated similar stories of other young people and these stories are shared through audio mp3s rather than long texts. Images and YouTube videos were also used to assist with visual engagement. The website was also tested multiple times across Google Chrome, Mozilla Firefox, Safari, and Internet Explorer to ensure quick page load times. Further, the program incorporated several quizzes and an individualised conceptualisation of unhelpful perfectionism, as well as hands-on activities to boost engagement. Future studies can also look into converting the online intervention to a smartphone app as the present study was not able to achieve that.

***Recruitment***

The project by National Eating Disorders Collaboration and ReachOut.com (2014) revealed that young people frequently accessed information through Google, YouTube, talking to friends and family. They enjoyed apps such as Instagram, Facebook and Snapchat where they could connect with family and friends, be reminded of upcoming events, and these apps were easy to use and visually appealing. Participants found apps such as Twitter confusing to use and unappealing (National Eating Disorders Collaboration & ReachOut.com, 2014). This information gives researchers and clinicians an idea of the best places to recruit participants for online interventions, and to be cognisant to developing

interventions that are easy to use and visually appealing for young people. Indeed, the recruitment process of the present study was particularly difficult, as schools frequently expressed concerns about the screening process and their responsibilities should a student indicate risks of developing eating disorders or suicidality, despite a detailed process around managing such risks that has also been approved by the Human Research and Ethics Committee of Curtin University. Advertisements on the radio, and Twitter had low response rates, with the biggest uptake occurring when the researchers placed paid advertisements on Facebook. More studies examining the experiences of young people and online interventions are required to incorporate their preferences and goals with evidence-based information on prevention and treatment. This enables stakeholders to develop truly cost effective and clinically effective online interventions, where young people participate and attain the maximum benefit possible from them.

**Strengths and Limitations of the Research**

There are several strengths and limitations of the present research. A strength of the psychometric study was the inclusion of additional psychopathology outcomes that previous studies have not examined, namely compulsive exercise, self-compassion and impulsivity. The study was also the first to conduct a confirmatory factor analysis, whereas previous studies only conducted exploratory factor analyses (Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014). Confirmatory factor analysis is a better statistical approach for the present research given that there has been prior knowledge that the CPQ has a two factor model and certain items on the CPQ have been identified to load onto specific factors. The confirmatory factor analysis was able to evaluate and successfully replicate the a priori hypothesis of a two-factor model of clinical perfectionism, which was theoretically driven, whereas exploratory factor analyses conducted by previous studies were data driven and seeks to maximise the amount of variance explained (Thompson, 2004). The study was the first to demonstrate divergent validity for the CPQ, through a weak, non-significant correlation with impulsivity. However, the study had some limitations, where participants were recruited through convenience sampling, which may result in a more homogenous, biased sample. The cross-sectional nature of the data also limited our ability to assess test-retest reliability. Finally, the study only included a subset of adolescents, and it would be helpful to

clearly ascertain the psychometric properties of the CPQ in younger children and adolescent samples.

With regards to the randomised controlled trial, the methodological design of the study was a key strength, where CBT-P was compared to an active control, CBT-S and a waitlist control. However, the high attrition rates observed in the study where 33% of CBT-P and 38% of CBT-S participants did not complete the interventions, suggested that it was a challenge keeping participants engaged in the online interventions. While this phenomenon is common across most online interventions (Eysenbach, 2005), there were more strategies that the present randomised controlled trial could have used to enhance uptake and minimise attrition. This includes increasing therapist support pre-, during and post-interventions through regular telephone calls to track progress and provide feedback and troubleshooting advice around cognitive behavioural tasks (Andersson, 2016; Andersson et al., 2009; Johansson & Andersson, 2012) and developing a smartphone app that is easily accessible for youths (National Eating Disorders Collaboration & ReachOut.com, 2014). Though this study had minimal therapist contact and support, this may also be seen as a strength given unguided self-help interventions have the potential for greater accessibility and scalability. Moreover, the main goal of the research was to evaluate the efficacy of CBT-P as a standalone program, separate from therapist factors which may be involved in guidance.

Another major limitation of the study is that while it was termed a prevention study, we were unable to examine the prevention of new onset eating disorders. However, this is similar to the majority of prevention studies in the eating disorder field, and meta-analyses have examined risk factor reduction studies rather than true prevention of the onset of eating disorders (Watson et al., 2016). This is because trials that examine the prevention of new- onset eating disorders are costly and have not had the financial support to recruit very large numbers of participants or to span long term follow-ups, which are needed based on the incident rate of the illness (Watson et al., 2016). Eating disorder prevention studies have not yet been sufficiently powered to analyse whether prevention interventions prevent the onset of new cases, (Cuijpers, 2003; Watson et al. 2016). Nonetheless, the present study had attempted to improve on previous prevention studies by not only providing effect sizes to measure the efficacy of the intervention, but also clearly defining and examining prevention effects, and including clinically significant changes (Watson

et al., 2017). This was achieved through a clear explanation of prevention effects, defined as the control group demonstrating increased symptomatology and/or screening positive for a potential eating disorder compared to the intervention group which has an absence of an increase in symptoms over time (Gillham et al., 2000). The prevention effect was then operationalised as clinically significant deteriorations and tested using a z-test comparing two proportions, consistent with a small handful of researchers in the prevention field who have also examined the migration of proportions of participants who showed clinically significant recovery, improvement and deterioration overtime (Shochet et al., 2001; Stice et al., 2011b; Wilksch et al., 2008).

## Future Directions

### Examining the Construct of Perfectionism

This research found a two-factor structure of clinical perfectionism, with the first factor (CPQ Factor 1, Perfectionistic Strivings) being related to the determined pursuit of personally-demanding, self-imposed standards and the Personal Standards subscale of the FMPS, and the second factor (CPQ Factor 2, Perfectionistic Concerns) representing the overdependence of self-evaluation on pursuit of high standards and strongly correlating with the Concern over Mistakes subscale of the FMPS. In the literature, numerous studies have found that the Personal Standards subscale of the FMPS loads onto the Perfectionistic Strivings dimension, while the Concern over Mistakes subscale of the FMPS loads onto the Perfectionistic Concerns dimension (Dunkley et al., 2006). By extension, CPQ Factor 1 (Perfectionistic Strivings) is closely associated with the Perfectionistic Strivings dimension while CPQ Factor 2 (Perfectionistic Concerns) was closely associated with the Perfectionistic Concerns dimension. As discussed in Chapter 1, there is an ongoing debate of whether perfectionism contains adaptive components (Bieling et al., 2004; Flett & Hewitt, 2006; Sirois & Molnar, 2016; Stoeber & Otto, 2006). The general consensus is that there are two dimensions of perfectionism, Perfectionistic Strivings and Perfectionistic Concerns. Traditionally, the Perfectionistic Strivings dimension was considered to consist of adaptive aspects, while the Perfectionistic Concerns dimension was perceived to contain primarily

maladaptive aspects (Dunkley et al., 2006). Earlier research had shown that Perfectionistic Strivings has been associated with greater positive affect (Bieling et al., 2004) and life satisfaction (Bergman et al., 2007), but remains a risk factor for eating disorders (Bardone- Cone et al., 2007; Wade et al., 2016), whereas Perfectionistic Concerns is consistently associated with depression, anxiety, and suicidal ideation (Burgess & DiBartolo, 2016) and long term psychosocial maladjustment (Dunkley et al., 2014).

However, a recent meta-analysis (Limburg et al., 2017) suggested that the two dimensions are more similar than different, with both Perfectionistic Strivings and Perfectionistic Concerns dimensions being associated with clinical disorders of depression, anxiety and bulimia nervosa, although Perfectionistic Concerns explained a larger variance than Perfectionistic Strivings in these disorders. Likewise, both dimensions were associated with depressive symptoms, anxiety, social phobia symptoms, worry, obsessive-compulsive symptoms, obsessive beliefs, global eating pathology, binge eating, and body dissatisfaction, although again, Perfectionistic Concerns explained a larger variance than Perfectionistic Strivings. The two dimensions were also positively correlated with each other. The clinical implication of this finding is that prevention and treatment approaches need to ensure that interventions target both Perfectionistic Strivings and Perfectionistic Concerns dimensions when seeking to reduce psychological disorders and/or symptoms through perfectionism (Limburg et al., 2017).

This research contributes to the literature by demonstrating that CPQ Factor 1 (Perfectionistic Strivings) contains maladaptive components because it was associated with depression, anxiety, low self-esteem, low self-compassion, in addition to the established risk for eating disorders (Bardone-Cone et al., 2007; Wade et al., 2016). This research also contributes to the literature by demonstrating that CPQ Factor 2 (Perfectionistic Concerns) was associated with eating disorders, in addition to the established risk with depression and anxiety (Burgess & DiBartolo, 2016). Further, this research highlighted that CPQ Factor 2 (Perfectionistic Concerns), as compared to CPQ Factor 1 (Perfectionistic Strivings), was more strongly correlated with eating disorder, depression, anxiety, low self-esteem and low self-compassion, but both were significantly associated with eating disorder, depression, anxiety, low self-esteem and low self-compassion. The present research was also able to demonstrate that CBT-P was able to target and reduce

both Perfectionistic Strivings and Perfectionist Concerns, and associated psychological symptoms of eating disorders, anxiety, depression and low self-esteem, as suggested by Limburg et al. (2017).

Future research can continue to examine the underlying mechanisms of perfectionism, health, and psychopathology so as to refine theoretical models of perfectionism and mental well-being, as well as improve interventions to minimise the adverse consequences associated with perfectionism (Sirois & Molnar, 2016). A key contribution of the study was the validation of a measure of clinical perfectionism in young female adolescents and adults, which was developed to improve on earlier perfectionism measures: Earlier perfectionism measures such as the FMPS measured aspects beyond the pathological aspects of perfectionism and led to a narrowed focus on understanding the maintaining aspects and the clinical relevance of perfectionism as captured in the construct of clinical perfectionism (Shafran et al., 2003). For example, the parental expectations and parental criticism subscales of FMPS confounded the aetiological factors of perfectionism as they focused on developmental aspects and the reporting of past experiences with parents (Rhéame et al., 2000). Likewise, the organisation subscale of the FMPS that emphasised the focus on precision and order. Organisation was not considered to be intrinsically problematic, but an adaptive behaviour leading to satisfaction and psychological well-being (Stumpf & Parker, 2000) and was not included as a subscale to the total FMPS scoring. Capturing the aspects of perfectionism that drive pathology rather than aspects that are associated with positive traits and outcomes are particularly relevant to the psychopathology field.

It is now clear that Perfectionistic Strivings and Perfectionistic Concerns overlap substantially in the context of psychopathology (Limburg et al., 2017). Some researchers have recommended statistically controlling for the overlap to understand the unique variance for each dimension of perfectionism (for an example, see Stoeber, Madigan, Damian, Esposito, & Lombardo, 2016). However, controlling for the shared variance between the two constructs may not be warranted. First, the shared variance between the two dimensions is indicative of the constructs themselves rather than a statistical error. For example, the more people set high standards to themselves, the more likely they are to be self-critical and to base their self-worth on whether they are able to meet these high expectations, which is inherent to the definition of clinical perfectionism (Shafran et

al., 2002). By statistically removing the shared variance, it is possible that the meaning of the construct may change to such a degree that it no longer captures the intended construct. For example, statistically controlling for the shared variance between Perfectionistic Strivings and Perfectionistic Concerns can result in the Perfectionistic Strivings dimension reflecting a flexible type of conscientiousness that has little to do with Perfectionistic Strivings (Flett & Hewitt, 2002; Greenspon, 2000). Second, while it may be statistically possible to separate the Perfectionistic Strivings scores from the Perfectionistic Concern scores in research studies, it is not possible to do so in real life. This leaves little purpose in then statistically controlling the shared variance, particularly in intervention studies where the interest is on the participants and their well-being.

**Refining Prevention Research**

As mentioned in Chapter 1, the aim of prevention studies is to modify risk factors, enhance protective factors, some reduce early warning signs and ultimately all aim to reduce the incidence of eating disorders (National Eating Disorders Collaboration, 2010). As discussed earlier, a risk factor must temporally precede the onset of the disorder and also be correlated to the disorder (Kraemer, 2010; Kraemer et al., 1997). However, the use of cross-sectional studies and inappropriate comparison groups (Pike et al., 2008; Stice et al., 2012) can lead to erroneous identification of "risk" factors, where they may be factors that maintains the disorder, rather than a true risk factor that is causal, occurs prior to the onset of disorder and therefore relevant to prevention (Stice et al., 2012). This research has chosen to focus on one particular risk factor, clinical perfectionism, to determine its efficacy in preventing eating disorder symptoms and associated comorbidities. This research is theoretically driven (Stice et al., 2012), with clinical perfectionism being implicated in the theoretical models of eating disorder aetiology and maintenance (Cooper et al., 2004; Fairburn, 2008). In this research, moderate to large effect reductions were noted in the two factors of clinical perfectionism and in self-esteem, with small to moderate reductions observed for the symptoms of eating disorders, moderate decreases in symptoms of depression and anxiety and small to large increases in levels of self-esteem, with changes being maintained at 6-month follow-up. However, these small to moderate effect sizes noted in the decreases of eating disorder symptoms are not surprising, given that this research specifically

targeted a single risk factor so as to provide a strong empirical test of aetiologic theories (Stice et al., 2007). Moreover, the cause and maintenance of eating disorders is multifaceted, therefore the effect size is understandably small.

The small to moderate decreases in eating disorder symptoms found for the CBT-P group in the present study were consistent with the findings from meta-analyses of selective prevention, where CBT approaches typically yielded small effect sizes in risk factors associated with eating disorders, and maintained its efficacy to an average 6 to 18 month follow-up (Watson et al., 2016). Likewise, the effect sizes in reducing eating disorder symptoms in the present CBT-P group ($d$ = 0.29 - 0.54) were consistent with results from a meta-analysis of online eating disorder prevention studies that are typically CBT based, and demonstrated small effects for eating disorder related risk factors of body dissatisfaction, thin ideal idealisation, shape concern, weight concern, dietary restriction, bulimic symptoms and purging frequency ($d$ = 0.25 to 0.30), and moderate effects found for drive for thinness ($d$ = 0.47) and combined shape and weight concerns (d = 0.42) (Melioli et al., 2016). Taken together, the efficacy of the present CBT-P intervention converges with the meta-analyses of selective prevention of eating disorders (Watson et al., 2016), as well as online eating disorder prevention studies (Melioli et al., 2016), where small to moderate reductions in eating disorder symptoms were consistently achieved. The findings also converge with theoretical accounts of eating disorder aetiology and/or maintenance (Bardone-Cone et al., 2006; Duncan et al., 2016; Fairburn et al., 1986; 1999; 2003; Garber & Bemis, 1982; Le Grange, 2005; Schmidt & Treasure, 2006; Stice, 2001; Vitousek & Hollon, 1990), and transdiagnostic accounts of the specific construct of clinical perfectionism (Egan et al. 2011; Shafran et al., 2002), in particular, providing evidence that changes in clinical perfectionism lead to changes in eating disorder, depression, and anxiety pathology.

Having demonstrated support of the transdiagnostic nature of clinical perfectionism, and it being a suitable target in prevention of eating disorders and comorbid depression and anxiety, the next suitable course of action is to have replication studies that test the efficacy of online CBT-P in various populations and to develop effectiveness trial designs to ensure that the program can have effects under naturalistic conditions. The findings from scientifically rigorous trials play a critical role in demonstrating the real-world value of prevention work that can

attract funding, community stakeholders, providers and potential participants (Marchand, Stice, Rohde, & Becker, 2011). Moving forward, investigating moderator and mediation models and the interaction of these risk factors with other vulnerabilities and/or stressors can help predict symptom level and/or diagnostic status, which are currently very limited in the field of eating disorders (Bardone-Cone et al., 2007). Further, simple direct relationships may not capture how different variables interact with each other to increase risk of eating disorders (Wade, Wilksch, Paxton, Byrne, & Austin, 2015).

For example, body dissatisfaction moderated the effects of perfectionism in eating disorders where adolescent girls high on both perfectionism and body dissatisfaction demonstrated the highest level of eating disorders (Boone et al., 2014) and the relationship between higher levels of perfectionism and increased eating disorder risk was mediated by higher levels of ineffectiveness over time (Wade et al., 2015). Examining and testing more complex models of eating disorders, particularly across developmental phases of childhood, adolescence, younger and older adulthood is required to further the understanding of eating disorders across a lifespan.

Longer term follow-ups of CBT-P are also required, with the majority of research studies in eating disorder prevention generally having only short follow-up or no follow-up (Watson et al., 2016). Given the average age of onset for AN and BN is in adolescence, (Allen et al., 2013; Lewinsohn et al., 2000; Smink et al., 2012; Stice et al., 2013b), it is crucial to monitor participants through these risky five years, and accurately determine the efficacy of prevention studies. Recommendations for making extended follow-up more feasible include securing and maintaining funding, maintaining the study infrastructure at clinical centres post-trial for as long as possible, maintaining ethics approvals for trials, informing study participants that they may be contacted later on departure from trial, and assembling a central file of records of participants post-trial with ethics approval (Drye et al., 2014).

## Conclusion

In conclusion, this research confirmed the suitability of using the Clinical Perfectionism Questionnaire in female youths, including adolescents. Specifically, it demonstrated construct validity and incremental validity in a younger sample.

The research also found a two-factor model of the CPQ, with CPQ Factor 1 (Perfectionistic Strivings) relating to determined pursuit of personally demanding, self- imposed standards and CPQ Factor 2 (Perfectionistic Concerns) representing the overdependence of self-evaluation on pursuit of high standards. These two factors match onto the theoretical definition of clinical perfectionism, which emphasises the determined pursuit of personally demanding and self-imposed standards and the overdependence of self-worth on achievement. This research also examined the efficacy of a pure cognitive behaviour therapy self-help targeting clinical perfectionism in preventing psychological problems in young females aged 14 to 19 years. Using a randomised controlled trial, CBT-P was found to be superior to an online CBT for stress management and waitlist control in reducing symptoms of clinical perfectionism, eating disorders, anxiety and depression, as well as improving self-esteem up to 6-month follow-up. Some clinically significant prevention effects were found, with CBT-P being superior to CBT-S in preventing clinically significant deterioration of Perfectionistic Concerns and depressive symptoms, and CBT-P being superior to waitlist control in preventing clinically significant deterioration of eating disorder symptoms from pre-test to 6-month follow-up. The few prevention effects may be largely attributed to the low numbers of participants who deteriorated, resulting in a floor effect. However, the fact that there was a prevention effect for eating disorder symptoms is encouraging given that the aim of the study was to prevent eating disorder symptoms. Together, this research supported the use of the CPQ in assessing clinical perfectionism in female youth, thereby providing new opportunities to accurately measure changes in perfectionism in youth and therefore the impact of prevention and treatment interventions. The research also supported the transdiagnostic nature of clinical perfectionism, suggesting that it is a useful target for reducing psychological problems in female youths. As digital mental health services continue to gain popularity, creating a gold standard evidence based mental health service that is easily accessible is a priority. By incorporating online self-help interventions into models of care such as stepped care models, be it as an alternative low-intensity service for well populations, or groups that may be at risk of developing an eating disorder, and/or adjunct to high intensity face-to-face services for those showing symptoms of eating disorders, the needs of individuals can be enhanced through better targeted services, with effective early interventions that spans across the

lifespan and continuity of care.

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# Appendices

## Appendix A Study Flyer


This study has been approved by the Curtin University Human Research Ethics Committee (Approval number HR187/2013)

# ATELOPHOBIA

## THE FEAR OF IMPERFECTION

- Does your teenage daughter set **extremely high standards** for herself?
- Does she chase these standards even if it leads to **bad effects** e.g. stress, low moods, anxiety, criticizing herself?
- Does she feel **worthless** if she think she didn't reach her goals?

✱ If you answered **yes** to any of these questions, your teen may be struggling with unhelpful perfectionism!

## WE WANT HER if she:

- **is a female**
- **14-17 years old**
- **has internet access**
- **is not receiving psychological therapy**

**We need her to take part in a free 4 week online program**

**It will help her overcome unhelpful perfectionism and manage her stress!**

**This is a FREE OF CHARGE program**

?

**If you are interested, please sign up at**

# www.be-you-tiful.com.au

This study has been approved by the Curtin University Human Research Ethics Committee (Approval number HR187/2013)

## Appendix B Information Sheet for Adolescents

## INFORMATION SHEET (ADOLESCENT)

**Principal Investigator:** Chloe Shu
**Co-Investigators:** Dr Sarah Egan, Dr Hunna Watson

**What are some general things you should know about research studies?**
You are invited to take part in a research study. Your parent or guardian needs to give permission for you to be in this study. You do not have to be in this study if you don't want to, even if your parent has already given permission. You are free to choose whether or not to be in this study. You may decide not to join, or, if you join, you may decide to stop being in the study, at any time, for any reason, without penalty.

**What is the purpose of this study?**
Research is how we learn new things. The purpose of this study is to see if doing a program either on perfectionism or stress is helpful for your mental wellbeing. If you agree to participate you will be randomly allocated in to one of these programs or a control where you wait to receive one of these programs. This will be conducted via an online program that lasts for 4 weeks (8 sessions, with 2 weekly sessions). The online program will include some fun video watching, light readings, short and easy quizzes (no, you're not graded for it!) and some simple and enjoyable hands on activities. You'll even have a personalised progress report on how you're doing from the start to end of program and even up to 6 months after the program ends!

**Are there any criteria to participate in the study?**
You are invited to participate in this study if you are/have:

1. Female
2. 14 to 19 years old
3. Internet access either at home or at a location where regular use is possible (e.g. school. library)
4. Can speak and read English
5. Access to a General Practitioner who would be able to monitor your physical health

Unfortunately, you are **not** suitable for the study if you are/have:

1. Currently undergoing psychological therapy
2. Current diagnosis of a clinical eating disorder, including anorexia nervosa, bulimia nervosa, binge eating disorder, other or unspecified feeding or eating disorders

**What will happen if you take part in the study?**
If you are interested in participating in the study, you and your parent will give your consent. In a few days, you will be contacted by phone by Chloe Shu (that's me!). I will be asking you some questions to see if you are suitable for the program. You can also ask me any questions you have. If you are suitable, I will email you your subject ID and whether you are in the perfectionism program, stress program or the waitlist control (which will start 6 months later). I will also ask you to complete some online questionnaires before your first session.

If you are in the perfectionism program or stress program, you can start your program immediately. There will be 8 sessions and you can log in twice a week over 4 weeks to complete your program.

If you are in the control group, you will be reminded to login weekly for the next 4 weeks to complete some short questions. You can choose to participate in the perfectionism or stress program after 6 months. You will be asked to complete some questionnaires before you start the intervention, at the end of the program, at 3 months, and 6 months after the program.

**Your safety**
Each week, we will ask you some questions about your mood and safety - e.g. "In the past week, have you ever felt so bad that you wished you were dead?" If we notice that you are at risk, we will contact your parent and recommend they monitor you closely, bring you to your GP and provide them with information of services your family can get extra help from.

**Who will be told the things we learn about you in this study?**
The information we collect about you will be kept private. Only the people working on this study will be able to look at the information we collect. It will not affect how your doctor or teacher treats you.
All records containing personal information (such as your name) that we collect will be kept strictly confidential and will be locked in a file at Curtin University for 25 years. You will be given a three digit code to log onto the online programs and that will be used to identify your data. Results of this study may be presented at meetings or in publications, but your name will not be used.
However, in the event that we notice that you are actively suicidal, your parent will be informed. We will then provide your parent with information of services you can get extra help from.

**How long will your part in this study last?**
You are invited to login to participate in the program twice a week over a 4-week period. You will also be asked to complete some questionnaires before you start the program, at the end of the program and at 3 months and 6 months after the program ends. The questionnaires will take a maximum of 30 minutes to complete.

**What are the possible risks or discomforts involved from being in this study?**
Reducing perfectionism or reducing stress level may increase your quality of life and mental wellbeing. However, there is no promise that you will benefit from the program. You have the right to withdraw from the study at any time.

Other treatments and/or medications:
During the program and up to 6 months after the program, we encourage you to not receive other forms of therapy, for example visiting a psychologist. If you are on any antidepressant medication, we ask that you must be stable on this medication for at least three months and to agree not to alter or change the dosage for the duration of the study i.e. from the start of the program until the 6 month follow-up period. In the event that you do require alternate treatments and/or medications, we ask that you inform the researcher.

Online confidentiality:
To ensure confidentiality, you will not be required to provide your name (apart from the adolescent consent form). You will be given a three digit code as your participant number, and it will be used for all questionnaires. The website for programs will be designed and hosted through Squarespace (http://www.squarespace.com). The website for programs will be password protected to limit access to participants, although there are no data collected on this website. Data collection of all questionnaires for the study will be hosted separately using the Qualtrics survey software (http://www.qualtrics.com), which is highly secured (see Qualtrics security statement http://www.qualtrics.com/security-statement/ and privacy statement http://www.qualtrics.com/privacy-statement/). Qualtrics' servers are protected by high-end firewall systems, with vulnerability scans being conducted regularly. They also use Transport Layer Security (TLS) encryption for all transmitted data. Surveys are protected with passwords and HTTP referrer checking. The data is hosted by third party data centres that are SSAE-16 SOC II certified. All data located within Qualtrics Survey Software will only be accessible by the researcher and will be password protected. At the completion of questionnaires, you will be reminded to close the browser windows.

**What if you have questions about this study?**
If you'd like to find out more information about this study, or if you feel that being in the study has resulted in any research related injury, emotional or physical discomfort please contact the research team by email: beyoutifulprogram@gmail.com Please note that this email service is solely to answer any queries or concerns regarding the interventions and not to be used for contact with a psychologist.

**What if you have questions about your rights as a research participant?**
This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR187/2013). The Committee includes of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth 6845 or by telephoning 9266 9223 or by emailing hrec@curtin.edu.au. Any complaints or concerns about the conduct of this research can also be directed there.

## Appendix C Information Sheet for Parents

## INFORMATION SHEET (PARENT)

**Principal Investigator:** Chloe Shu
**Co-Investigators:** Dr Sarah Egan, Dr Hunna Watson

**What are some general things you should know about research studies?**
Your daughter is invited to take part in a research study looking at the effects of different psychological programs in preventing negative psychological outcomes and promoting mental wellbeing. You will need to give permission for her to be in this study. Kindly note that your daughter does not have to be this study if she does not want to, even if you have already given permission. She is free to choose whether or not to be in this study and may decide to stop being in the study, at any time, for any reason, without penalty.

**What is the purpose of this study?**
The purpose of this research study is to see if reducing perfectionism or stress can prevent negative psychological outcomes and promote mental wellbeing. This will be conducted via an online program that lasts 8 sessions over 4 weeks. The online program will include some fun video watching, light readings, short and easy quizzes and some simple and enjoyable hands on activities. Your daughter will also receive a personalised progress report on how she is doing from the start to end of program and even up to 6 months after the program ends!

**Are there any criteria to participate in the study?**
She is invited to participate in this study if she or has:

1. Female
2. 14 to 17 years old
3. Internet access either at home or at a location where regular use is possible (e.g. school. library)
4. Adequate English language skills
5. Access to a General Practitioner who would be able to monitor her physical health

She is **not** suitable for the study if she is/has:

1. Currently undergoing psychological therapy
2. Current diagnosis of a clinical eating disorder including anorexia nervosa, bulimia nervosa, binge eating disorder, other or unspecified feeding or eating disorders

**What will happen if your daughter takes part in the study?**
1. You and your daughter will give your consent.
2. In a few days, she will be contacted by phone by Chloe Shu. I will be asking her some questions to see if she is suitable for the program. She will also be able to ask me about any questions she may have.
3. If she is suitable, I will email you and your daughter her subject ID and whether she is allocated to the perfectionism program, stress program or the waitlist control (which will start 6 months later). I will also ask her to complete some online questionnaires before your first session. If she is not suitable, I will provide you with some information of services you can get extra help from via your email.

4. If she is in the perfectionism program or stress management program, she can start the program immediately. There will be 8 sessions and she can log in twice a week over 4 weeks to complete her program. It would be extremely helpful for you to encourage her to participate in each session.
You will also be provided with weekly emails to update you about what your daughter has learnt each week and how you and your family can provide her additional support.
5. If she is in the control group, she will be reminded to login weekly for the next 4 weeks to complete some short questions. She can choose to participate in the perfectionism or stress management program after 6 months. She will be asked to complete some questionnaires prior to starting the intervention, at the end of the program, at 3 months and 6 months after the program.

**Your daughter's safety**
Each week, we will ask your daughter some questions about her mood and safety - e.g. "In the past week, have you ever felt so bad that you wished you were dead?" If we notice that she is actively suicidal, we will contact you via email and recommend you monitor her closely, talk to her GP and provide you with information of services your family can get extra help from.

**Who will be told the things we learn about your daughter in this study?**
The information we collect about your daughter will be kept private. Only the people working on this study will be able to look at the information we collect. It will not affect how her doctor or teacher treats her.
All records containing personal information (such as her name) that we collect will be kept strictly confidential and will be locked in a file at Curtin University for 25 years. She will be given a three digit code to log onto the online programs and that will be used to identify her data. Results of the study may be presented at meetings or in publications, but her name will not be used.

**How long will your daughter's part in this study last?**
She will be invited to participate in the program twice a week over a 4-week period. She will also be asked to complete some questionnaires before she starts the program, at the end of the program and at 3 months and 6 months after the program ends. The questionnaires will take a maximum of 30 minutes to complete.

**What are the possible risks or discomforts involved from being in this study?**
Reducing perfectionism or reducing stress level may increase your daughter's quality of life. However, there is no guarantee that she will benefit from the program. She has the right to withdraw from the study at any time.

Alternative treatments and/or medications:
During the program and up to 6 months after the program, we encourage your daughter to not receive any other forms of therapy, for example visiting a psychologist. If she is on any antidepressant medication, we ask that she must be stable on this medication for at least three months. We also ask that if she is on antidepressant medications, to agree not to alter or change the dosage for the duration of the study i.e. from the start of the program until the 6 month follow-up period. In the event that she does require alternate treatments and/or medications, we ask that she informs the researcher. She will then be withdrawn from the study.

Online confidentiality:
To ensure confidentiality, your daughter will not be required to provide her name (apart from the adolescent consent form). She will be given a three digit code as her participant number, and it will be used for all questionnaires. The website for programs will be designed and hosted through Squarespace (http://www.squarespace.com), a web-hosting platform for creating and maintain websites. The website for programs will be password protected to limit access to participants, although there are no data collected on this website. Data collection of all questionnaires for the study will be hosted separately using the Qualtrics survey software (http://www.qualtrics.com), which is highly secured (see Qualtrics security statement http://www.qualtrics.com/security-statement/ and privacy statement http://www.qualtrics.com/privacy-statement/). Qualtrics' servers are protected by high-end firewall systems, with vulnerability scans being conducted regularly. They also use Transport Layer Security (TLS) encryption for all transmitted data. Surveys are protected with passwords and HTTP referrer checking. The data is hosted by third party data centres that are SSAE-16 SOC II certified. All data located within Qualtrics Survey Software will only be accessible by the researcher and will be password protected. At the completion of questionnaires, you will be reminded to close the browser windows.

**What if you have questions about this study?**
For more information concerning this research or if you feel that being in the study has resulted in any research related injury, emotional or physical discomfort please contact the research team by email: beyoutifulprogram@gmail.com Please note that this email service is solely to answer any queries or concerns regarding the interventions and not to be used for contact with a psychologist.

**What if you have questions about your daughter's rights as a research subject?**
This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR187/2013). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth 6845 or by telephoning 9266 9223 or by emailing hrec@curtin.edu.au. Any complaints or concerns about the conduct of this research can also be directed here.

## Appendix D Consent Form for Adolescents

### Adolescent Consent Form

**Please read this carefully, tick the box and complete the form:**

- I understand that the treatment targets perfectionism and stress management and there is a chance that I may not benefit from this treatment.
- I understand that I will be randomly allocated to one of the three groups: an online perfectionism program, a stress management program or a waitlist group where I will undergo either of the programs 6 months later. I understand that this allocation is random.
- If I do need to seek other psychological therapy from the time that I start the program until 6 months after the program, I agree to contact the researcher.
- If I am taking antidepressant medications, I agree that I have been stable on my medication for the past 3 months. If there is any change in my antidepressant medication type or dosage, I agree to contact the researcher.
- In the event that I do require other psychological treatment or medication, I agree to inform the researcher at **beyoutifulprogram@gmail.com**
- I understand that my personal information will be kept completely confidential and if the research was to be published, I will not be able to be identified.
- I understand that my data will be kept for 25 years in a locked cabinet at Curtin University.
- I understand that I am able to withdraw from the study at any stage without having to give a reason, and that by withdrawing I will be required to stop the program and I may be referred elsewhere for treatment.

□I have fully read the information sheet and give my consent to be part of the study.
My full name ……
Contact number ……
Email ……
Best days and times to call me ……

## Appendix E Consent Form for Parents

### Parent Consent Form

**Please read this carefully, tick the box and complete the form**

- I understand that the treatment is to target perfectionism and stress management and there is a chance that she may not benefit from this treatment
- I understand that she will be randomly allocated to one of the three groups: an online perfectionism program, a stress management program or a waitlist group where she will undergo either of the program 6 months later. I understand that this allocation is random.
- If she needs to seek other psychological therapy from the time that I start the program until 6 months after the program, I agree to contact the researcher.
- If she is taking antidepressant medications, I agree that she has been stable on my medication for the past 3 months. If there is any change in her antidepressant medication type or dosage, I agree to contact the researcher
- In the event that she does require other psychological treatment or medication, I agree to inform the researcher at beyoutifulprogram@gmail.com
- I understand that her personal information will be kept completely confidential and if the research was to be published, she will not be able to be identified.
- I understand that her data will be retained for 25 years in a locked cabinet at Curtin University.
- I understand that she is able to withdraw from the study at any stage without having to give a reason, and that by withdrawing she will be required to stop the program and she may be referred elsewhere for treatment.

□I have fully read the above information sheet and give my consent for my daughter to be part of the study

My full name ……
My daughter's full name ……
My contact number ……
My email ……

In the event that your daughter or you are unreachable, please provide another person whom we can contact:

Name ……

Relationship to daughter ……

Contact number or Email ……

## Appendix F Screening Measure for Risk of Suicidality

To make it more comfortable for the participants to respond to the MINI-Kid suicidality module, the researcher will explain the purpose of the suicidality measure before the clients are asked the questions on the phone or online during the 4-week programs, which is to ensure the well-being and safety of participants. It will also be explained that if these questions cause them great distress or they have concerns about these questions, they can contact the research team and these concerns will be handled on a case-to-case basis with the clinical expertise of Dr Sarah Egan and Dr Hunna Watson.

## Appendix G Feedback Questionnaire

Consider each statement and place a tick in the circle that best reflects the amount of time and effort that you spent on the readings this week.

| | | | | | | |
|---|---|---|---|---|---|---|
| **1.** | How much of the readings did you read? | 0% | 25% | 50% | 75% | 100% |
| | | □ | □ | □ | □ | □ |
| **2.** | On average, how much time did you spend on the reading? | None | 1-30 minutes | 30-60 minutes | 60-120 minutes | 120 + minutes |
| | | □ | □ | □ | □ | □ |
| **3.** | How would you rate the usefulness of the readings so far? | Not useful at all | A little bit useful | Moderately useful | Very useful | Extremely useful |
| | | □ | □ | □ | □ | □ |

Please indicate how strongly you agree/disagree with the following statement

| | Strongly Disagree | Disagree | Neither | Agree | Strongly Agree |
|---|---|---|---|---|---|
| The reading was easy to read | □ | □ | □ | □ | □ |

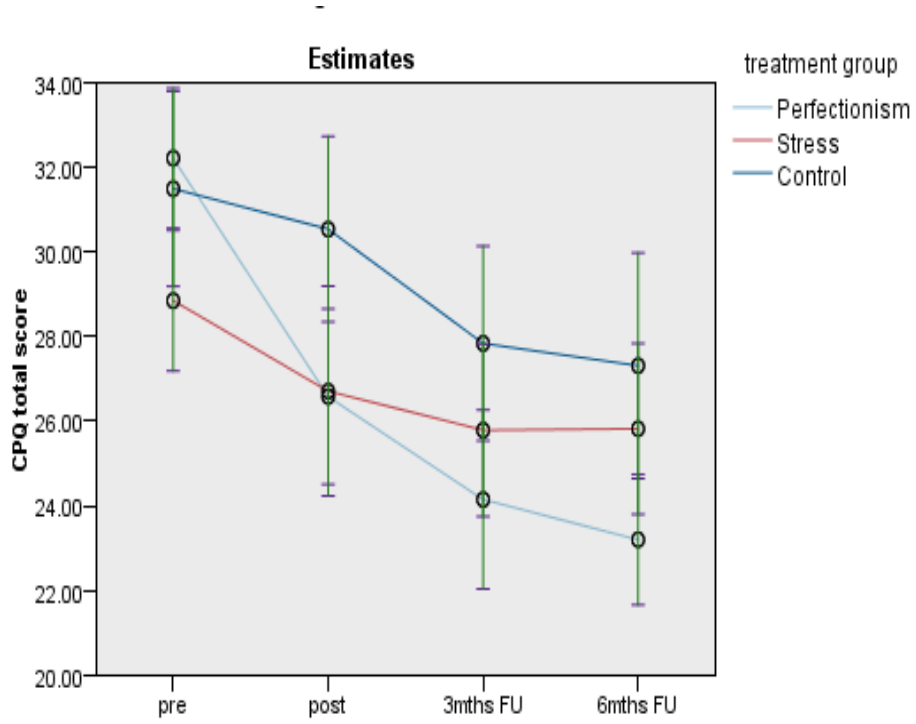
**Any other comments?**

_____

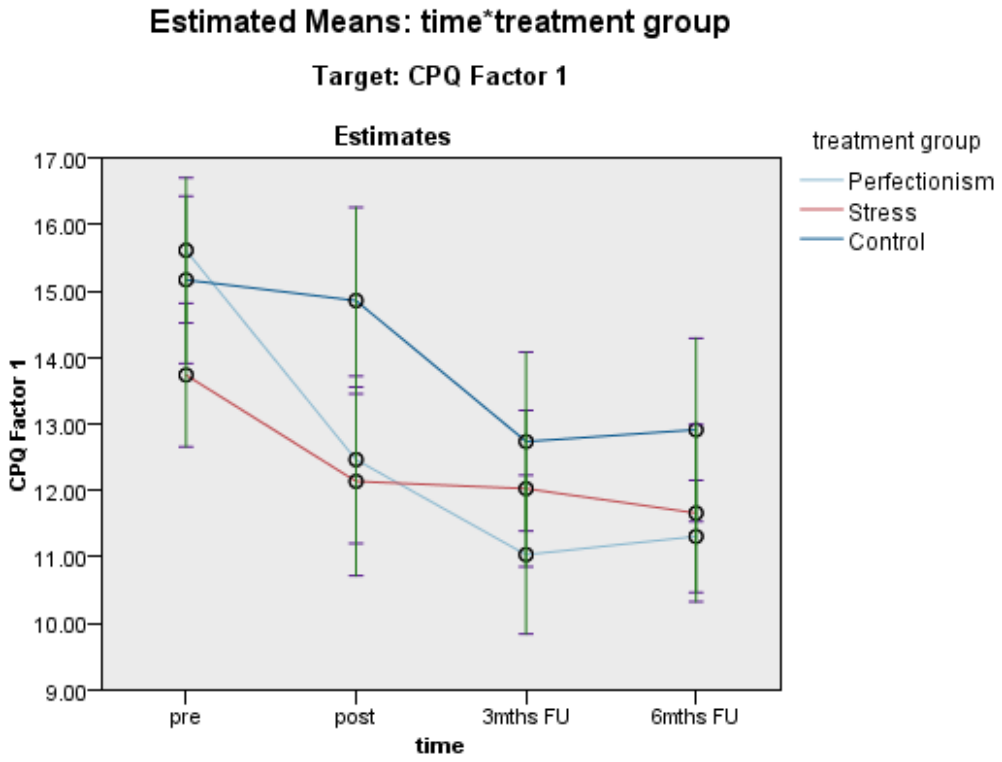
_____

## Appendix H GLMM Graphs of the Interactions for Each Outcome Variable

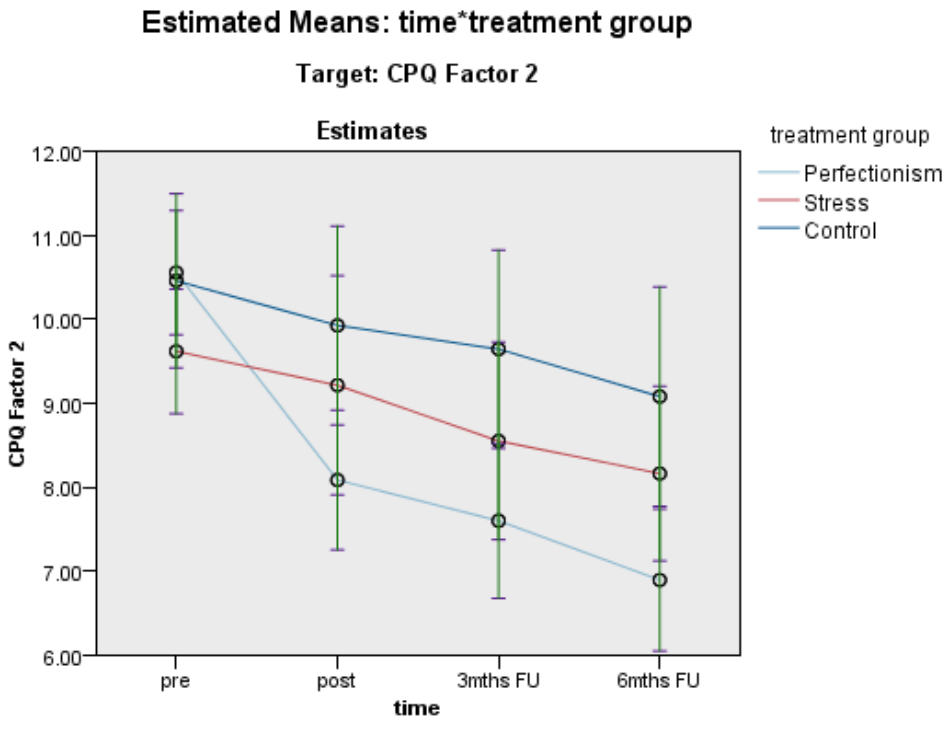
CPQ Total



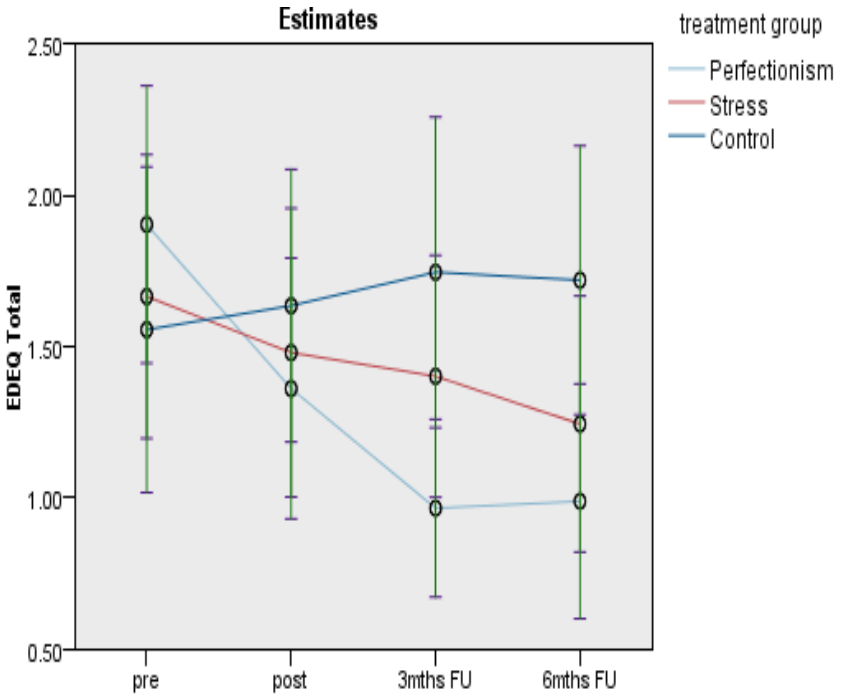
CPQ Factor 1



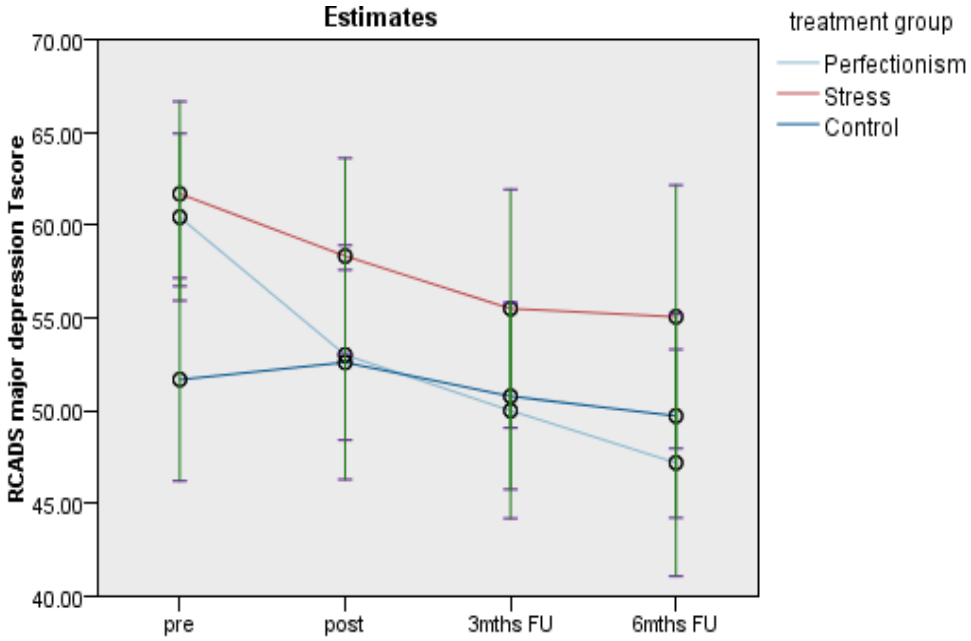

CPQ Factor 2



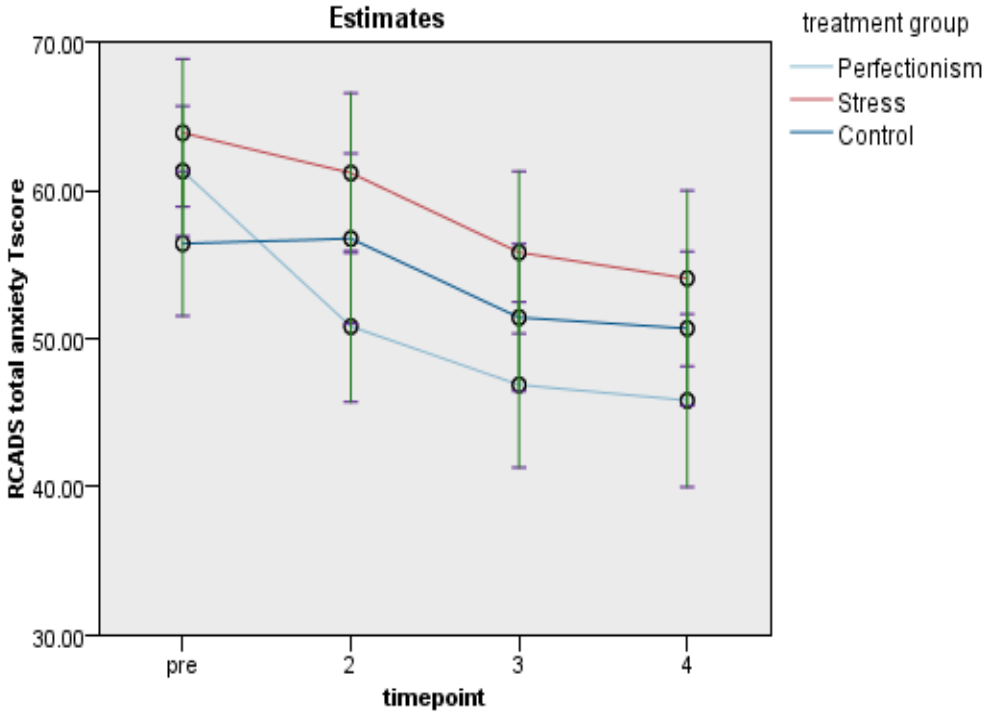
EDE-Q



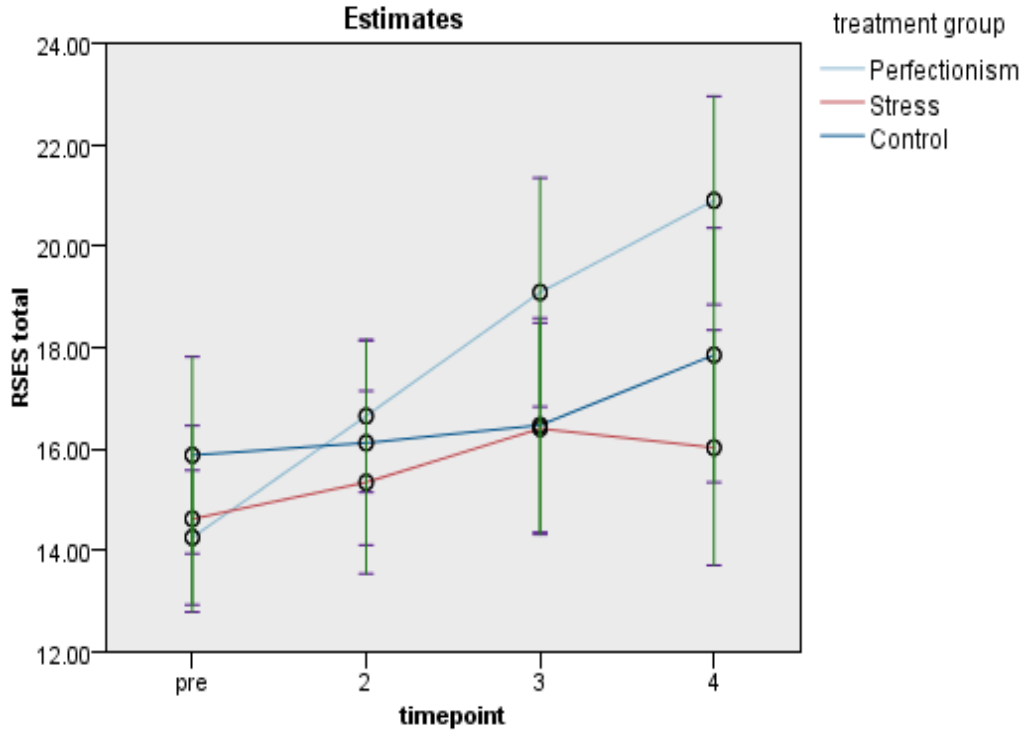

RCADS Depression



RCADS Anxiety




RSES



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