School of Psychology and Speech Pathology

An Examination of Cognitive Biases and Imagery in Perfectionism

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Doctor of Philosophy
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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.

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 # HR88 2012

Signature: …….

Date: ……...

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List of Abbreviations

ABM: Attention Bias Modification;

APS-R: Almost Perfect Scale-Revised;

BPS: Burns Perfectionism Scale;

CBT: Cognitive behaviour therapy;

CBT-E: Enhanced cognitive behaviour therapy;

CBM: Cognitive bias modification;

CBM-I: Interpretation cognitive bias modification;

CPQ: Clinical Perfectionism Questionnaire;

DAS: Dysfunctional Attitudes Scale;

DASS-21: Depression, Anxiety and Stress Scale-21;

DSM-5: Diagnostic and Statistical Manual of Mental Disorders, 5th edition;

EDI: Eating Disorders Inventory;

EDI-P: Perfectionism subscale of the Eating Disorders Inventory;

FMPS: Frost Multidimensional Perfectionism Scale;

GLMM: Generalised Linear Mixed Model;

HMPS: Hewitt and Flett Multidimensional Perfectionism Scale;

M: Mean;

n: Sample size;

N: Total sample size;

OCCWG: Obsessive Compulsive Cognitions Working Group;

OCD: Obsessive-compulsive disorder;

OCPD: Obsessive-Compulsive Personality Disorder;

PANPS: Positive and Negative Perfectionism Scale;

PC: Perfectionistic concerns;

PI: Perfectionism Inventory

PS: perfectionistic strivings;

PSWQ: Penn State Worry Questionnaire;

PTSD: Post-traumatic stress disorder;

RCT: Randomised controlled trial;

RNT: Repetitive Negative Thinking;

RTQ: Repetitive Thinking Questionnaire;

RTQ-10; Repetitive Negative Thinking – Short Scale;

SD: Standard deviation;

SE: Standard error of measurement;

Abstract

Perfectionism is implicated in the aetiology and perpetuation of various psychological disorders, such as depression, anxiety, obsessive compulsive, and eating disorders. Perfectionism may also explain comorbidity rates between disorders and impede the treatment of these psychological disorders. Consequently, research has explored if treatment for perfectionism reduces perfectionism and associated psychopathology. While numerous studies have examined treatment for perfectionism, further research is required examining cognitive-behavioural models of perfectionism.

The cognitive-behavioural model of clinical perfectionism specifies that an individual high in perfectionism may set excessively high standards for themselves, and base their self-worth on meeting these standards. In addition to the definition of clinical perfectionism, factor analyses of common perfectionism measures have found two main dimensions; 1) perfectionistic concerns, which is related to concerns about making mistakes, and 2) perfectionistic strivings, which is related to striving for high standards. Within the cognitive-behavioural model of clinical perfectionism there are several key hypotheses. For example, individuals with high levels of perfectionistic concerns may demonstrate distinct attentional and interpretation cognitive biases towards information viewed as a threat to achieving personally demanding goals. However, to date, there has been limited experimental research testing these assumptions. Furthermore, research has identified that other key cognitive constructs, such as repetitive negative thinking and imagery, may be important links between perfectionism and psychological distress. Yet, these two important cognitive constructs have not been evaluated together to determine their relative contribution to explaining the relationship between perfectionism and psychological distress. By understanding these mechanisms within perfectionism we may further improve treatment specificity and efficacy. Thus the present thesis aimed to test the relationship between key cognitive constructs and perfectionism across three studies.

Study one was designed to test the prediction that perfectionism is characterised by a distinct attention bias toward information that signals failure. Study one compared participants characterised with heightened perfectionistic concerns (n = 31) to participants with low perfectionistic concerns (n = 25). The results indicate that those with heightened perfectionism, but not those with low

perfectionism, displayed a greater attentional preference to negative stimuli relative to positive stimuli, but only when the stimuli were perfectionism-relevant in nature.

Study two was designed to test the prediction that perfectionism is associated with a distinct interpretation bias in situations that may activate underlying perfectionistic beliefs (N = 76). The findings revealed that perfectionistic concerns were positively associated with an interpretation bias toward a negative emotional interpretation of the scenarios. That is, perfectionistic concerns were positively associated with a tendency to rate negative test sentences as more similar to the original perfectionism-relevant scenarios, and a reduced tendency to rate positive test sentences as less similar to these original scenarios.

Study two also revealed that perfectionistic strivings were positively associated with a bias in the emotional interpretation of the scenarios. Specifically, perfectionistic strivings were positively associated with a tendency to rate negative test sentences as more similar to the original perfectionism-relevant scenarios, and a reduced tendency to rate positive test sentences as less similar to these original scenarios. The pattern of ratings observed for perfectionistic strivings were specific to participants interpreting the affective interpretation of the ambiguous scenario. The findings from studies one and two provide support for the critical assumptions underpinning conceptualisations of perfectionism, that there are distinct attentional and interpretation biases for those who are heightened in perfectionism relative to those who are low in perfectionism.

Study three was designed to test the prediction that perfectionistic concerns and strivings were associated with psychological distress directly and indirectly through repetitive negative thinking and imagery. A non-clinical population (N = 397) was recruited to test three structural equation models. The first model evaluated the relationship between perfectionistic concerns and perfectionistic strivings, repetitive negative thinking, and psychological distress. Results indicated that repetitive negative thinking was an indirect pathway for the relationship between perfectionistic concerns and psychological distress.

The second model included imagery as an additional intermediate variable to determine if imagery also carried a unique indirect effect between perfectionism and psychological distress. The second model revealed that imagery was an indirect pathway between perfectionistic concerns and psychological distress, while repetitive negative thinking no longer carried a significant indirect effect. The third model

evaluated the addition of clinical perfectionism, measured by the Clinical Perfectionism Questionnaire, to model two, to determine which measure of perfectionism best predicted psychological distress. The third model revealed that the clinical perfectionism accounted for the variance between perfectionistic concerns and psychological distress, rendering perfectionistic concerns non-significant. Importantly, imagery operated as an indirect pathway from clinical perfectionism and perfectionistic strivings to psychological distress. Overall, study three identified that, in part, perfectionism is directly associated with psychological distress, and some of the distress experienced could be explained by the mode of cognition individuals may engage with. Additionally, study three identified that imagery may be an important pathway from perfectionism to psychological distress beyond repetitive negative thinking. As imagery has been shown to influence the emotional experiences of individuals more powerfully than verbal-linguistic processes, this finding highlights the importance of further research on imagery in perfectionism.

The findings from the three studies support the validity of the cognitive-behavioural model of clinical perfectionism, but also highlight that further research is required to evaluate specific measures of clinical perfectionism. Importantly, two key findings emerged from the present thesis: (1) that clinical perfectionism is characterised by attention and interpretation biases, and (2) that two cognitive products, repetitive negative thinking, and to a greater degree imagery, provide indirect pathways between clinical perfectionism and psychological distress.

Based on the findings across this body of research, it would be informative to further determine whether the attention and interpretation biases present for perfectionism are distinguishable from attention and interpretation biases within a clinical population. It would also be important to determine the extent to which imagery explains the relationship between perfectionism and psychological distress within those with clinical diagnoses. If such perfectionism specific biased cognitive processes could be separated from the biased cognitive processes observed within clinical samples, then novel approaches such as computerised cognitive bias modification techniques could be evaluated. Furthermore, if imagery is found to be a powerful indirect pathway between perfectionism and psychological distress, then interventions that focus on imagery rescripting could be investigated as an adjunct to the verbal-linguistic processing techniques that are currently the primary focus in traditional cognitive therapies.

Publication Included as Part of the Hybrid Thesis

Study One (Chapter 3) of this thesis has been published (see Appendix A);

Howell, J. A., McEvoy, P. M., Grafton, B., Macleod, C., Kane, R. T., Anderson, R. A., & Egan, S. J. (2016). Selective attention in perfectionism: Dissociating valence from perfectionism-relevance. *Journal of Behavior Therapy and Experimental Psychiatry*, *51*, 100-108. doi:10.1016/j.jbtep.2016.01.004

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Chapter 1: The Definition and Importance of Perfectionism

1.1. Improving our Understanding of Emotional Disorders

The World Health Organisation estimates that psychological disorders account for 13% of the global burden of disease (World Health Organization, 2013) and are the leading cause of years lived with a disability, surpassing both cardiovascular disease and cancer (Collins et al., 2011; Whiteford et al., 2013; Whiteford, Ferrari, Degenhardt, Feigin, & Vos, 2015). Within the category of psychological disorders, depressive disorders were rated as the second largest contributor to the burden of disease in the Global Burden of Disease Study (Ferrari et al., 2013). Between 2010 and 2030, psychological disorders are also projected to remain a leading cause of the global burden of disease with an estimated worldwide economic cost of US$2.5 trillion in 2010 and the economic cost is expected to surpass US$6 trillion by 2030 (Mathers & Loncar, 2006; World Health Organization, 2013). Within the Australian context, the 2007 National Survey of Mental Health and Wellbeing estimated that nearly 50% of Australian adults had experienced a psychological disorder in their lifetime, while 20% had experienced a psychological disorder within the previous 12 months (Australian Bureau of Statistics, 2008). Begg, Vos, Stevenson, Stanley, and Lopez (2007) further estimate that psychological disorders are the largest contributor to non-fatal burden of disease among Australians.

Given the global economic burden of psychological disorders and, more importantly, to the individuals living with a disorder, further research is required to improve our understanding of psychological disorders and the efficacy of available treatments. Although research has continued to adjust and incorporate new treatment foci within the field of psychological disorders (e.g., Brewin et al., 2009; McEvoy, Erceg-Hurn, Saulsman, & Thibodeau, 2015; McEvoy & Saulsman, 2014; Salemink, Kindt, Rienties, & van den Hout, 2014), recent research has also explored the concept of targeting transdiagnostic processes. A transdiagnostic process is a construct that is implicated as a risk or maintaining factor across multiple disorders (Egan, Wade, & Shafran, 2011; Sauer-Zavala et al., 2017). The transdiagnostic approach to psychopathology provides a framework for researchers and clinicians to move beyond distinct diagnostic categories, and focus on core processes that contribute to the development and maintenance of multiple psychological disorders

(Harvey, Watkins, Mansell, & Shafran, 2004; Mansell, Harvey, Watkins, & Shafran, 2008; Newby, McKinnon, Kuyken, Gilbody, & Dalgleish, 2015). Understanding the transdiagnostic processes that contribute to multiple disorders may provide an explanation for the rates of comorbidity amongst psychological disorders often observed in clinical practice (Bieling, Summerfeldt, Israeli, & Antony, 2004). Transdiagnostic treatments then focus on these core processes that occur across disorders without specific tailoring for the disorder (McEvoy, Nathan, & Norton, 2009). An important clinical implication for using the transdiagnostic approach is that targeting common mechanisms across emotional disorders may be an effective and efficient strategy for simultaneously treating multiple disorders (Barlow, Allen, & Choate, 2004). Perfectionism has been identified as one such important transdiagnostic process across a range of psychological disorders (Egan, Wade, et al., 2011; Egan, Wade, & Shafran, 2012). Despite the clinical significance of perfectionism (Shafran & Mansell, 2001) it remains unclear whether cognitive factors such as attention and interpretation biases, repetitive negative thinking, or imagery are crucial components of how perfectionism is associated with psychological distress.

1.2. What is Perfectionism?

Perfectionism has been described in the literature for over 100 years (Frost & Steketee, 1997), with the majority of early definitions describing perfectionism as a dysfunctional characteristic. The first account of perfectionism dates back to Janet (1898), who described perfectionism as being characterised by rigidity with regards to thoughts or ideas. Since Janet's original description, there have been numerous definitions that attempt to capture perfectionism (Shafran, Cooper, & Fairburn, 2002). The present section of the chapter will explore and critique the definitions of perfectionism and the key measures that reflect each definition. The exploration of the key measures of perfectionism is important as research on perfectionism has been driven by equating perfectionism with its measurement, with limited grounding in theory (Shafran et al., 2002). There are a range of measures for perfectionism, yet it is beyond the scope of the present literature review to identify and analyse every such measure, therefore the present chapter will only explore the key measures used in research for each definition. For further information and an overview of the complete range of measures available for perfectionism see Egan, Wade, Shafran, and Anthony (2014, pp. 60-80).

1.2.1. Early Definitions and Measures of Perfectionism

The first cognitive-behavioural conceptualisation of perfectionism originated from Ellis (1958), who detailed perfectionism as an unrealistic, impossible, cognitive goal around being perfectly capable, intelligent, and successful in all respects. The key theme of Ellis's definition was the unrelenting high standards that the individual should achieve, as opposed to their attempts to achieve their standards. Hollander (1965) asserted that perfectionism was the practice of demanding a performance at a higher quality than what may be required for the situation. Hollander (1965) also described that individuals with perfectionism were unlikely to ever live up to the standards to which they evaluated their performances, yet they would be driven to achieve these standards as this achievement would determine whether they (or others) found them acceptable. Sorotzkin (1985) also argued that individuals with perfectionism were unlikely to live up to their standards, and highlighted that individuals with perfectionism measured their worth against unrealistic goals and any deviation from achieving these goals would be met with self-criticism. Across these early definitions emerged the clear theme that perfectionism was maladaptive, which involved the pursuit of unattainable goals and the debasement of an individual's sense of worth if they failed to achieve their goals (Ellis, 1958; Hollander, 1965; Sorotzkin, 1985).

Hamachek (1978) was the first to highlight that there could be two components of perfectionism, that is, individuals may have normal perfectionism or neurotic perfectionism. Normal perfectionists were considered to be those who recognised they may not attain all of their high standards, yet experienced the positive emotions and a sense of achievement from their striving and performances (Hamachek, 1978). Neurotic perfectionists encompassed those who strived for high standards despite adverse consequences, and rarely experienced the positive emotions or a sense of achievement from their strivings and performances (Hamachek, 1978). Hamachek posited that perfectionism may not always be maladaptive, rather, there could be a positive striving component to perfectionism (i.e., normal perfectionists). The argument was that what made perfectionism maladaptive (neurotic perfectionists), was the self-criticism and the sense of achievement, or lack thereof, that individuals experienced as a result of their performance (Hamachek, 1978).

There are several measures related to the early definitions of perfectionism, of which the key measures are the Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978), the Burns Perfectionism Scale (BPS; Burns, 1980), and the Perfectionism subscale of the Eating Disorder Inventory (EDI; Garner, Olmstead, & Polivy, 1983). The DAS (Weissman & Beck, 1978) was designed to measure self-defeating cognitions associated with anxiety and depression. The DAS was not initially designed to assess perfectionism; however a factor analysis yielded an item grouping that has been labelled the Self-critical Perfectionism subscale as the items covered high personal standards and a concern about making mistakes (Imber et al., 1990). The Self-critical Perfectionism subscale has high internal consistency (α=0.91; Imber et al., 1990; Steele et al., 2013) and validity (Dunkley, Sanislow, Grilo, & McGlashan, 2004). The Self-critical Perfectionism subscale (Weissmann & Beck, 1978) was used to evaluate the relationship between perfectionism and psychopathology (e.g., Dunkley et al., 2004; Dunkley, Sanislow, Grilo, & McGlashan, 2009). The DAS was later adapted by Burns to develop the BPS (Burns, 1980). The BPS contained items that reflected an individual's pathological perfectionistic beliefs pertaining to self-evaluation and performance (Burns, 1980). Enns and Cox (2002) explained that the BPS has modest reliability at best and, as such, has had limited application in clinical research.

Another early measure developed is the EDI (Garner et al., 1983). The EDI consists of eight subscales designed to measure psychological constructs related to eating disordered psychopathology. One subscale is the Perfectionism subscale (EDI-P), which evaluates the extent to which individuals set excessive or disproportionate expectations for themselves (Garner et al., 1983). The EDI-P has been found to be reliable (e.g., α=0.74 – 0.76) and valid within an eating disorder population, however the EDI-P has been rarely used in other samples (Bardone-Cone et al., 2007). As the EDI-P has primarily been used within samples with eating disorders, it is unclear whether the psychometric properties of the EDI-P are adequate in other clinical samples (Bardone-Cone et al., 2007; Enns, Cox, & Clara, 2002).

1.2.2. Multidimensional Definitions and Measures of Perfectionism

Frost, Marten, Lahart, and Rosenblate (1990) and Hewitt and Flett (1991b) proposed that perfectionism is multidimensional and should be broadened from earlier definitions. To assess perfectionism, Frost, Marten, et al. (1990) and Hewitt and Flett (1991b) developed questionnaires of multidimensional perfectionism. Frost,

Marten, et al. (1990) argued that perfectionism involved more than just setting high personal standards for oneself, because this does not distinguish between people with perfectionism and those who appeared to be highly competent and successful. Therefore, Frost, Marten, et al. (1990) developed a Multidimensional Perfectionism Scale (FMPS) that examined six dimensions of perfectionism: Personal Standards (setting high personal standards), Concern over Mistakes (striving for perfection out of fear of making a mistake), 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).

Hewitt and Flett (1991b) suggested that perfectionism consisted of a combination of both intrapersonal and interpersonal dimensions. As such, Hewitt and Flett (1991b) constructed a Multidimensional Perfectionism Scale (HMPS) that included the Self-Oriented Perfectionism subscale, which involved setting high personal standards and becoming critical of oneself if they are not met (i.e., intrapersonal perfectionism). Other subscales included Socially-Prescribed Perfectionism, which involved meeting standards and perceived standards set for them by significant others, and Other-Oriented Perfectionism, which is similar to Self-Oriented Perfectionism but directed towards other people (i.e., interpersonal perfectionism).

In support of the multidimensional conceptualisation of perfectionism, factor analyses have indicated that there are two higher order dimensions of perfectionism, one reported to be maladaptive, which is related to concerns about making mistakes, and one reported to be adaptive, which is related to striving for high standards (Bieling, Israeli, & Antony, 2004). The factor structure appears consistent across studies (Bieling, Israeli, et al., 2004; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993). Bieling, Israeli, et al. (2004) and Frost et al. (1993) found items from the FMPS and HMPS (subscales Doubts about Actions, Concern over Mistakes, Parental Expectations, and Parental Criticism from FMPS, and Socially-Prescribed Perfectionism from HMPS) loaded onto the maladaptive dimension, titled maladaptive evaluative concerns, and the other items (subscales Personal Standards, and Organisation from FMPS, and Other-Oriented Perfectionism and Self-Oriented Perfectionism from HMPS) loaded onto the adaptive dimension, titled positive striving. Additional research has supported the presence of two higher order

dimensions of perfectionism (Blankstein & Dunkley, 2002; Blankstein, Dunkley, & Wilson, 2008). Stoeber and Otto (2006) have referred to the two dimensions of perfectionism as perfectionistic concerns (i.e., maladaptive evaluative concerns) and perfectionistic strivings (i.e., positive striving). The importance of noting the terms perfectionistic concerns and strivings is that, more recently, research has used these terms to describe the two dimensions of perfectionism (e.g., Burgess, Frost, & DiBartolo, 2016; Smith et al., 2016).

Frost et al. (1993) reported that perfectionistic concerns were positively correlated with depressive symptoms and negative affect, which was congruent with Bieling, Israeli, et al. (2004) findings that perfectionistic concerns were related to stress, anxiety, depression, and test anxiety. Perfectionistic concerns and its constituent subscales (i.e., Concern over Mistakes, Socially-Prescribed Perfectionism) are consistently higher in clinical than non-clinical samples, including those with mood, anxiety, and eating disorders (Egan, Wade, et al., 2011). A recent meta-analysis by Limburg, Watson, Hagger, and Egan (in press) highlighted that perfectionistic concerns retains a robust association with psychopathology across both clinical and non-clinical samples. Frost et al. reported that perfectionistic strivings were correlated with positive affect, which was consistent with Stoeber and Otto's (2006) findings that perfectionistic strivings, when controlling for perfectionistic concerns, were associated with positive outcomes. The positive outcomes included achievement, positive affect, conscientiousness, greater perceived social support, and reduced symptoms of depression and suicidal ideation (Stoeber & Otto, 2006), suggesting that striving for high standards could be adaptive and healthy for the individual. In contrast, perfectionistic concerns has been found to consistently be associated with psychopathology (Egan, Wade, et al., 2011; Limburg et al., in press).

However, other researchers have challenged the notion that perfectionistic strivings are an adaptive form of perfectionism, as there is evidence to suggest the Personal Standards subscale of the FMPS (Frost, Marten, et al., 1990), which is often associated with perfectionistic strivings, is a risk factor for eating disorders (Wade et al., 2008) and may influence eating disorder psychopathology (Bardone-Cone et al., 2008). Reviews by Egan, Wade, et al. (2011) and Egan, Wade, et al. (2012) have also posited that perfectionistic strivings may not always be adaptive. This conclusion is consistent with the recent meta-analysis of Limburg et al. (in press), who found that

perfectionistic strivings was positively associated with psychopathology within eating disorder samples, yet was less related to psychopathology in non-clinical samples. In light of the evidence to date, perfectionistic concerns have been universally accepted to be a maladaptive form of perfectionism, while perfectionistic strivings may be associated with some positive outcomes but is not universally adaptive (Egan, Wade, et al., 2011, 2012; Limburg et al., in press; Smith et al., 2016).

The FMPS and HMPS are the two most commonly used measures of multidimensional perfectionism. Beyond the FMPS and HMPS, another multidimensional perfectionism measure is the Positive and Negative Perfectionism Scale (PANPS, Terry-Short, Owens, Slade, & Dewey, 1995). The PANPS has two subscales, one is a Positive Perfectionism subscale, which assesses positive striving or achieving (e.g., I enjoy the glory gained by my successes), and the other a Negative Perfectionism subscale, which assesses the negative outcomes of perfectionism (e.g., No matter how well I do I never feel satisfied with my performance). Both the Positive and Negative Perfectionism subscales demonstrated high internal consistency within athlete samples (Egan, Piek, Dyck, & Kane, 2011). The Negative Perfectionism subscale has also been demonstrated to be a valid measure within clinical samples, however there has been inconsistent factor loadings for Positive Perfectionism subscale items (Egan, Piek, et al., 2011; Haase, Prapavessis, & Owens, 1999; Haase, Prapavessis, & Owens, 2002).

Another multidimensional measure of perfectionism is the Almost Perfect Scale - Revised (APS-R; Slaney, Rice, Mobley, Trippi, & Ashby, 2001). The APS-R is a revised version of the Almost Perfect Scale (Slaney & Johnson, 1992, as cited by Slaney et al., 2001). The APS-R consists of three factors that assess the extent to which individuals have high personal standards, the extent to which individuals want order, and the extent to which individuals perceive a discrepancy between their own performance and their standards (Slaney et al., 2001). The Perfectionism Inventory (PI; Hill et al., 2004) is another multidimensional perfectionism measure. The PI consists of eight subscales including domains such as, but not limited to, having high standards for others, requiring validation or approval from others, concern about making mistakes, and the extent to which individuals ruminate over past mistakes or errors (Hill et al., 2004). There are several other multidimensional perfectionism measures beyond the PANPS, APS-R, and the PI, including but not limited to, the

Perfectionistic Self-Presentation Scale (Hewitt, Flett, Sherry, et al., 2003), and Consequences of Perfectionism Scale (Kim, 2010). However, the FMPS and the HMPS remain the most widely used perfectionism measures. For further information and an overview of the large range of measures available for perfectionism see Egan et al. (2014 p. 60-80).

1.2.2.1. Critique of multidimensional perfectionism. One of the primary critiques of the multidimensional perfectionism conceptualisation is that the frequent use of the two original multidimensional perfectionism measures (Frost, Marten, et al., 1990; Hewitt & Flett, 1991b) has largely led perfectionism to be a construct equated with scores on the FMPS and HMPS (Shafran et al., 2002). Shafran et al. (2002) reported that the problem with the widespread acceptance of perfectionism being equivalent to the scores on perfectionism measures is that the multidimensional conceptualisation was not solely based on theoretical and clinical descriptions of perfectionism. Furthermore, Shafran et al. (2002) argued that the measures incorporated not only key constructs, but constructs that are not essential to perfectionism definitions. Shafran et al. (2002) explained that items in the Personal Standards, Concern over Mistakes, and Self-Oriented Perfectionism subscales of the FMPS and HMPS are the closest approximations to the original theoretical accounts of perfectionism (Ellis, 1958; Hollander, 1965), while the remaining subscales are related constructs, yet ultimately unnecessary when conceptualising the individual's presentation of perfectionism. For instance, perceived parental pressure or parental concerns may be relevant for understanding the development of perfectionism for the individual, however does not provide a direct application within the clinical context (Burgess et al., 2016; Shafran et al., 2002). Shafran et al. asserted that the widespread acceptance and reliance on the multidimensional conceptualisation of perfectionism was one reason as to why there has not been any further development in the theoretical understanding and clinical intervention for perfectionism. The authors argued that for research to further develop and understand perfectionism's role in psychological disorders, it needs to be more clearly defined within a clinical context (Shafran et al., 2002).

1.2.3. Cognitive-Behavioural Definition and Measure of Perfectionism

Shafran et al. (2002) proposed a cognitive-behavioural model of clinical perfectionism, which was later updated by Shafran, Egan, and Wade (2010). Shafran et al. (2002; 2010) argued that individuals with clinical perfectionism set themselves

high standards, and then base their own self-worth upon achieving these standards. The clinical perfectionism definition was based on other clinicians' reports and observation in a clinical setting with individuals with eating disorders. Shafran et al. defined clinical perfectionism as "… the setting of, and striving to meet, very demanding standards that are self-imposed and relentlessly pursued despite this causing problems. It involves basing one's self-worth almost exclusively on how well these high standards are pursued and achieved." (Shafran et al., 2010, p. 9).

The clinical perfectionism definition encompassed three core features. The first feature is that individuals set personally demanding standards. The standards are set in the areas of the individual's life that are personally relevant to the individual (i.e., weight, work quality, athletic ability). When individuals perceive either real or imagined failure to satisfy their high standards, they view failure as a reflection of their worthlessness, and suffer negative emotional consequences such as anxiety or depression (Shafran et al., 2002; Shafran, Lee, & Fairburn, 2004). The second feature is that individuals will strive to meet their high standards despite negative consequences. Individuals with clinical perfectionism are reported not to diminish their ambitions or attempts to achieve their high standards even when the outcomes are negative. These outcomes may occur across a variety of domains, including emotional (e.g., anxiety, depressed mood), social (e.g., social isolation or exclusion), physical (e.g., exhaustion, insomnia), and cognitive domains (e.g., self-criticism, distractibility) (Shafran et al., 2002; Shafran et al., 2010). The third feature is that an individual's self-worth is based on meeting their personally demanding standards. Failure to achieve a goal can result in the individual generalising their perceived inadequate performance to a global negative perception of themselves, such as viewing themselves as a failure as a person (Shafran et al., 2010). Acknowledging past literature, Shafran and colleagues highlighted that aiming for high standards is not problematic per se, but when an individual's self-worth is predominantly based on achieving those standards, and their standards are pursued despite negative outcomes, the individual is no longer in a pursuit of excellence, rather they are experiencing clinical perfectionism.

The Clinical Perfectionism Questionnaire (CPQ; Fairburn, Cooper, & Shafran, 2003a) is a measure based on the conceptualisation of clinical perfectionism. It was designed to assess the setting of and striving to achieve high standards, and the impact on self-esteem if the individual perceives their standards

have not been met. The CPQ has demonstrated good internal consistency, and convergent and predictive validity (Chang & Sanna, 2012; Dickie, Surgenor, Wilson, & McDowall, 2012; Egan et al., 2016; Steele, O'Shea, Murdock, & Wade, 2011). However, recent evidence has indicated that there may be potential issues regarding the structure of the questionnaire, specifically that items requiring reverse coding may weaken the overall validity of the CPQ (Stoeber & Damian, 2014). Research that has removed these items have found significant improvements in the overall measurement model (Egan et al., 2016).

Although there is no other measure of clinical perfectionism available as far as the author is aware, studies have also used the Concern over Mistakes and Personal Standards subscales of the FMPS (Frost, Marten, et al., 1990) to capture aspects relevant to clinical perfectionism, as the definition of clinical perfectionism includes the setting of, and striving for, demanding standards and responding negatively to perceived mistakes or errors within the performance (Egan, Dick, & Allen, 2012; Handley, Egan, Kane, & Rees, 2014). Handley and colleagues (2014) developed a cut-off score for high levels of perfectionism (Concern over Mistakes score > 24.7) from the average Concern over Mistakes score across studies using clinical samples, and a cut-off score for low levels of perfectionism based on the average Concern over Mistakes score for non-clinical controls (Concern over Mistakes score < 18.5).

1.2.3.1. Critique of clinical perfectionism. Shafran and colleagues' (2002) conceptualisation of clinical perfectionism is not without criticism. Hewitt, Flett, Besser, Sherry, and McGee (2003) asserted that the clinical definition of perfectionism did not account for interpersonal processes and was thus problematic. Shafran, Cooper, and Fairburn (2003), in turn, responded and highlighted that the clinical conceptualisation concentrated on specific intrapersonal processes, which tend to be the factors targeted within clinical practice. Stoeber and Damian (2014) have also critiqued a unidimensional conceptualisation of clinical perfectionism by highlighting that the CPQ has yielded two factors that reflect perfectionistic concerns and perfectionistic strivings. However, Stoeber and Damian's argument is contingent on the assumption that the clinical perfectionism model is a unidimensional approach to perfectionism. It should be noted that Shafran et al. have never reported that the CPQ would yield a single factor structure, nor that clinical perfectionism is unidimensional. Rather, Shafran et al. identified that the items used in some of the

subscales of the FMPS or HMPS did not necessarily reflect or measure how perfectionism may present for individuals who are affected by perfectionism in their day-to-day lives. For example, items that correspond with parental concerns and expectations in the FMPS appear to relate to the past and contexts within which perfectionism may have developed rather than current symptoms (Shafran et al., 2002, 2003). Shafran and colleagues reported that items relating to perfectionistic concerns (e.g., Concern over Mistakes subscale of the FMPS) and perfectionistic strivings (e.g., Personal Standards subscale of the FMPS) were a better representation of how perfectionism may operate within an individual's life. To date, there is a wide range of definitions and measures of perfectionism. Despite the lack of consensus regarding the definition of perfectionism, research has consistently demonstrated that perfectionism is important in the development and perpetuation of multiple psychological disorders (Egan, Wade, et al., 2011).

Despite there being no agreed definition in use in the literature, the definitions are largely overlapping on the core components that constitute perfectionism. That is, there are two generally accepted components in perfectionism; 1) perfectionistic concerns, which is related to concerns about making mistakes, and 2) perfectionistic strivings, which is related to striving for high standards. In this way perfectionism in the following literature review will be used to refer to the over-arching construct of perfectionism (i.e., the striving for personally demanding standards which can be accompanied with intense self-critical evaluations if these standards are not met) and discrepancies between studies using different definitions will be described where relevant. The research in the present thesis will focus on using the FMPS, which is one of the most widely used measures in perfectionism research. Furthermore, the subscale Concern over Mistakes and Personal Standards, which align with perfectionistic concerns and perfectionistic strivings respectively, are used in perfectionism treatment research and as a measure of clinical perfectionism (Handley, Egan, Kane, & Rees, 2015). It is also important to consider, where relevant, the CPQ as a measure of perfectionism as the CPQ has also been used in treatment research and is a measure of clinical perfectionism.

1.3. Why is Perfectionism Important?

Studies reported that comorbidity rates for adults with psychological disorders in the general population can exceed 40%, indicating nearly half of the clinical population experiences more than one disorder (Kessler, Chiu, Demler, &

Walters, 2005). Comorbidity rates are considerably higher within clinical populations, where comorbidity is the norm rather than the exception (Brown et al., 2001). It has also been argued that comorbidity may occur due to psychological disorders sharing predisposing and perpetuating factors (Bieling, Summerfeldt, et al., 2004) and as such treating shared predisposing or perpetuating factors may help to efficiently treat the primary and comorbid disorders. Since perfectionism is implicated as a predisposing and perpetuating factor in several psychopathologies, it could explain comorbidity in psychological disorders (Egan, Wade, et al., 2011; Shafran & Mansell, 2001). The majority of the research that has associated perfectionism with psychological disorders is cross-sectional in nature. Cross-sectional research only captures a single point in time, which precludes any inferences regarding the nature of perfectionism, namely causality or directionality of effects, which would be best explored through experimental and longitudinal designs. In light of this, there are several prospective studies, specifically a meta-analysis of ten longitudinal studies, which indicates that perfectionistic concerns and perfectionistic strivings predict depressive symptoms over time (Smith et al., 2016).

Bieling, Summerfeldt, et al. (2004) found that in a sample of 345 clinical participants perfectionism predicted the number of comorbid anxiety and mood disorders. These findings remained significant after controlling for depression, stress and anxiety (Egan, Wade, et al., 2011). There is also evidence that perfectionism impedes the outcome of interventions for psychological disorders (Egan, Wade, et al., 2011). While the consideration that perfectionism as a transdiagnostic process is a burgeoning research area, a key implication is that targeting perfectionism in treatment may ameliorate a broad range of psychopathological symptoms (Bieling, Israeli, et al., 2004; Egan, Wade, et al., 2011; Fairburn, Cooper, & Shafran, 2003b; Harvey et al., 2004). Evidence for the relationship between perfectionism and various emotional symptoms and disorders will now be reviewed.

1.3.1. Perfectionism is Associated with Multiple Disorders

1.3.1.1. Perfectionism and mood disorders. The association between perfectionism and mood disorders has been consistently reported across clinical and non-clinical samples (Egan, Wade, et al., 2011). Perfectionism was described as “destructive” within mood disorders (Blatt, 1995, p. 1014), with high perfectionism scores demonstrated for individuals with depression compared to non-depressed controls (Enns, Cox, & Borger, 2001; Hewitt & Flett, 1991a). Multiple studies have

demonstrated moderate to strong positive correlations between perfectionism, depression, bipolar disorder, and suicidal ideation (Bieling, Summerfeldt, et al., 2004; Blatt, Zuroff, Bondi, Sanislow, & Pilkonis, 1998). The correlations between perfectionism and depressive symptoms have been demonstrated across different perfectionism scales, including the CPQ, the Concern over Mistakes, Doubts about Actions, Parental Expectations, Parental Criticism subscales of the FMPS, and Self-Oriented Perfectionism subscale of the HMPS (Bieling, Summerfeldt, et al., 2004; Chang, Chang, & Sanna, 2011; Chang & Sanna, 2012; Smith et al., 2016; Steele & Wade, 2008). A cross-sectional study by Flett, Hewitt, Blankstein, and Mosher (1995) found that Self-Oriented Perfectionism was related to depressive symptoms. Although other cross-sectional findings did not observe the relationship between perfectionism and depressive symptoms (Flett, Hewitt, Blankstein, & O'Brien, 1991), Flett et al. (1995) found that Self-Oriented Perfectionism was a prospective predictor for depressive symptoms three months later. Another prospective study by Dunkley, Sanislow, Grilo, and McGlashan (2006) indicated that high levels of perfectionism had predictive utility in the development of depressive symptoms over time. They suggested that heightened scores on the DAS (Weissman & Beck, 1978, March) were significantly related to depression scores in a 3-year longitudinal study. The predictive utility of perfectionism was still observed when initial levels of psychopathology were controlled for (Dunkley, Sanislow, et al., 2006).

The relationship between perfectionism and depressive symptoms has also been demonstrated in another recent meta-analysis by Smith et al. (2016), which examined 10 longitudinal studies published between 2001 and 2015. These longitudinal studies investigated the relationship between perfectionism and depressive symptoms. Importantly, Smith et al. controlled for neuroticism to determine whether perfectionism accounts for depressive symptoms beyond what is accounted for by baseline neuroticism and depression symptoms. The findings from the meta-analysis support theoretical accounts that individuals with perfectionistic concerns behave and think in ways that may lead to depressive symptomatology (Bekes et al., 2015; Graham et al., 2010; Smith et al., 2016). Furthermore, the findings from the meta-analysis indicated that perfectionistic strivings, previously considered to be adaptive (Stoeber & Otto, 2006), may also result in depressive symptoms. Smith et al. reasoned that perfectionistic strivings may result in depressive symptoms when an individual is presented with stressors that threaten an

individual's self-worth, such as poor performances on a test. Furthermore, nature of cross-sectional studies that provide only a single assessment at a single time may not capture the longstanding extent to which perfectionistic strivings influences the individual (Smith et al., 2016).

Perfectionism has also been associated with bipolar disorder (Corry et al., 2013; Egan, Wade, et al., 2011). Research indicated that the cognitive style of individuals who meet diagnostic criteria of bipolar disorder is perfectionistic, where they tend to be highly critical of self, and achievement oriented (Alloy et al., 2005; Lam, Wright, & Smith, 2004). Alloy et al. (2015) proposed in a review of the literature that perfectionistic concerns (i.e., maladaptive beliefs about performance expectations and self-critical thoughts about mistakes) of the individual could ultimately interact with events where the individual was striving for success (i.e., perfectionism relevant events) which may influence the depressive and hypomanic symptoms experienced in bipolar. This interaction was evaluated by Francis-Raniere, Alloy, and Abramson (2006) who found that when initial depressive and hypomanic symptoms were controlled for, the interaction between perfectionistic concerns and congruent events predicted increases in both depressive and hypomanic symptoms over a four month period (Francis-Raniere et al., 2006). More recent studies have suggested that the relationship between perfectionism and bipolar depressive symptoms is mediated by anxiety and stress (Corry et al., 2013). Corry et al. (2013) proposed that perfectionistic beliefs, such as the fears about making mistakes, can promote maladaptive emotion regulation strategies (e.g., repetitive negative thinking) to cope with the associated anxiety and stress in an attempt to prevent the feared outcome from occurring. By then engaging with avoidance of events that may trigger fears about making mistakes and subsequent anxiety, individuals may then isolate themselves, which can subsequently promote depressive symptoms (Corry et al., 2013).

One significant implication of the research on perfectionism as a transdiagnostic maintaining factor is that perfectionism could also impede the treatment efficacy of psychological disorders (Egan, Wade, et al., 2011). Blatt, Quinlan, Pilkonis, and Shea (1995) used data from a collaborative research project for the National Institute of Mental Health Treatment of Depression Collaborative Research Program and found that perfectionism was a significant predictor of poor treatment outcomes for depression, over a 16-week treatment period, across

cognitive-behavioural therapy (CBT) and interpersonal treatment protocols. Blatt et al. (1998) completed a follow-up and found perfectionism was also a predictor of poor treatment outcomes at the 18-month follow-up. The relationship between perfectionism and the therapeutic alliance has also been explored (Zuroff et al., 2000). Specifically, Zuroff et al. (2000) found that perfectionism was negatively related with the therapeutic alliance, and argued that participants with high perfectionism were less likely to engage in a constructive, cooperative, and collaborative relationship over the course of treatment. The importance of the influence on therapeutic outcome is that as perfectionism increased, ratings of the therapeutic alliance decreased, which was associated with poorer treatment outcomes (Zuroff et al., 2000).

Research has also indicated that perfectionism may negatively affect treatment response for adolescents, such that adolescents with higher perfectionism continued to demonstrate elevated depression across a trial that involved participants receiving CBT, fluoxetine, a combination of CBT and fluoxetine, or pill placebo (Jacobs et al., 2009). Overall, a range of cross-sectional, longitudinal, and treatment studies provide support for the role of perfectionism with mood disorders, ranging from being a central component of the disorder through to interfering with treatment response and engagement (Egan, Wade, et al., 2011)

1.3.1.2. Perfectionism and anxiety disorders. Associations between perfectionism and various anxiety disorders have also been reported across clinical and non-clinical samples (Egan, Wade, et al., 2011). The meta-analysis by Limburg et al. (in press) identified that there was a strong, positive relationship between perfectionistic concerns and anxiety disorders, while perfectionistic strivings was not significantly associated with anxiety disorders. The association between perfectionism and anxiety disorders has most commonly been investigated in social anxiety disorder (American Psychiatric Association, 2013), previously known as social phobia (American Psychiatric Association, 2000; Ashbaugh et al., 2007). More recently, research has also explored the relationship between perfectionism and panic disorder with or without agoraphobia (Wheeler, Blankstein, Antony, McCabe, & Bieling, 2011), generalised anxiety disorder (Handley et al., 2014) and post-traumatic stress disorder (PTSD) (Egan, Hattaway, & Kane, 2014).

Models of social anxiety indicate perfectionism is involved in the development and maintenance of the disorder (c.f. Clark & Wells, 1995; Heimberg,

Juster, Hope, Mattia, & Iketani, 1995). For example, it is proposed that individuals have early experiences that teach them to view social interactions as threatening. By viewing social interactions as threatening or potentially dangerous (e.g., humiliating) the individual develops perfectionistic beliefs that such threat may be avoided by perfect social performances (Clark & Wells, 1995). As a perfect social performance cannot be attained, the individual will likely have several negative automatic thoughts about the consequences of not achieving these standards (i.e., social rejection), or viewing the self as worthless (Clark & Wells, 1995). Shafran et al. (2002) proposed that individuals with perfectionism may not only scrutinise their performance during a social interaction, but may also selectively attend to negative experiences that confirmed their belief that social interactions could be dangerous. Individuals may also engage with repetitive thinking patterns where they evaluate their past performances, often highlighting flaws or discounting positive aspects of the social interactions (Shafran et al., 2002).

Studies in student samples have indicated that Concern over Mistakes, Doubts about Actions (Shumaker & Rodebaugh, 2009), Socially-Prescribed Perfectionism (Flett, Hewitt, & de Rosa, 1996), and perfectionistic concerns (DiBartolo, Li, & Frost, 2008) are associated with social anxiety symptoms. Findings from student samples are consistent with findings that suggested Concern over Mistakes, Doubts about Actions, and Socially-Prescribed Perfectionism scores are associated with social anxiety symptoms in individuals diagnosed with social anxiety disorder (Antony, Purdon, Huta, & Swinson, 1998; Lundh & Öst, 1996, 2001; Wheeler et al., 2011). Lundh and Öst (2001) indicated that if perfectionism is central to social anxiety, then treatments that successfully ameliorate social anxiety symptomology would note a reduction in associated perfectionism. Both Lundh and Öst (2001) and Ashbaugh et al. (2007) reported that CBT for social anxiety resulted in significant reductions in Concern over Mistakes, Doubts about Actions, Personal Standards, and Parental Criticism scores. Moreover, the pre- to post-treatment change in Concern over Mistakes and Doubts about Actions predicted changes between pre- to post-treatment of social anxiety, which is consistent with the notion that perfectionism may maintain social anxiety (Ashbaugh et al., 2007).

Lundh and Öst (2001) also found that changes in Doubts about Actions scores from pre- to post-treatment predicted the pre- to post-treatment change in social anxiety (Frost & Steketee, 1997; Iketani et al., 2002a; Iketani et al., 2002b).

Lundh and Öst (2001) described that individuals who did not respond to CBT for social anxiety had significantly higher Concern over Mistakes scores than treatment responders, and that post-treatment nonresponders Concern over Mistakes scores were reduced to the level of treatment responders' pre-treatment Concern over Mistakes scores. It may be that those who were more concerned about making mistakes than their treatment responder counterparts were not able to engage with CBT as well as those who were less concerned about making mistakes, especially considering behavioural experiments in CBT for social anxiety disorder often involve making mistakes in social situations (Bennett-Levy et al., 2004). Although the observation that change in perfectionism predicts change in social anxiety symptoms is consistent with a possible causal role, it still does not provide direct evidence for causality, rather it could still be a correlate of social anxiety.

Several studies have also indicated that individuals with panic disorder (with or without agoraphobia) experience significantly higher scores on Concern over Mistakes, Personal Standards, and Self-Oriented Perfectionism (Antony, Purdon, et al., 1998; Frost & Steketee, 1997; Iketani et al., 2002a; Iketani et al., 2002b). It is proposed that individuals with panic disorder may want to remain in 'perfect' control of their emotional states, which may subsequently lead to catastrophic misinterpretation of bodily sensations and emotions judged as being 'out of control' (Egan, Wade, et al., 2014; Ellis, 2002). In contrast, Wheeler et al. (2011) found that there was no difference between scores of perfectionism in those diagnosed with panic disorder and control participants. The disparate findings may also highlight the necessity for further research, in particular on whether the difference between those with panic disorder and those without is the result of perfectionism, or whether it is the result of another, though not unrelated, construct such as the intolerance of uncertainty. Further research is required to evaluate the relative contribution perfectionism has towards panic disorder and whether this contribution remains unique even when accounting for intolerance of uncertainty.

There has been limited evaluation of the relationship between perfectionism and generalised anxiety disorder. Studies using student populations have found associations between FMPS and HMPS subscales and worry, a defining symptom of generalised anxiety disorder (Buhr & Dugas, 2006; Santanello & Gardner, 2006). Buhr and Dugas (2006) found both Socially-Prescribed Perfectionism and Self-Oriented Perfectionism scores were significantly correlated with pathological worry

as measured by the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990). Importantly, Self-Oriented Perfectionism scores continued to be a significant predictor of PSWQ scores, after controlling for demographic characteristics and intolerance of uncertainty, while Socially-Prescribed Perfectionism scores were not a significant predictor of PSWQ scores. Given the importance of intolerance of uncertainty within established models of generalised anxiety (Dugas, Gagnon, Ladouceur, & Freeston, 1998; Ladouceur, Gosselin, & Dugas, 2000), and pathological worry (Buhr & Dugas, 2006), it is important to recognise that perfectionism continued to account for unique variance in pathological worry. Other researchers have found that perfectionistic concerns scores (Kawamura, Hunt, Frost, & DiBartolo, 2001; Santanello & Gardner, 2006; Stoeber & Joormann, 2001), are positively related to pathological worry.

To date, only one study, as far as the author is aware, has evaluated the relationship between perfectionism, as measured by the Concern over Mistakes and Doubts about Actions subscales of the FMPS and the CPQ, in individuals diagnosed with generalised anxiety disorder (Handley et al., 2014). The finding that Concern over Mistakes scores predicted worry is consistent with previous research, however Handley et al. (2014) did not observe a significant relationship between Doubts about Actions scores and worry. The authors argued that the lack of relationship between Doubts about Actions scores and worry, which was found in previous research, could be explained by the fact that past research (Santanello & Gardner, 2006; Stoeber & Joormann, 2001) has used composite Concern over Mistakes and Doubts about Actions subscale scores. It is possible that the significant relationship may be accounted for by Concern over Mistakes scores alone (Handley et al., 2014). Furthermore, Handley et al. (2014) was one of the few studies to use a measure of clinical perfectionism (CPQ; Fairburn et al., 2003a), which yielded a similar pattern of results to the Concern over Mistakes subscale of the FMPS, and indicated a clear association between clinical perfectionism and worry in a clinical sample. The association between clinical perfectionism and worry is consistent with theoretical explanations originally proposed by Shafran et al. (2002), who indicated that individuals with clinical perfectionism are more likely to engage with repetitive thoughts about future performances and the implications of not reaching their self-imposed standards on those performances.

Research has also explored the relationship between perfectionism and symptoms of PTSD (Egan, Hattaway, et al., 2014; Kawamura et al., 2001). Kawamura et al. (2001) found significant correlations between perfectionism, represented by perfectionistic concerns and Personal Standards scores, and symptoms of PTSD. More recently, Egan, Hattaway, et al. (2014) explored the relationship between perfectionism, rumination, and symptoms of PTSD in patients diagnosed with PTSD. The findings from Egan, Hattaway, et al. (2014) demonstrated that perfectionistic concerns, measured by Concern over Mistakes scores, and clinical perfectionism, measured by CPQ scores, were each positively associated with symptoms of PTSD. Egan et al. also found a robust association between repetitive negative thinking and symptoms of PTSD. Furthermore, repetitive negative thinking mediated the relationship between perfectionism and symptoms of PTSD, whereby individuals high in perfectionism who responded by ruminating about their past experiences were, in turn, more likely to experience symptoms of PTSD (Egan, Hattaway, et al., 2014).

It is important to note that treatment for anxiety disorders may also be impeded by high levels of perfectionism. For example, Lundh and Öst (2001) found that adults who did not respond to CBT for social anxiety had higher Personal Standards, Concern over Mistakes, and Doubts about Actions scores than those who did respond to treatment. Lundh and Öst (2001) also found that after treatment, the perfectionism scores of individuals who did not respond to treatment were reduced to the same level as pre-treatment scores for the treatment responders. The findings that individuals' perfectionism scores reduced to the same level as treatment responders prior to treatment further implies that high levels of perfectionism impede the benefits individuals with social anxiety receive from CBT. A limitation of Lundh and Öst's (2001) trial is that it is not clear whether the effects of perfectionism are independent of baseline symptom severity. However, as identified by Shafran and Mansell (2001) it may be that perfectionism needs to be reduced before individuals can benefit from targeted CBT for anxiety.

1.3.1.3. Perfectionism and obsessive-compulsive disorder. Perfectionism has also been seen as a factor that impacts on the development and maintenance of obsessive-compulsive disorder (OCD; Obsessive Compulsive Cognitions Working Group, 1997). The Obsessive Compulsive Cognitions Working Group (OCCWG) identified that perfectionism may be a central belief in OCD (Obsessive Compulsive

Cognitions Working Group, 1997). The OCCWG stated that perfectionism in OCD was “the tendency to believe there is a perfect solution to every problem, that doing something perfectly (i.e., mistake free) is not only possible, but also necessary and that even minor mistakes have serious consequences” (OCCWG, 1997, p.678). Although perfectionism was described as a central belief, research has indicated that perfectionism is related to two specific experiences within OCD, checking behaviours and not just right obsessions (Moretz & McKay, 2009; Pinto et al., 2017).

Perfectionism may influence checking behaviours, which are one of the key maintaining features in OCD, where individuals report the need to feel that they have completed a task perfectly (Julien, O’Connor, Aardema, & Todorov, 2006). In order to determine if the task has been completed perfectly, individuals often check their performance (Moretz & McKay, 2009). Individuals with high levels of perfectionism may also perceive more personal responsibility for negative events, which in turn may lead to increased checking behaviours in an attempt to prevent the negative outcome from occurring (Bouchard, Rhéaume, & Ladouceur, 1999; Moretz & McKay, 2009; Pinto et al., 2017)

Moretz and McKay (2009) identified that the relationship between perfectionism and OCD is clearer when not just right obsessions are considered. Not just right obsessions are thoughts or an experience that a task has not been completed at all, or has not been completed to the required performance level (Moretz & McKay, 2009). It is important to note that not just right obsessions and the need to complete a task perfectly are part of the collection of symptoms that drive checking compulsions in OCD (McKay et al., 2004). When individuals assume more responsibility for the prevention of negative events, it is understandable that if the individual has a not just right obsession and the drive to perform perfectly, the individual could be more likely to engage with checking behaviours.

Researchers have found that in non-clinical samples, Concern over Mistakes, Doubts about Actions, Parental Expectations and Parental Criticism subscale scores of the FMPS are positively correlated with OCD symptoms, and there is some evidence to suggest that Personal Standards subscale scores are also related to OCD symptoms (Frost & DiBartolo, 2002; Frost, Novara, & Rhéaume, 1990; Frost & Steketee, 1997; Wu & Cortesi, 2009). Perfectionistic concerns have been found to predict total obsessive-compulsive symptoms as well as washing behaviours, checking behaviours, and rituals (Wu & Cortesi, 2009). Studies have also

demonstrated that relative to control participants, individuals with OCD have significantly higher scores on Concern over Mistakes, Doubts about Actions, and Socially-Prescribed Perfectionism (Moretz & McKay, 2009; Wu & Cortesi, 2009). Further, Limburg et al. (in press) highlighted that that when considered together, Concern over Mistakes, Doubts about Actions, and Socially-Prescribed Perfectionism were associated with OCD symptoms in a recent meta-analysis. Limburg et al. argued, however, that the relationship between OCD and perfectionism (in particular the Doubts about Actions scale) may be exaggerated as some items comprising doubts about actions were adapted from a measure of OCD symptoms (Frost, Marten, et al., 1990), and thus there is likely to be some overlap between the Doubts about Actions subscale and measures of OCD symptoms.

Studies have also found perfectionism may be associated with OCD severity, whereby a significant positive relationship was found between Concern over Mistakes and Doubts about Actions scores and measures of OCD severity (Rhéaume et al., 2000; Wu & Cortesi, 2009). Perfectionism may also impact on the treatment of OCD. From a trial that involved cognitive therapy for OCD, Wilhelm, Berman, Keshaviah, Schwartz, and Steketee (2015) found that reductions in perfectionism and intolerance of uncertainty beliefs, measured by the Obsessive Beliefs Questionnaire (Obsessive Compulsive Cognitions Working, 2005), were associated with greater reductions in OCD symptoms over time. Wilhelm et al.'s findings were consistent with other studies, such as Manos et al. (2010) and Kyrios, Hordern, and Fassnacht (2015), which reported that changes in perfectionism from pre- to post-treatment were a unique predictor of changes in OCD symptom severity. Other researchers have suggested that there may be an interaction between perfectionism constructs that are related to performance, such as Concern over Mistakes and Doubts about Actions subscales, which impede treatment response, particularly for those who receive exposure and response prevention OCD (Chik, Whittal, & O'Neill, 2007). Such findings are in line with Frost and DiBartolo's (2002) predictions that high levels of perfectionism may interfere with an individual's ability to engage with exposure to ultimately disconfirm unhelpful beliefs about obsessive thoughts. It is important to note that other findings, such as those by Su, Carpenter, Zandberg, Simpson, and Foa (2016), indicate that perfectionism may not impede OCD treatment. Su et al. (2016) tested whether obsessive beliefs, such as perfectionism, mediated the relationship between exposure and response prevention and OCD. Su

and colleagues found that perfectionism did not mediate the relationship between exposure and response prevention and OCD symptom reduction. It may be that there are other constructs that could impede OCD treatment such as metacognitive beliefs (Rees & Anderson, 2013) and as such this requires further research. Overall, these studies provide support for the role of perfectionism on obsessive and compulsive experiences, ranging from being a central component of the disorder through to interfering with treatment response and engagement (Egan, Wade, et al., 2011).

1.3.1.4. Perfectionism and eating disorders. Studies have also suggested that perfectionism has a central role in the development and maintenance of both anorexia nervosa and bulimia nervosa (Bardone-Cone, 2007; Bardone-Cone et al., 2007; Egan, Wade, et al., 2011). Specifically, perfectionism constructs such as Personal Standards, Doubts about Actions, and Concern over Mistakes scores (Shafran, Lee, Payne, & Fairburn, 2006; Tozzi et al., 2004), and Self-Oriented Perfectionism and Socially-Prescribed Perfectionism scores (Ashbaugh et al., 2007), have been found to be related to eating disorders. Limberg and colleagues (in press) reported that although perfectionistic concerns is a consistent predictor of psychological disorders, for eating disorders both perfectionistic concerns and perfectionistic strivings approximately predict eating disorder pathology equally.

Studies that have investigated non-clinical populations have found a consistent association between Self-Oriented Perfectionism scores and eating behaviours (Bardone-Cone, 2007; Joyce, Watson, Egan, & Kane, 2012), and perfectionism has been shown to predict symptoms of bulimia (Bardone-Cone, 2007; Bardone-Cone et al., 2007; Fitzsimmons-Craft, Bardone-Cone, Brownstone, & Harney, 2012). A study that investigated a non-clinical sample of females also found a positive association between Concern over Mistakes, Doubts about Actions, and Organisation subscale scores and body satisfaction (Wade & Tiggemann, 2013).

To further investigate the role of perfectionism and body satisfaction, Boone and Soenens (2015) investigated whether a manipulation of an individual's performance standards in day to day living (e.g., strive for perfection in everything someone does) could reveal a vulnerability factor for eating disorder symptoms. The authors predicted that performance standards would be a particular vulnerability for individuals who were already dissatisfied with their body relative to those who were satisfied with their bodies. Boone and Soenens recruited 47 female students, of which half of the participants were asked to engage with tasks in their usual routine

over the next day to the highest possible standards, while the other half were to engage with tasks in their usual routine with the lowest possible standards. Boone and Soenens (2015) found that those women who were asked to strive for high standards in a 24-hour period and were dissatisfied with their body were more likely to endorse symptoms of eating disorders than those who were striving for high standards and were satisfied with their body. Women who were asked to strive for high standards in a 24-hour period and were dissatisfied with their body were also more likely to endorse symptoms of eating disorders than those who were asked to aim for low standards and had either high or low body satisfaction. The manipulation of personal standards and subsequent influence on an individual's symptoms of eating disorders is consistent with previous research (Boone & Soenens, 2015; Boone, Soenens, Vansteenkiste, & Braet, 2012; Shafran et al., 2006). Past research found that those who were placed in conditions that emphasised high personal standards (Boone & Soenens, 2015; Boone et al., 2012; Shafran et al., 2006) or required a flawless performance (Boone & Soenens, 2015) engaged with greater food restriction, consumed fewer high calorie foods (Shafran et al., 2006), or engaged with greater restraint and binge-eating relative to individuals in the low personal standards conditions (Boone & Soenens, 2015).

In a longitudinal study, Sutandar-Pinnock, Blake Woodside, Carter, Olmsted, and Kaplan (2003) found that EDI-P scores (Garner et al., 1983) were significantly related to illness status and prognosis for those diagnosed with Anorexia Nervosa, whilst lower EDI-P scores being associated with better outcomes at follow-up for those diagnosed with Anorexia Nervosa. Other prospective studies with non-clinical student samples indicated that EDI-P and Personal Standards scores interacted with factors such as self-esteem, perceived weight status and body dissatisfaction, and predicted bulimic symptoms for up to nine months (Steele, Corsini, & Wade, 2007).

Fairburn et al. (2003b) proposed that clinical perfectionism is one of the key perpetuating factors for eating disorders, in addition to low self-esteem, distress intolerance, and interpersonal difficulties. Fairburn et al. argued that clinical perfectionism is similar in nature to the core psychopathology of eating disorders as both clinical perfectionism and eating disorders are underlined by stringent self-evaluations. Based on the assertion that perfectionism is similar to the psychopathology of eating disorders, Fairburn et al. developed a transdiagnostic treatment called Enhanced Cognitive Behaviour Therapy (CBT-E) for use with

individuals with an eating disorder. Within the CBT-E treatment protocol, the core eating disordered psychopathology is targeted, while modules that reduce clinical perfectionism, and improve self-esteem, distress tolerance and interpersonal skills could be incorporated when these factors are important perpetuating factors. Treatment studies that have utilised the transdiagnostic model of eating disorders have supported the efficacy of CBT-E (Byrne, Fursland, Allen, & Watson, 2011; Fairburn et al., 2009). Furthermore, studies with large samples have lent support to the use of the overall transdiagnostic model of eating disorders in explaining dietary restraint (Hoiles, Egan, & Kane, 2012; Lampard, Tasca, Balfour, & Bissada, 2012). The support for CBT-E as an effective treatment was maintained even when CBT-E was compared with other treatments, such as interpersonal psychotherapy, at post-treatment and over a 60-week follow-up (Fairburn et al., 2015). It remains unclear how much content was covered in these treatment studies on perfectionism, as perfectionism is considered an optional module to be included if relevant to the client. However research does indicate that recovery from eating disorders is associated with reduced levels of perfectionism that are comparable to scores demonstrated by individuals in the general population (Bardone-Cone et al., 2007), whereas those who have higher levels of perfectionism are less likely to recover from an eating disorder (Sutandar-Pinnock et al., 2003).

It is unsurprising then that research has also reported that higher perfectionism scores were associated with poorer treatment responses for individuals with anorexia nervosa (Sutandar-Pinnock et al., 2003). However, a pilot study by Goldstein, Peters, Thornton, and Touyz (2014) found that the inclusion of a perfectionism treatment in a hospital setting for individuals with anorexia nervosa did not significantly enhance treatment outcomes. Lloyd, Fleming, Schmidt, and Tchanturia (2014) targeted perfectionism in anorexia nervosa with a six week group treatment that targeted perfectionism based on the cognitive-behavioural model of clinical perfectionism (Shafran et al., 2002) and the use of modules developed by Fursland, Raykos, and Steele (2002). In contrast with the findings by Goldstein et al., Lloyd et al. found significant reductions in perfectionistic concerns, as well as significant improvements in body mass index. Surprisingly however, the body mass index change was not associated with the changes in perfectionism. Lloyd et al. reported that it would be unlikely to find a direct association in such a short treatment plan; however a reduction in perfectionistic concerns may facilitate client's

engagement with eating disorder treatments. Lloyd et al.'s conclusion was consistent with the results from a study by Steele, Bergin, and Wade (2011), which indicated that perfectionism scores were negatively correlated with improvements in the global score on the Eating Disorder Examination (Fairburn & Cooper, 1993).

1.3.1.5. Perfectionism and personality. Perfectionism has also been associated with obsessive-compulsive personality disorder (OCPD) as reflected by the diagnostic criterion specifying that "perfectionism interferes with task completion (e.g., is unable to complete a project because his or her own overly strict standards are not met" (American Psychiatric Association, 2013, p. 678; Pinto et al., 2017). Research supports the notion that perfectionism is a core feature in OCPD (Ansell et al., 2010; Ansell, Pinto, Edelen, & Grilo, 2008). Although there may be overlap between OCPD and perfectionism, they are not interchangeable constructs. As both Shafran et al. (2002) and Egan, Wade, et al. (2011) identified, there are other requirements for a diagnosis of OCPD that are not consistent with various definitions of perfectionism, such as hoarding worn-out or worthless objects or extremely restricted spending on the self or others (American Psychiatric Association, 2013).

Stoeber (2014) explored the relationship between perfectionism, measured by scores on the HMPS, and scores on the Personality Inventory for DSM-5 (Krueger, Derringer, Markon, Watson, & Skodol, 2013). Stoeber found that the HMPS subscales of Self-Oriented Perfectionism, Socially-Prescribed Perfectionism, and Other-Oriented Perfectionism were related to traits of personality disorders beyond OCPD, such as schizotypal personality disorder, borderline personality disorder, antisocial personality disorder, and avoidant personality disorder (Stoeber, 2014). Stoeber's findings are consistent with previous research that explored the association between perfectionism and other personality disorders. For example, McCrown and Carlson (2004) reported that individuals with narcissistic personality disorder demonstrated higher Socially-Prescribed Perfectionism scores than those diagnosed with antisocial personality disorder or mood disorder, and Hewitt, Flett, and Turnbull-Donovan (1992) reported that individuals with borderline personality disorder had higher scores of Socially-Prescribed Perfectionism than control participants. The studies by Hewitt et al. (1992), McCrown and Carlson (2004), and Stoeber (2014), provided some insight into the relationship between perfectionism and personality, however, these studies are correlational in nature, which precludes conclusions about the role perfectionism has in personality disorders. One important

implication of the association between perfectionism and personality is that it may provide further evidence for the conclusion that perfectionism is a transdiagnostic mechanism that is related to several psychological disorders (Egan, Wade, et al., 2011, 2012).

1.3.2. Potential Mechanism of Comorbidity

An important implication of perfectionism as a transdiagnostic process is that it may provide further understanding as to rates of comorbidity of psychological disorders (Bieling, Summerfeldt, et al., 2004; Egan, Wade, et al., 2011, 2012). Harvey et al. (2004) argued that comorbidity between disorders may be the result of common maintaining mechanisms. Given perfectionism has been shown to be elevated across multiple mood, anxiety, eating, and personality disorders (Egan, Wade, et al., 2011), perfectionism may provide an explanation for disorder comorbidity (Bieling, Summerfeldt, et al., 2004).

Bieling, Summerfeldt, et al. (2004) explored the relationship between perfectionism, measured by the HMPS and FMPS, and comorbidity between anxiety and mood disorders. Bieling, Summerfeldt, et al. (2004) found that subscales of the HMPS, including Self-Oriented Perfectionism and Socially-Prescribed Perfectionism, and the total score of the FMPS and single scale scores from the FMPS including Concern over Mistakes, Parental Criticism, and Doubts about Actions were correlated with the number of overall comorbid diagnoses. The results from Bieling, Summerfeldt, et al. (2004) indicated that perfectionistic concerns predicted comorbidity after controlling for current symptoms of depression, anxiety, and stress. Later research by Wheeler et al. (2011) were consistent with Bieling, Summerfeldt and colleagues findings. Wheeler et al. (2011) found that after controlling for current symptom severity in a clinical sample, subscale scores on the Concern over Mistakes and Doubts about Actions from the FMPS, and Socially-Prescribed Perfectionism from the HMPS, and were positively correlated with comorbidity. Wheeler et al. split participants into two groups who were classified as having high comorbidity (with two or more comorbid diagnoses) or low comorbidity (zero to one comorbid diagnoses) and found that those with high comorbidity were associated with higher perfectionism scores relative to those with low comorbidity. Wheeler et al. (2011) also found that perfectionistic concerns predicted comorbidity status after controlling for current symptom severity. Further research, specifically prospective research, is required to evaluate perfectionism's role in comorbidity,

however an important implication of perfectionism being fundamentally related to comorbidity is that treatment that targets perfectionism may subsequently reduce the symptoms of comorbid disorders (Bieling, Summerfeldt, et al., 2004).

1.3.3. Targeting Perfectionism in Treatment

Egan, Wade, et al. (2011) proposed that if perfectionism is involved in the development and maintenance of psychological disorders then it has important implications for the transdiagnostic treatment of such disorders. Namely, by targeting perfectionism, there may be resolution of not only perfectionistic concerns, but also symptom reduction across the disorders perfectionism may maintain (Bieling, Summerfeldt, et al., 2004; Shafran et al., 2002). Given the potential for perfectionism to interfere with the treatment of multiple disorders, researchers have developed targeted treatments for perfectionism (Lloyd, Schmidt, Khondoker, & Tchanturia, 2015), which may also resolve associated symptoms of anxiety, depression, and eating disorders (Egan & Hine, 2008; Egan, van Noort, et al., 2014; Glover, Brown, Fairburn, & Shafran, 2007; Handley et al., 2015; Riley, Lee, Cooper, Fairburn, & Shafran, 2007; Steele & Wade, 2008; Steele et al., 2013). CBT for perfectionism has also been demonstrated to be effective in group (Handley et al., 2015) and individual (Egan, van Noort, et al., 2014) session formats. These randomised controlled trials (RCT; Egan, van Noort, et al., 2014; Handley et al., 2015), the largest RCTs to date, were not included in a recent meta-analysis by Lloyd et al. (2015), which examined eight studies of CBT for perfectionism and found it is possible to reduce perfectionism. Lloyd et al. (2015) found a large pooled effect size for pre- to post-treatment reductions specifically for the Personal Standards and Concern over Mistakes subscales of the FMPS. Lloyd et al. (2015) also found medium pooled effect sizes for reductions of anxiety and depression symptoms, small to large pooled effect sizes for reductions in eating disorder symptoms, and very large effect size for reductions in obsessive compulsive symptoms. The importance of finding a moderate to large pooled effect size in treatment effects is that it is comparable to other transdiagnostic treatment protocols (e.g., Farchione et al., 2012)

Importantly, it can be hypothesised that if perfectionism maintains psychological disorders, then cognitive-behavioural treatments for perfectionism should not only result in symptom amelioration, but also a reduction in diagnoses and comorbid diagnoses. Egan, van Noort, et al. (2014) found that for two perfectionism treatment conditions (face-to-face and pure self-help), there were

significant reductions in individuals meeting criteria for a psychiatric disorder, from 54% of participants at pre-treatment down to 29% at post-treatment, and 18% at follow-up. Egan, van Noort, et al. (2014) also found that the number of participants with comorbidity reduced from 21% at pre-treatment, 17% at post-treatment, to 2% at follow-up. It is also important to note that the authors found face-to-face treatment was effective for reducing symptoms of anxiety and depression, however the reduction of anxiety and depression symptoms was not observed in the pure self-help group. Egan, van Noort, et al.'s findings are consistent with another RCT that found an indirect effect for the pre- to post- change in social anxiety, anxiety sensitivity, rumination, and depression through the pre- to post- change in perfectionism scores, specifically the change in scores for the Concern over Mistakes subscale of the FMPS (Handley et al., 2015). The finding that there is an indirect pathway for the pre to post changes in psychological symptoms through the changes in perfectionism highlights how CBT for perfectionism may reduce associated psychopathology while only focusing on reducing clinical perfectionism.

The use of CBT for perfectionism as a transdiagnostic treatment may provide a flexible and cost-effective treatment option to be used by clinicians, which may provide comparable results to disorder specific treatments (see McHugh, Murray, & Barlow, 2009). It is important to highlight the potential of research to explore perfectionism targeted CBT given the wide-spread impact perfectionism can have, research into understanding perfectionism can help bridge the gap between research and clinical practice when dealing with comorbidity (Egan, Wade, et al., 2012). To further improve the treatment efficacy of CBT for perfectionism, further investigation needs to be done on the models that underpin the therapy. Specifically, there is one model, the clinical perfectionism model, that has conceptualised the maintenance factors of perfectionism (Shafran et al., 2002) and has been used to guide the development of effective treatments for perfectionism (Egan, van Noort, et al., 2014; Egan, Wade, et al., 2014; Handley et al., 2015). Although a clinical perfectionism model has been generated, there is an opportunity to test hypotheses generated by the clinical perfectionism model that have, to date, not been tested. By further testing hypotheses generated by the clinical perfectionism model, further revisions of the clinical perfectionism model can be made that can inform the treatment of perfectionism.

Chapter 2: Exploring the Model of Perfectionism

2.1. The Clinical Perfectionism Model

Shafran et al. (2002) created a cognitive-behavioural model that aims to explain how clinical perfectionism is maintained. The original model was refined by Shafran et al. (2010), which explicitly included the role of performance-related behaviours within the model and is presented in Figure 1.

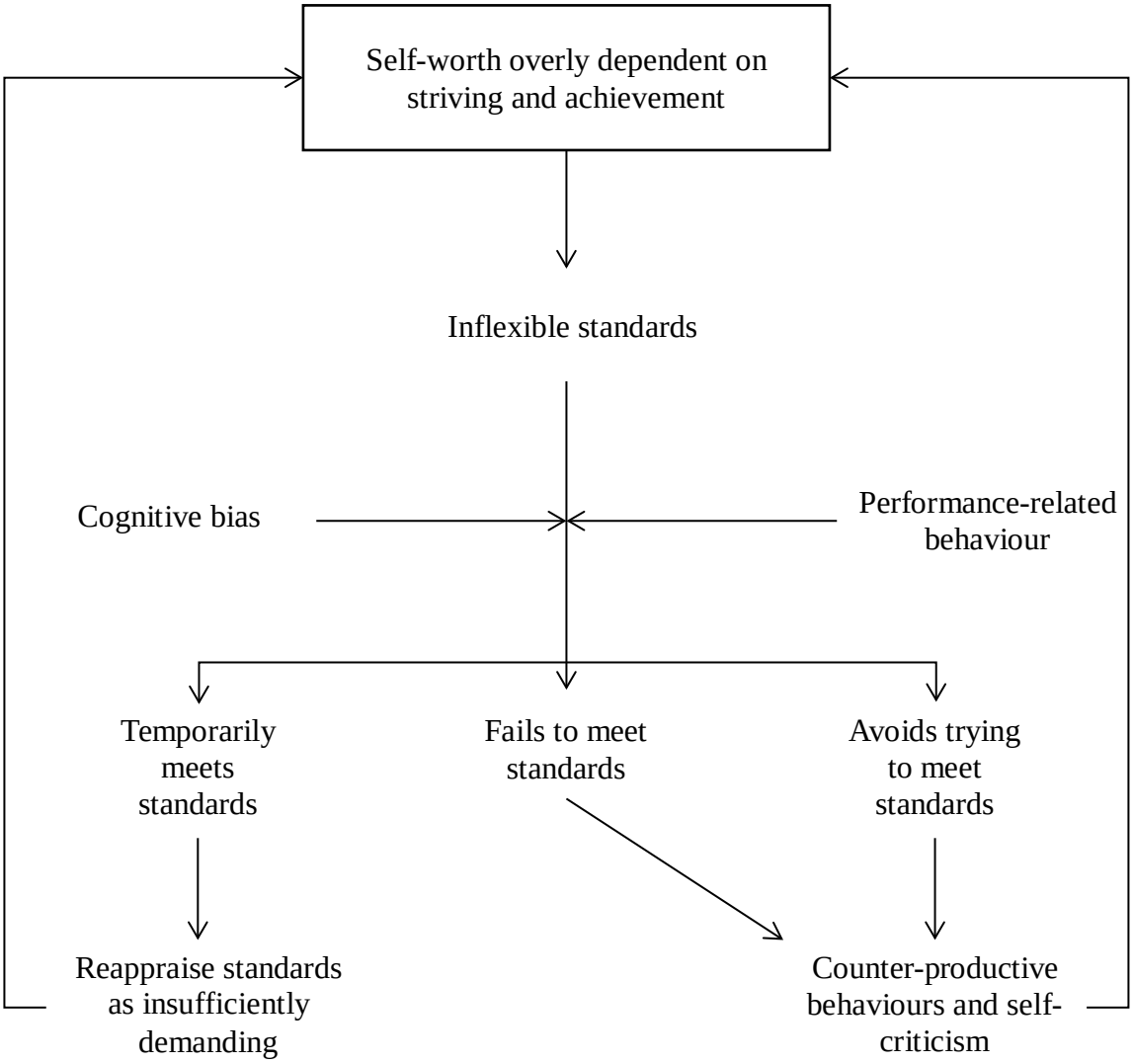

Figure 1. The revised cognitive-behavioural model of the maintenance of clinical perfectionism (reproduced from Shafran et al., 2010 with permission from Little Brown Book Group).

The top of the model identifies that individuals with clinical perfectionism may base their self-esteem on striving towards and attaining personally demanding

standards they set. The standards are expressed as rigid, dichotomous rules, such as, I must achieve above 80% in an assessment, anything less is a complete failure (for further examples see Egan, Piek, Dyck, Rees, & Hagger, 2013). Alternatively, an individual may set an inflexible standard with regards to weight that they must always weigh 50kg and therefore anything over 50kg would be considered a failure (Shafran et al., 2002).

The clinical perfectionism model then indicates that cognitive-behavioural processes influence these inflexible standards as a result of various thinking biases (i.e., overgeneralisation or catastrophising), which influence how an individual will interpret and evaluate their striving towards and achievement of their standards (Shafran et al., 2002). For example, if an individual did not achieve 80% in an assessment and perceived that they are a complete failure, the individual may predict that they may fail an entire class, drop out of study, and end up without a job. Shafran et al. (2002) also suggests that individuals will selectively attend to features of their performances, such as perceived flaws in their striving towards and achievement of their standards. The model also proposes that the individual may engage in counter-productive performance-related behaviours such as, procrastination, avoidance of tasks, reassurance seeking and performance checking (Egan, Wade, et al., 2011; Shafran et al., 2010).

It was proposed that one potential outcome of the dichotomous, inflexible thinking style and counter-productive behaviours is that the individual experiences 'real' or 'perceived' failure, which causes a cycle of intense self-criticism about the failure (Shafran et al., 2010). For instance, when an individual does not achieve 80% on an assessment they may criticise their effort, with thoughts such as 'others will not respect me if I do not achieve' or 'I should have done better, I am an idiot for not getting that mark'. The perceived or real failure, and the resultant thoughts, then reinforce their original belief, that their self-worth is dependent on striving for standards. Shafran et al. (2002) also proposes that the individual may set their standards at a level that is so personally demanding, that the individual has fears about not attaining those standards and eventually avoids trying to reach them (Shafran et al., 2002). For example, if an individual perceives that they may not achieve 80% on an assessment and is afraid of the consequences (based on their own catastrophic thoughts), the individual may procrastinate starting the assignment. A consequence of the individual avoiding attempting their standard is that the

individual subsequently fails to reach the standard originally set. As a result of the failure, the individual may then engage in a cycle of intense self-criticism (i.e., 'I am stupid and worthless for not achieving the standard'), which contributes to a negative view of themselves and ultimately reinforces the idea that their self-worth is contingent on striving and achieving their standards (Egan, Wade, et al., 2011; Shafran et al., 2002; Shafran et al., 2010).

Shafran et al. (2002) suggested that even when the individual attains their standards, there may be a momentary experience that enhances self-esteem, which may reinforce the individual's belief that they should continue striving for personally demanding standards. However, Shafran et al. (2002) also proposed that the individual may discount their achievement and therefore no longer experience a positive sense of achievement. The individual may also re-assess their standards as they believe their standards are no longer personally demanding enough. Individuals may then re-set their standards higher. For example, if an individual achieves 82% on an assessment they may re-evaluate their original standard of 80% and aim to achieve 85% on their next assessment. By increasing their personally demanding standards, it increases the likelihood that individuals will experience perceived or real failure to achieve their standards in the future. The increase in personally demanding standards can result in more self-criticism, and therefore reinforce the cycle of self-criticism and basing self-worth on attaining personally demanding standards (Egan, Wade, et al., 2011; Shafran et al., 2002; Shafran et al., 2010).

Evidence has indicated that individuals with clinical perfectionism identified that they set imposing standards (Bieling, Israeli, Smith, & Antony, 2003), react with self-criticism in response to perceived failure (Riley & Shafran, 2005), endorse dichotomous thinking styles when evaluating performances (Egan, Piek, Dyck, & Rees, 2007; Egan et al., 2013), engage in counter-productive performance-related behaviours (Lee, Roberts-Collins, Coughtrey, Phillips, & Shafran, 2011; Yiend, Savulich, Coughtrey, & Shafran, 2011), and make negative internal attributions for perceived failures (Egan et al., 2013). While preliminary evidence has provided support for the clinical perfectionism model, it is only recently that research has started testing some of the underlying cognitive assumptions conceptualised in the model (Kobori & Tanno, 2012; Yiend et al., 2011).

Identifying the underlying maintaining mechanisms may allow for greater efficacy and efficiency in interventions for perfectionism. One such consideration

highlighted by Shafran et al. (2002) is that information processing biases may be an important maintaining factor in perfectionism. However, there is scant research exploring these biases in clinical perfectionism. To clarify the nature of information processing biases involved in clinical perfectionism beyond what is currently accounted for within the model it is important to consider the original model on which many models of psychological disorders are based on, the information processing model (Beck & Clark, 1988).

2.2. The Information Processing Model

The information processing model proposed that psychopathology can be explained by a three stage schema-based model (Beck & Clark, 1988). At the core level it was proposed that there are cognitive structures, which represent an enduring collation of prior knowledge and experiences. These structures assist individuals with the screening and organisation of information, such that any stimuli consistent with a cognitive structure is often elaborated, encoded, and more easily retrieved, while irrelevant or inconsistent stimuli tends to be ignored or forgotten (Beck & Clark, 1988). Cognitive structures tend to remain dormant until triggered by environmental cues or events.

Once activated, cognitive structures lead to cognitive processes that distort the processing of information. Cognitive processes are reciprocal in nature, whereby the cognitive processes can bias the way individuals attend to, interpret, and recall information that then reinforces the maladaptive cognitive structures, which in turn increases the likelihood of biased cognitive processes being activated. Beck and Clark (1988) argued that cognitive processes can largely occur outside of awareness such as an attention biased towards threat or interpretation biases of ambiguous information. These biased cognitive processes can then underpin other cognitive biases, which often include, though are not limited to, overgeneralisation (taking one instance either past or present and applying the outcome to all current/future scenarios), personalisation (blaming one's self for external events), and dichotomous thinking (evaluating experiences as two mutually exclusive categories) (Beck & Clark, 1997). These cognitive processes are responsible for directing attention to particular information for encoding (attention bias), and deriving particular meanings from otherwise ambiguous information (interpretation bias), which can then give rise to cognitive products.

Cognitive products are the patterns of cognition that are then generated from the cognitive processes and include automatic thoughts or internal dialogues (Beck & Clark, 1988, 1997; Beck, 2011). Cognitive products tend to be the cognitions often observed in clinical practice such as mental imagery and repetitive negative thinking (Beck & Clark, 1988). It has been argued that the function of repetitive negative thinking can include avoidance of emotional content or to focus on the experiences around the individual's distress and attempt to problem solve a range of issues (Borkovec, Alcaine, & Behar, 2004).

Mental imagery could be viewed as transdiagnostic; being a repetitive cognition that engage with or contain sensory experiences (Horowitz, 1970). Kosslyn et al. (2001) described mental imagery as "seeing with the mind's eye or hearing with the mind's ear" (Kosslyn, Ganis, & Thompson, 2001, p. 635), and can be experienced in any sensory modality (Holmes, Arntz, & Smucker, 2007). The nature of imagery is such that mental imagery can be a sensory representation of an experience (e.g., imagining hearing another person stating they are disappointed in you) in addition to being the emotional impact (e.g., feeling guilty or nauseated by imaging hearing someone state they are disappointed). Repetitive negative thinking could also be viewed as transdiagnostic; being a pattern of "repetitive thinking about one or more negative topics that is experienced as difficult to control" (Ehring & Watkins, 2008, p. 193).

The specific content of cognitive products will depend on the nature of emotionally salient stimuli to a particular individual, although common themes occur within particular diagnoses (e.g., social-evaluative mental images or thoughts for social anxiety disorder, physical threat mental images or thoughts for panic disorder). Given the transdiagnostic nature of perfectionism, it is important that investigations of cognitive products are also transdiagnostic. In this way perfectionism in the following literature review will be used to refer to the over-arching construct of perfectionism (i.e., the striving for personally demanding standards which can be accompanied with intense self-critical evaluations if these standards are not met) and discrepancies between studies using different definitions will be described where relevant

For the purpose of this thesis, mental imagery will therefore be used to refer to the over-arching process of mentally experiencing sensations or pictures of cognitive products. Within this definition, mental imagery may lead an individual to

repeatedly experience mental images linked with previous memories or experiences, or could be about future events. These mental images may be about positive or negative experiences or events, yet even when mental images contain positive experiences, some of the resultant positive aspects of hyperarousal (i.e., excitation) could become negative when it is associated with a pre-occupation with the future and goal pursuit (Deeprose & Holmes, 2010). Additionally, repetitive negative thinking will therefore be viewed as the process of dwelling on cognitive products, whereby individuals repetitively engage with thoughts about future or past events. Both mental imagery and repetitive negative thinking may be driven by lower level cognitive processes, such as attention biases or interpretative biases, which serve to selectively favour emotionally threatening or negative information.

These cognitive products then have a reciprocal relationship with an individual's behaviour and mood, such that imagery or repetitive negative thoughts reinforce particular behaviours, which may then lead to people engaging more with imagery or repetitive negative thinking as maladaptive coping processes. Of particular relevance to the information processing model is that each section of the model, cognitive structures, processes, and products, operate at increasing levels of awareness. For example, an individual may be aware of the cognitive products or their behaviours that result from cognitive products, but not of the underlying cognitive processes or structures that give rise to these products.

2.3. Integrating the Information Processing Model with the Clinical Perfectionism Model

As a cognitive-behavioural model, the clinical perfectionism model draws on the processes represented in the information processing model. For instance, the information processing model proposes a core cognitive structure that influences the cognitive processes and products observed. Within the clinical perfectionism model, the core cognitive structure is that the individual's self-worth is contingent upon striving for and meeting personally demanding goals. Both models incorporate cognitive processes, which specifically within the clinical perfectionism model is conceptualised as erroneous thinking styles (e.g., dichotomous thinking, overgeneralisation, or jumping to conclusions). Shafran et al. (2002) stated that attentional biases may lead to these erroneous thinking styles, similar to the information processing model. For the purpose of this thesis, attention bias in clinical perfectionism will therefore be used to refer to the selective attention to information

that signals failure and inattention or discounting of achievements (Shafran et al., 2010). The cognitive processes observed within the clinical perfectionism model may lead to various cognitive products such as self-criticism, or the reappraisal of standards, consistent with the pattern observed in the information processing model (Beck, 2005).

Understanding the clinical perfectionism model from an information processing basis provides an opportunity to propose where additional research can be directed to improve our understanding of clinical perfectionism. Using the information processing model highlights several cognitive processes and cognitive products that allows for examination of the clinical perfectionism model to improve understanding of perfectionism as a construct and how it relates to psychological distress. Both the information processing model and clinical perfectionism model identify selective attention as one such underlying cognitive process. Selective attention is described as the systematic tendency to preferentially allocate attention towards specific stimuli (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van, 2007), however limited research has evaluated the potentially biased process within perfectionism groups (Kobori & Tanno, 2012). Of particular importance, the component attentional processes underlying patterns of biased attention in perfectionism has not been systematically examined. Specifically, it is uncertain whether people with clinical perfectionism quickly orient their attention to stimuli confirming their beliefs, or experience difficulty moving their attention away from the stimuli once it is observed.

Another cognitive process that is proposed within the information processing model is biased interpretations (Beck & Clark, 1997). An interpretative bias indicates individuals ascribe negative meaning to emotionally ambiguous sensory information, such as an individual with social anxiety interpreting ambiguous social cues as threatening to one's self, such as a yawn as an indication that they are boring rather than the listener being tired (Beck & Clark, 1997). For the purpose of this thesis, interpretation bias in clinical perfectionism will therefore be used to refer to individuals reappraising standards as insufficiently demanding; however there has been limited exploration as to whether people have interpretive biases relating to perfectionism when confronted with different situations (Yiend et al., 2011). It should also be noted that the clinical perfectionism model suggests that many of the situations a perfectionist encounters are rarely completely ambiguous. For instance,

according to the clinical perfectionism model, a situation where an individual achieved a high standard (e.g., 85% on an exam), but it was slightly below their own personally demanding goal (e.g., 95% on an exam), has unambiguously achieved below their own standard. Where there is ambiguity is how an individual interprets the consequences of these experiences. For example, an individual with clinical perfectionism may negatively interpret this experience and subsequent consequences and become self-critical as a result of these interpretations. This explanation is consistent with evidence suggesting that individuals with heightened perfectionism are more likely to react negatively to failure (Besser, Flett, & Hewitt, 2004), however there has been limited empirical research evaluating early information-processing biases, such as interpretation bias.

Shafran et al. (2002) also identified that an individual may engage with repetitive negative thinking, asserting that individuals with clinical perfectionism will continually think about and evaluate their past performances with increasing scrutiny until they find an error in that performance. This process is similar to how Frost, Marten, et al. (1990) described individuals who are high in perfectionism being repeatedly and highly critical of their own behaviours (e.g., concern over mistakes). However, the construct of repetitive negative thinking is not explicitly conceptualised within the clinical perfectionism model.

Another cognitive product hypothesised to operate within perfectionism is imagery, which may also occur recurrently. Mental imagery can be defined as mental cognitions that engage with or contain sensory experiences (Horowitz, 1970). Other researchers have defined mental imagery as “seeing with the mind’s eye or hearing with the mind’s ear” (Kosslyn et al., 2001, p. 635). These definitions embrace all of the types of imagery that can be observed, which is of importance for practitioners and researchers, since it does not just occur in terms of mental pictures, but can be experienced in any sensory modality. Although mental imagery is not conceptualised within current models of perfectionism, Lee et al. (2011) found that individuals who score high on the full FMPS, compared to those who score low on the full FMPS, were more likely to experience more distress from perfectionism-related mental imagery, and have greater difficulty dismissing these mental images. For example, a negative image in perfectionism might relate to the individual being shamed at work in front of their colleagues due to a project being completed to a less than perfect standard. Despite the lack of empirical evaluation of mental imagery in perfectionism

research, Egan, Wade, et al. (2014) identify that mental imagery treatment techniques can easily be incorporated in treatment of perfectionism, yet will require further research to determine the effectiveness of incorporating mental imagery modification techniques.

Both repetitive negative thinking and mental imagery can significantly impact on negative emotional experiences such as anxiety, stress, and depression (Ehring & Watkins, 2008; Krans, 2011). Repetitive negative thinking may be an indirect pathway between perfectionism and psychological distress (Harris, Pepper, & Maack, 2008; Macedo, Marques, & Pereira, 2014; Short & Mazmanian, 2013), perfectionism and depression (Di Schiena, Luminet, Philippot, & Douilliez, 2012), and perfectionism and PTSD (Egan, Hattaway, et al., 2014). Repetitive negative thinking and mental imagery as cognitive products may assist clinical explanations as to how and why individuals with clinical perfectionism experience negative affect. Thus there is a theoretical role for these cognitive processes and products in perfectionism. The following will first briefly consider converging evidence from other research fields highlighting the importance of these cognitive processes and products before the currently limited direct evidence regarding the presence of cognitive processes, attention and interpretation bias, and cognitive products, repetitive negative thinking and imagery, in perfectionism is considered.

2.4. Cognitive Processes in Perfectionism

Despite limited studies, there is preliminary evidence for an attention bias and interpretation bias occurring within perfectionism (Kobori & Tanno, 2012; Yiend et al., 2011). The preliminary evidence highlights that there is scope for further evaluation of cognitive processes involved in perfectionism, both for theoretical understanding and clinical practice (Egan, Hattaway, et al., 2014). To date, these cognitive biases have not yet been stringently tested within perfectionism models.

2.4.1. Attention

Attention bias refers to attentional allocation towards any specific cue; for example, an attentional bias towards threat-related stimuli relative to neutral or positive stimuli (Bar-Haim et al., 2007). It has been proposed that attention biases can contribute to the development and maintenance of psychological disorders (Harvey et al., 2004), with attentional focus varying depending on the presenting psychopathology. Bias toward threat-related information is particularly evident in individuals with high levels of trait anxiety (Van Bockstaele et al., 2013), anxiety

disorders (Shechner et al., 2012), and mood disorders (Joormann & Arditte, 2013). Some examples of attention biases within various psychopathologies are where individuals rapidly engage with or have difficulty disengaging from physically threatening stimuli in panic disorder (Koster, Crombez, Verschuere, & Houwer, 2006; Richards, Benson, Donnelly, & Hadwin, 2014), or attentional avoidance of social-threat cues (e.g., emotional faces) or engagement with socially threatening stimuli in social anxiety (Schofield, Johnson, Inhoff, & Coles, 2012). Biased attention also plays a role in PTSD, OCD, eating disorders, mood disorders (e.g., unipolar and bipolar depression), and substance abuse disorders (Beard, Sawyer, & Hofmann, 2012; Dozois, Seeds, & Collins, 2009; Harvey et al., 2004; Koster, De Lissnyder, Derakshan, & De Raedt, 2011; Shechner et al., 2012). A thorough exploration of the different mechanisms involved in, and mediators or moderators of, attentional biases is beyond the scope of this literature review (see Richards et al., 2014 for further information).

There have been several tasks designed to assess biased attention, such as the emotional Stroop task, dot-probe task, emotional spatial cueing, and visual search tasks (Bar-Haim et al., 2007). However, to date the two most popular tasks are the emotional Stroop task and dot-probe task. The emotional Stroop task is a variant of the original Stroop interference task (Stroop, 1935), whereby participants are required to name the colour of words that vary according to emotional valence. The response latency between a threat related word (e.g., judge or harm) would be compared to the response latency for a neutral word (e.g., rainbow or bowl) as an index of attention bias. Whilst the emotional Stroop task requires participants to respond to a single word stimulus, the dot-probe task involves presenting pairs of words with their members differing in content, presented briefly on a computer screen. Participants then discriminate a small probe stimulus that then appears in the loci of where one of the words in the pair was shown. The relative speed to which the individual successfully discriminates the probe that appears in the locus of one category of words (i.e., threat related words), relative to the speed the probe is identified in the locus of the other category of words (i.e., neutral words), provides an indication as to the attentional distribution between the two types of words (Grafton & Macleod, 2014; Grafton, Watkins, & MacLeod, 2012; Macleod, Mathews, & Tata, 1986).

The importance of sensitive measurement and understanding of the influence of attention biases is clear when considering that induced attentional biases have been causally linked with emotional vulnerability and subsequent interpretation of events (White, Suway, Pine, Bar-Haim, & Fox, 2011). It is also interesting that while research has tended to focus on biased attention to disorder relevant stimuli across a range of conditions (e.g., social threat for SAD, trauma-relevant for PTSD) there has been a comparative paucity of research focusing on the patterns of biased attention for a transdiagnostic process (i.e., perfectionism) that may be common to the development and maintenance of many of these disorders. The evaluation of biased attention in perfectionism may help to identify patterns of cognition that are a fundamental risk factor for many different types of psychopathology.

2.4.1.1. Attention bias and perfectionism. Within the clinical perfectionism model, attention bias is broadly characterised as selective attention towards failure related information and inattention or discounting of achievements (Shafran et al., 2002). In the perfectionism field, there has been limited experimental research examining the type of information that captures attention, that is, whether perfectionism-related attention is automatically captured by perfectionism-relevant stimuli per se (i.e., mistakes) or emotional valence in general (i.e., all negative stimuli). These concepts are comparable to attention bias research evaluating cognitive mechanisms underpinning subclinical and clinical anxiety (Cisler & Koster, 2010; Koster et al., 2006; MacLeod & Mathews, 2012) or depression (Mathews & MacLeod, 2005; Rude, Valdez, Odom, & Ebrahimi, 2003).

To date, one study observed a relationship between perfectionism and social anxiety-related attention bias (Lundh & Öst, 1996), while only one other study has evaluated and found a relationship between perfectionism and attention bias (Kobori & Tanno, 2012). Lundh and Öst (1996) assessed attentional biases, self-focus, and perfectionism in participants with social anxiety (n = 42) and matched controls (n = 42). An emotional Stroop task was used to assess attentional bias, which required individuals to name the colour of socially threatening or benign words as quickly as possible. In the emotional Stroop task, attentional bias towards socially threatening information was indexed by longer colour-naming latencies for social-threat words relative to non-threat words. Lundh and Öst (1996) found that perfectionism, specifically Concern over Mistakes scores of the FMPS (Frost, Marten, et al., 1990), was correlated with an attentional bias towards social-threat words in both

participants with a diagnosis of social anxiety and their matched controls. Using these findings to describe attentional bias in perfectionism is difficult for two reasons. First, the study focused on attention biases to socially threatening words (e.g., dull) in individuals with social anxiety, rather than perfectionism-relevant stimuli related to mistakes or failure. Second, participants were selected and then compared based on the presence or absence of social anxiety, which did not allow for the comparison of attention biases across varying levels of perfectionism severity (e.g., high vs. low).

To examine attention bias across perfectionism groups, Kobori and Tanno (2012) investigated selective attention with Self-Oriented Perfectionism scores of the HMPS (Hewitt & Flett, 1991b) while controlling for state anxiety. The authors controlled for state anxiety due to its relationship with both perfectionism and perfectionistic cognitions, and the potential impact it has on experimental performance (Kobori & Tanno, 2012). Similar to Lundh and Öst (1996), Kobori and Tanno (2012) used a modified Stroop colour-naming task, yet they targeted perfectionism-related stimuli (e.g., failure, flaw, imperfection) rather than social-threat stimuli. The authors screened 245 undergraduate students using the Self-Oriented Perfectionism scores of the HMPS (Hewitt & Flett, 1991b) and classified participants as high perfectionists (> 75th percentile, n = 20) or low perfectionists (< 25th percentile, n = 20). Kobori and Tanno assumed that individuals would demonstrate an attention bias if there was a slower reaction time to name the colour of words when content was perfectionism relevant relative to naming the colour of neutral words. The results indicated that reaction times between high and low perfectionists did not differ for the colour naming of neutral words, but high perfectionists took significantly longer to react to (i.e., their attention was captured by) failure-related words compared to their low perfectionist counterparts.

Whilst Kobori and Tanno (2012) specifically recruited and tested for a perfectionism-relevant attention bias, there are two methodological limitations that preclude the conclusion that individuals with greater perfectionism scores demonstrate a distinct attentional bias relative to individuals with lower perfectionism scores. The first limitation of Kobori and Tanno's (2012) study involves the use of the emotional Stroop task. The premise of the emotional Stroop task is that individuals will demonstrate slowing in reaction time to naming the colour of a word when that word content is threatening to the individual (Algom,

Chajut, & Lev, 2004; Bar-Haim et al., 2007). Critics have identified that individuals may display a general slowdown in the presence of certain information as a result of behavioural freezing, rather than a reflection of attention being directed to the semantic meaning of the word (Algom et al., 2004). This criticism of the emotional Stroop task led to the development of attentional assessment tasks, such as the dot-probe task, that can index attention without concern for a general slowdown in the presence of certain information.

To date, the most widely used method to assess attention bias is the attentional dot-probe task. The dot-probe task involves presenting pairs of words with their members differing in content, presented briefly on a computer screen. Participants must then discriminate a small probe stimulus that then appears in the loci of where one of the words in the pair was shown. The relative speed to which the individual successfully discriminates the probe that appears in the locus of one category of words, relative to the speed the probe is identified in the locus of the other category of words, provides an indication as to the attentional distribution between the two types of words (Grafton & Macleod, 2014; Grafton, Watkins, & MacLeod, 2012; Macleod, Mathews, & Tata, 1986). The use of dot-probe methodology would allow more thorough testing of the hypothesis that there is a distinct attentional preference between individuals with clinical perfectionism.

The second limitation related to Kobori and Tanno's (2012) study is that only negative perfectionism-relevant words and neutral perfectionism-irrelevant words were compared. Restricting the stimuli to only two categories of stimulus words precludes any conclusions about whether there are distinct attentional biases to either positive perfectionism-relevant or negative perfectionism-relevant stimuli. Kobori and Tanno claim to have demonstrated that individuals with high perfectionism attend to negative perfectionism-relevant stimuli relative to individuals with low perfectionism. However, the effect observed could be the result of the individuals with high perfectionism attending to the valence of the words (i.e., negative) regardless of whether the information presented was perfectionism-relevant or not. Equally, the observed effect may be the result of individuals with high perfectionism demonstrating an attentional preference for all perfectionism-relevant stimuli regardless of its valence. In response to the limitation regarding the stimuli used, the question as to whether biased attention in perfectionism is specific to positively or negatively valenced words, perfectionism-relevant or perfectionism-irrelevant

stimuli, or a combination of valence and perfectionism-relevance serves the basis of the investigation of study 1.

2.4.2. Interpretation

Interpretation bias refers to a consistent resolution of ambiguity across a range of experiences such as ambiguity within a situation (e.g., a speaker noticing an audience member yawning), or of the different moods and sensations an individual experiences (e.g., anxiety related physiological sensations) (Hirsch, Meeten, Krahe, & Reeder, 2016). Cognitive models of anxiety and depression (Beck & Clark, 1988, 1997) emphasise the importance of how people interpret past and future events in a benign (positive or neutral) or threatening manner. For example, a benign interpretation of noticing an audience member yawning could be that the audience member did not get enough sleep, whilst a threatening interpretation could be that the presenter views themselves as a terrible public speaker. As a result, the presenter could remain calm or experience symptoms of anxiety respectively.

With interpretation biases theorised to have consequences for mood, and behaviour (Harvey et al., 2004, p. 138; Mathews & Mackintosh, 2000), research has confirmed these associations, in particular the association between negative interpretation biases, and subsequent anxiety and depressive symptoms (Salemink, van den Hout, & Kindt, 2009; Wisco & Nolen-Hoeksema, 2010) .. Other psychopathologies with demonstrated interpretation biases include PTSD, eating, body dysmorphic, and substance abuse disorders (Buckley, Blanchard, & Neill, 2000; Harvey et al., 2004; Lee & Shafran, 2004; Mobini, Reynolds, & Mackintosh, 2013). The exact nature of the interpretation biases vary between disorders, however the common theme is that each interpretation bias across disorders is congruent with an individual's primary concern. The specificity of interpretation biases could be illustrated by the difference between interpretations made by an individual with a substance disorder compared to an individual with PTSD. Within substance abuse disorders an individual may interpret neutral stimuli to be relevant to their substance of use, for example, the words 'bar' or 'shot' related to drinking, whereas a war veteran with PTSD may be more likely to interpret the same stimuli as a metal bar or gunshot, respectively, and thus as personally threatening rather than neutral.

There are a range of paradigms designed to assess interpretation biases, for an overview of the complete range of paradigms available for interpretation biases see Hirsch et al. (2016). Several assessments of interpretation bias rely on participants

either generating interpretations, whether they are one word or sentence based interpretations, of an ambiguous scenario, or to be presented with a range of plausible interpretations that are then rank ordered by the participant. In each case the ratio of negative to positive interpretations generated or ranked highly are used as an index of the participants negative interpretation bias (Hirsch et al., 2016). These tasks can have the benefit of being participant generated, or easy to score and administer. However each of these tasks are particularly subject to demand effects (i.e., a participant responding in a manner they think the researcher wants), response bias (i.e., participant responding falsely), or a lack of sensitivity as to whether the participant is experiencing a genuine negative interpretation bias or just a lack of positive interpretations (Hirsch et al., 2016).

A current leading paradigm for exploring interpretation biases is an interpretation bias recognition task (Yiend et al., 2011). Within this interpretation bias task, participants are exposed to ambiguous scenarios, from which, at a later time, they are then exposed to a range of disambiguating sentences that are either related to the scenario (target sentences) or unrelated to the scenario (foil sentences). The target sentences can then reflect benign, positive, or negative interpretations of a situation, and based on how similar participants rate these target sentences to the original scenario, can give an index of a participants interpretation bias (Hirsch et al., 2016). Additionally, since all interpretations can be rated as being similar to the original scenario this approach does not encounter the same demand or response bias effects other interpretation tasks are limited by. The researcher is also able to determine if there is a general response bias towards particular types of interpretations through the use of the foil sentences. For instance, if a participant responds the same to both negative target and foil sentences, this may indicate a response bias rather than a true interpretation bias.

Understanding the best paradigm to use for ongoing exploration of interpretation biases is important, not only due to the impact of interpretation on negative experiences and emotions, but also because of evidence that a change in interpretation can lead to changes in behaviour (Yiend et al., 2011). Similar to attention bias, research has tended to focus on interpretation biases with respect to a specific disorder. There has been a lack of research focusing on the patterns of biased attention for a transdiagnostic process (e.g., perfectionism) that may be common to the development and maintenance of many of these disorders. The evaluation of

biased interpretation in perfectionism may further inform theory as to the relevant patterns of cognition that are a fundamental risk factor across a range of psychopathologies.

2.4.2.1. Interpretation bias and perfectionism. Shafran et al. (2002) argued that individuals with clinical perfectionism make negative interpretations when striving for perfection. For instance, if individuals with clinical perfectionism strive for a personally demanding goal, yet do not meet the goal, they may interpret ambiguous stimuli in these situations negatively (e.g., perceive themselves to be inadequate) and experience a negative emotional response (e.g., feel depressed about their performance). Moreover, if individuals with perfectionism interpret the unachieved goal as evidence of a failure to meet appropriately high standards there may still be negative cognitive (e.g., self-criticism) and affective responses (e.g., anxiety or depressed mood) (Dunkley, Zuroff, & Blankstein, 2006) even if the outcome is positive (e.g., congratulations received for the level of achievement met). Negative affective consequences could also occur even when individuals with perfectionism reach their high standards if they interpret goal attainment as evidence that the previously expected standard was set too low. However, there is a lack of experimental studies testing the hypothesis derived from the cognitive-behavioural model of clinical perfectionism (Shafran et al., 2010), that individuals with high levels of perfectionism display an interpretation bias for perfectionism-relevant information. Understanding the nature of interpretation biases in clinical perfectionism may further inform interventions that aim to correct these biases.

Only one study to date has examined whether there is a clear interpretation bias in relation to perfectionism. Yiend et al. (2011) aimed to explore naturally occurring interpretation biases associated with perfectionism. An ambiguous passage task was used to assess interpretation biases that required individuals to read a passage, which was ambiguous with respect to either emotional or perfectionist meaning, and then rated four interpretations on how similar in meaning the interpretations were to the corresponding passage after being presented all the scenarios. Yiend et al. (2011) selected 40 undergraduate students (20 high and 20 low perfectionists) based on their scores on the Perfectionism subscale of the DAS (Weissman & Beck, 1978), and presented 20 scenarios with potential perfectionist meanings and 20 scenarios that were emotionally neutral taken from a study on interpretation in individuals with social anxiety by Eysenck, Mogg, May, Richards,

and Mathews (1991). In the interpretation task, Yiend et al. required participants to first read the brief emotionally ambiguous passages, half of which were perfectionism unrelated (Eysenck et al., 1991) and half of which were perfectionism related specifically designed for the study. After reading all of the passages, the participants were required to rate the degree to which four members of a set of test sentences were similar in meaning to the original passage after all 40 original passages were presented. Two of the test sentences represented potential negative or positive interpretations of the original scenario (target sentences), whereas two were negative and positive sentences that did not represent potential interpretations of the original scenario (foil sentences). The four test sentences were rated in terms of their similarity to the meaning of the original passage (1 = very different in meaning to 4 = very similar in meaning), which was used to index the participants' interpretation bias. The interpretations were designed by Yiend et al. to reflect perfectionist, non-perfectionist, positive, or negative interpretations. Yiend and colleagues argued that a perfectionism-relevant interpretation bias would be demonstrated if high and low perfectionists differed in their interpretations of perfectionism related scenarios.

Yiend et al. (2011) found that the pattern of responses were different between the high and low perfectionism groups across perfectionism related scenarios compared to perfectionism unrelated scenarios. When Yiend et al. (2011) further examined the interaction between perfectionism groups, they found that for the perfectionism related scenarios, compared to participants with low levels of perfectionism, participants with high levels of perfectionism rated items as being more similar in meaning when the item had perfectionist implications relative to non-perfectionist implications. This finding was not observed for the emotional passage set used from Eysenck et al. (1991). The pattern of results highlighted that individuals with high levels of perfectionism were more likely to endorse perfectionistic interpretations compared to participants with low perfectionism. The findings reflected the reverse pattern for non-perfectionist interpretations, whereby individuals with low levels of perfectionism were more likely to endorse non-perfectionistic interpretations compared to participants with high perfectionism (Yiend et al., 2011). Yiend et al.'s conclusions were strengthened by the methodological approach used to assess the interpretation bias (Hirsch et al., 2016).

Further examination of perfectionism-relevant interpretation bias could improve understanding of the clinical perfectionism model, which identified how

individuals may interpret and evaluate their performance both personally and within social contexts (Shafran et al., 2010). The high degree of specificity in the interpretation tasks suggests the observed interpretation bias was a component of perfectionism rather than just a factor of general interpretation bias observed in anxiety or mood disorders (Yiend et al., 2011). It is important to note that in some of the test sentences employed by Yiend et al., the negative interpretation reflected an expected negative *emotional* interpretation as a result of a situation where an individual fell short of their own personal standard. For other test sentences, the negative interpretation reflected an expected negative *outcome* of such situations, for example a negative reaction from others directed towards the individual. Although both types of interpretations were assessed (emotions and outcomes), Yiend et al. did not directly compare the pattern of perfectionism-relevant interpretation bias on these two types of stimulus materials, but as will be discussed next it would be informative to do so.

It is plausible that those considered to have clinical perfectionism are disproportionately more likely to infer that they would experience negative emotions when their performance falls short of perfection. When considering the cognitive-behavioural model of clinical perfectionism, it could be considered a defining feature of perfectionism, as an individual may base their self-worth upon striving for and meeting personally demanding standards (Shafran et al., 2002). However, it is also possible that the effects reported by Yiend et al. were driven by a biased interpretation that concerned the anticipated affective consequence of failing to meet exceptionally high standards. The nature of the biased interpretations remains unclear. Specifically, it is unclear whether individuals with high levels of perfectionism specifically resolve only the ambiguity about the emotional (or affective) interpretation of the experience, or the ambiguity about the expected outcome of the experience. To determine whether the negative interpretation bias that characterises perfectionism is restricted to biased interpretations concerning one's affective reactions, or also includes the biased interpretations regarding the meaning of a given result of events as a result from falling short of perfection, it is necessary to directly compare patterns of perfectionism-relevant interpretation bias involving both types of interpretations. In response to the limitation regarding the lack of clarity around these two types of selective interpretations (i.e., affective and event based interpretations of ambiguous perfectionism-relevant scenarios) the

question as to whether biased interpretation in perfectionism is specific to the affective interpretation or event expectations of an ambiguous scenario, positive or negatively valenced interpretations, or a combination of type of interpretations and valence serves the basis of the investigation of the research presented in Study 2.

2.5. Cognitive Products in Perfectionism

Following the information processing model, cognitive processes then give rise to distorted cognitive products that are reflective of one's core beliefs. Two particular cognitive products that may further explain the relationship between perfectionism and psychological distress are repetitive negative thinking and imagery. It is important to note that research to date has focused on the relationship between repetitive negative thinking and perfectionism (e.g., Egan, Hattaway, et al., 2014; Flett, Coulter, Hewitt, & Nepon, 2011; Flett, Madorsky, Hewitt, & Heisel, 2002), while the relationship between perfectionism and other potentially important cognitive products, such as mental imagery, has only been explored in one study (Lee et al., 2011). Given the significant impact imagery can have on emotion (Holmes, Geddes, Colom, & Goodwin, 2008; Holmes & Mathews, 2010), including it in models could provide further understanding as to the role these cognitive products have in maintaining psychological distress.

2.5.1. Repetitive Negative Thinking

Ehring and Watkins (2008) defined repetitive negative thinking as a pattern of thinking about a previous, present, or future problem or negative experience that is repetitive, intrusive, and difficult to disengage from. It is important to note that research has typically focused on one form of repetitive negative thinking, either rumination or worry, however, studies in recent years have suggested that there are many more commonalities across various forms of repetitive negative thinking than differences (Bird, Mansell, Dickens, & Tai, 2012; Mahoney, McEvoy, & Moulds, 2012; McEvoy, Mahoney, & Moulds, 2010; McEvoy, Watson, Watkins, & Nathan, 2013). There is some evidence that rumination focuses more on past events and worry focuses more on the future, although this is not exclusively the case, with both rumination and worry including both past- and future-oriented cognitions (Ehring & Watkins, 2008). Given rumination and worry reflect a common underlying construct of repetitive negative thinking, and that worry, rumination, and repetitive negative thinking are all transdiagnostic (e.g., McEvoy & Brans, 2013; McEvoy, Watson,

Watkins, & Nathan, 2013), the present thesis will use the term repetitive negative thinking in reference to either rumination or worry.

Repetitive negative thinking has been linked with attentional biases (Donaldson, Lam, & Mathews, 2007; Koster et al., 2011), interpretation biases (Laposa, Cassin, & Rector, 2010), and imagery (Brewin et al., 2009). Repetitive negative thinking was proposed to trigger intrusive memories, which can lead to a variety of emotions that can often be accompanied by physical sensations (Brewin, Gregory, Lipton, & Burgess, 2010). Repetitive negative thinking has also been correlated with negative post-event processing, which is when an individual scrutinises their performance following a social interaction (Brozovich & Heimberg, 2008). The relationship between repetitive negative thinking and post-event processing is demonstrated in both the general population and clinical population with social anxiety with elevated scores on the Social Phobia Scale (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1993). Interestingly, repetitive negative thinking and post-event processing can occur even after experiences with positive events (Laposa et al., 2010), which further emphasises that repetitive negative thinking involves the process of engaging with repetitive thoughts rather than the specific thought content itself. Repetitive negative thinking was also significantly related to negative interpretations of memories after controlling for the intrusions frequency and severity, and it was also highly related to symptoms of depression (Starr & Moulds, 2006).

Ehring and Watkins (2008) also reviewed whether repetitive negative thinking was a transdiagnostic process and reported that it was implicated across 13 psychological disorders such as, depression, social anxiety, PTSD, OCD, eating disorders, and hypochondriasis. With a significant relationship with psychopathology and negative outcomes, repetitive negative thinking may contribute to the understanding of the pathways through which perfectionism is related to psychological distress or psychopathology.

2.5.1.1. Repetitive negative thinking and perfectionism. As repetitive negative thinking and perfectionism are both important constructs that are commonly elevated across psychological disorders (Egan, Wade, et al., 2011; Ehring & Watkins, 2008; Mathews & MacLeod, 2005; Nolen-Hoeksema, 2000; O'Connor, O'Connor, & Marshall, 2007), research has explored whether repetitive negative thinking is a pathway through which individuals with perfectionism experience

psychological distress (Macedo et al., 2014). Identifying the role of repetitive negative thinking is important, because when an individual is striving for high standards they may also engage in repetitive negative thinking. Following the information processing model, evaluating cognitive products may provide an additional pathway through which perfectionism operates and influences emotion and behaviours. Recent studies have subsequently demonstrated that repetitive negative thinking acts as a mediator between perfectionism and constructs of psychological distress such as depression and anxiety (Blankstein & Lumley, 2008; Chang et al., 2007; Egan, Hattaway, et al., 2014; Olson & Kwon, 2007; Randles, Flett, Nash, McGregor, & Hewitt, 2010; Stoeber & Joormann, 2001).

Harris et al. (2008) investigated a sample of 96 college students who completed the FMPS (Frost, Marten, et al., 1990), and retrospectively reported levels of repetitive negative thinking and symptoms of depression following the recollection of a disappointing exam/test. The authors found that repetitive negative thinking was an indirect pathway between perfectionism and depressive symptoms in response to recalling an exam where the individuals did not perform at a desired level. Harris et al.'s (2008) findings are similar to those of previous studies that have demonstrated that the brooding ruminative response style was a mechanism identified to explain the relationship between perfectionism and psychological distress (O'Connor et al., 2007), and the relationship between perfectionism and depressive symptoms over time (Olson & Kwon, 2007).

Macedo et al. (2014) emphasised that individuals with perfectionism may engage more readily with repetitive negative thinking. Individuals may focus on and repeat events in their mind, often to search for errors in their performance or engage with 'what if' scenarios about what could have happened if the individual responded differently (Shafran et al., 2002). Specifically, those who continually reviewed negative thoughts were more likely to prolong their negative emotional experiences (Blankstein & Lumley, 2008). Individuals may also avoid emotional processing by engaging with verbal-linguistic processes such as repetitive negative thinking (Blankstein & Lumley, 2008; Chang et al., 2007; Egan, Hattaway, et al., 2014; Olson & Kwon, 2007; Randles et al., 2010; Stoeber & Joormann, 2001).

Consistent with the prediction that individuals who experienced repetitive negative thoughts were more likely to prolong negative emotional experiences, Short and Mazmanian (2013) identified that repetitive negative thinking, in particular

rumination, was an indirect pathway that partly explained the relationship between perfectionism and psychological distress. Short and Mazmanian's finding is consistent with that of Di Schiena et al. (2012), where repetitive negative thinking fully explained the relationship between perfectionism and depressive symptoms.

Macedo et al. (2015) assessed 788 college students on two dimensions of perfectionism, perfectionistic concerns and perfectionistic strivings, from composite scores of both the FMPS (Frost, Marten, et al., 1990) and HMPS (Hewitt & Flett, 1991b). Macedo et al. found that, as an indirect pathway, repetitive negative thinking partially explained how perfectionistic concerns predicted psychological distress. Furthermore, repetitive negative thinking fully explained the predictive relationship between perfectionistic strivings and psychological distress. This finding is consistent with past literature demonstrating that perfectionistic concerns is associated with psychological distress (Egan, Wade, et al., 2011). It also highlights that when considering perfectionism, perfectionistic concerns is not the only explanation for the link between perfectionism and psychological distress, rather there are other factors that may be involved, such as the frequency and nature of the thoughts individuals engage with.

Importantly, the finding that the relationship between perfectionistic strivings and psychological distress was fully explained by repetitive negative thinking may help explain inconsistent findings in the literature that suggest perfectionistic strivings is associated with positive outcomes (Bieling, Israeli, et al., 2004) yet could also be a vulnerability factor in mood disorders (Smith et al., 2016). According to Macedo et al.'s (2015) findings, the relationship between perfectionistic strivings and psychological distress or disordered psychopathology may be due to particular indirect pathways. It may be that perfectionistic strivings may only become negative if the individual consequently repetitively and negatively thinks about the possible outcomes of their strivings. Repetitive negative thinking may lead the individual to also become more self-critical regarding their performance (Macedo et al., 2014). These findings are not surprising considering other research that has found subscales of other perfectionism measures, such as Personal Standards from the FMPS (Frost, Marten, et al., 1990), are associated with eating disorders and depression (Egan, Wade, et al., 2011; Smith et al., 2016). Although repetitive negative thinking could be a relevant pathway through which individuals with perfectionism experience psychological distress, it should be noted that it does not completely explain the

relationship between perfectionism and psychological distress. As such, it is important to account for additional cognitive products that may be present in perfectionism to improve models and conceptualisations for transdiagnostic treatments.

2.5.2. Mental Imagery

Another cognitive product that may have significant implications is mental imagery. Mental imagery has also been considered transdiagnostic as it is involved in the development and maintenance of several disorders including, but not limited to, PTSD, depression, eating, and anxiety disorders (Holmes & Mathews, 2010). Mental imagery has been widely recognised as a cognitive feature in psychological disorders (Krans, 2011), with research demonstrating imagery across PTSD, social anxiety, agoraphobia, panic disorder, health anxiety, and OCD (Holmes & Mathews, 2010). Mental imagery has also been observed in mood disorders, such as depression and bipolar disorder (Holmes et al., 2008), eating disorders, body dysmorphic disorder (Hirsch, Mathews, Clark, Williams, & Morrison, 2003), and substance abuse disorders (Brewin et al., 2010).

Mental imagery, in particular repetitive and intrusive images, can significantly affect an individual's behavioural and emotional strategies (Hackmann, Bennett-Levy, & Holmes, 2011, p. 13). Typically, intrusive images result in behaviours triggered to avoid, suppress or neutralise the distress experienced from the image. These behaviours have been recognised in the context of different disorders, such as avoidance in PTSD or social anxiety (Hackmann et al., 2011; Moulds & Holmes, 2011), rumination in depression and bipolar disorder (Holmes, Lang, & Deeprose, 2009) and ritualised behaviours in OCD (Speckens, Hackmann, Ehlers, & Cuthbert, 2007). Mental imagery can amplify negative emotions, more so than emotion based verbal processing (Holmes & Mathews, 2010). As such, participants who focused on imaging a negative story experienced significant increases in state anxiety compared to people who focused on verbalising the story (Holmes & Mathews, 2010). Conversely, positive imagery about positive events resulted in greater reductions in anxiety than when individuals just focused on words (Pictet, Coughtrey, Mathews, & Holmes, 2011). Furthermore, imagery based techniques have already been used to enhance existing treatments (McEvoy et al., 2015; McEvoy & Saulsman, 2014). Given the significant impact imagery has on both behaviours and emotion, it is increasingly important to evaluate whether imagery is a

key pathway between perfectionism and psychological distress as a mechanism through which individuals with perfectionism may experience psychological distress.

2.5.2.1. Imagery and perfectionism. When considering the relationship between perfectionism and imagery it is important to consider that imagery can be experienced in any sensory modality (Holmes, Arntz, et al., 2007). For example, a negative image in perfectionism might relate to the individual being shamed at work in front of their colleagues due to completing a project to a less than perfect standard, and the individual imagines hearing the comments colleagues make, whilst also experiencing the physiological reactions that may accompany the feelings of anxiety the individual would experience in that situation.

To date there has only been one study as far as the author is aware that examined the relationship between perfectionism and imagery. Lee et al. (2011) assessed the nature of imagery in perfectionism and the relationship between imagery and perfectionism-relevant behaviours (e.g., checking, avoidance, and spending excessive time on task). The authors divided a non-clinical sample into two groups, using a median split on FMPS scores, where one group reflected high perfectionism and the other low perfectionism. Lee at al. evaluated imagery through the use of a modified images interview (Hackmann, Clark, & McManus, 2000), which provided both interview content for thematic analysis in addition to ratings for several questions (e.g., on a scale of 1-10 how distressing is this particular image?). The authors found that from the ratings participants provided, the imagery score was significantly higher for the high perfectionism group compared to the low perfectionism group. The high perfectionism group also experienced more distress, more difficulty dismissing images, and greater negative impact from perfectionism-relevant imagery compared to the low perfectionism group. Lee et al. also explored the influence imagery had on completing behavioural tasks, and found an association between higher imagery scores, such that higher imagery scores were significantly related to checking and safety behaviours, and difficulty in completing a task even when controlling for general psychopathology (Lee et al., 2011). Through thematic analysis of the qualitative component of the project, Lee et al. (2011) found that the images were most often negative or distressing, and the most common themes were work/academia related, followed by images about improving interpersonal relationships, self-image, and sports.

Consistent with the view regarding clinical perfectionism as "a form of psychopathology maintained by specific cognitions and behaviour(s)" (Riley et al., 2007, p. 2229) the findings from Lee et al.'s (2011) study suggest imagery is associated with perfectionism. More specifically, those with higher levels of perfectionism demonstrated distorted cognitive processes in the form of intrusive imagery. The relative impact that imagery may have as an indirect pathway between perfectionism and psychological distress, and whether this pathway was more powerful than that of repetitive negative thinking, serves the basis of the investigation of the research presented in Study 3.

2.6. Potential Clinical and Theoretical Implications from the Present Thesis

Future research evaluating the relationships between perfectionism, cognitive processes, cognitive products, and psychological distress, could not only improve our theoretical understanding of perfectionism but could also guide novel interventions targeting perfectionism. These aims are particularly important given that perfectionism has a significant impact on treatment outcomes, and targeting perfectionism can reduce disorder symptomology (Egan, Wade, et al., 2012; Lloyd et al., 2015). The main aim of CBT for perfectionism is to reduce the degree to which an individual's self-worth is contingent on attainment of high personal standards, and to modify the associated maladaptive cognitions and behaviours (Shafran et al., 2010). If future research provides an understanding of the underlying mechanisms of clinical perfectionism, then one of the future directions of research investigating cognitive processes and products is to develop novel treatments to more effectively and efficiently achieve the aims of CBT for perfectionism.

With attention and interpretation biases potentially operating within perfectionism, and the significant implications of both biases in psychological disorders, developing novel techniques such as Cognitive Bias Modification (CBM) to reduce these biased processes could augment the effectiveness of current CBT for perfectionism. CBT has long aimed to reduce cognitive biases through a variety of techniques, and CBM techniques may offer one way of achieving this as an extension of therapeutic tradition. CBM can be defined as a method of manipulating a cognitive bias that characterises a psychological disorder, through extensive practice on novel cognitive tasks. The information processing model indicates that cognitive processes do not operate in isolation, and early evidence has suggested novel cognitive bias techniques that target both attention and interpretation could be

useful. For example, Beard, Weisberg, and Amir (2011) explored a 4-week intervention that utilised a combined approach to CBM including both attention and interpretation training for individuals with social anxiety, which was compared to a placebo group. They found medium to large effect sizes, which were comparable to other CBT and pharmacological treatments for social anxiety. There were also significant behavioural changes (i.e., fewer avoidance behaviours demonstrated by several behaviours such as eye contact) in an impromptu speech task from to pre- to post-treatment (Beard, Weisberg, & Amir, 2011).

The potential to use a computerised task to achieve comparable results to traditional CBT or pharmacological treatments could be useful for therapists to explore. Given we do not know the nature of the underlying cognitive biases in relation to perfectionism, it is understandable that computerised tasks have not yet been explored in perfectionism, however if an evidence base is developed for these underlying processes in perfectionism, research could then evaluate whether the inclusion of CBM as an adjunct protocol to current CBT for perfectionism could improve treatment outcomes. Evidence from novel CBM treatments could provide support for theoretical models of perfectionism. In particular, it may provide evidence for the potential attention or interpretation biases as maintaining factors within perfectionism.

An interesting consideration is the inclusion of imagery based CBM techniques (Holmes, Mathews, Dalgleish, & Mackintosh, 2006). Imagery is important to consider given the wide impact it has on emotions and information processing (Holmes & Mathews, 2010), as it serves to reduce the negative and overwhelming experiences of individuals with clinical perfectionism (Lee et al., 2011). Treatment for disorders using imagery is not a new concept (Edwards, 2007), as it has been used in treatment for PTSD and for exposure purposes in social anxiety and OCD (Hackmann et al., 2011). Imagery rescripting helps individuals experience emotions that are commonly avoided or suppressed; which has been used successfully to target distressing images in social anxiety, eating disorders, and depression (Cooper, Todd, & Turner, 2007; Holmes, Arntz, et al., 2007; McEvoy et al., 2015; McEvoy & Saulsman, 2014; Nilsson, Lundh, & Viborg, 2012; Wheatley et al., 2007; Wild, Hackmann, & Clark, 2007). Imagery rescripting serves to reduce the individual's perception of helplessness or victimisation, and can encourage positive imagery increasing an individual's sense of mastery, competence, and compassion

(Hackmann et al., 2011). What is particularly important is that these improvements have been observed during follow-up periods of up to 12-month follow-ups (Wheatley et al., 2007; Wild, Hackmann, & Clark, 2008). There is evidence for CBT treatment protocols enhanced with imagery-based techniques throughout each component (see McEvoy et al., 2015), however further research evaluating the efficacy of these programs is required. Given the utility imagery has on influencing emotion, Holmes and colleagues (2006) tested whether the incorporation of imagery could improve cognitive biases. In particular imagery based CBM involves the repeated practice of generating mental images of positive interpretations of ambiguous situations (Blackwell et al., 2015). Although further research is required (Blackwell et al., 2015), research has indicated that getting participants to generate mental images of positive outcomes to ambiguous situations were more effective in reducing anxiety than the traditional focus on either written or spoken interpretations (Holmes et al., 2006; Holmes, Lang, & Shah, 2009). For example, Holmes et al. (2006) took 26 participants who were provided CBM for interpretation biases. Of the 26 participants, 13 were required to listen to the ambiguous paragraphs and were told to imagine the positive outcomes, whilst the remaining 13 participants were required to listen and to think about the verbal meaning of the content. The findings indicated that those in the imagery training condition, were more likely to experience positive affect than their peers who focused on the verbal meaning of the content. The findings from Holmes et al. (2006) were replicated by Holmes et al. (2009), who found similar increases in positive mood in imagery training conditions compared to verbal training conditions. Interestingly, Holmes et al. (2009) also proposed that a focus on verbal training may prompt participants to compare their own experiences with those presented in the positive interpretation training material, which subsequently lowers the participant's mood. The authors also speculated that imagery based interventions may not lead comparisons between positive interpretation training materials and their own experiences.

Despite these promising findings (Holmes et al., 2006; Holmes et al., 2009) it is unclear whether these benefits are also present for clinical samples. Both studies by Holmes and colleagues (2006; 2009) used non-clinical samples. Blackwell et al. (2015) evaluated imagery based CBM in a randomised controlled trial for participants with a current diagnosis of major depression. Blackwell et al. found that although there were changes to overall experiences and symptoms of depression, the

imagery based CBM did not offer any advantage over a verbal focus as a control. Although there was no distinct advantage between treatment conditions, the authors found in post-hoc analyses that the imager based CBM may improve client's experiences of anhedonia, the lack of feeling pleasure from previously enjoyable activities (Blackwell et al., 2015).

Before evaluating the utility of including imagery protocols within perfectionism treatments, the relationship between perfectionism and imagery needs to be explored. The clinical implications for both CBM and imagery methods move beyond improving CBT for perfectionism and provide an avenue for therapists to target comorbid disorders. It is unusual for clinicians to observe clients without some level of comorbidity, which often leads to complex conceptualizations and difficulty implementing disorder-specific CBT programs (McHugh et al., 2009; Shafran et al., 2009). Comorbidity typically forces clinicians to face the dilemma of choosing one evidence-based practice over another, with the knowledge that one condition (e.g., depression) may be effectively treated while having little impact on the comorbid conditions (e.g. OCD; Craske, 2012). Complicating matters further is that clinicians often have limited time, and are therefore unable to facilitate multiple sequential interventions (Egan, Wade, et al., 2012).

A transdiagnostic CBT intervention may provide a flexible treatment option for clinicians that can be used as a cost-effective treatment, which may provide comparable results to disorder specific treatments (see McHugh et al., 2009). The importance of a transdiagnostic CBT intervention for perfectionism is highlighted by evidence that perfectionism can impede treatment progress. For example, perfectionism may be a barrier to treatment if individuals refuse to conduct a behavioural experiment that appears to be unrelated to increasing productivity or the achievement of high standards (Egan, Wade, et al., 2014). It is important to highlight the potential of research in this field to explore perfectionism targeted CBT as one of a range of transdiagnostic treatments that are being investigated to deal with the issue of comorbidity in practice (Egan, Wade, et al., 2012).

2.7. Summary, Rationale, and Aim of the Present Thesis

There has been debate in the literature as to the best definition of perfectionism. It is generally accepted that perfectionism involves the striving for high personal standards that may be met with self-criticism if these standards are not met (Frost, Marten, et al., 1990; Shafran et al., 2002). Research has primarily been

conducted using two multidimensional measures of perfectionism, the FMPS (Frost, Marten, et al., 1990) and the HMPS (Hewitt & Flett, 1991b). Shafran et al. (2002) critiqued the reliance upon the measures of perfectionism rather than theory and, based on theory and clinical observation, developed a maintenance model of clinical perfectionism (Shafran et al., 2002; Shafran et al., 2010).

Underpinning the model of clinical perfectionism are several assumptions about the cognitive processes involved with the processing of information, namely an attention bias and interpretation bias towards information that signals failure (real or perceived). Previous research has examined cognitive biases in relation to mood, anxiety, and eating disorders (Hertel & Mathews, 2011; Lundh & Öst, 2001; Posner, Snyder, & Davidson, 1980); however there is limited investigation of these processes in relation to the transdiagnostic construct of perfectionism. If perfectionism is a critical predisposing and perpetuating factor for a range of psychological disorders (Egan, Wade, et al., 2011), then better understanding some of the core features of perfectionism could allow for further developments and improvements in effective transdiagnostic treatments. Based upon the model of clinical perfectionism, it is possible that understanding whether other transdiagnostic mechanisms, such as cognitive biases, are present in perfectionism may further augment CBT for perfectionism. Another consideration for treatment is that if there are clear cognitive biases in perfectionism, future research can consider developing CBM protocols that target perfectionism relevant biases, which could be run as an adjunct to other cognitive-behavioural protocols. In this way, if perfectionism is a key maintaining feature of a disorder, clinicians can then target perfectionism both directly in session, and within CBM protocols presented at home outside of the clinicians practice. In considering the additional impact of these biased cognitive processes, they may then result in repetitive negative thinking about failure or increase the likelihood that an individual experiences images about failure. Repetitive negative thinking and mental imagery may be potential pathways through which individuals with perfectionism experience psychological distress.

The overall aim of this thesis is to better understand the critical cognitive processes that underpin perfectionism and the possible cognitive products that may explain the relationship between perfectionism and psychological distress. To achieve this aim, a series of three studies across two samples of the general population were used. Studies One and Two utilise a sample of 76 participants from

the general population that are linked by the overarching aim to further understand whether there is an association between perfectionism and attention and interpretation biases. Study Three examined a sample of 397 participants from the general population to test theoretically driven models as to how perfectionism is associated with psychological distress.

2.7.1. Summary, Rationale, and Aim of Study One

Based on the clinical perfectionism model and information processing model, researchers have hypothesised that perfectionism has a distinct cognitive process, specifically attention bias, which may be separate from the attention bias observed in anxiety and mood disorders (Kobori & Tanno, 2012). However, the only study to specifically explore attention bias in perfectionism did not have appropriate test materials to test this hypothesis (Kobori & Tanno, 2012). The previous study only measured the relationship between perfectionism and attention bias when either negative, perfectionist-relevant words (i.e., stimuli related to failure) were used or neutral words (i.e., stimuli with no inherent meaning). The key question remained as to whether individuals with perfectionism had their attention captured by the emotional valence of the stimuli (i.e., the negative valence) or the perfectionism relevance of the stimuli (i.e., stimuli signalling failure). It also remains unclear as to whether the individual's attention would be captured by all negative stimuli, regardless of perfectionism relevance, or all perfectionism relevant stimuli, regardless of valence, or a specific combination (i.e., perfectionism relevant stimuli but only when negative). The aim of Study One was to answer these questions.

Study One of the present thesis addresses this aim by examining the discrete prediction that those with high levels of perfectionistic concerns will attend to negative information more than positive information, but only when the information is perfectionism-relevant. If individuals who are classified as high in perfectionistic concerns demonstrate a distinct attentional bias when compared to those classified as low in perfectionistic concerns, this would lend further support for the cognitive-behavioural model of perfectionism originally proposed by Shafran et al. (2002). Such evidence may provide a rationale for further exploring the conceptualisation of clinical perfectionism with the aim of developing novel cognitive bias modification treatments to be incorporated as an adjunctive treatment option for perfectionism.

2.7.2. Summary, Rationale, and Aim of Study Two

Based on the clinical perfectionism model and information processing model, research has also supported perfectionism as having a distinct cognitive process, specifically interpretation bias, that is separate from the interpretation bias observed in anxiety and mood disorders (Yiend et al., 2011). Yiend et al (2011) found that, for perfectionism-relevant scenarios, those high in perfectionism assigned higher familiarity ratings to negative than to positive candidate interpretations compared to those low in perfectionism (Yiend et al., 2011). Though this was an important first study, the interpretation of ambiguous scenarios sometimes assessed a heightened anticipation of more negative *emotional* responses in situations where one falls short of perfection (e.g., I would feel bad if…). In other stimulus materials, the negative interpretation assessed heightened anticipation of more negative *outcomes* of such situations, for example, the negative reactions of others (e.g., others would be disappointed if…).

The key question remained as to whether individuals with perfectionism were more likely to endorse negative interpretations of ambiguity than positive interpretations of ambiguity for just the emotional resolution of ambiguity (i.e., the emotional experience as a result of the ambiguity in a scenario) or whether it was also observed for the resolution of ambiguity for the expected outcomes (i.e., the events that may follow ambiguity in a scenario). It also remains unclear as to whether the individual's interpretation of ambiguity would be biased towards all negative stimuli, regardless of the resolution of ambiguity, or specific to a certain type of resolution of ambiguity. Furthermore, there is no evaluation as to whether there is any difference in interpretations based on the two aspects of perfectionism, namely, perfectionistic concerns and perfectionistic strivings. It is possible that perfectionistic concerns are more likely to be associated with negative resolutions of ambiguity, whilst perfectionistic strivings may be more likely to be associated with positive resolutions of ambiguity.

These questions formed the aim of Study Two, which was to test whether perfectionistic concerns and perfectionistic strivings predicted a perfectionism-relevant interpretation bias. Study Two addresses this aim by testing two predictions. First, that perfectionistic concerns predicts a negative interpretation bias of ambiguity; and second, that perfectionistic strivings predicts a positive interpretation bias of ambiguity. Study Two therefore allows for a specific evaluation as to whether

the perfectionism-relevant interpretation bias was disproportionate toward a specific affective interpretations or event expectations based on the ambiguous scenario.

It is important to determine if perfectionistic concerns predict a greater interpretation bias towards a negative resolution of ambiguity for perfectionist scenarios than an interpretation bias towards a positive resolution of ambiguity. Such a finding would lend further support for the cognitive-behavioural model of perfectionism originally proposed by Shafran et al. (2002). It is important to note that perfectionistic concerns is only one aspect described within the cognitive-behavioural model of perfectionism, and as such it would also be informative to evaluate the predictive utility of perfectionistic strivings and interpretation bias. Such evidence may provide a rationale for further exploring the conceptualisation of clinical perfectionism with the aim of developing novel interpretation cognitive bias modification treatments to be incorporated as an adjunct treatment option for perfectionism.

2.7.3. Summary, Rationale, and Aims of Study Three

Based on the clinical perfectionism model and information processing model, research has identified the potential influence that cognitive products have on the relationship between perfectionism and psychological distress (Macedo et al., 2015). Despite the importance of evaluating underlying cognitive products, such as repetitive negative thinking and imagery, research has not yet explored the relative contribution of these two cognitive products together to explain the relationship between perfectionism and psychological distress. Furthermore, the research conducted on repetitive negative thinking and perfectionism has involved the evaluation of perfectionistic concerns or perfectionistic strivings as measured by the FMPS or HMPS. However, no study has included an assessment of clinical perfectionism, as measured by the CPQ (Fairburn et al., 2003a), to determine the relative contribution that a specific measure of clinical perfectionism makes to the explanation of the relationship between perfectionism and psychological distress. The CPQ includes items that are more tightly aligned with Shafran et al.'s (2002) definition of clinical perfectionism, and so may better capture individual differences in this dimension (Dickie et al., 2012). Although the Concern over Mistakes subscale of the FMPS is highly correlated with the CPQ (Egan et al., 2016), it is unclear whether the CPQ would continue to explain any additional variance in the relationship between perfectionism and psychological distress beyond what is

already accounted for by the Concern over Mistakes subscale. Work of this type could provide important converging evidence regarding the use of different measures of perfectionism to assess the relative impact of perfectionism rather than relying on a singular measurement approach.

These questions formed the aim of Study Three, which was to test the direct and indirect pathways between perfectionistic concerns, perfectionistic strivings, clinical perfectionism, and psychological distress. Study Three tested the prediction that perfectionistic concerns will positively predict psychological distress both directly and indirectly through repetitive negative thinking and imagery, whilst perfectionistic strivings would not demonstrate this relationship. Furthermore, a specific measure more closely aligned with the cognitive-behavioural model of clinical perfectionism could explain additional variance of psychological distress both directly and indirectly beyond what is accounted for by perfectionistic concerns.

A structural equation model was used to test three theoretically driven models to best explain the relationship between perfectionism and psychological distress. The first model tested the direct relationship between perfectionistic concerns and perfectionistic strivings with psychological distress and the indirect pathway through repetitive negative thinking. The second model determined the relative contribution of both repetitive negative thinking and imagery to the relationship between perfectionistic concerns, perfectionistic strivings, and psychological distress. The third model tested the direct relationship between perfectionistic concerns and perfectionistic strivings and psychological distress with the inclusion of clinical perfectionism. The indirect pathway through repetitive negative thinking and imagery was also tested. Such evidence may provide a rationale for further evaluating the indirect role repetitive negative thinking or imagery may have as treatment foci in research examining transdiagnostic treatments.

Thus, across the three studies presented in this thesis, there were four central aims. The first two aims were to test the predictions about the relationship between perfectionism, attention bias, and interpretation bias. The third aim was to assess the relationship between perfectionistic concerns, perfectionistic strivings, and clinical perfectionism with psychological distress. In addition to examining different measures of perfectionism, the fourth aim was also to examine the relative strength of the indirect pathways from perfectionism to psychological distress via repetitive negative thinking and imagery.

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Only minor edits have been made to the present chapter (e.g., Australian spelling) to ensure consistency within the present thesis. See Appendix A for published article.

As indicated in Appendix B. JH was the lead author on the published paper. JH, RA, SE, CM, and BG conceptualised the research design and methodology. JH recruited participants and analysed data with input from RTK. JH drafted the manuscript. All authors edited drafts of the manuscript and approved the final manuscript.

Chapter 3: Study One

3.1. Introduction

Clinical perfectionism has been defined as the pursuit of perfection and basing self-worth on achievement, despite adverse consequences (Shafran et al., 2002). This definition of perfectionism has been central to the development of CBT for perfectionism, which have been found to be effective in reducing perfectionism, anxiety and depression (for a review see Lloyd et al., 2015). Perfectionism has been identified as a predisposing and perpetuating factor for eating, anxiety, and mood disorders and is associated with poorer treatment outcomes for these disorders (Egan, Wade, et al., 2011). Perfectionism has been proposed to be a transdiagnostic process that underpins numerous psychological disorders (Egan, Wade, et al., 2011) and this transdiagnostic nature of perfectionism may contribute to the high rates of comorbidity among psychological disorders (Bieling, Summerfeldt, et al., 2004; Egan, Wade, et al., 2012). Consequently, targeting perfectionism may be an efficient way of treating multiple psychological disorders (Egan, Wade, et al., 2011). This study aims to evaluate the hypothesis that selective attention, which is a type of attentional bias, is a maintaining mechanism of clinical perfectionism. A focus on changing unhelpful patterns of selective attention is already a component of CBT for perfectionism (e.g., Egan, Wade, et al., 2014), yet little research has examined the role of selective attention in perfectionism. Examining the role of selective attention in perfectionism in an experimental study may be helpful in confirming the need to target selective attention in CBT for perfectionism. Furthermore, this may help

determine if additional approaches that can change selective attention, such as attention bias modification (ABM), may be a useful adjunct to CBT for perfectionism in the future.

A cognitive-behavioural model of clinical perfectionism was first proposed by Shafran et al. (2002), and later updated by Shafran et al. (2010). Shafran et al. (2002) postulated that individuals high in clinical perfectionism set excessively high standards for themselves, and base their self-worth on meeting these standards. Shafran et al. (2002) put forward the hypothesis, based on clinical observation, that perfectionism that is clinically relevant is maintained in part by a particular form of attentional bias. Attentional bias can be broadly defined as a systematic tendency to preferentially allocate attention towards specific types of information (Bar-Haim et al., 2007). Information can be considered perfectionism-relevant when it concerns the evaluation of performance, and perfectionism-irrelevant when it bears no relationship to performance standards. Such information can be further subdivided according to whether it is negative in emotional tone or positive in emotional tone. Thus, negative perfectionism-relevant information would concern failure and criticism, whereas positive perfectionism-relevant information would concern success and praise. Shafran et al. (2002) proposed that people with high levels of clinical perfectionism, namely those with perfectionistic concerns, but not those with low levels of clinical perfectionism, allocate greater attention to negative perfectionism-relevant information than to positive perfectionism-relevant information. Shafran et al.'s proposition is consistent with early clinical impressions of perfectionism, such as that put forward by Hollander (1965), who stated that the perfectionist "looks so intently for defects or flaws that he lives his life as though he were an inspector at the end of a production line." (p. 95). According to Shafran and colleagues, because this attentional bias increases the processing of negative perfectionism-relevant information, relative to positive perfectionism-relevant, it gives rise to cognitive distortions such as overgeneralising failure, and discounting of success (Egan, Wade, et al., 2011; Shafran et al., 2010).

Shafran et al.'s (2002) proposal has guided the development of therapeutic interventions for perfectionism. CBT for perfectionism includes treatment components that are specifically designed to alter patterns of biased attentional responding to negative perfectionism-relevant information (Egan, Wade, et al., 2014). To date, however, no study has directly tested the key prediction generated by

Shafran et al.'s theoretical position that individuals high in clinical perfectionism, but not those low in clinical perfectionism, will display an attentional bias towards negative perfectionism-relevant information compared to positive perfectionism-relevant information. Importantly, if the prediction regarding selective attention were to be confirmed, then this would support the therapeutic value of including such components in CBT for perfectionism. Alternatively, if this prediction were not to be confirmed, then this would suggest that future research would be useful to determine the most effective components of CBT for perfectionism through examining alternative mechanisms of change.

Only one study to date has compared attentional bias in people who score high and low in perfectionism, and while the results of this study are encouraging, interpretation of its findings is constrained by limitations associated with the adopted methodology. Specifically, in this study, Kobori and Tanno (2012) screened 243 undergraduate students on the Self-Oriented Perfectionism subscale of the HMPS (Hewitt & Flett, 1991b). They compared the performance of those who scored in the top 25% (high perfectionism) and who scored those in the bottom 25% (low perfectionism) on an emotional Stroop task that required them to colour name negative perfectionism-relevant words (e.g., failure, flaw, imperfection) and neutral words unrelated to perfectionism (e.g., air, temperature, printer). Kobori and Tanno assumed that when participants' attention was captured by word content, then their colour naming of these words would be slowed. The high perfectionism group took significantly longer than the low perfectionism group to colour name the negative perfectionism-relevant words, whereas the groups did not differ in their colour naming latencies for the neutral perfectionism-irrelevant words. Although Kobori and Tanno's (2012) findings are consistent with the possibility that people high in perfectionism may attend disproportionately to negative perfectionism-relevant information, two limitations prevent the study from adequately testing Shafran et al.'s (2002) hypothesis. The first limitation concerns Kobori and Tanno's use of the emotional Stroop task to assess attentional bias, while the second limitation concerns the nature of the stimulus words used in their study. Each limitation will be considered in turn.

There has been compelling criticism of the assumption that slowing to colour name particular words on the emotional Stroop task permits the conclusion that attention is being drawn to the content of such words (Algom et al., 2004; Bar-Haim

et al., 2007; Macleod et al., 1986). As critics have pointed out, some participants may display general response slowing in the presence of certain information, reflecting behavioural freezing, without this involving greater attention to the content of that information. Moreover, critics also have noted that, even if an attentional bias is implicated in slowing to colour name certain words, this could just as readily involve attentional avoidance of these particular coloured word as attentional vigilance to the semantic content of these words (Lavy & van den Hout, 1994). Such concerns have led researchers to advocate the use of attentional assessment tasks that more clearly index the distribution of selective attention between the differing information of interest. The most widely used approach for achieving this is the attentional probe task, in which pairs of words, with their members differing on the dimension of interest, are briefly exposed on a computer screen, and participants must discriminate small probe stimuli that then appear in the locus where either word was shown. Degree of speeding to discriminate probes that appear in the locus of one category of words, relative to those that appear in the locus of the other category of words, indicates that attention was preferentially allocated to the former type of words compared to the latter (Grafton & Macleod, 2014; Grafton et al., 2012; Macleod et al., 1986). The use of this attentional probe methodology would permit more rigorous testing of the hypothesis that high perfectionism, unlike low perfectionism, is characterised by greater selective attention to failure related than success related information. This will be the attentional assessment approach adopted in the present study.

The second limitation of Kobori and Tanno's (2012) study is that it compared only negative perfectionism-relevant words and neutral perfectionism-irrelevant words. The restriction of consideration to these two categories of stimulus words precludes conclusions concerning whether high in perfectionism, but not low in perfectionism, is characterised by greater attention to negative perfectionism-relevant information than to positive perfectionism-relevant information. Kobori and Tanno claim to have shown that those high in perfectionism attend more than do those low perfectionism to negative perfectionism-relevant information, whereas this is not the case for neutral perfectionism-irrelevant information. However, this effect could result from those high in perfectionism showing an attentional bias shown to all negative information, regardless of whether or not this information is related to perfectionism. The effect may also result from those high in perfectionism showing

an attentional bias to all perfectionism-relevant information regardless of whether or not this information is negative in emotional valence. To adequately test the hypothesis that clinical perfectionism is characterised by greater attention to negative perfectionism-relevant information than to positive perfectionism-relevant information, it is vitally important to include negative and positive words, some of which are perfectionism-relevant (e.g., inept/exceptional) and some of which are perfectionism irrelevant (e.g., attack/fun), when assessing the patterns of attentional bias that characterise heightened perfectionism.

The aim of the present experiment was to investigate the nature of attentional bias in perfectionism while addressing the limitations of previous research. The attentional probe approach was employed to compare the patterns of attentional selectivity exhibited by those high in perfectionism and low in perfectionism. The physical and temporal parameters we adopted in the current probe task were based on those employed in studies that have used this approach to investigate the attentional basis of anxiety vulnerability (c.f. Bar-Haim et al., 2007). Importantly, the stimulus material included both emotionally negative and emotionally positive words, with half of the words of each emotional category being perfectionism-relevant and the other half being perfectionism-irrelevant. Using such a design enabled us to test the critical prediction based on Shafran et al.'s (2002) model of perfectionism that participants high in perfectionistic concerns, but not those low in perfectionistic concerns, will exhibit greater attention to negative than to positive information, but only when this information is perfectionism-relevant. The rationale for the study is that if selective attention is shown to be related to perfectionistic concerns then this would support its role as a maintaining factor as proposed by Shafran et al (2002), support the focus on selective attention in CBT for perfectionism, and suggest that future research may examine if it is useful to modify selective attention through paradigms such as ABM in addition to existing methods used in CBT for perfectionism.

3.2. Method

3.2.1. Participants

Groups of participants who were high and low in perfectionistic concerns were required. Previous research investigating the association between biased patterns of attentional selectivity and individual difference dimensions, such as anxiety and depression, have reported effect sizes in the moderate-large range (c.f.

Bar-Haim et al., 2007; Peckham, McHugh, & Otto, 2010). Assuming an effect size of a similar magnitude in the present study, an a priori-power analysis using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) revealed that approximately 50 participants (25 in each perfectionistic concerns group) would be required to detect a such an effect (power = 0.8, two-tailed alpha = .05).

The criteria for classifying individuals as high in perfectionistic concerns were guided by prior CBT treatment studies that included a cut off for high perfectionistic concerns of ≥24.7 on the Concern over Mistakes (CM) subscale of the FMPS (e.g., Egan, van Noort, et al., 2014; Frost, Marten, et al., 1990; Handley et al., 2015). This score was based on the average CM score of anxiety disorder samples included in a review by Egan et al. (2011). Individuals low in perfectionistic concerns were defined as a cut-off of ≤18.5 on CM, which was the average CM score of control participants in the Egan et al. (2011) review.

Seventy-six participants were recruited from the community through flyers placed at a University, and local newspaper and radios ads, were screened. A total of 25 (17 males, 8 females) and 31 (11 males, 20 females) met criteria for the low and high perfectionistic concerns groups, respectively and took part in the study (see Table 1). A chi-square test of goodness of fit ($\alpha = .05$) revealed that gender did not differ between the groups, χ^2 (3, N = 56) = 6.43, $p = .09$, $\Phi = .006$. As can be seen in Table 1, the two groups did not differ in age, depression, anxiety, and stress scores. Participants in the high perfectionistic concerns group had significant higher scores perfectionism than the low perfectionistic concerns group.

Table 1. *Participant characteristics (means, with standard deviations in parentheses)*

	Low perfectionism (n=25)	High perfectionism (n=31)	Group difference *t*(1, 54)	*p*	Effect size (Cohen's *d*)
Age	26.08 (11.23)	28.48 (10.25)	0.80	.43	0.22
CM subscale	15.92 (1.77)	28.86 (3.46)	18.21	<.001	4.71
DASS-21 (depression)	1.48 (1.71)	1.81 (1.14)	0.85	.40	0.23
DASS-21 (anxiety)	2.80 (2.90)	2.97 (3.124)	0.18	.86	0.06
DASS-21 (stress)	5.60 (4.03)	6.08 (3.12)	0.61	.74	0.13

3.2.2. Materials

3.2.2.1. Questionnaires.

3.2.2.1.1. Concern over Mistakes (Frost Multidimensional Perfectionism Scale).

(CM; Frost, Marten, et al., 1990). CM is seen as a core component of clinical perfectionism and is highly correlated with a measure of clinical perfectionism (Egan et al., 2016); hence, it was chosen to measure perfectionism in the present study. The CM subscale of the FMPS consists of nine items assessing concern about making errors. Individuals respond using a 5-point Likert-type scale with higher scores indicating higher perfectionism. The CM subscale has good test-retest reliability, and construct validity (Egan, Wade, et al., 2011). Internal consistency in this study was high ($\alpha = .85$).

3.2.2.1.2. Depression, Anxiety and Stress Scale-21. (DASS-21; Lovibond & Lovibond, 1995a). This 21-item scale was administered to check whether the high and low perfectionistic concerns groups differed in anxiety, depression or stress, and if so control for this potential confound as attentional responding to emotional information differs as a function of anxiety and depression (Bar-Haim et al., 2007; Harvey et al., 2004). Respondents rate items describing emotional symptoms over the past week on a 4-point Likert type scale. The DASS-21 has strong concurrent and discriminant validity (Antony, Bieling, Cox, Enns, & Swinson, 1998). Internal consistencies for were high in this study for depression ($\alpha = .87$), anxiety ($\alpha = .77$), and stress ($\alpha = .79$).

3.2.2.2. Stimulus Words. The attentional probe task allowed for the assessment of attentional preferences for the word members of a word/non-word pair, which was determined by comparing speeding to discriminate probes presented in the locus of the word, compared to probes presented in the locus of the non-word. We were interested in the degree to which attentional preference to words differed across the following four categories of experimental words: 1) negatively valenced and perfectionist-irrelevant (e.g., attack, intimidated, lonely), 2) negatively valenced and perfectionist-relevant (e.g., failure, inept, insufficient), 3) positively valenced and perfectionist-irrelevant (e.g., gregarious, fearless, fun), 4) positively valenced and perfectionist-relevant (e.g., excel, success, exceptional). To select these words, we first created a pool of 200 candidate stimulus words, and had these rated by 6 psychology graduates on two dimensions. Raters assessed the degree to which each word was perfectionism-relevant using a 7-point Likert-type scale ranging from -3

(extremely perfectionist-relevant) to +3 (extremely perfectionist-irrelevant). To help guide these judgments, the raters were provided Shafran et al. (2002) definition of perfectionism i.e., "the over dependence of self-evaluation on the determined pursuit (and achievement) of self-imposed personally demanding, standards of performance in at least one salient domain, despite the occurrence of adverse consequences" (p. 773). The raters also assessed the emotional valence of each word using a 7-point Likert-type scale ranging from -3 (extremely negative) to +3 (extremely positive), where the mid-point (0) was identified as emotionally neutral.

Using these ratings we selected 16 words in each of the four categories listed above. Thus, half of the 64 words were emotionally negative and half were emotionally positive, giving rise to a Stimulus Emotional Valence factor. Half of each emotional subtype were perfectionism-relevant while half were perfectionism-irrelevant, giving rise to a Stimulus Perfectionism Relevance factor. A two-way ANOVA, considering the Stimulus Emotional Valence factor and the Stimulus Perfectionism-Relevance factor, was carried out on the emotional valence ratings given to the selected words by the independent raters. There was a significant main effect of the Stimulus Emotional Valence factor, reflecting as required more negative valence ratings for words in the negative subset than for words in the positive subset; $F(1,60) = 1470.00$, $p < .01$, $\eta^2 = .961$ (negative valenced stimuli $M = -2.47$, $SD = .51$; positive valenced stimuli $M = 2.34$, $SD = .48$). There was no significant main effect of the Stimulus Perfectionism-Relevance factor, $F(1,60) = 0.001$, *ns*, $\eta^2 < .001$, and no interaction between the two factors, $F(1,60) = 0.248$, *ns*, $\eta^2 = .004$. Thus, the selected perfectionism-relevant and perfectionism-irrelevant words did not differ in terms of average of emotional valence. When an equivalent ANOVA was carried out on the perfectionism-relevance ratings this revealed the required significant main effect of the Stimulus Perfectionism-Relevance factor, reflecting higher perfectionism-relevance ratings for words in the perfectionism-relevant subset than for words in the perfectionism-irrelevant subset; $F(1,60) = 1069.36$, $p < .01$, $\eta^2 = .947$ (perfectionism-relevant stimuli $M = 2.34$, $SD = .48$; perfectionism-irrelevant stimuli $M = -2.50$, $SD = .67$). There was no significant main effect of the Stimulus Emotional Valence factor, $F(1,60) = 0.045$, *ns*, $\eta^2 = .001$, and no interaction between the two factors, $F(1,60) = 0.401$, *ns*, $\eta^2 = .007$. Thus, negative and positive words did not differ in terms of average perfectionism-relevance.

Additional ANOVAs were carried out on word length (expressed as numbers of letters per word), and frequency (according to the norms of Brysbaert & New, 2009). No significant effects emerged from either ANOVA (all $F < 3.40$, $p > .05$), indicating that word length and frequency did not differ as a function of emotional valence or perfectionism-relevance.

Finally, 32 emotionally neutral perfectionism irrelevant words were selected for use in baseline trials. The emotional valence ratings for these 32 words ranged from -1 to 1 with a mean of .03, which did not differ significantly from the emotionally neutral midpoint of zero, $t(1, 31) = 0.37$, $p = .71$, $d = .10$. The perfectionism relevance ratings of these words ranged from -1 to -3 with a mean of -2.53, which did not differ significantly from the mean rating given to the perfectionism-irrelevant stimuli in the main set of 64 emotional words, $t(1,31) = 0.23$, $p = .81$, $d = .06$.

3.2.2.3. Apparatus. A Dell Latitude E6530 laptop with a 17-inch colour monitor, and a standard two-button mouse, was employed to present stimuli and to record participant responses, and the attentional assessment task was presented in E-Prime v2.0 (Schneider, Eschman, & Zuccolotto, 2012).

3.2.3. Experimental task

3.2.3.1. Attention probe task. The attentional probe task used to assess selective attention delivered 384 trials, across which each stimulus word was exposed a total of 4 times, with presentation order randomised. Each trial began with a fixation display, followed 1150 ms later by the 500 ms exposure of one of the stimulus letter string pairs. One of the letter strings appeared just above and one just below the centre of the screen, with the two letter strings separated vertically by 3 cm. The word member of the pair appeared in the upper or lower screen location with equal frequency across trials. Immediately after the letter strings disappeared, a small visual probe appeared in either one of the two screen positions where a letter string had just been shown. This probe appeared equally often in the upper and lower screen location. Thus, on 50% of trials the probe appeared where the word had just been presented, while on 50% of trials it appeared where the nonword had just been presented. The probe was a small grey line that sloped upwards either right or left. Participants were required to make a discriminative response based on the direction of this slope, as soon as they processed the probe. The participant's latency to make this probe discrimination response accurately was the dependent variable of interest.

Speeding to discriminate those probes that appeared in the locus of the words, relative to probes that appeared in the locus of the nonwords, indicated degree of increased attention to the word member of each pair. Using the equation below, we computed for each participant an index of the degree to which greater attention was paid to each of the four experimentally critical word types (i.e. emotionally negative perfectionism-relevant, emotionally negative perfectionism irrelevant, emotionally positive perfectionism-relevant, emotionally positive perfectionism-irrelevant), compared to the baseline words. A higher index score reflects greater attentional preference for that target word subtype.

Attentional Preference for Target Word Subtype X = (discrimination latency for probes in locus of nonword paired with target word subtype X – discrimination latency for probes in locus of target word subtype X) – (discrimination latency probes in locus of nonword paired with baseline word – discrimination latency for probes in locus of baseline word).

3.2.4. Procedure

The research was approved by the Curtin University Human Research Ethics Committee (approval number HR88/2012). Participants were tested individually and provided informed consent before completing the FMPS and DASS-21[2]. The participant was seated approximately 60 cm from the computer screen, and the requirements of the probe task were provided in verbal and written form. The instructions emphasised the need to discriminate the probe slope as quickly as possible, and to respond without delay as soon as probe slope was accurately identified. A brief practice period (16 trials) was completed using a separate set of neutral stimuli. Participants then completed the attentional probe task, before being debriefed about the purpose of the study.

3.3. Results

Participants displayed a high level of accuracy on the probe task, averaging less than 7% errors. Accuracy rates did not differ between the two perfectionism groups, $F(1, 58)$ 1.65, $p = .20$, $\eta^2=.02$, (High perfectionistic concerns group , M = 93.27, SD = 6.44; low perfectionistic concerns group, M = 95.04, SD = 2.88). Prior to computing the attentional preference indexes, outlier probe discrimination latency scores (defined as those falling > 2.58 SD from each participant's mean probe discrimination latency) were removed. This resulted in exclusion of 5.32% of

latencies. Attentional preference index scores were then computed as shown in Table 2.

These attention preference index scores were subjected to a Generalised Linear Mixed Model (GLMM), that included participants as a random factor, and the following three fixed factors: perfectionistic concerns group (high perfectionistic concerns vs. low perfectionistic concerns); Stimulus Perfectionism Relevance (perfectionist-relevant vs. perfectionistic-irrelevant words); and Stimulus Emotional Valence (negative words vs. positive words). Perfectionistic concerns group was a between-groups factor while Stimulus Perfectionism Relevance, and Stimulus Emotional Valence were within-groups factors. GLMM was used in preference to the traditional ANOVA approach because it better accommodates violations concerning normality, linearity, and homogeneity of variance (Stroup, 2012). The findings obtained using GLMM were equivalent to those found using ANOVA.

The analysis revealed a significant main effect of Stimulus Emotional Valence, reflecting higher attentional preference index scores for emotionally negative words (M = 33.95, SD = 159.49) than for emotionally positive words (M = -9.59, SD = 170.83), $F(1,455) = 11.34$, $p = .001$, $\eta^2 = .024$. However, importantly, this main effect was qualified by a significant two-way interaction between Stimulus Perfectionism Relevance x Stimulus Emotional Valence, $F(1,455) = 4.50$, $p = .034$, $\eta^2 = .009$, which was further subsumed within a higher order interaction involving all three factors, $F(1,455) = 9.43$, $p < .01$, $\eta^2 = .020$. The presence of this three-way interaction indicates that the relative impact of perfectionistic concerns group on attentional preference for negative information compared to attentional preference for positive information differed depending on the relevance of such information to perfectionism. Hence, we sought to determine whether the specific nature of this higher order interaction was in line with the experimental predictions.

Specifically, we computed the significance of the component simple two-way interactions of perfectionistic concerns group x Stimulus Emotional Valence was calculated at each level of the Stimulus Perfectionism Relevance factor. Consistent with the hypothesis under test, the simple interaction was not significant when stimuli were perfectionism-irrelevant, $F(1,228) = 2.98$, $p = .09$, $\eta^2 = .013$, but was significant when stimuli were perfectionism relevant, $F(1,228) = 5.96$, $p = .015$, $\eta^2 = .025$.

Figure 2 illustrates the two way interaction of perfectionistic concerns group x Stimulus Emotional Valence, observed for perfectionism relevant stimulus materials alone. As can be seen in Figure 2, the nature of this simple two-way interaction was completely consistent with predictions. Specifically, for these perfectionism-relevant stimuli alone, participants with high perfectionistic concerns displayed higher significantly higher attentional preference scores for negative words than for positive words (M = 62.45, SD = 142.78 vs. M = -38.47, SD = 181.70, respectively), $t(1,228) = 3.76$, $p < .001$, 95% CI [48.08, 153.76], $d = .62$, while those with low perfectionistic concerns did not (M = 0.51, SD = 137.43 vs. M = 20.85, SD = 155.85, respectively), $t(1,228) = 1.06$, $p = .29$, 95% CI [-17.61, 58.29], $d = .13$. Thus, unlike participants with low perfectionism, those with high perfectionistic concerns exhibited greater attention to negative than to positive information, but only when this information was perfectionism-relevant.

Table 2. *Mean attentional bias index scores (and SD) obtained on attentional probe task.*

	Stimulus Perfectionism-Relevance			
	Perfectionism-Irrelevant		Perfectionism-Relevant	
	Stimulus Emotional Valence			
Perfectionistic concerns group	Positive Words	Negative Words	Positive Words	Negative Words
High perfectionistic concerns	26.101 (175.67)	16.701 (130.31)	-38.47 (181.70)	62.45 (142.78)
Low perfectionistic concerns	3.614 (118.28)	44.11 (141.49)	00.51 (137.43)	20.85 (155.85)

Figure 2.

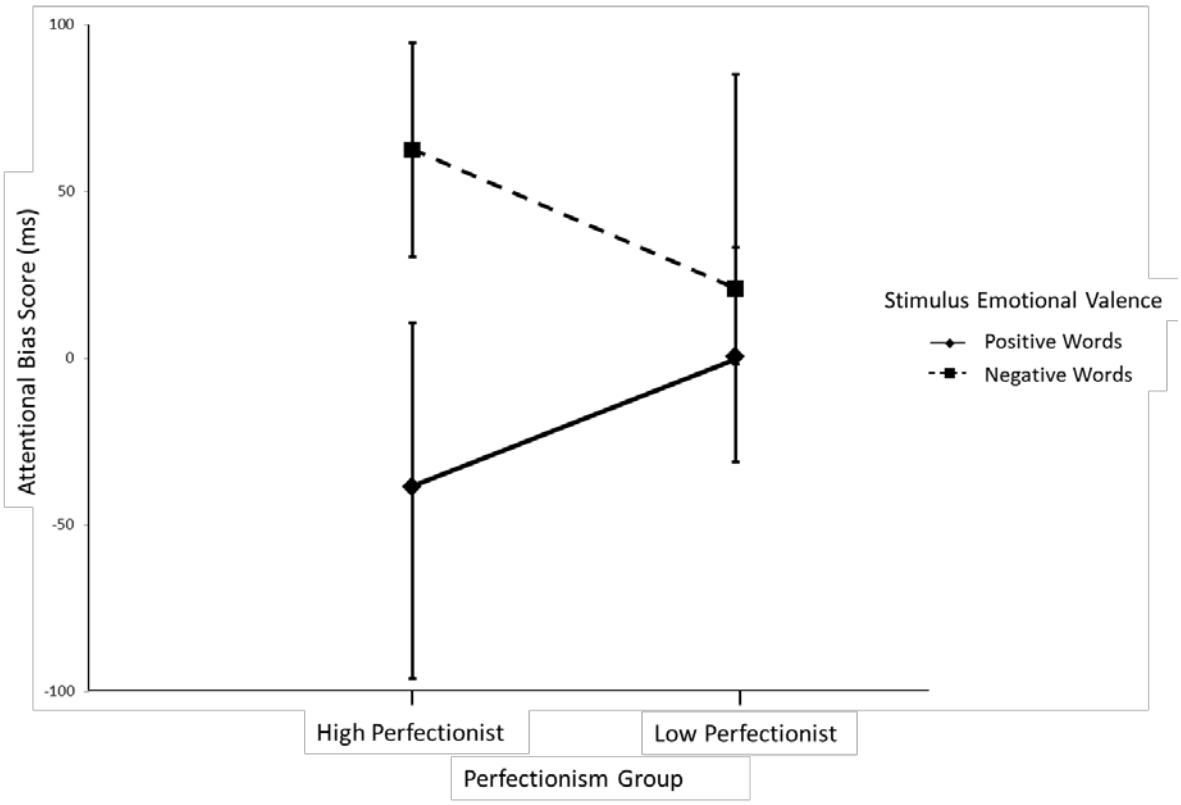

Figure 2. Significant simple two way interaction between Perfectionism Group x Stimulus Emotional Valence shown on Perfectionism Relevant Words alone.

3.4. Discussion

This study is the first to test the prediction, generated by Shafran et al.'s (2002) model of clinical perfectionism, that people with high levels of perfectionistic concerns, unlike those with low levels of perfectionistic concerns, preferentially allocate greater attention to negative information compared to positive information, but only when this information is perfectionism-relevant. Consistent with this hypothesis, the findings indicate that only participants who scored high in perfectionistic concerns exhibited greater attention to negative than to positive information, and this pattern of attentional selectivity was evident only when this information was perfectionism-relevant.

The present demonstration of a perfectionism-relevant attentional bias has an important theoretical implication. Most obviously, it lends weight to the cognitive-behavioural model of clinical perfectionism, which proposes that biased attentional processing of negative perfectionism-relevant information plays an important role in the development and perpetuation of clinical perfectionism (Shafran et al., 2002;

Shafran et al., 2010). This contention has been based only on the clinical impressions of therapists concerning the patterns of selective attention they infer from clinical interactions with individuals identified as perfectionists, and on patient self-reports concerning their attentional processing (Glover et al., 2007). As pointed out elsewhere, self-report measures of cognitive processes are notoriously inaccurate, and so cannot permit confident conclusions concerning such processes (MacLeod, 1993; Nisbett & Wilson, 1977). In the present study an objective performance measure, rather than subjective self-report measures, was used to infer attentional bias. Thus, this objective approach can provide greater confidence in the veracity of the prediction, generated by Shafran and colleagues' cognitive-behavioural model of clinical perfectionism, that high levels of perfectionistic concerns are characterised by greater attention to negative than to positive information, when perfectionism-relevant.

The findings also have applied importance. In recent years, novel cognitive-behavioural therapy (CBT) interventions for perfectionism have been developed. CBT for perfectionism involves treatment components specifically designed to alter biased patterns of selective attention to negative perfectionism-relevant information and this has been found to be effective in reducing perfectionism, anxiety, depression and eating disorders (e.g., Egan & Hine, 2008; Egan, van Noort, et al., 2014; Glover et al., 2007; Handley et al., 2015; Riley et al., 2007; Shafran et al., 2010; Steele & Wade, 2008; Steele et al., 2013). Attention broadening techniques have been used to reduce selective attention in clinical perfectionism. For example, Shafran et al. (2010) described a client who had selective attention to flaws in a cake she produced for a dinner party and thought the whole night was ruined and that she was a failure. The client was encouraged to broaden her attention and consider evidence that others commented the food was excellent, and to shift her attention to external factors such as engaging in conversation, and noticing the details of a friend's shirt colour. Egan, Wade, et al. (2014) also provided the example of asking a client how itchy their scalp is and then asking them to rate it, then asking the client to concentrate on the itchiness of their head and to close their eyes and focus on their scalp, and then re-rate the itchiness, resulting in a higher rating and thus a demonstration of how powerful selective attention can be. Behavioural experiments are idiosyncratic to the individual, for example if a student had selective attention to long pauses or saying 'um' too much in public speaking, they could engage in a behavioural experiment

where they compare their results in class presentations and the degree of engagement of classmates in the presentation after purposely making more perceived flaws through pauses and saying ‘um’ more often.

Ultimately, however, the therapeutic value of these components in CBT will critically depend upon whether this attentional bias makes a causal contribution to clinically relevant perfectionism, as argued by Shafran and colleagues (2002; 2010). The results of the current study cannot determine whether the attentional bias to negative perfectionism-relevant information makes a functional contribution to the symptoms of clinical perfectionism. Future researchers should seek to address this issue. One way in which investigators could appraise the causal role of such attentional bias in contributing to heightened perfectionism would be to assess attentional bias to negative perfectionism-relevant information immediately before, and immediately after, CBT treatment for clinical perfectionism. Of course, such attentional bias may be a consequence of high levels of perfectionistic concerns, in which case reductions in clinical perfectionism produced by CBT would be expected to mediate reductions of this attentional bias over the course of treatment. However, if attentional bias to negative perfectionism-relevant information plays a causal role in clinical perfectionism, then the reduction of this attentional bias over the course of treatment would instead be expected to mediate the attenuation of clinical perfectionism.

Another way in which investigators could interrogate the causal involvement of this attentional bias in clinical perfectionism would be to employ appropriately designed variants of ABM procedures. The ABM approach involves exposing participants to training versions of the present attentional probe procedure, configured in a manner designed to implicitly alter attentional bias. Thus, for example, to increase or reduce attentional bias to a given category of information, probes are consistently presented either proximally or distally to such information, across many hundreds of trials. Such procedures have proven effective in experimentally manipulating selective attentional responding to target types of information (c.f. MacLeod & Mathews, 2012). It remains to be seen whether the use of this ABM approach, to directly reduce attention to emotionally negative perfectionism-relevant information in people with heightened perfectionism, would contribute to the attenuation of their perfectionism. Such a finding would not only confirm that this attentional bias does make a causal contribution to the expression of

perfectionist symptomatology, but also would open the door to the development of ABM based therapeutic interventions for clinical perfectionism. Despite limited evidence that perfectionism is associated with a specific attentional bias, CBT for perfectionism (e.g., Egan, Wade et al., 2014) includes a range of techniques designed to correct attentional biases and increase attentional flexibility, such as attending to competing information indicative of success. If a specific attentional bias is found to causally contribute to clinical perfectionism, then future research should determine whether adjunctive ABM offers additive benefits to CBT in terms of treatment outcomes. Furthermore, it would be useful for future research to determine if selective attention mediates reductions in perfectionism during CBT for clinical perfectionism. If selective attention is identified as a mediator then, following the recommendations of Kraemer, Wilson, Fairburn, and Agras (2002) on establishing mechanisms of change, trials using protocols enhanced with techniques to address selective attention may help to determine if it is a mechanism of change. This would have important clinical implications with regard to whether or not changing selective attention should be a treatment focus for perfectionism.

Though these findings may yield some interesting theoretical and clinical implications, it is appropriate to acknowledge some limitations of the current study. As we did not assess clinically diagnosed participants, we cannot draw conclusions regarding the patterns of attentional selectivity that characterise clinical disorders in which high perfectionistic concerns has been identified as a predisposing and perpetuating factor (e.g., mood, anxiety and eating disorders). Future research should directly examine the patterns of attentional bias to negative perfectionism-relevant information that characterise such clinical conditions. we also recognise that the attentional probe assessment procedure used in the present study provides only a snapshot of selective attention at the specific point in time when the probes appeared. A more continuous measure of attention, such as that which can be obtained using eye-movement technology, could illuminate the temporal dynamics of the pattern of selective attention that characterises high levels of perfectionistic concerns. If the use of eye movement assessment approaches in future research yields similar results to those we have presently obtained using the attentional probe task, then this would represent powerful converging support for the current conclusion, that high levels of perfectionistic concerns involves an attentional bias that favours negative

information over positive information, when this is related to perfectionism-relevant concerns.

In the current study, the word stimuli presented in the attentional probe task were selected from a larger pool of candidate words that had previously been judged in terms of their relevance to perfectionism by a panel of independent raters. An advantage of adopting this common approach to stimulus development is that it helped ensure that the word stimuli ultimately selected for use, in general, were perfectionism-relevant or -irrelevant. A potential downside to this approach, however, is that not all of the word stimuli presented necessarily will have been perfectionism-relevant or –irrelevant for every participant. For example, the words 'lonely' and 'intimidated' would likely be perfectionism-relevant for an individual with high perfectionistic concerns who is concerned about their social performance, but not for an individual who is concerned about their performance at work. While the current approach revealed perfectionism-relevant biases in attentional responding to information that, in general, can be classed as perfectionism-relevant, future researchers could consider maximising personal relevance of all stimulus words by selecting stimulus materials for each participant based on that individual's ratings. If each participant were to rate the candidate stimulus words, prior to completing the probe task, then it would be possible to use only those words judged by that participant to be perfectionism-relevant as the perfectionism-relevant stimuli presented in the probe task (e.g., Amir, Beard, Burns, & Bomyea, 2009). The use of such idiosyncratic word stimuli may enable an even more sensitive assessment of the patterns of attentional bias that characterise perfectionists.

To assess individual differences in perfectionism in the present research we employed the widely used CM subscale of the FMPS (Frost, Marten, et al., 1990). The FMPS has undergone extensive psychometric analysis, which has consistently revealed that it has very good reliability and validity (e.g., Egan, Piek, et al., 2011; Frost et al., 1993; Frost, Marten, et al., 1990), providing high confidence in the scores obtained. However, some investigators have argued that other more recently developed questionnaire measures, such as the CPQ (Fairburn et al., 2003b), include items that are more tightly aligned with Shafran et al.'s the definition of perfectionism, and so may better capture individual differences in this dimension (Dickie et al., 2012). Although the CM subscale is highly correlated with the CPQ (Egan et al., 2016), the psychometric properties of the CPQ are relatively less well

established (Dickie et al., 2012; Egan et al., 2016). Future researchers should deliver the current attentional probe task, and employ the CPQ to assess individual differences in perfectionism. Work of this type could provide important converging evidence for the presently observed findings.

Future research should also consider recruiting participants from across the full distribution of perfectionism scores, irrespective of whether perfectionism is assessed by the CM subscale of the FMPS, the CPQ, or any other measure of perfectionism. In the present study, we adopted the commonly used extreme group approach (EGA) to recruit participants, whereby individuals were invited to take part in the study only if they met the criteria for high vs. low levels of perfectionistic concerns, which we based on established cut-offs reflecting perfectionistic concerns scores obtained by individuals with vs. without a diagnosis of clinical pathology, respectively. However, some investigators have pointed out that the EGA approach may obscure the detection of non-linear relationships between the variables of interest (Preacher, Rucker, MacCallum, & Nicewander, 2005). Thus, we suggest that future researchers should recruit participants from across the entire distribution of perfectionism scores, as such work could potentially extend understanding of the attentional basis of high levels of perfectionism, which we have shown in the current study to be characterised by an attentional bias that favours negative information over positive information, but only when this is related to perfectionism-relevant concerns.

The present study has demonstrated that high levels of perfectionistic concerns is characterised an attentional bias towards negative perfectionism relevant information. High levels of perfectionistic concerns have been shown elsewhere to be characterised by an increased tendency to impose negative interpretations on situations that are perfectionism relevant (Yiend et al., 2011), and also by an increased tendency to forgo efficient task completion in order to achieve high levels of task performance (Stoeber, 2011b). It could be informative for future research to investigate whether or not these different cognitive anomalies represent independent characteristics of high levels of perfectionistic concerns. An intriguing possibility is that this attentional bias to negative perfectionism-relevant information may be the primary cognitive distortion that gives rise to these other anomalies. Future researchers equipped with the capacity to directly manipulate this attentional bias

would be well positioned to test this hypothesis by examining the impact of this attentional manipulation on these other anomalies.

It can be concluded that high levels of perfectionistic concerns, unlike low levels of perfectionistic concerns, are characterised by a bias that involves greater attention to negative than to positive information, but only when this information is perfectionism-relevant. We hope that this research serves to stimulate further research into the attentional basis of perfectionism, given the pervasive role that clinical perfectionism appears to play across a wide range of psychological disorders.

Chapter 4: Study Two

4.1. Introduction

Shafran et al. (2002) proposed that there are several cognitive processes that may maintain clinical perfectionism. Study One explored how individuals with high levels of clinical perfectionism, namely perfectionistic concerns represented by the Concern over Mistakes subscale of the FMPS, demonstrated an attentional preference for negative, perfectionistic stimuli. Based on the clinical perfectionism model, and the information processing model, it is also likely that individuals with clinical perfectionism demonstrate an interpretation bias.

According to the cognitive-behavioural model of perfectionism, individuals with clinical perfectionism make negative emotional interpretations when striving for perfection. For instance, if an individual with clinical perfectionism aimed to achieve personally demanding goals, but did not meet them, they would be inclined to interpret this outcome negatively (e.g., as evidence of personal failure and inadequacy) and consequently experience a negative emotional response (e.g., feel anxious or depressed), even if their performance was actually good (Dunkley, Zuroff, et al., 2006). However, the negative interpretation that ambiguous situations are reflective of personal failure and inadequacy may only be constrained to those who strive for perfection and base their self-worth on attaining those standards (i.e., perfectionistic concerns). Based on the cognitive-behavioural model of perfectionism, it is possible that those who aim for high standards, but do not base their self-worth upon meeting these demanding standards, experience more positive or benign interpretations, as their attempt to achieve perfection was interpreted as evidence of positive self-worth or personal success (Stoeber & Otto, 2006; Stoeber & Yang, 2010).

Such interpretation biases could be important aetiological and maintaining factors in psychological disorders, which should be targeted for effective treatment (Beck & Clark, 1988, 1997; Blanchette & Richards, 2010). However, there have been a lack of experimental studies specifically testing the hypothesis, derived from the clinical perfectionism model (Shafran et al., 2010), that individuals with clinical perfectionism display an interpretation bias when processing perfectionism-relevant information.

Only one study has evaluated whether a negative interpretation bias is characteristic of clinical perfectionism. Yiend et al. (2011) selected 40 undergraduate students (20 individuals high and 20 individuals low in perfectionism) based on their scores on the Perfectionism Subscale of the DAS (Weissman & Beck, 1978). These researchers compared individuals who were high and low in perfectionism on an interpretation task. The interpretation task was based on Eysenck et al. (1991) method of assessing interpretation bias in social anxiety.

In this task, participants read brief emotionally ambiguous passages, which can be interpreted in an emotionally negative or emotionally positive manner. Participants were presented with a set of four test sentences that were similar in meaning to each original scenario in a subsequent 'recognition memory task' designed to assess an interpretation bias. Two of these test sentences represented potential negative or positive interpretations of the original scenario (target sentences), whereas two were negative and positive sentences that did not represent potential interpretations of the original scenario (foil sentences). Elevated ratings for negative relative to positive test sentences, when these were targets rather than foils, served to indicate disproportionately negative interpretation of the previously presented scenarios. Yiend et al. found that, for perfectionism-relevant scenarios, those high in perfectionism assigned higher familiarity ratings to negative than to positive candidate interpretations compared to those low in perfectionism. This was not the case for perfectionism-irrelevant scenarios, where there were no group differences observed. Yiend et al. proposed that this pattern of findings is consistent with the content-specificity hypothesis, according to which those with high perfectionism display a negative interpretation bias when processing perfectionism-relevant information only.

Yiend and colleagues (2011) conclusions are bolstered by the methodological strength of their assessment task, and represent important support for the operation of a perfectionism-related interpretation bias.. In some of the stimulus materials employed by Yiend et al. (2011) the negative interpretations assessed concerned a heightened anticipation of more negative emotional responses in situations where one falls short of perfection (e.g., "you feel disappointed that…"). In other stimulus materials, the negative interpretation assessed concerned heightened anticipation of more negative outcomes of such situations, for example, involving the negative

reactions of others (e.g., “feel criticised…”). Yiend et al. did not directly compare patterns of perfectionism-relevant interpretative bias on these two types of stimulus materials, but it would be informative to do so. As such, evaluating the nature of the interpretation bias beyond the findings of Yeind et al. may further illuminate the specific nature of perfectionism-relevant interpretation bias. If it can be determined whether individuals with perfectionism are more likely to interpret only negative affective responses or negative events occurring, these findings may lend further insight into the mechanisms through which interpretative biases maintain perfectionism.

It is not surprising that individuals high in clinical perfectionism are disproportionately likely to infer that they would experience negative emotions when their performance falls short of perfection, as this could be considered a defining feature of clinical perfectionism. Indeed, the cognitive-behavioural model of clinical perfectionism indicates self-worth is dependent upon striving for and meeting personally demanding standards (Shafran et al., 2002). Thus, it is possible that the effects reported by Yiend et al. were exclusively driven by biased interpretations concerning the expected affective consequence of failing to meet exceptionally high standards. So it remains unknown whether individuals with high perfectionism also draw disproportionately negative interpretations concerning the outcomes of situations in which their performance falls short of perfection. For example, a negative interpretation concerning the outcome of a situation may be the interpretation that if they do not achieve 95% on an exam then they will not get a good job. With regards to a negative interpretation concerning the expected affective consequences may be the expected feelings of disappointment and anxiety about not achieving 95% on an exam regardless of the outcome of the event. Understanding whether the negative interpretation bias is based on expected affective consequences or anticipated outcomes of different situations could help to inform clinical conceptualisations of biased interpretations in perfectionism. Shafran et al. (2010) and Egan et al. (2014) emphasised the use of a range of cognitive and behavioural techniques to challenge perfectionistic interpretations, and if interpretation biases in perfectionism are located to a specific domain, then understanding the nature of the interpretation bias may inform the implementation and focus of these cognitive and behavioural techniques. The implication of determining the specificity of the

interpretation bias may allow for a clearer conceptualisation of interpretation bias drawn directly into the cognitive-behavioural model of perfectionism. Including interpretation biases into the cognitive-behavioural model of perfectionism could also allow for a clearer client conceptualisation in practice that could inform a greater emphasis on challenging interpretation biases in CBT for perfectionism. To determine whether the negative interpretive bias that characterises clinical perfectionism is restricted to biased interpretations concerning one's affective interpretations of falling short of perfection, or also includes biased interpretations concerning the event expectations that will result from falling short of perfection, it is necessary to directly compare patterns of perfectionism-relevant interpretive bias involving both types of interpretations. The present study also directly compares these two types of selective interpretations (i.e., affective interpretations and event expectations of perfectionism-relevant scenarios).

It is also important to recognise that definitions of perfectionism consist of both perfectionistic concerns (i.e., concerns about making mistakes) and perfectionistic strivings (i.e., the striving for high personally demanding standards). Yiend et al. (2011) used the perfectionism subscale of the DAS, which measures self-critical perfectionism, as the items covered both high personal standards and concern about making mistakes. The use of such a measure makes it difficult to ascertain whether the significant results Yiend and colleagues found were the result of perfectionistic concerns, perfectionistic strivings, or both. It may be expected that the source of a negative interpretation of ambiguity would primarily be associated with perfectionistic concerns, which is strongly associated with psychological distress (Limburg et al., in press). However, there is still a lack of clarity as to the exact nature of the interpretation bias associated with perfectionism, and whether this association is only observable for perfectionistic concerns or also demonstrated for perfectionistic strivings. The inclusion of perfectionistic strivings to determine whether perfectionism-specific interpretation biases are restricted to only perfectionistic concerns or also applies to perfectionistic strivings is an important extension to Yeind et al.'s findings. Given perfectionistic strivings may only be linked to psychological distress in certain populations, predominately eating disorders, (Limburg et al., in press) and could be considered adaptive in others (Bieling, Israeli, et al., 2004; Stoeber & Otto, 2006), it is unclear whether

perfectionistic strivings is associated with any interpretation biases. Based on the cognitive-behavioural model of clinical perfectionism, it would be unsurprising to find that perfectionistic strivings is associated with negative interpretations as the very definition of clinical perfectionism includes both the striving for, and concerns about mistakes, in the definition of clinical perfectionism. To date, no research has evaluated the relationship between perfectionistic strivings and interpretation bias though it would be informative to do so.

In addition to assessing both perfectionistic concerns and perfectionistic strivings, it is important to note that the significant results could be exaggerated by the use of an extreme groups approach (Preacher et al., 2005). With uncertainty as to whether an interpretation bias is only observable in the extreme groups, or whether there is a linear relationship, it would be important to assess interpretation across the continuum of perfectionism. To determine the source of Yiend et al.'s (2011) significant finding, the present study will explore two different types of interpretations. Additionally, the present study will also extend Yiend et al.'s findings beyond perfectionistic concerns to perfectionistic strivings.

Using such a design allows for the test of the key predictions generated by Shafran et al.'s (2002) cognitive-behavioural model of perfectionism. These predictions are that participant's scores on perfectionistic concerns will be associated with a greater mean likelihood rating score for negative interpretations on perfectionistic scenarios, and that these interpretations will involve inferring both negative emotional consequences and negative objective outcomes when processing these perfectionistic scenarios. Furthermore, participants' scores on perfectionistic strivings will predict a greater mean likelihood rating score for positive interpretations on perfectionistic scenarios, and that these interpretations will involve inferring both positive emotional consequences and positive objective outcomes when processing these perfectionistic scenarios.

4.2. Method

4.2.1. Participants

To investigate perfectionism-related interpretative bias, participants over the age of 18 years were recruited from the general population through advertisements placed at a local university campus, radio ads, a community newspaper, and flyers on local bulletin boards. An a priori power analysis using G*Power (Faul et al., 2007)

indicated a minimum of 60 participants would be required, using this design, to detect a moderate-large effect, based on Yiend et al. (2011) findings (power = 0.80, two-tailed alpha = .05).

Seventy-six participants were recruited and completed the questionnaire measures and interpretation bias task. This sample of participants had an age range between 18 to 65 (*M* = 27.50, *SD* = 10.06), was predominantly female (51 females, 25 males), and had an average score on the Concern over Mistakes subscale of the FMPS (labelled perfectionistic concerns) of 23.13 (*SD* = 6.30, range = 12 to 38) and Personal Standards subscale of the FMPS (labelled perfectionistic strivings) of 24.79 (*SD* = 4.87, range = 12 to 34). There was no association between perfectionistic concerns scores and age, $r(76) = .05$, $p = .66$, or gender, $r(76) = -.08$, $p = .48$. There also was no association between perfectionistic concerns scores and DASS depression, $r(76) = .06$, $p = .61$, anxiety, $r(76) = .06$, $p = .59$, or stress, $r(76) = .08$, $p = .47$. Perfectionistic strivings did not correlate with age, $r(76) < .01$, $p = .98$, or gender, $r(76) = -.108$, $p = .35$, nor was perfectionistic strivings associated with DASS measures of depression, $r(76) = .08$, $p = .49$, anxiety, $r(76) = .10$, $p = .39$, or stress, $r(76) = .21$, $p = .07$.

4.2.2. Materials

4.2.2.1. Questionnaires.

4.2.2.1.1. Frost Multidimensional Perfectionism Scale *(Frost, Marten, et al., 1990)*. The FMPS is a 35-item questionnaire divided into six subscales. For the purposes of this study, only the Concern over Mistakes (negative reactions to mistakes) and Personal Standards (setting high standards) subscales were used to represent perfectionistic concerns and perfectionistic strivings respectively (Burgess et al., 2016). The Concern over Mistakes subscale of the FMPS contains nine items that assess concern over making errors and mistakes, while the Personal Standards subscale of the FMPS contains seven items that assess the setting of high standards. Responses are made on a 5-point Likert-type scale (1 = strongly disagree to 5 = strongly agree), whereby scores can range between 9 to 45 for Concern over Mistakes, and 7 to 35 for Personal Standards. There are no traditional cut-off scores for high scores. Higher scores on the Concern over Mistakes or Personal Standards showing higher concern over mistakes or higher personal standards respectively. Previous research indicates these two scales are significantly correlated ($r = .3$-$.6$),

and although there is considerable shared variance, these constructs are considered to still account for independent variance (Smith & Saklofske, 2017). An example item of the Concern over Mistakes subscale is “If I fail at work/school, I am a failure as a person”, while an example item of the Personal Standards subscale is “I am very good at focusing my efforts on attaining a goal.”. The Concern over Mistakes and Personal Standards subscales have good test-retest reliability and good construct validity (Egan, Wade, et al., 2011). In the present study the internal consistency was high for Concern over Mistakes (α = .85) and Personal Standards (α = .81), and were moderately correlated (*r* = .37).

4.2.2.1.2. Depression, Anxiety and Stress Scale-21 (Lovibond & Lovibond, 1995a). The DASS-21 assesses depression, anxiety, and stress within the past week. Importantly, interpretation biases may differ as a function of depression or anxiety (Beck & Clark, 1988). Depression, anxiety, and stress were therefore assessed so any association between perfectionism and psychological distress could be controlled. Individuals rate items on a four-point Likert scale (0 = did not apply to me at all, to 3 = applied to me very much, or most of the time). Scores on the subscale items are summed, with higher scores indicating higher psychopathology. The measure has good concurrent and discriminant validity (Antony, Bieling, et al., 1998). Internal consistencies were high in this study for depression (α = .87), anxiety (α = .77), and stress (α = .79).

4.2.3. Apparatus

A Dell Latitude E6530 laptop with a 17-inch colour monitor was used to present stimuli and to record participant responses. The interpretation bias task was presented in E-Prime v2.0 software (Schneider et al., 2012).

4.2.4. Interpretation Bias Task

An adaptation of the task described by Yiend et al. (2011) was used to assess patterns of an interpretation bias selectively adopted by participants who vary in terms of their perfectionism when processing perfectionism-relevant scenarios. In an initial encoding task, participants read 40 three-line scenarios, each describing perfectionism-relevant situation. Every scenario started with a brief identifying title, and then went on to describe a situation in which a protagonist aimed for a level of achievement that was well above what would be reasonably required and, despite performing well, fell just short of this target level of achievement. Two steps were

taken to ensure that participants read each passage for meaning; the final word was missing some letters and participants had to provide the first missing letter, and a comprehension question followed each passage that could be answered only if participants had understood the situation. If participants made errors on either of these two comprehension checks, then the passage was excluded from further data analysis.

Following this encoding task, an interpretation bias index was created based upon the interpretations that had been imposed on each passage which required participants to judge the degree to which eight test sentences were similar in meaning to the scenario described in that original passage. The test sentences were constructed to assess the relative degree to which emotionally positive and negative interpretations were imposed on these scenarios. Importantly, these materials were designed to also reveal whether such a perfectionism-relevant interpretive bias is restricted to drawing interpretations concerning the affective consequences of falling short of high standards, or also involves interpretations concerning the likely objective outcomes of situations when falling short of high standards. Within these four target sentences, two sentences were negative and two were positive in emotional content, with one sentence of each emotional valence describing a subjective emotional interpretation of the scenario and the other describing an emotionally toned outcome of the scenario. Evaluation of these critical test sentences would further illuminate the potential interpretation biases. An additional four foil test sentences were also included that were matched to the target test sentences according to emotional tone and type of interpretation. The distinguishing feature between the target and foil test sentences is that the foil test sentences were not plausible interpretations based on the information provided in the scenario. The purpose of these foil test sentences was to confirm that participants were not simply responding in a valence-congruent manner (e.g., endorsing all negative content) regardless of its relationship with the original scenario. Thus, there were eight test sentences associated with each originally presented scenario representing the nested combination of the following three factors: tests sentence status (target vs. foil), test sentence valence (negative vs. positive) and test sentence situation type (affect interpretations vs. event expectations).

To ensure any difference observed between ratings for test sentence categories, care was taken to ensure the emotional intensity was equivalent across all nested test sentences as rated by reviewer's independent to the initial design of the study. Across reviewer's ratings who were independent to the initial design of the study there was no difference between emotional intensity across all test sentences. For example, there was no statistical difference between any negative test sentences which were all rated equally negative, additionally the negative test sentences were not more intense than the positive rated test sentences. For a complete explanation of the rating procedure see Appendix F.

To illustrate the nature of the stimulus materials, consider the example initial scenario entitled *"Exam preparation"*, which read *"You have worked hard studying throughout the year. You have studied almost all of the material covered throughout the year. You want to perform very well in your end of year…"* followed by the word fragment *"e-am-"* (exams), and by the comprehension question was "*Did you study for your exams?*" (correct answer YES). In this example, the crucial ambiguous component of the scenario is the 'almost' part of studying the material covered throughout the year. The description of 'almost' may be interpreted by someone with a negative perfectionism-relevant bias as falling short of an ideal or perfection, whereas for someone with benign or positive perfectionism-related bias may interpret 'almost' to be a positive achievement.

The eight test sentences associated with this scenarios were as follows: 1) "*You feel terrible because you haven't studied enough.*" (target test sentence; negative; affect interpretation); 2) "*You feel great as you have studied a lot.*" (target test sentence; positive; affect interpretation); 3) "*You will perform terribly in the exams.*" (target test sentence; negative; event expectations); 4) "*You will perform exceptionally in the exams.*" (target test sentence; positive; event expectations); 5) "*You didn't like your classes.*" (foil test sentence; negative; affect interpretation); 6) "*You really enjoyed your classes.*" (foil test sentence; positive; affect interpretation); 7) "*You will be late to your exam.*" (foil test sentence; negative; event expectations); 8) "*You will arrive on time for your exam.*" (foil test sentence; positive; event expectations).

Participants rated each of the test sentences on a 6-point scale, to indicate how strongly they considered the selected test sentence to have been implied by the

situation presented in the original scenario. These ratings will be referred to as "likelihood ratings", with higher ratings indicating increased judged likelihood of the experiences and events described in the test sentences. The pattern of likelihood ratings given to the differing target sentences have the capacity to reveal biased affective interpretation of the original scenarios, as these target sentences each represent candidate interpretation that could be drawn from these scenarios. In contrast, likelihood rating given to the different foil sentences will instead control for response bias effects, unrelated to interpretation of the original scenarios, as these foil sentences do not represent candidate interpretations that could be drawn from these scenarios. Hence, perfectionism-related bias in interpretive processing will be indexed by differences in the pattern of likelihood ratings given across the target test sentences, which are distinct from the foil test sentences.

4.2.5. Procedure

The research was approved by the Curtin Human Research Ethics Committee (HR88/2012). Each participant provided informed consent before completing the FMPS and DASS-21 prior to being tested individually. Participants were seated approximately 60 cm from the computer screen, and the requirements of the interpretation task were communicated in both verbal and written form. Instructions emphasised that participants should read the passages carefully before completing the word fragment, and the comprehension question. Immediately following the last passage, the participants then completed the computerised interpretation bias assessment task and were thanked, debriefed about the purpose of the study, and placed into a randomised draw for a $25 gift voucher.

4.2.6. Proposed Data Analysis

Mean likelihood rating scores assigned to the test sentences under each experimental condition are shown in Table 3. These data were subjected to a Generalised Linear Mixed Model (GLMM). The GLMM represents a special class of regression model (Stroup, 2012). 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 (Stroup, 2012). GLMM was used in preference to the traditional least squares Analysis of Variance (ANOVA) approach to data analysis, because it better accommodates for violations of ANOVA assumptions concerning normality, linearity, and homogeneity of

variance (Stroup, 2012). The GLMM also allowed the analysis of perfectionism as a continuous variable, rather than it being dichotomized into 'High' and 'Low' groups.

4.3. Results

Mean likelihood rating scores assigned to the test sentences under each experimental condition are shown in Table 3. These data were subjected to a Generalised Linear Mixed Model (GLMM) that considered the within subject factors Test Sentence Status (target vs. foil), Test Sentence Valence (positive vs. negative), and Test Sentence Situation Type (affect interpretation vs. event expectation). The relationship between perfectionistic concerns and the mean likelihood ratings were considered first, and then perfectionistic strivings was considered.

4.3.1. Perfectionistic Concerns and Mean Likelihood Ratings

In testing the hypothesis that participant's scores on perfectionistic concerns are associated with greater mean likelihood rating score for negative interpretations on perfectionistic scenarios, and that these interpretations will involve inferring both negative affective consequences and negative event outcomes for perfectionistic scenarios, a significant three-way interaction that is not modified by the test sentence situation type is expected. The nature of this three-way interaction would be that perfectionistic concerns are associated with greater mean likelihood rating scores for negative disambiguated interpretations than positive disambiguated interpretations, and this effect is stronger for target sentences than foil sentences. This three-way interaction would not be modified by test sentence situation type.

Perfectionistic concerns scores were entered as a continuous variable. This analysis revealed a significant main effect of Test Sentence Valence (F [1,1200] = 43.59, $p < .001$, $\eta^2 = .04$), indicating participants were more likely to rate negative disambiguated test sentences as similar to the scenarios than positive disambiguated test sentences, which was subsumed within a significant two-way interaction of perfectionistic concerns x Test Sentence Valence (F [1,1200] = 16.95, $p < .001$, $\eta^2 = .01$).

As illustrated in Figure 3, this interaction reflected that as perfectionistic concerns increased participants were more likely to assign higher likelihood ratings to the negatively valenced test sentences (b =.04, 95% CI = .021; .061) and more likely to assign lower likelihood ratings to the positively valenced sentences (b =-.03, 95% CI = -.051; -.015). Thus as participants perfectionistic concerns scores increased

they judged the events in the negative test sentences as being more likely, and the events in the positive test sentences as less likely. In this approach such differences in mean likelihood ratings can only be attributed to interpretive bias if participants' scores for mean likelihood ratings were greater on target sentences than on foil sentences. It was indeed the case that the above described two way interaction of perfectionistic concerns x Test Sentence Valence (positive vs. negative) was significantly modified by Test Sentence Status (target vs. foil), in a higher order interaction involving these three factors (F[1,1200] = 4.51, p = .034, η^2 = .004). The fact that this higher order interaction was not further modified by test sentence situation type (affective interpretation vs. event expectations) (F[1,1200] = 1.38, p = .241, η^2 = .001), indicates that, as predicted, this three way interaction was equally evident across sentences describing affective responses and outcome events. Hence, the specific nature of this higher order interaction was to be explored.

4.3.1.1. Perfectionistic concerns and test sentence valence. To examine the nature of perfectionistic concerns x Test Sentence Valence x Test Sentence Status three-way interaction, the significance of the component simple two-way interactions of perfectionistic concerns x Test Sentence Valence at each level of the Test Sentence Status factor was explored. Moreover, as illustrated in Table 4, the nature of the three-way interaction was indeed reflective of an interpretation bias rather than a general response bias to perfectionism-relevant scenarios as the magnitude of the effects underpinning the two-way interaction of perfectionistic concerns x Test Sentence Valence was greater on target tests sentences than on foil test sentences.

Within the Target Test Sentence Status there was a significant main effect for Test Sentence Valence (F[1,600] = 34.34, p < .001, η^2 = .054), which was qualified by a significant perfectionistic concerns x Test Sentence Valence interaction (F[1,600] = 16.69, p < .001, η^2 = .027). The nature of this two way interaction was such that when Negative Test Sentence Valence was considered, perfectionistic concerns had a significant positive correlation, with mean likelihood ratings r(300) = .37, p < .001, while for Positive Test Sentence Valence, perfectionistic concerns had a significant negative correlation with mean likelihood ratings, r(300) = -.35, p < .001. The magnitude of these two correlations did significantly differed from one another, Z = 9.19, p < .01. Hence, there was evidence to suggest that the negative

Test Sentence Valence and Positive Test Sentence Valence were differentially implicated in the observed mean likelihood ratings.

Thus, consistent with the hypothesis, the perfectionistic concerns x Test Sentence Valence interaction reflected that as participants perfectionistic concerns increased participants were more likely to assign higher likelihood ratings to the negatively valenced test sentences (b = .04, t[300] = 2.82, p = .005, 95% CI = .011; .059) than to the positively valenced test sentences (b = -.03, t[300] = -2.76, p = .006, 95% CI = -.056;-.009).

If the mean likelihood ratings represent a systematic response bias rather than an interpretive bias, then there would be no difference between the pattern of likelihood ratings of the foil statements and the target test sentences. There was a significant two way interaction between perfectionistic concerns x Test Sentence Valence when considering the Foil Test Sentence Status (F[1,600] = 14.86, p < .001, η^2 = .024). The nature of the perfectionistic concerns x Test Sentence Valence interaction reflected that as perfectionistic concerns increased, participants were more likely to assign higher likelihood ratings to the negatively valenced test sentences (b =.03, t[300] = 2.61, p = .009, 95% CI = .006; .046) than to the positively valenced test sentences (b = -.02, t[300] = -2.53, p = .012, 95% CI = -.039;-.005). However, as predicted the magnitude of the relationship between perfectionistic concerns and mean likelihood rating scores at each level of test sentence valence was lower for foil test sentences than for target test sentences (see Table 4).

In sum, there was a significant three-way interaction between perfectionistic concerns, Test Sentence Valence, and Test Sentence Status. The nature of the three-way interaction was in line with the hypothesis that perfectionistic concerns are associated with greater mean likelihood rating score for negative interpretations on perfectionistic scenarios, in that as perfectionistic concerns increased, the magnitude of the difference between assigning higher likelihood ratings for negative valenced test sentences and lower likelihood ratings for positive valenced test sentences was greater for target test sentences than foil test sentences. This pattern of likelihood ratings is consistent with the hypothesis that perfectionistic concerns are associated with more negative interpretations of perfectionism-related scenarios, and less positive interpretations.

Table 3. *Mean likelihood rating scores assigned to the test sentences under each experimental condition*

Rating category	*Test Sentence Situation Type*							
	Affect				Event			
	Test Sentence Valence							
	Negative interpretations		Positive interpretations		Negative interpretations		Positive interpretations	
	Test Sentence Status							
	Target	Foil	Target	Foil	Target	Foil	Target	Foil
Average rating	3.29 (.79)	2.69 (.66)	3.95 (.69)	3.88 (.67)	2.69 (.75)	2.43 (.64)	4.10 (.66)	4.13 (.59)

Figure 3

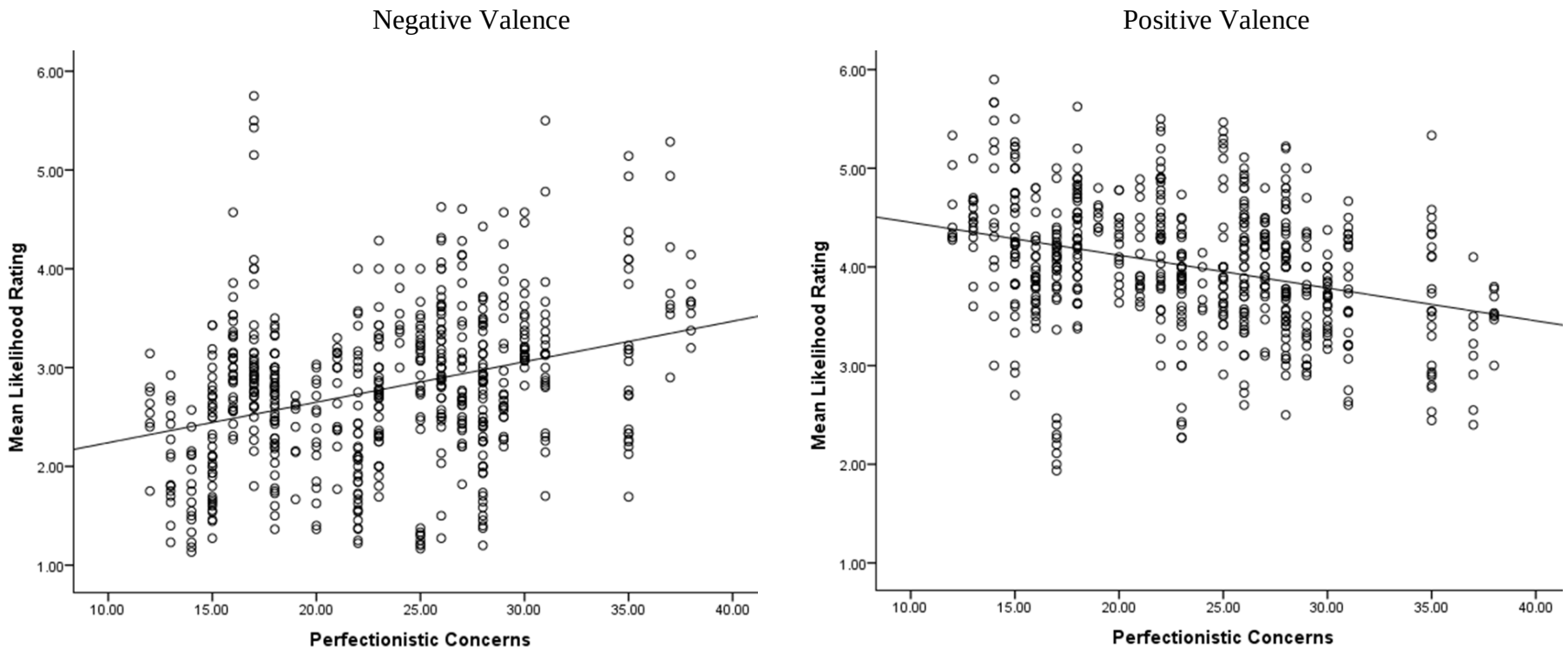

Figure 3. Scatterplot representation of the relationship between perfectionistic concerns and Mean Likelihood Ratings at each level of Test Sentence Valence

Table 4. *Correlation between mean likelihood ratings and perfectionistic concerns at each level of Test Sentence Valence and Test Sentence Status.*

Test Sentence Status	*Test Sentence Valence*		
	Negative	Positive	Magnitude (Z score)
Target	.37**	-.35**	9.19*
Foil	.31*	-.28*	7.41*

* $p < .01$

** $p < .001$

4.3.2. Perfectionistic Strivings and Mean Likelihood Ratings

To assess the hypothesis that participant's scores on perfectionistic strivings will predict a greater mean likelihood rating score for positive interpretations across both positive emotional consequences and positive objective outcomes when processing these perfectionistic scenarios, a significant three-way interaction that is not modified by the test sentence situation type could be expected. The nature of this three-way interaction would be that perfectionistic strivings would be associated with greater mean likelihood rating scores for positive disambiguated interpretations, which is demonstrated more strongly for target sentences than foil sentences. This three-way interaction would not then be modified by test sentence situation type.

Perfectionistic strivings was entered as a continuous variable. This analysis revealed a significant main effect of Test Sentence Valence (F [1,1200] = 22.34, p < .001, η^2 = .018), indicating participants were more likely to rate negative disambiguated test sentences as similar to the scenarios, which was subsumed within a two-way interaction of perfectionistic strivings x Test Sentence Valence (F [1,1200] = 6.25, p < .001, η^2 = .005).

As illustrated in Figure 4, the pattern of this interaction was consistent with that observed for perfectionistic concerns. As participants perfectionistic strivings increased, participants were more likely to assign higher mean likelihood ratings to the negatively valenced test sentences (b =.04, 95% CI = .010; .066). However, there was no predictive relationship between perfectionistic strivings scores and mean likelihood ratings for positively valenced test sentences (b =-.02, 95% CI = -.051; .002). Thus, participants with higher perfectionistic strivings judged the experiences and events described within the negative test sentences as being more likely.

The GLMM also revealed a second two-way interaction between perfectionistic strivings x Test Sentence Situation Type (F [1,1200] = 6.81, p < .001, η^2 = .006). Both the perfectionistic strivings x Test Sentence Valence and perfectionistic strivings x Test Sentence Situation Type interaction were subsumed within a three-way interaction of perfectionistic strivings x Test Sentence Valence x Test Sentence Situation Type (F [1,1200] = 18.68, p < .001, η^2 = .015). In this assessment approach such differences in mean likelihood ratings can only be attributed to interpretive bias if participant's scores for mean likelihood ratings were greater for target sentences than on foil sentences. The three-way interaction of

perfectionistic strivings x Test Sentence Valence x Test Sentence Situation Type was significantly modified by Test Sentence Status, in a higher order interaction involving these four factors (F[1,1200] = 5.06, p = .025, η^2 = .004). Hence, this higher order interaction indicates that the relationship between perfectionistic strivings and mean likelihood ratings differed depending on whether the test sentence was a plausible interpretation or not, whether it described an affective response or outcome event, and whether the test sentence was negative or positive.

4.3.2.1. Four-way interaction. To determine the nature of a four-way interaction, the significance of the three-way interactions of perfectionistic strivings x Test Sentence Valence x Test Sentence Situation Type at each level of the Test Stimulus Sentence Type factor was explored. Moreover, as illustrated in Table 5, the nature of the four-way interaction was reflective of an interpretation bias rather than a general response bias to perfectionism-relevant scenarios as the magnitude of the effects underpinning the three-way interaction of perfectionistic strivings x Test Sentence Valence x Test Sentence Status factors was greater on target tests sentences than on foil test sentences.

When the Target Test Sentence Status was considered there was a significant main effect for Test Sentence Valence (F[1,600] = 23.71, p < .001, η^2 = .038), which was qualified by a significant perfectionistic strivings x Test Sentence Valence interaction (F[1,600] = 9.33, p < .001, η^2 = .015). There was also a significant three-way interaction between perfectionistic strivings x Test Sentence Valence x Test Sentence Situation Type (F[1,600] = 21.98, p < .001, η^2 = .035). To examine the nature of this three-way interaction within the Target Sentence Status, the significance of the component simple two-way interactions of perfectionistic strivings x Test Sentence Valence at each level of the Test Sentence Situation Type factor was explored.

Figure 4.

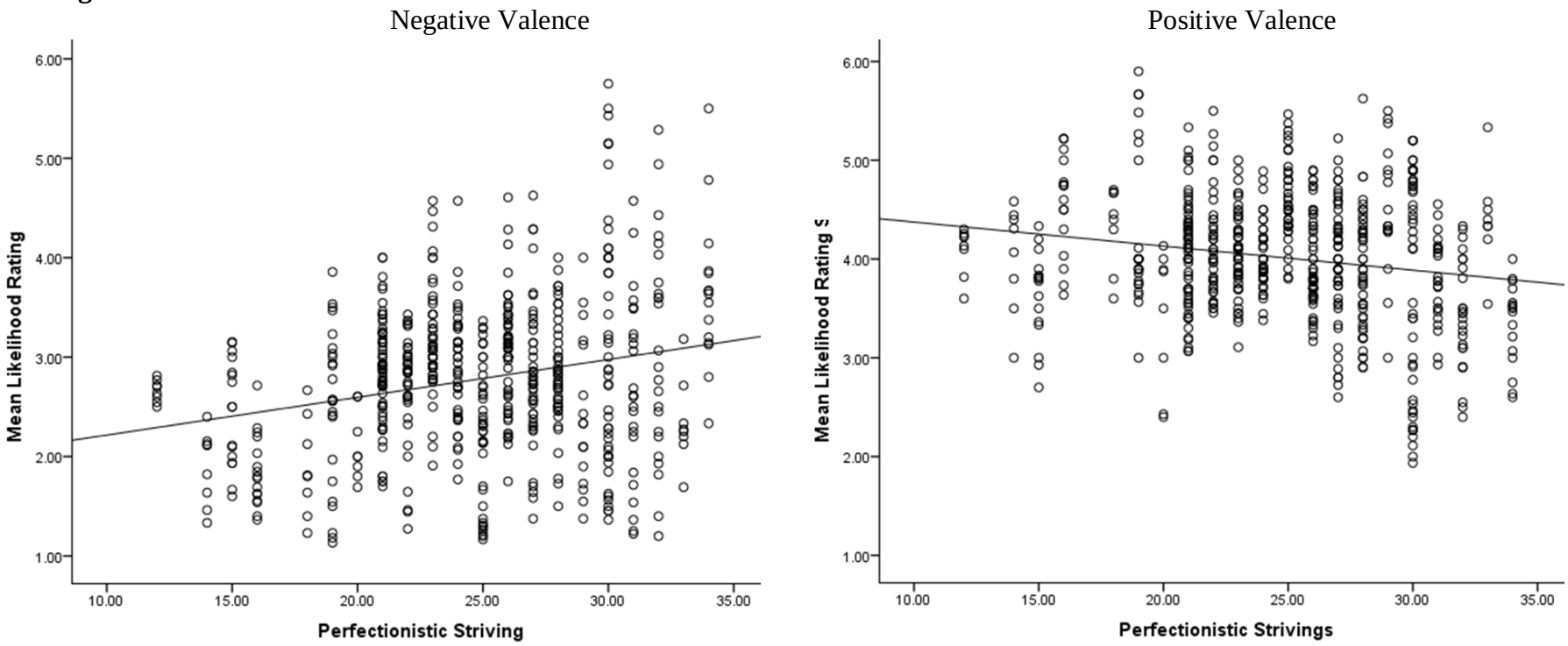

Figure 4. Scatterplot representation of the relationship between perfectionistic strivings and Mean Likelihood Ratings at each level of Test Sentence Valence

Table 5. *Correlation between mean likelihood ratings and perfectionistic strivings at each level of Test Sentence Valence and Test Sentence Status.*

	Test Sentence Situation Type					
	Affect			Event		
	Test Sentence Valence					
Test Sentence Status	Negative	Positive	Magnitude	Negative	Positive	Magnitude
Target	.46**	-.30**	6.96**	.20*	-.17*	3.23**
Foil	.25**	-.16*	3.65*	.08	-.08	1.39

* $p < .01$
** $p < .001$

4.3.2.1.1. Perfectionistic strivings and target test sentence status. For Target Test Sentence Status and Affect Test Sentence Situation Type, there was a significant main effect for Test Sentence Valence (F[1,300] = 29.29, $p < .001$, $\eta^2 = .089$), where participants were more likely to rate negative disambiguated test sentences, which was qualified by a significant perfectionistic strivings x Test Sentence Valence interaction (F[1,300] = 17.07, $p < .001$, $\eta^2 = .054$). There was a significant main effect for Test Sentence Valence for Target Test Sentence Status and Event Test Sentence Situation Type, (F[1,300] = 16.51, $p < .001$, $\eta^2 = .052$), which was not qualified by any higher order interactions. These findings suggest that although participants were more likely to provide greater mean likelihood ratings for negatively valenced sentences than positively valenced sentences for event test sentences, participants mean likelihood ratings for affect test sentences vary as a function of scores on perfectionistic strivings and Test Sentence Valence.

4.3.2.1.1.1. Perfectionistic strivings at each level of test sentence valence. The relationship between perfectionistic strivings and mean likelihood ratings were then evaluated at each level of Test Sentence Valence to determine the source of the two-way interaction found within Target Test Sentence Status and Affect Test Sentence Situation Type. When Negative Test Sentence Valence was considered, perfectionistic strivings had a significant positive correlation, $r(150) = .46$, $p < .001$, with mean likelihood ratings. In contrast, for Positive Test Sentence Valence, perfectionistic strivings had a significant negative correlation, $r(150) = -.30$, $p < .001$, with mean likelihood ratings. The magnitude of these two correlations significantly differed from one another, $Z = 6.96$, $p < .001$. Hence, Negative Test Sentence Valence and Positive Test Sentence Valence were differentially implicated in the observed relationship between perfectionistic strivings and mean likelihood rating scores. The nature of the two-way perfectionistic strivings x Test Sentence Valence interaction for target test sentences concerning the affect situation type, was that as participants perfectionistic strivings increased participants were more likely to assign higher likelihood ratings to the negatively valenced test sentences (b =.08, t[150] = 4.80, p = .005, 95% CI = .045; .107) than to the positively valenced test sentences (b = -.04, t[150] = -2.83, p = .005, 95% CI = -.072;-.013).

4.3.2.1.2. Perfectionistic strivings and foil test sentence status. As would be recalled, if the mean likelihood ratings reflected an overall response bias rather than an interpretive bias, there would be no difference between the pattern of likelihood ratings for the foil statements and the target test sentences. There was a significant three way interaction between perfectionistic strivings x Test Sentence Valence x Test Sentence Situation Type (F[1,600] = 8.57, p = .004, η^2 = .014) when Foil Test Sentence Status were considered The nature of the perfectionistic strivings x Test Sentence Valence x Test Sentence Situation Type interaction reflected that as perfectionistic strivings increased, participants were more likely to assign higher likelihood ratings to the negatively valenced test sentences (b =.03, t[150] = 2.26, p = .025, 95% CI = .004; .065) than to the positively valenced test sentences (b = -.02, t[150] = -1.45, p = .145, 95% CI = -.053; .008), but this effect was restricted to the affect interpretations factor of Test Sentence Situation Type rather than event expectations. However, as hypothesised the magnitude of the relationship between perfectionistic strivings and mean likelihood rating scores at each level of test sentence valence was lower for foil test sentences than for target test sentences (see Table 5). The difference in the magnitude of the relationship confirms that the pattern of findings for target sentences is due to an interpretation bias rather than a general perfectionism-relevant response bias.

4.3.2.1.3. The source of the four-way interaction. Thus, despite a significant four-way interaction between perfectionistic strivings Test Sentence Valence, Test Sentence Situation Type across both Target and Foil Test Sentences, the nature of the main three-way interaction was such that as perfectionistic strivings increased the pattern of assigning higher likelihood ratings for negative valenced test sentences and lower likelihood ratings for positively valenced test sentences was only observed for target test sentences. Furthermore, the magnitude of the difference between the ratings for negative and positively valenced test sentences was greater when participants considered the affective outcome rather than the event outcome. This pattern of likelihood ratings is not consistent with the hypothesis that perfectionistic strivings is associated with an inflated tendency to impose positive interpretations. However the pattern of findings is consistent with theory proposed by the cognitive-behavioural model of clinical perfectionism that across both interpretations about affective experiences or about outcome events associated with the situations described in the perfectionism-relevant scenarios. The pattern of likelihood ratings

instead suggests that, similar to perfectionistic concerns, perfectionistic strivings is associated with an inflated tendency to impose negative interpretations across both affective experiences and event expectations associated with situations presented in perfectionism-relevant scenarios.

4.4. Discussion

The present study tested the prediction, generated by Shafran et al.'s (2002) model of perfectionism, that clinical perfectionism would be characterised by a disproportionate tendency to impose negative interpretations of perfectionism-related scenarios. The findings confirmed this prediction. Participants' interpretation of scenarios that describe situations in which a protagonist performs at an acceptable level but falls short of perfection were assessed. Participants scoring higher in perfectionism demonstrated a tendency to impose negative interpretations on such scenarios. Of particular importance was that this pattern of findings was observed for both perfectionistic concerns and perfectionistic strivings.

It is not surprising that perfectionistic concerns was associated with negative interpretations for scenarios that depicted a protagonist striving for personally demanding standards and, although falling short of these standards, still achieved a level of performance that would generally be acceptable. This pattern of findings provides support for the cognitive-behavioural model of clinical perfectionism, which posits that a defining feature of those with clinical perfectionism is that they will formulate negative interpretations when presented with scenarios that involve perfectionistic beliefs relative to those with lower perfectionism (Shafran et al., 2002). The findings are consistent with the conclusions drawn by Yiend et al. (2011), who used a similar objective measure of interpretation biases. Importantly, because the effects of interest were disproportionately greater on target test sentences, relative to foil test sentences, we can be confident that they reflect perfectionism-related differences in interpretative processing, rather than a more general perfectionism-related response bias. These convergent findings provide further support for the cognitive-behavioural model of clinical perfectionism, which posits that individuals with high levels of perfectionism have a greater tendency to display a negative interpretation of information relative to individuals with low levels of perfectionism.

The present research has not only provided convergent findings with Yiend et al. (2011) results, but also clarifies the specific nature of perfectionism-relevant interpretive bias. As identified previously, it was unclear whether perfectionism was

associated with only an interpretation of negative affective responses or negative events occurring. The present findings have demonstrated that there is no differential interpretation bias based on the affective interpretation or event expectation of ambiguous scenarios, in that higher perfectionistic concerns were associated with a higher likelihood of interpreting ambiguous situations in a way that is consistent with a negative interpretation of perfectionism-relevant scenarios for both their emotional response and consequences of their actions.

The present study also found perfectionistic strivings was associated with more negative interpretations for these scenarios that depicted a protagonist striving for, but ultimately falling short of, personally demanding goals. This may be surprising if researchers only consider perfectionistic strivings is aligned with an adaptive form of perfectionism (Bieling, Israeli, et al., 2004; Stoeber & Otto, 2006). Given perfectionistic strivings has always been a part of the definition of clinical perfectionism, it could be expected that perfectionistic strivings may lead to negative interpretations of events. The understanding that perfectionistic strivings is not adaptive is also consistent with recent meta-analyses that has linked perfectionistic strivings with psychological distress (Limburg et al., in press; Smith et al., 2016).

The observed pattern of findings provides important considerations for the theoretical understanding of clinical perfectionism. The present results highlight the inconsistent findings within the literature that suggest perfectionistic strivings is associated with positive outcomes (Bieling, Israeli, et al., 2004) yet could also be a vulnerability factor in mood disorders (Smith et al., 2016) or eating disorders (Egan et al., 2016; Limburg et al., in press). Importantly, the present findings indicate the need for more nuanced evaluations of the relationship between perfectionism and psychological distress, in particular it could be that perfectionistic strivings becomes a vulnerability factor if an individual also demonstrates an interpretation bias towards negative interpretations of scenarios. This is plausible given depression is characterised by biased interpretations of events (Blackwell & Holmes, 2010; Wisco & Nolen-Hoeksema, 2010; Yiend et al., 2013), and so this may help explain why perfectionistic strivings is a vulnerability factor for depression (Limburg et al., in press). Furthermore, it is possible that perfectionistic strivings were linked with a negative interpretation bias if the individual consequently repetitively and negatively thought about the possible outcomes of the strivings (Macedo et al., 2015).

Repetitive negative thinking may lead the individual to also become more self-critical regarding their performance (Macedo et al., 2014).

The present findings have potential clinical implications. There are several studies that have examined CBT interventions designed to reduce clinical perfectionism (e.g., Egan, van Noort, et al., 2014; Handley et al., 2015). CBT for perfectionism has specific components intended to reduce negative interpretations of situations that may activate perfectionistic beliefs, and these techniques have demonstrated therapeutic effects both on perfectionism and associated symptoms of depression and anxiety (Egan, van Noort, et al., 2014; Handley et al., 2015; Steele et al., 2013). Shafran et al. (2010) and Egan et al. (2014) emphasised the use of a range of cognitive and behavioural techniques to challenge perfectionistic interpretations. The current demonstration that negative interpretive bias is intimately associated with perfectionism lends weight to the theoretical assumptions underpinning the clinical use of such CBT components. Moreover, this type of performance based assessment task may provide clinicians with a useful tool for measuring resulting change in interpretive bias, in a manner that is not compromised by the demand or expectancy effects that may compromise self-report measures of interpretation.

Although the present findings support the possibility that negative interpretation bias may contribute to clinical perfectionism as proposed by Shafran et al. (2002), it is important to recognise that the association between such interpretative bias and elevated perfectionism permits no conclusions concerning the causal nature of this association. The present study did not aim to ascertain the causal contribution of interpretation biases to clinical perfectionism, and as such future researchers should aim to evaluate this issue. One approach would be to assess this interpretation bias in individuals who have completed CBT for perfectionism, to determine whether therapeutic gains are mediated by the reduction of interpretation bias, as may be expected if such bias causally contributes to the dysfunctional symptomatology that characterises perfectionism. Investigators could also evaluate the causal role of interpretation bias in perfectionism by employing a cognitive bias modification procedure to directly manipulate interpretation (CBM-I). Although methodologies can vary, the CBM-I approach typically involves requiring the extended processing of emotionally ambiguous information under circumstances that require participants to repeatedly access its benign meaning (Amir & Taylor, 2012). This is intended to train the participants to consistently interpret ambiguous

information in either a positive (or in some cases a negative) manner. For example, to increase benign interpretation of ambiguity, ambiguous target information may be consistently preceded by cue information related to its benign interpretation, across many hundred trials of a task that requires individuals to identify the relationship between the target and cue information, and reinforces success in doing so. Such procedures have demonstrated effectiveness in experimentally manipulating interpretation biases in anxiety disorders (Amir & Taylor, 2012; Hayes, Hirsch, Krebs, & Mathews, 2010). Future research should now investigate whether CBM-I, designed to directly reduce the type of perfectionism-related negative interpretation identified in the present study, can assist in the attenuation of dysfunctional symptomatology experienced by clinical perfectionists. If CBM-I proves to be effective in this regard, it would not only confirm that this interpretation bias causally contributes to perfectionist symptomatology, but would also suggest that CBM-I may have value as an adjunct treatment alongside CBT for perfectionism.

While the present study is one of the first to examine perfectionism-relevant interpretive bias, previous research has documented other types of cognitive anomalies in individuals with clinical perfectionism. For example, it has been shown that individuals high in perfectionism are characterised by attentional bias towards emotionally negative perfectionism-relevant information (see Chapter 3), and also by generally impaired cognitive efficiency (Stoeber, 2011b). It is unknown whether these various cognitive anomalies represent independent characteristics of high perfectionism, or whether they may be functionally related. One intriguing possibility, worthy of further investigation, is that the negative interpretative bias observed in the present study represents the “downstream” consequence of the early attentional bias to negative perfectionism-relevant information (see Chapter 3), which itself could be a consequence of impaired attentional control resulting from the compromised cognitive efficiency observed by Stoeber (2011). Future research, which discretely manipulates either interpretative bias, attentional bias, or cognitive control while assessing the impact of such manipulations on all three domains of cognitive functioning, could serve to illuminate the potential inter-relationships between these differing aspects of perfectionism-relevant information processing. Such research may also explore the intricacies of participant’s responses to both target and foil sentences to determine the nature of the stimuli that may increase the risk of a general response bias.

The present study has several limitations. One limitation is that although the perfectionistic scenarios and test sentences were selected on the basis of equal emotional tone, it is likely that scenarios and test sentences were not equally positive or negative for every participant. For example, scenarios and test sentences concerning academic performance may have greater potential negative emotional impact for those perfectionistic individuals who are particularly concerned about their academic success, than for perfectionistic individuals who are instead concerned about their sporting achievements or physical appearance. Future researchers could strive to maximise the personal relevance of their stimulus materials by developing categories of interpretations consistent with prominent perfectionistic concerns or strivings (e.g., academics, social settings, and sporting accomplishments). Participants could then rate the category types prior to completing the interpretation task to identify the most concerning categories for them. It would then be possible to only use the scenarios from the categories that were judged by that participant to be personally relevant as the stimuli presented in the interpretation task. This approach may provide researchers with a more sensitive assessment of the interpretation bias patterns that characterises high perfectionists.

Another consideration for the present research is that no relationship was observed between perfectionism (both perfectionistic concerns and perfectionistic strivings) and symptoms of depression, anxiety, and stress. Depression, anxiety, and stress were assessed to ensure that the relationship between perfectionism and interpretation bias was not confounded by symptoms of psychological distress. Given that particular perfectionistic concerns in particular has previously demonstrated a robust relationship with psychological distress (Limburg et al., in press), it is surprising that there was no correlation observed between these constructs in this study. It is not clear why this may be the case. Range attenuation for perfectionism is unlikely to explain this finding given that there was a large range of scores for perfectionistic concerns (M = 23.13, SD = 6.30, range = 12 to 38) and perfectionistic strivings (M = 24.79, SD = 4.87, range = 12 to 34). For symptoms of depression (M = 1.94, SD = 1.87, range = 0 to 10), anxiety (M = 3.01, SD = 3.06, range = 0 to 16), and stress (M = 6.29, SD = 3.85, range = 0 to 19), the average was within the normal range (Lovibond & Lovibond, 1995b). It is consistent that the average scores were in the normal range for each of depression, anxiety, and stress. Yet with a range of scores up to moderate for depression and extremely severe for anxiety and stress it is

unlikely range attenuation would explain this finding. Given that we do not know the clinical status of the participants, we cannot draw firm conclusions that perfectionism specific interpretation biases are separate from interpretation biases observed in clinical disorders where high perfectionism has been identified as a common problem (Egan, Wade, et al., 2011). Future research could directly evaluate the patterns of interpretation bias in perfectionism and whether it can be distinguished from commonly held interpretation biases that characterise the clinical conditions associated with perfectionism (e.g., depression). It can be concluded from the present findings that perfectionistic concerns, and possibly perfectionistic strivings, are characterised by a negative interpretation bias, which operates during the processing of perfectionism-relevant information in ways that serve to inflate the perceived probability of negative affective experiences and negative event outcomes.

Chapter 5: Study Three

5.1. Introduction

Within the context of clinical perfectionism, Shafran et al. (2002) proposed that there are several cognitive processes and products that may influence an individual's behaviour. Chapter 3 explored how individuals with high levels of clinical perfectionism, namely perfectionistic concerns represented by the Concern over Mistakes subscale of the FMPS, is associated with an attentional preference for negative, perfectionistic stimuli. Chapter 4 evaluated how individuals' levels of clinical perfectionism, represented by scores for perfectionistic concerns and perfectionistic strivings, were associated with a negative interpretation bias.

Based on the models of clinical perfectionism and information processing, it is also likely that the way individuals with clinical perfectionism engage their thoughts may explain the relationship between clinical perfectionism and psychological distress. The present study aimed to evaluate the relationship between clinical perfectionism and psychological distress both directly and indirectly through repetitive negative thinking and mental imagery. Although perfectionistic concerns and perfectionistic strivings are closely aligned with the concept of clinical perfectionism, it would also be informative to evaluate whether a specific measure of clinical perfectionism would explain any additional variance of psychological distress both directly and indirectly beyond what is accounted for by perfectionistic concerns and perfectionistic strivings. Research to date has typically focused on the factor structure of the CPQ (Chang & Sanna, 2012; Dickie et al., 2012; Egan et al., 2016; Stoeber & Damian, 2014), additionally there is a lack of evaluation as to whether the CPQ can predict psychological distress beyond what is accounted for by more popular measures such as the FMPS.

Perfectionism involves the setting of extremely high, personally demanding, goals despite negative consequences (Shafran et al., 2002). The setting of high standards is only maladaptive if an individual bases their self-worth on the unrealistic expectation that the standards must always be met (Egan, Wade, et al., 2011). Perfectionism is widely regarded as a multidimensional construct that consists of two factors (Stoeber & Otto, 2006). The first is perfectionistic concerns, which involves the individual being excessively self-critical for not reaching a goal or being extremely worried about making mistakes on a performance. The second is

perfectionistic strivings, which is the setting of high goals and striving for achievement without excessive worry about performance. Shafran et al (2002) proposed that when the individual fails to meet their unrealistic standards, they interpret this as a personal failure and psychological distress ensues. Evidence has demonstrated that perfectionism is transdiagnostic (Egan, Wade, et al., 2011), which is defined as a process that plays a role in the development and maintenance of multiple psychological disorders (McEvoy et al., 2009). Importantly, perfectionism has been directly linked with the development and maintenance of psychological disorders such as, mood, anxiety, and eating disorders (Egan, Wade, et al., 2011, 2012; Shafran & Mansell, 2001; Wheeler et al., 2011). Accounting for additional transdiagnostic processes, such as repetitive negative thinking (Ehring & Watkins, 2008; McLaughlin & Nolen-Hoeksema, 2011) and mental imagery (Holmes & Mathews, 2010), may further improve our understanding of the pathways through which perfectionism can lead to psychological distress.

5.1.1. Perfectionism and Repetitive Negative Thinking

Ehring and Watkins (2008) define repetitive negative thinking as a pattern of verbal linguistic thinking about a previous, present, or future problem or negative experience that is repetitive, intrusive, and difficult to disengage from. Given the transdiagnostic nature of perfectionism, it is important that investigations of cognitive products are also transdiagnostic such as repetitive negative thinking (Ehring & Watkins, 2008; Nolen-Hoeksema, 2000; O'Connor et al., 2007), research has explored whether repetitive negative thinking is a pathway through which individuals with perfectionism experience psychological distress (Macedo et al., 2014).

Macedo et al. (2014) suggested that repetitive negative thinking in perfectionism may prolong negative emotions where an individual maintains focus on negative events, searching for errors in their performance, or generating ‘what if’ scenarios regarding what could have happened if the individual responded differently (Shafran et al., 2002). Verbal-linguistic activity such as repetitive negative thinking may also serve an avoidant function by suppressing more aversive and physiologically arousing mental imagery and thereby limiting emotional processing (Borkovec et al., 2004). Consistent with these predictions, repetitive negative thinking is associated with both perfectionism and other variables, including depression symptoms and anxiety (Blankstein & Lumley, 2008; Chang et al., 2007;

Egan, Hattaway, et al., 2014; Olson & Kwon, 2007; Randles et al., 2010; Stoeber & Joormann, 2001).

Short and Mazmanian (2013) theorised that perfectionism would lead to rumination and worry, which in turn would increase negative affect. Consistent with this theory, Short and Mazmanian found that repetitive negative thinking, represented by both rumination and worry, was an indirect pathway between perfectionism and negative affect. This finding is consistent with Di Schiena et al.'s (2012) finding that rumination was a complete indirect pathway for the relationship between perfectionism and depressive symptoms, such that perfectionism no longer had a significant association with depression symptoms after accounting for rumination.

To further evaluate the relationship between perfectionism and repetitive negative thinking, Macedo et al. (2015) assessed 788 college students on repetitive negative thinking and two dimensions of perfectionism, perfectionistic concerns and perfectionistic strivings. Macedo et al. predicted that perfectionistic concerns would lead to repetitive negative thinking, which in turn would increase psychological distress. Consistent with this prediction, Macedo et al. found perfectionistic concerns had a significant indirect relationship with psychological distress through repetitive negative thinking, in addition to a direct relationship with psychological distress. The authors also found a significant indirect relationship between perfectionistic strivings and psychological distress through repetitive negative thinking.

The finding that the direct relationship between perfectionistic concerns and psychological distress is maintained, even when the indirect pathway through repetitive negative thinking is considered, is consistent with past literature demonstrating that perfectionistic concerns is associated with psychological distress (Egan, Wade, et al., 2011). It is also important to recognise that as perfectionistic concerns predicted repetitive negative thinking, which in turn predicts increases in psychological distress also suggests that the way individuals engage with their thoughts may influence their wellbeing. According to Macedo et al.'s (2015) findings, the relationship between perfectionistic strivings and psychological distress or psychopathology may be, in part, due to particular indirect pathways. It is plausible that perfectionistic strivings may only become negative if the individual repetitively thinks about negative outcomes of these strivings (e.g., potential failure). Repetitive thinking about performance outcomes may then lead the individual to

become more self-critical regarding their own performance (Macedo et al., 2014), which helps to explain how perfectionistic strivings could be a vulnerability factor in mood disorders (Smith et al., 2016) and eating disorders (Egan, Wade, et al., 2011).

It is important to note that research has typically focused on one dimension of repetitive negative thinking, either rumination or worry, however, studies in recent years have suggested that rumination and worry are more common than distinct (Bird et al., 2012; Mahoney et al., 2012; McEvoy et al., 2010; McEvoy et al., 2013; Watkins, Moulds, & Mackintosh, 2005). Rumination has almost exclusively been explored within the context of mood disorders and is viewed as a core cognitive feature of depression where individuals repetitively think about past events (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), whilst worry has been a focus of anxiety disorders, in particular generalised anxiety disorder where individuals repetitively think about possible future events (Watkins et al., 2005). In this way rumination and worry have been distinguished temporally (Ehring & Watkins, 2008). Furthermore, the specific content of cognitive products will depend on the nature of emotionally salient stimuli to a particular individual. To date, most studies have focused on diagnosis-specific forms of repetitive negative thinking, such as rumination (depression) or worry (anxiety) (Di Schiena et al., 2012; Short & Mazmanian, 2013). However, recent research suggests that rumination and worry are more similar than different and that the common underlying construct of repetitive negative thinking could be captured with a measure that treats repetitive negative thinking as a unified transdiagnostic construct (Bird et al., 2012; Mahoney et al., 2012; McEvoy, Thibodeau, & Asmundson, 2014; McEvoy et al., 2013).

It would be informative to extend beyond the examination of just the relationship between perfectionism and repetitive negative thinking. Repetitive negative thinking may reflect just one way an individual engages with their thoughts, whilst there may be other, additional intermediate variables, which also contribute to the relationship between perfectionism and psychological distress. One such intermediate variable could be mental imagery. It may be important to consider repetitive negative thinking and mental imagery in the same model, given mental imagery demonstrates stronger associations with emotions than verbal-linguistic activity such as repetitive negative thinking (Holmes et al., 2008). Additionally, repetitive negative thinking may also serve an avoidant function by suppressing more aversive and physiologically arousing mental imagery and thereby limiting

emotional processing (Borkovec et al., 2004), and as such would be interesting to determine which process best explains the relationship between perfectionism and psychological distress.

5.1.2. Perfectionism and Mental Imagery

One such potential intermediate variable to consider between perfectionism and psychological distress is mental imagery. Mental imagery can be defined as mental cognitions that engage with or contain sensory experiences (Horowitz, 1970). Kosslyn et al. (2001) described mental imagery as "seeing with the mind's eye or hearing with the mind's ear" (p. 635), and indeed it can be experienced in any sensory modality (Holmes, Arntz, et al., 2007). For example, a multisensory negative image in perfectionism might include a mental image of being shamed at work in front of colleagues after completing a project imperfectly, hearing negative comments and laughter from colleagues, and experiencing a strong behavioural urge to escape. Mental imagery is widely recognised as a transdiagnostic process across psychological disorders (Hackmann et al., 2011; Krans, 2011).

Of particular importance when considering the association between perfectionism and psychological distress is that negative intrusive mental imagery can significantly affect people's behaviour and emotional regulation strategies (Hackmann et al., 2011). For example, in a sample of individuals with dysphoria, Pictet et al. (2011) found that those who engaged with positive mental imagery not only experienced an improvement in their ratings of positive and negative affect, but also in their performance on a behaviour task that required participants to catch magnetic fish. Mental imagery also amplifies positive and negative emotions, more so than emotion-based verbal processing such as repetitive negative thinking (Holmes & Mathews, 2010).

Lee et al. (2011) conducted the only study to date that has assessed mental imagery and behavioural expressions within perfectionism. Lee et al. examined mental imagery through the Imagery Interview, which is a 48-item semi-structured interview that asks participants to discuss any intrusive mental images, experiences, and sensations that may be related to a specific memory. Within this interview are twelve questions that ask participants to rate their experiences with the mental imagery, such as how intense the mental image is or a rating of the distress the mental image causes. The ratings provided by participants can then be summed to give an indication of the overall experience an individual has with mental imagery,

or used as subscales (e.g., imagery distress or impact on day-to-day behaviour). The FMPS (Frost, Marten, et al., 1990) and the Imagery Interview was explored in a non-clinical sample (N = 59), and examined the relationships between perfectionism, imagery, and perfectionistic behaviours (e.g., checking performance and avoiding tasks) using the behavioural domain questionnaire (Lee et al., 2011). After using a median split to distinguish between individuals high and low in perfectionism on the basis of overall FMPS scores, the authors found that the individuals ratings for their overall experience of mental imagery was significantly higher for the participants with high perfectionism compared to low perfectionism. Additionally, individuals high in perfectionism experienced more distress, found it harder to dismiss the images, and experienced a negative impact from perfectionism related mental imagery. The overall experience of mental imagery also predicted higher checking behaviours and a greater difficulty completing the task as measured by the behavioural domain questionnaire. Further evaluation of the relationship is required as the study was largely exploratory and used a relatively small sample.

It is also important to consider that the use of an Imagery Interview is not feasible across such a large sample, as each interview would last between 30 to 60 minutes depending on the participant, as such the use of a validated self-report measure of mental imagery would allow for an evaluation of mental imagery in perfectionism in a larger sample. Deeprose and Holmes (2010) identified that as mental imagery can be experienced in any sensory domain (Hackmann et al., 2011) the general assessments of mental imagery (e.g., Spontaneous Use of Imagery Questionnaire; Reisberg, Pearson, & Kosslyn, 2003) or the vividness of mental imagery generation (e.g., Vividness of Visual Imagery; Marks, 1973) do not adequately assess intrusive prospective mental imagery. Given the lack of specific measures that assess intrusive prospective mental imagery, Deeprose and Holmes (2010) developed an adaptation of the impact of events scale – revised (Weiss & Marmer, 1997), which was designed assess the impact of intrusive prospective mental imagery across multiple sensory domains.

Given the significant impact mental imagery has on emotion (Holmes & Mathews, 2010), mental imagery may be a pathway through which perfectionism results in psychological distress. Research has tended to focus on the impact images may have within the context of a specific disorder (Brewin et al., 2010; Hirsch & Holmes, 2007; Holmes, Blackwell, Burnett Heyes, Renner, & Raes, 2016; Holmes,

Crane, Fennell, & Williams, 2007). There has been a lack of research focusing on the relative impact of mental imagery within a transdiagnostic process (i.e., perfectionism) that may be common to the development and maintenance of many of these disorders. The evaluation of the impact of mental imagery in perfectionism may further inform theory as to the relevant modes of cognition that may drive psychological distress and could become an important transdiagnostic treatment focus across a range psychopathologies. Mental imagery-based techniques have already been used to enhance existing treatments for emotional disorders (McEvoy et al., 2015; McEvoy & Saulsman, 2014), and if mental imagery is found to be an important indirect pathway between perfectionism and psychological distress then techniques such as imagery rescripting could be incorporated in the treatment of perfectionism.

To date, research has not explored both repetitive negative thinking and mental imagery within the same model as possible intermediate variables between perfectionism and psychological distress. In addition, research has only assessed perfectionistic concerns and perfectionistic strivings through the use of either the FMPS or HMPS. No research to date has evaluated whether a measure of clinical perfectionism such as the CPQ (Fairburn et al., 2003a) further contributes to understanding the relationship between perfectionism and psychological distress. The inclusion of clinical perfectionism can directly inform the cognitive-behavioural model of perfectionism and treatments of perfectionism, whereas the inclusion of a multidimensional perfectionism scale would enable comparisons to previous findings.

The main objective of the present study was to investigate the relationship between perfectionism, repetitive negative thinking, mental imagery, and psychological distress by comparing three models. The first model evaluated the indirect effect of perfectionistic concerns and perfectionistic strivings on psychological distress via repetitive negative thinking. The second model included mental imagery as an additional intermediate variable between perfectionistic concerns, perfectionistic strivings, and psychological distress. The third model tested whether clinical perfectionism, in addition to perfectionistic concerns and perfectionistic strivings, had unique direct and indirect relationships with psychological distress via the two intermediate variables. The models were evaluated in this sequential way so that findings could be compared to and extend earlier

literature that included only a subset of these constructs. Testing the first model would allow for a comparison between the present population and previous research that only investigated repetitive negative thinking as an intermediate variable. It would also allow for the test of the prediction that there is a direct relationship between perfectionistic concerns and psychological distress, in addition to an indirect relationship through repetitive negative thinking. By establishing the indirect relationship between perfectionism and psychological distress through repetitive negative thinking and then only adding mental imagery in model 2 would allow for a more direct evaluation of the proportion of unique variance explained in psychological distress when mental imagery is included as an additional indirect pathway. The addition of mental imagery would allow for the test of the prediction that there is a direct relationship between perfectionistic concerns and psychological distress, and an indirect relationship through mental imagery rather than repetitive negative thinking. Finally, the third model included a measure of clinical perfectionism to determine the relative contribution it makes to the explanation of the relationship between perfectionism and psychological distress. To date, the clinical perfectionism measure has not been evaluated in a structural equation model with repetitive negative thinking and mental imagery as intermediate variables.

5.2. Method

5.2.1. Participants

Kline (2005) recommends 20 participants per free parameter in structural equation models. The most complex model (Model 3) has 20 free parameters, therefore an adequate sample size was 400 participants. Participants were recruited via convenience sampling from the community through flyers placed at a University, local newspaper and radios ads, a link placed on a social networking website, and via an undergraduate psychology research register with course credit awarded for participation.

There were 456 participants recruited and 397 participants completed all essential questionnaires (87.1% completion rate). The sample was predominantly female (67.8%), with an average age of 28.09 years (SD = 11.09; range = 17 – 69); age did not differ significantly between females (M = 28.52, SD = 11.05) and males (M = 27.55, SD = 10.86), $F(1, 376) = .60$, *ns*, $\eta^2 = .001$. There were 31.2% of participants working full-time, 8.6% working part-time, 7.8% University students, 1.8% carers/retired, and 50.6% did not report occupation.

5.2.2. Measures

5.2.2.1. Perfectionism.

5.2.2.1.1. The Frost Multidimensional Perfectionism Scale (Frost, Marten, et al., 1990). The FMPS is a 35-item questionnaire divided into six subscales. For the purposes of this study, only the 9-item Concern over Mistakes (negative reactions to mistakes) and 5-items representing pure Personal Standards (setting high standards personal standards without it being contingent upon self-worth; DiBartolo, Frost, Chang, LaSota, & Grills, 2004) subscales were used as measures of perfectionistic concerns and perfectionistic strivings, respectively. Items are rated on a 5-point Likert scale according to the degree to which the participant agrees with them. Higher scores on Concern over Mistakes or Personal Standards represented higher levels of perfectionistic concerns or perfectionistic strivings respectively. The FMPS and its subscales have good internal consistency and validity (Bardone-Cone et al., 2007; Egan, Wade, et al., 2011). Internal consistencies in the present study was good for Concern over Mistakes ($\alpha = .87$) and Personal Standards ($\alpha = .80$) subscales.

5.2.2.1.1. The Clinical Perfectionism Questionnaire (Fairburn et al., 2003b). The CPQ is a 12-item self-report measure designed to measure clinical perfectionism. Participants rate items using a 4-point Likert scale to indicate the extent to which each item describes them. Scores range from 12 to 48, with higher scores indicating higher levels of clinical perfectionism. The CPQ has demonstrated good internal consistency, and has been associated with measures of perfectionistic concerns and perfectionistic strivings, and psychological distress which demonstrated convergent validity, and predictive validity (Chang & Sanna, 2012; Dickie et al., 2012; Egan et al., 2016; Steele, O'Shea, et al., 2011). Internal consistency in the present study was good ($\alpha = .82$).

5.2.2.2. Repetitive Negative Thinking.

5.2.2.2.1. The Repetitive Negative Thinking - Short scale (RTQ-10; Mahoney et al., 2012). The RTQ-10 was adapted from the Repetitive Thinking Questionnaire (RTQ; McEvoy et al., 2010). Respondents rate statements about the experience on a 5-point Likert scale (ranging from “1 = not true at all” to “5 = very true”). Higher scores indicate greater engagement in repetitive negative thinking. The RTQ-10 contained six items with references to both thoughts and images, so all references to images were removed so as to not confound the additional use of mental imagery measures in the present study. The RTQ-10 has excellent internal

consistency (α = .89), is highly correlated with the full scale (*r* = .95), and has comparable convergent validity to the full scale (Mahoney et al., 2012). Internal consistency in the present study was high (α = .88).

5.2.2.3. Mental imagery.

5.2.2.3.1. The Impact of Future Events Scale (IFES; Deeprose & Holmes, 2010). The IFES was included to measure mental imagery related to the future (Deeprose & Holmes, 2010). The participants responded to 24 Likert type items on a 5-point scale, examining prospective mental imagery experience, avoidance, and hyper-arousal related to the mental imagery (Deeprose & Holmes, 2010). The measure of mental imagery used in the study is both a measure about the mental imagery representation of the experience, and emotional impact of the mental imagery. The IFES was adapted from the IES-R scale (Weiss & Marmer, 1997) by adapting the items to refer to the future rather than the past. Deeprose and Holmes (2010) developed an additional two questions that pertained to feeling optimistic and feeling energetic as additional aspects of hyperarousal regarding the future. Deeprose and Holmes (2010) explained that even positive aspects of hyperarousal (i.e., excitation) could become negative when it is associated with a pre-occupation with the future and goal pursuit. Higher scores on this scale reflect a greater experience of intrusive prospective, personally relevant mental imagery. Results for the IFES indicate good test-retest reliability (*r* = .73) and good reliability (α = .87) (Deeprose & Holmes, 2010; Deeprose, Malik, & Holmes, 2011). Internal consistency in the present study was high (α = .92).24

5.2.2.4. Psychological distress.

5.2.2.4.1. The Depression, Anxiety and Stress Scale-21. (Lovibond & Lovibond, 1995a). The DASS-21 is a 21-item scale assessing depression, anxiety, and stress within the past week. Individuals rate items on a 4-point Likert scale. Scores on the subscale items are summed to indicate a range of symptom severity. Strong reliability and validity has been demonstrated (Antony, Bieling, et al., 1998). For the purpose of this study, the scores from the separate depression, anxiety, and stress scales were summed to create a composite score representing psychological distress (Lovibond & Lovibond, 1995b). Internal consistency in the present study was high (α = .95).

5.2.3. Procedure

The research was approved by the Curtin University Human Research Ethics Committee (HR88/2012). Each participant provided informed consent before completing questionnaires online that included the above measures hosted through the online survey site Qualtrics. Participants were informed that their responses were confidential as no identifying information was collected and that they could withdraw at any time prior to completing the questionnaires. Participants could place their name into a draw for a $25 AUD gift voucher, while university participants who required research participation for their course were credited participation points for completing the survey. Participation took approximately 25 minutes to complete.

5.2.4. Data analysis

Confirmatory factor analyses (CFA) were first performed with maximum likelihood estimation using Mplus version 7.4 (Muthén & Muthén, 1998) to test the factor structure of each measure and ensure the measurement model optimally reflected the latent constructs. Furthermore, Modification Indices (MIs > 20, Hu & Bentler, 1999) were examined and theoretically defensible paths were freed. Chi-square difference tests were used to compare model fit following modifications. Goodness-of-fit was assessed using the chi-square statistic and degrees of freedom (Chi-square/df; values should be <2.0), Comparative Fit Index (CFI; values should be ≥0.95), Root Mean Square Error of Approximation (RMSEA; values should be ≤0.06), Tucker-Lewis Index (TLI; values should be ≥0.95), Standardised Root Mean Square Residual (SRMR; values should be ≤0.08) (Hu & Bentler, 1999).

After confirmation of adequate fit of the measurement models, structural equation modelling was implemented using Mplus to test three models. The significance values for both direct and indirect pathways were estimated with a 95% confidence interval using a bootstrapping procedure based on 1000 draws from the data. The first model tested the direct pathways between perfectionistic concerns, perfectionistic strivings, and psychological distress, in addition to the indirect relationships via repetitive negative thinking. The second model was the same as the first model except that mental imagery was included as an additional intermediate variable. The third model was the same as the second model but included clinical perfectionism as an additional predictor (see Figure 5). Each model was run with and without the control variables of age and gender and the pattern of significant results

did not change; therefore results from the most parsimonious models without control variables are reported.

5.3. Results

5.3.1. Confirmatory Factor Analyses

Prior to testing each of the three structural equation models CFA was conducted to test the factor structure of each measure and ensure the measurement models provided an adequate fit to the data. For perfectionistic strivings, a single factor model provided a good fit ($\chi^2[N = 5] = 19.35$, $p < .001$, CFI = .977, RMSEA = .085, SRMR = .029), so this model was retained. For perfectionistic concerns, a single factor model also provided a good fit ($\chi^2[N = 27] = 113.46$, $p < .001$, CFI = .933, RMSEA = .090, SRMR = .045), although the MI (29.31) indicated that items 25 and 34 were highly related. Both items are about others' reactions to the individual's mistakes (item 25 "If I do not do as well all the time, people will not respect me" and item 34 "The fewer mistakes I make, the more people will like me.") so their covariance was freed, which improved model fit ($\Delta \chi^2[N = 1] = 29.21$, $p < .001$, CFI = .955, RMSEA = .075, SRMR = .039).

For repetitive negative thinking, a single factor model from the initial CFA revealed good fit so no modifications were considered ($\chi^2[N = 35] = 100.90$ $p < .001$, CFI = .972, RMSEA = .069, SRMR = .031). For psychological distress measurement model, the three depression, anxiety, and stress scores were used as indicators of the psychological distress latent variable. The model was just-identified (i.e., zero degrees of freedom), so goodness of fit does not apply. However, the standardised indicator loadings were high (.87-.89) with the latent variable explaining between 76% and 79% of the variance in indicator scores.

Considering the mental imagery factor, the initial CFA revealed a poor fit ($\chi^2[N = 252] = 1483.78$, $p < .001$, CFI = .745, RMSEA = .111, SRMR = .084). Items 1 ("I believed my thoughts about the future would definitely happen and would become real.") and 23 ("I felt energetic and excitable.") loaded weakly on the latent mental imagery construct (*r*s = .20 and .06, respectively). Items 2 and 15 were highly correlated (MI = 112) with both items assessing sleep (item 2 "I had trouble staying asleep." and item 15 "I had trouble falling asleep."). Items 1 and 23 were removed and items 2 and 15 were allowed to covary before conducting a second CFA, which provided better but not ideal fit ($\chi^2[N = 208] = 1003.29$, $p < .001$, CFI = .823, RMSEA = .098, SRMR = .068). In this model items 8 and 11 (MI = 60), which both

measured avoiding the future (item 8 “I stayed away from reminders of the future.” and item 11 “I tried not to think about the future.”), and items 11 and 17 (MI = 58), which both measured the individual removing thoughts about the future (item 11 “I tried not to think about the future.” and item 17 “I tried to remove thoughts of the future from my mind.”), were highly correlated, so were allowed to covary before conducting a third CFA. A third CFA revealed improved, although still not ideal model fit ($\chi^2[N = 206] = 898.72$, $p < .001$, CFI = .846, RMSEA = .092, SRMR = .065), but no further modifications were deemed to be theoretically defensible.

For clinical perfectionism, the initial CFA revealed a poor model fit ($\chi^2[N = 54] = 383.47$, $p < .001$, CFI = .722, RMSEA = .124, SRMR = .091), with items 2 and 8 demonstrating the weakest loadings ($r = .035$ and .028, respectively). Items 2 (“Over the past month, have you tended to focus on what you have achieved, rather than on what you have not achieved?”) and 8 (“Over the past month, have you done just enough to get by?”) are the only reversed scored items and have demonstrated poor fit previously (Egan et al., 2016), so they were removed before running a second CFA. Fit improved but remained poor ($\chi^2[N = 35] = 233.49$, $p < .001$, CFI = .808, RMSEA = .120, SRMR = .074). The modification indices (MI) indicated items 3 and 10 should be covaried (MI = 60), which can be explained by both items asking about others’ opinions of the individual (item 3 “Over the past month, have you been told your standards are too high?” and item 10 “Over the past month, do you think that other people would have thought of you as a “perfectionist”?”). Item 1 (“Over the past month, have you pushed yourself really hard to meet your goals?”) also had a weak loading on the clinical perfectionism factor ($r = .22$) and was removed. A third CFA without items 1, 2, and 8, and with items 3 and 10 covaried, demonstrated good fit ($\chi^2[N = 26] = 80.64$, $p < .001$, CFI = .940, RMSEA = .073, SRMR = .046). Descriptive statistics and correlations for these variables of interest can be seen in Table 6.

Figure 5.

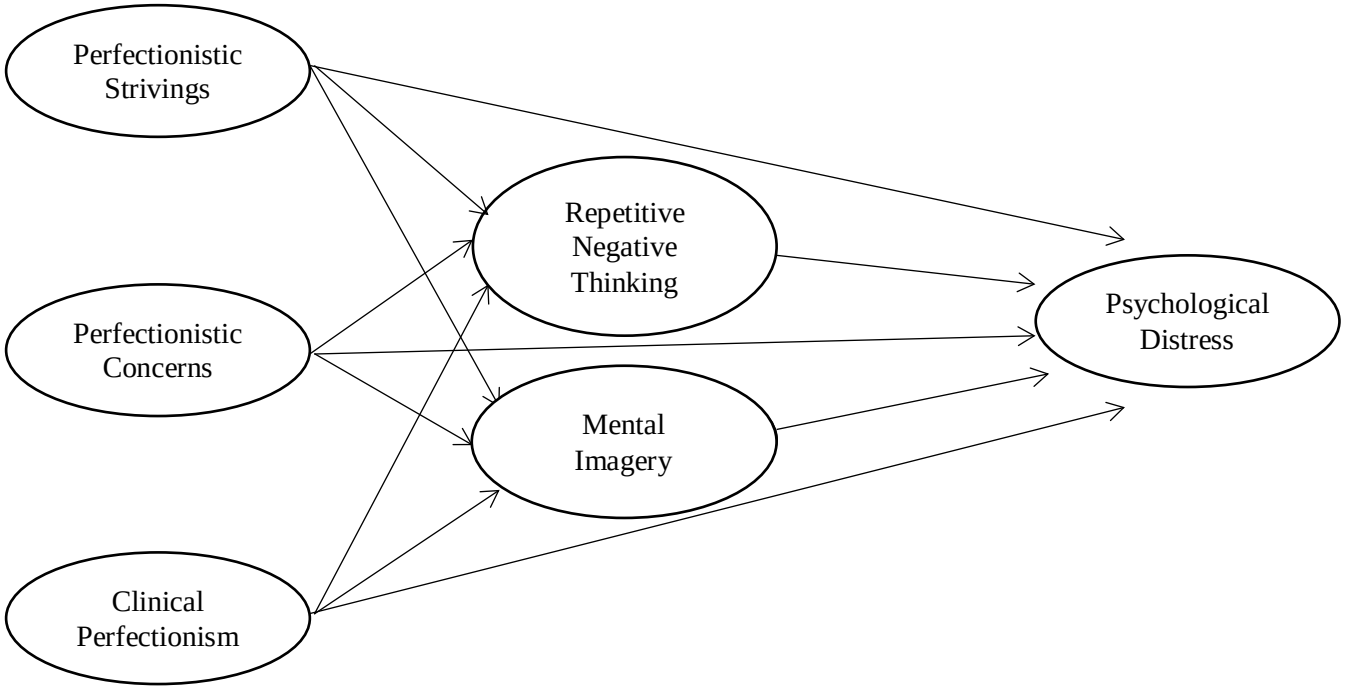

Figure 5. All structural pathways tested between perfectionistic concerns, perfectionistic strivings, clinical perfectionism, repetitive negative thinking, mental imagery, and psychological distress.

Model 1 included all pathways involving perfectionistic striving, perfectionistic concerns, repetitive negative thinking, and psychological distress only. Model 2 included Model 1 pathways plus mental imagery. Model 3 included all Model 2 pathways plus clinical perfectionism.

Table 6. *Means, standard deviations, and correlations between variables of interest.*
(N = 397)

	Mean	Std. Deviation	Range	Range	1	2	3	4	5	6	7	8
1. Perfectionistic concerns	24.52	6.69	10 - 43	10 - 43	-							
2. Perfectionistic strivings	16.98	3.91	6 - 25	6 - 25	.37**	-						
3. Clinical Perfectionism	17.51	4.57	15 - 45	15 - 45	.61**	.48**	-					
4. Repetitive Negative Thinking	30.21	10.42	10 - 50	10 - 50	.39**	.10*	.49**	-				
5. Impact of Future Events Scale	44.59	16.70	2 - 92	2 - 92	.36**	.09	.42**	.56**	-			
6. Depression	10.25	5.58	0 - 23	0 - 23	.40**	-.02	.36**	.44**	.75**	-		
7. Anxiety	9.41	4.89	0 - 21	0 - 21	.35**	.06	.39**	.44**	.76**	.77**	-	
8. Stress	12.97	5.17	0 - 23	0 - 23	.44**	.19**	.52**	.55**	.75**	.76**	.77**	-

Note: **$p < .001$; *$p < .05$

5.3.2. Structural Equation Models

Model 1. In testing the hypothesis that participant's scores on perfectionistic concerns are associated directly with greater psychological distress scores, in addition to perfectionistic concerns predicting repetitive negative thinking, which in turn predicts psychological distress, first there should be a significant relationship between perfectionism and psychological distress. Second, there should be a significant relationship between perfectionism and repetitive negative thinking, and between repetitive negative thinking and psychological distress.

To test this the first model included all the measurement models without structural pathways, and this model provided a poor fit to the data, $\chi^2(N = 323) = 1042.72$, $p < .001$, CFI = .872, RMSEA = .075 (90% CI = .070; .080) $p < .05$, SRMR = .193. When the structural pathways were included, a chi-square difference test suggested a significantly improved model fit, $\Delta\chi^2(N = 6) = 308.81$, $p < .001$. The first model with structural pathways provided an adequate fit to the data, $\chi^2(N = 317) = 733.91$, $p < .001$, CFI = .926, RMSEA = .058 (90% CI = .052; .063) $p < .001$, SRMR = .069, and accounted for a statistically significant proportion of variance in psychological distress ($R^2 = .42$, $p < .001$).

Consistent with the hypotheses, there were statistically significant direct positive effects of perfectionistic concerns on repetitive negative thinking (β = .46, $p < .001$, SE = 0.057, 95% CI = .350; .574) and psychological distress (β = .34, $p < .001$, SE = 0.059, 95% CI = .219; .451). There was also a statistically significant direct effect of repetitive negative thinking on psychological distress (β = .46, $p < .001$, SE = 0.046, 95% CI = .367; .547), and a significant positive indirect effect of perfectionistic concerns on psychological distress through repetitive negative thinking (β = .21, $p < .001$, SE = 0.037, 95% CI = .138; .284). As perfectionistic strivings did not have a statistically significant effect on repetitive negative thinking (β = -.07, $p = ns$, SE = 0.063, 95% CI = -.197; .051) or psychological distress (β = -.09, $p = ns$, SE = 0.057, 95% CI = -.197; .051) this pathway was removed to yield the most parsimonious model.

Model 1 was reanalysed by looking at the relationship between perfectionistic concerns, repetitive negative thinking, and psychological distress without perfectionistic strivings. The adjusted model indicated adequate fit, $\chi^2(N = 319) = 737.54$, $p < .001$, CFI = .925, RMSEA = .057 (90% CI = .049; .062), $p < .05$, SRMR = .071, with only a small reduction in the CFI (.001) and RMSEA (.001) compared

to the model with perfectionistic strivings. The model also continued to account for a statistically significant proportion of variance in psychological distress (r^2 = .41, p < .001). There were statistically significant direct positive effects of perfectionistic concerns on repetitive negative thinking (β = .42, p < .001, SE = 0.047, 95% CI = .331; .515) and psychological distress (β = .29, p < .001, SE = 0.050, 95% CI = .187; .384). There was also a statistically significant direct effect of repetitive negative thinking on psychological distress (β = .47, p < .001, SE = 0.046, 95% CI = .156; .337). A statistically significant positive indirect effect of perfectionistic concerns on psychological distress through repetitive negative thinking was observed (β = .20, p < .001, SE = 0.033, 95% CI = .133; .263). See Table 6 for the standardised coefficients of the initial and final structural models for Model 1.

Table 7. *Standardised coefficients (95% confidence intervals) for the initial structural model and final modified structural model for model 1 (N = 397)*

	Pathway	Standardised path coefficient	Standard error	*p*-value (2-tailed)
	Component pathways of the indirect effects			
	PC → RNT	.46 (.350; .574)	0.057	< .001
	PS → RNT	-.07 (-.197; .051)	0.063	.245
	RNT → Distress	.46 (.367; .547)	0.037	< .001
Initial structural model	**Direct pathway**			
	PC → Distress	.34 (.219; .451)	0.059	< .001
	PS → Distress	-.09 (-.197; .051)	0.061	.162
	Overall indirect effects			
	PC → RNT → Distress	.21 (.138; .284)	0.037	< .001
	PS → RNT → Distress	-.03 (-.086; .020)	0.027	.222
	Component pathways of the indirect effects			
	PC → RNT	.42 (.331; .515)	0.047	< .001
	RNT → Distress	.47 (.156; .337)	0.046	< .001
Final modified structural model	**Direct pathway**			
	PC → Distress	.29 (.187; .384)	0.050	< .001
	Overall indirect effects			
	PC → RNT → Distress	. 20 (.133; .263)	0.033	< .001

Note: PC = perfectionistic concerns, PS = perfectionistic strivings, RNT = Repetitive Negative Thinking, Distress = Psychological Distress.

Model 2. In testing the hypothesis that participant's scores on perfectionistic concerns are associated directly with greater psychological distress scores, in addition to perfectionistic concerns predicting mental imagery, which in turn predicts psychological distress, first there should be a significant relationship between perfectionism and psychological distress. Second, there should be a significant relationship between perfectionism and mental imagery, and between mental imagery and psychological distress.

To test this, the second model, which included mental imagery was evaluated and indicated poor model fit, $\chi^2(N = 1114) = 2805.83$, $p < .001$, CFI = .847, TLI = .839, RMSEA = .062 (90% CI = .059; .065) $p < .001$, SRMR = .108. However, this model did provide a significant improvement over the measurement model without the structural pathways, $\Delta\chi^2(N = 9) = 697.36$, $p < .001$, and the structural model accounted for a large and statistically significant proportion of the variance in psychological distress ($r^2 = .82$, $p < .001$).

There were statistically significant direct positive effects of perfectionistic concerns on repetitive negative thinking (β = .52, $p < .001$, SE = 0.056, 95% CI = .410; .630), mental imagery (β = .53, $p < .001$, SE = 0.056, 95% CI = .416; .636), and psychological distress (β = .15, $p = .001$, SE = 0.045, 95% CI = .057; .233). There was also a statistically significant direct effect of mental imagery on psychological distress (β = .82, $p < .001$, SE = 0.028, 95% CI = .776; .886).

There was a statistically significant positive indirect effect of perfectionistic concerns on psychological distress through mental imagery (β = .42, $p < .001$, SE = 0.055, 95% CI = .315; .531). As perfectionistic strivings did not have a statistically significant effect on mental imagery (β = -.12, $p = .052$, SE = 0.063, 95% CI = -.247; .001), and neither perfectionistic strivings nor repetitive negative thinking had a significant effect on psychological distress (β = -.06, $p = ns$, SE = 0.040, 95% CI = -.137; .021, and β = .05, $p = ns$, SE = 0.040, 95% CI = -.026; .132, respectively), these constructs were subsequently removed from the model.

Model 2 was reanalysed by looking at the relationship between perfectionistic concerns, mental imagery, and psychological distress without perfectionistic strivings or repetitive negative thinking. Compared to the model with perfectionistic strivings and repetitive negative thinking, the CFI (.009) and RMSEA (.002) slightly improved, but the overall fit was still inadequate, $\chi^2(N = 1116) = 2710.40$, $p < .001$, CFI = .856, TLI = .848, RMSEA = .060 (90% CI = .057; .063) $p < .001$, SRMR =

.070. The model continued to account for a large and statistically significant amount of variance in psychological distress (r^2 = .82, p < .001). Consistent with the predictions, there were statistically significant direct positive effects of perfectionistic concerns on mental imagery (β = .42, p < .001, SE = 0.046, 95% CI = .334; .514) and psychological distress (β = .12, p < .001, SE = 0.035, 95% CI = .052; .190). There was also a statistically significant direct effect of mental imagery on psychological distress (β = .85, p < .001, SE = 0.023, 95% CI = .803; .893). In terms of indirect effects, there was a statistically significant positive indirect effect of perfectionistic concerns on psychological distress through mental imagery (β = .36, p < .001, SE = 0.046, 95% CI = .270; .450). See Table 7 for the standardised coefficients of the initial and final structural models for Model 2.

Table 8. *Standardised coefficients (95% confidence intervals) for the initial structural model and final modified structural model for model 2 (N = 397)*

	Pathway	Standardised path coefficient	Standard error	*p*-value (2-tailed)
	Component pathways of the indirect effects			
	PC → RNT	.52 (.410; .630)	0.056	< .001
	PS → RNT	-.11 (-.238; .009)	0.063	.070
	PC → Mental imagery	.53 (.416; .636)	0.056	< .001
	PS → Mental imagery	-.12 (-.247; .001)	0.063	.052
	RNT → Distress	.05 (-.026; .132)	0.040	.184
	Mental imagery → Distress	.82 (.776; .886)	0.028	< .001
Initial structural model	**Direct pathway**			
	PC → Distress	.15 (.057; .233)	0.045	< .001
	PS → Distress	-.06 (-.137; .021)	0.040	.141
	Overall indirect effects			
	PC → RNT → Distress	.03 (-.034; .090)	0.024	.255
	PS → RNT → Distress	-.01 (-.020; .008)	0.007	.416
	PC → Mental imagery → Distress	.42 (.315; .531)	0.055	< .001
	PS → Mental imagery → Distress	-.10 (-.213; .011)	0.057	.076
	Component pathways of the indirect effects			
	PC → Mental imagery	.42 (.334; .514)	0.046	< .001
	Mental imagery → Distress	.85 (.803; .893)	0.023	< .001
Final modified structural model	**Direct pathway**			
	PC → Distress	.12 (.052; .190)	0.035	< .001

Overall indirect effects			
PC → Mental imagery → Distress	.36 (.270; .450)	0.046	< .001

Note: PC = perfectionistic concerns, PS = perfectionistic strivings, RNT = Repetitive Negative Thinking, Distress = Psychological Distress.

Model 3. To test the prediction that clinical perfectionism would explain addition variance of psychological distress, beyond what is accounted for by perfectionistic concerns, first there should be a significant relationship between clinical perfectionism and psychological distress after controlling for the relationship between perfectionistic concerns and psychological distress. Second, there should be a significant relationship between clinical perfectionism and mental imagery thinking, and between mental imagery and psychological distress.

This third model, which included clinical perfectionism, was initially tested and indicated poor fit, χ^2 (N = 1575) = 3563.69, p < .001, CFI = .843, TLI = .835, RMSEA = .056 (90% CI = .054; .059) p < .001, SRMR = .069. However, this model did provide a significant improvement over the measurement model without the structural pathways, $\Delta\chi^2(N = 15) = 1127.00$, $p < .001$, and the structural model accounted for a large and statistically significant proportion of the variance in psychological distress ($r^2 = .83$, $p < .001$).

As predicted there were statistically significant direct positive effects of clinical perfectionism on repetitive negative thinking (β = .69, $p < .001$, SE = 0.095, 95% CI = .506; .880), and mental imagery (β = .58, $p < .001$, SE = 0.097, 95% CI = .390; .772). There was a statistically significant direct negative effect of perfectionistic strivings on repetitive negative thinking (β = -.28, $p < .001$, SE = 0.068, 95% CI = -.417; -.149), mental imagery (β = -.26, $p < .001$, SE = 0.068, 95% CI = -.393; -.125), and psychological distress (β = -.10, $p = .026$, SE = 0.047, 95% CI = -.191; -.007). There was also a statistically significant direct effect of mental imagery on psychological distress (β = .82, $p < .001$, SE = 0.035, 95% CI = .746; .884). In terms of indirect effects, there was a statistically significant positive indirect effect of clinical perfectionism on psychological distress through mental imagery (β = .47, $p < .001$, SE = 0.090, 95% CI = .297; .651). There was also a significant negative indirect effect of perfectionistic strivings on psychological distress through mental imagery (β = -.21, $p < .001$, SE = 0.058, 95% CI = -.325; -.097). As neither perfectionistic concerns nor repetitive negative thinking had a statistically significant relationship with psychological distress or mental imagery these constructs were subsequently removed.

Model 3 was reanalysed by looking at the relationship between clinical perfectionism, perfectionistic strivings, mental imagery, and psychological distress without perfectionistic concerns or repetitive negative thinking. The CFI and

RMSEA remained unchanged from the initial model, fit overall, χ^2(N = 1578) = 3569.011, $p < .001$, CFI = .843, TLI = .835, RMSEA = .056 (90% CI = .054; .059) $p < .001$, SRMR = .069, but this more parsimonious model continued to account for a large and statistically significant proportion of variance in psychological distress ($r^2 = .83$, $p < .001$).

There were statistically significant direct positive effects of clinical perfectionism on mental imagery (β = .69, $p < .001$, SE = 0.061, 95% CI = .567; .807), and psychological distress (β = .20, $p < .001$, SE = 0.054, 95% CI = .098; .310). There was a statistically significant direct negative effect of perfectionistic strivings on mental imagery (β = -.27, $p < .001$, SE = 0.070, 95% CI = -.405; -.129), and psychological distress (β = -.10, $p = .032$, SE = 0.046, 95% CI (-.191; -.007). Mental imagery also had a significant direct effect on psychological distress (β = .81, $p < .001$, SE = 0.032, 95% CI = .742; .868).

In terms of indirect effects, there was a statistically significant positive indirect effect of clinical perfectionism on psychological distress through mental imagery (β = .55, $p < .001$, SE = 0.056, 95% CI = .443; .663). There was also a significant negative indirect effect of perfectionistic strivings on psychological distress through mental imagery (β = -.22, $p < .001$, SE = 0.061, 95% CI = -.335; -.095). See Table 8 for the standardised coefficients of the initial and final structural model for Model 3. The final model is also illustrated in Figure 6.

Table 9. *Standardised coefficients (95% confidence intervals) for the initial structural model and final modified structural model for model 3 (N = 397)*

	Pathway	Standardised path coefficient	Standard error	*p*-value (2-tailed)
	Component pathways of the indirect effects			
	PC → RNT	.05 (-.126; .216)	0.087	.602
	PS → RNT	-.28 (-.417; -.149)	0.068	.070
	CP → RNT	.69 (.506; .880)	0.095	< .001
	PC → Mental imagery	-.12 (-.296; .050)	0.088	.178
	PS → Mental imagery	-.26 (-.393; -.125)	0.068	< .001
	CP → Mental imagery	.58 (.390; .772)	0.097	< .001
	RNT → Distress	-.01 (-.101; .075)	0.045	.770
	Mental imagery → Distress	.82 (.746; .884)	0.035	< .001
Initial structural model	**Direct pathway**			
	PC → Distress	.10 (-.009; .207)	0.055	.072
	PS → Distress	-.10 (-.191; -.007)	0.047	< .001
	CP → Distress	.12 (-.026; .272)	0.076	.104
	Overall indirect effects			
	PC → RNT → Distress	<-.001 (-.014; .009)	0.005	.903
	PS → RNT → Distress	< .004 (-.020; .008)	0.007	.795
	CP → RNT → Distress	-.01 (-.164; .146)	0.034	.791
	PC → Mental imagery → Distress	.10 (-.213; .011)	0.079	.224
	PS → Mental imagery → Distress	-.21 (-.325; -.097)	0.058	< .001
	CP → Mental imagery → Distress	.47 (.297; .651)	0.090	< .001
	Component pathways of the indirect effects			

	PS → Mental imagery	-.27 (-.405; -.129)	0.070	< .001
	CP → Mental imagery	.69 (.567; .807)	0.061	< .001
	Mental imagery → Distress	.81 (.742; .868)	0.032	< .001
Final modified structural model	**Direct pathway**			
	PS → Distress	-.10 (-.191; -.007)	0.046	.032
	CP → Distress	.20 (.098; .310)	0.054	< .001
	Overall indirect effects			
	PS → Mental imagery → Distress	-.22 (-.335; -.095)	0.061	< .001
	CP → Mental imagery → Distress	.55 (.443; .663)	0.056	< .001

Note: PC = perfectionistic concerns, PS = perfectionistic strivings, CP = Clinical Perfectionism, RNT = Repetitive Negative Thinking, Distress = Psychological Distress.

Figure 6.

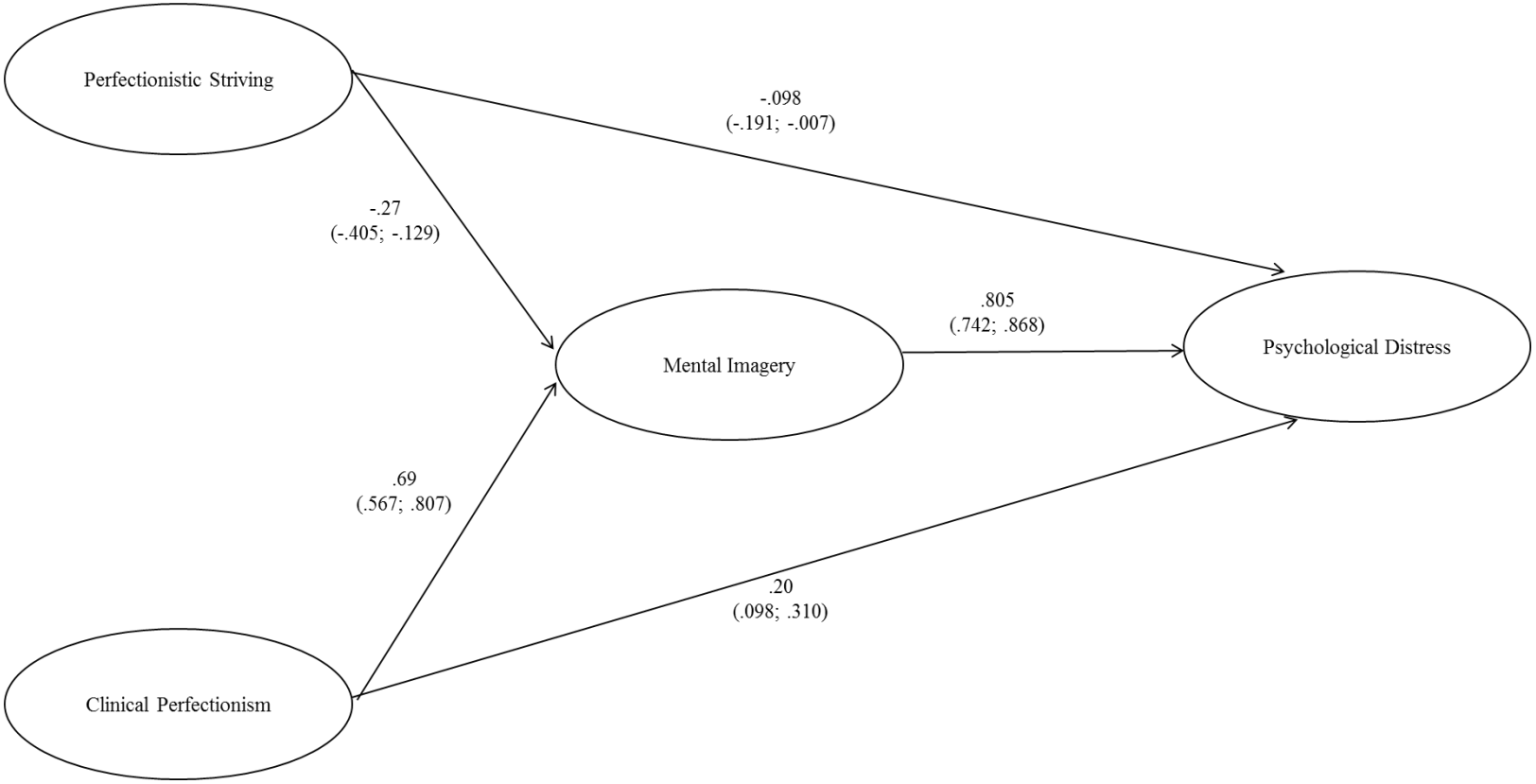

Figure 6. Final structural equation model (model 3). Ovals represent latent variables. Only significant pathways coefficients represented. All coefficients are standardised with 95% confidence intervals in parentheses.

5.4. Discussion

The aim of the present study was to investigate the relative contribution of mental imagery and repetitive negative thinking in the relationship between perfectionism and psychological distress. When only considering perfectionistic strivings, perfectionistic concerns, repetitive negative thinking, and psychological distress, perfectionistic strivings did not significantly predict psychological distress either directly or indirectly. Rather, perfectionistic concerns predicted psychological distress directly, and indirectly via repetitive negative thinking. The indirect relationship via repetitive negative thinking is consistent with previous research (Di Schiena et al., 2012; Egan, Hattaway, et al., 2014; Macedo et al., 2015; Short & Mazmanian, 2013) and suggests repetitive negative thinking could be an important factor that can explain the relationship between perfectionism and psychological distress. Further, the finding that perfectionistic concerns directly predicted psychological distress is also in line with evidence that consistently links maladaptive facets of perfectionism with a range of symptoms of psychopathology in both clinical and non-clinical samples (Egan, Wade, et al., 2011; Limburg et al., in press). The findings that perfectionistic strivings was not related to psychological distress is also consistent with past research, at least in non-clinical samples (Egan, Wade, et al., 2011; Limburg et al., in press).

The findings from the present study demonstrated that when mental imagery was included in the model the direct relationship between repetitive negative thinking and psychological distress became non-significant, mental imagery had a stronger relationship with psychological distress than repetitive negative thinking, and this model explained twice the variance in psychological distress (R^2 = .41 for Model 1 vs. .82 for Model 2). The relative dominance of mental imagery over repetitive negative thinking in explaining psychological distress is consistent with theory and evidence that mental imagery has a more potent impact on emotion than verbal-linguistic cognitive activity (e.g., Borkovec et al., 2004; Holmes et al., 2008).

The finding that mental imagery carries a powerful indirect pathway between perfectionism and psychological distress is consistent with Lee et al. (2011) finding that individuals with elevated perfectionism experience images that are distressing and difficult to dismiss. The findings also serve as evidence for Deeprose and Holmes (2010) conclusion that even potentially positive images may be associated with psychological distress within the context of a pre-occupation with the future and

goal pursuit as is often the focus within perfectionism. The results therefore lend weight to the notion that mental imagery has a powerful association with subsequent emotional experiences and should be targeted in treatment of perfectionism. It could be useful for future research to examine whether imagery-based techniques such as imagery rescripting (Egan, Wade, Shafran, & Anthony, 2014), which would specifically target distress caused by images, could have a more direct and potent influence on emotion compared to techniques designed to modify affect within the verbal mode (e.g., cognitive restructuring of verbal thoughts).

These findings revealed that when the clinical perfectionism was added, the indirect relationship between perfectionistic concerns and psychological distress through mental imagery became non-significant, while clinical perfectionism directly and indirectly predicted psychological distress through mental imagery. Importantly, there was a stronger relationship between clinical perfectionism and mental imagery relative to that observed between perfectionistic concerns and mental imagery in model 2. It is not surprising that clinical perfectionism accounted for the variance explained by perfectionistic concerns. Clinical perfectionism was developed from an understanding that individuals base their self-worth on striving for, and achievement of, personally demanding standards. Conceptually, items on the CPQ is similar to items on the concern over mistakes subscale (e.g. item 4 from the CPQ "Over the past month, have you felt a failure as a person because you have not succeeded in meeting your goals?" and Item 9 from the FMPS: "If I fail at work/school, I am a failure as a person"). The finding that perfectionistic concerns was no longer significant once clinical perfectionism was included also suggests that clinical perfectionism may better capture and explain mental imagery and psychological distress.

The findings from model 3 also revealed that when clinical perfectionism accounted for the variance that was explained by perfectionistic concerns, perfectionistic strivings had a significant negative relationship with mental imagery, even though no such relationship was revealed in the previous models. This significant relationship indicated that perfectionistic strivings was associated with less mental imagery, which, in turn, was associated with less psychological distress. It is unclear why the relationship between perfectionistic strivings and mental imagery became significant in model 3, while in previous models no such relationship was observed. It may be that the clinical perfectionism measure better

discriminates between pathological and non-pathological aspects of perfectionism than perfectionistic concerns, which is based on the FMPS. If this were the case, it would be expected that perfectionistic concerns would capture variance in mental imagery explained by perfectionistic strivings, thereby obscuring the relationship between perfectionistic strivings and mental imagery. In contrast, when clinical perfectionism is included in the model unique relationships between pathological and non-pathological aspects of perfectionism would be expected to become more apparent. The present results were consistent with this explanation. It appears that whilst clinical perfectionism is associated with more intense mental imagery, perfectionistic strivings may be adaptive and associated with less mental imagery. These findings suggest that a combination of clinical perfectionism and the perfectionistic strivings may ideally distinguish between adaptive (i.e., striving for high personal standards) and dysfunctional (i.e., achieving high personal standards is seen as critical for maintaining self-esteem) aspects of perfectionism, at least in non-clinical samples.

Although the present findings suggest perfectionism may have a direct relationship with psychological distress, it is important to also consider alternative explanations. It is plausible that other indirect pathways not measured in the present study would better represent the direct relationship. Specifically, the repetitive negative thinking measure used in the present study evaluated the process of engagement with repetitive negative thinking rather than specific content. Potentially, a measure of specific negative thoughts, such as the Perfectionistic Cognitions Inventory (Flett, Hewitt, Blankstein, & Gray, 1998), may capture a more proximal cognitive variable that could explain additional variance between perfectionism and psychological distress. Another intermediate variable that was not measured was perfectionistic behaviours and this may explain additional variance in psychological distress.

These findings have implications for increasing our understanding of when perfectionism leads to positive and negative outcomes. When an individual is striving for a personally demanding standard, yet they are not concerned about making mistakes and their self-worth is not dependent on meeting these standards, they may be less likely to experience mental imagery about not reaching their standards. Previous research in a non-clinical sample by Smith, Saklofske, Yan, and Sherry (2015) has found that when perfectionistic concerns were controlled for,

perfectionistic strivings were negatively associated with depressive symptoms. However, Smith et al. (2015) used composite scores from a range of subscales, which included subscales from the HMPS (Hewitt & Flett, 1991b), FMPS (Frost, Marten, et al., 1990), and EDI (Garner et al., 1983). The use of these various subscales to assess perfectionistic concerns and strivings may explain why Smith et al. (2015) found that perfectionistic concerns and strivings explained unique variance in psychological distress. Stoeber and Otto (2006) argued that there is significant overlap between perfectionistic concerns and perfectionistic strivings, and that when perfectionistic concerns are controlled for there should be a clearer negative relationship between perfectionistic strivings and psychological distress. The conclusion that researchers can delineate a relationship between perfectionistic strivings and psychological distress was demonstrated in two systematic reviews by Gotwals, Stoeber, Dunn, and Stoll (2012) and Stoeber (2011a) who demonstrated perfectionistic strivings was adaptive after controlling for perfectionistic concerns.

There are several limitations of the present study that should be considered. First, it was not ascertained whether any participants had a psychological disorder, and as such we cannot draw conclusions regarding generalisability to a clinical sample. It remains to be seen whether the same pattern would emerge, whereby mental imagery accounts for all the variance explained by repetitive negative thinking, in a clinical sample, and future research should aim to test this possibility. Second, the cross-sectional nature of this study precludes conclusions about causality or directionality of effects, which are best addressed in experimental and longitudinal designs. These are important directions for future research. Third, throughout this study the models did not achieve what would be considered good model fit (Hu & Bentler, 1999). It is possible that alternative models would produce better model fit. Modification indices suggested some item covariances could be freed, specifically some items that could cross-load onto other latent variables. Bryne (2012) suggested that any changes based on modification indices should be based on statistical and theoretical considerations; as such, the suggested modifications were deemed to not be theoretically defensible and the original model was retained. As such, the present findings should be considered with caution.

An additional consideration regarding the findings is that the measure of repetitive negative thinking captures, at its core, both the process of the thought (i.e., repetitiveness of a thought) and the verbal-linguistic representation of the thought

(i.e., an 'I' statement of the thought). In contrast, the measure of mental imagery used in the study is both a measure about the mental imagery representation of the experience, and emotional impact of the mental imagery. It may be that the large variance accounted for by mental imagery is reflective of the mental imagery measure containing questions that relate to emotional impact. This may point to one of the difficulties of assessing mental imagery, as mental imagery can be experienced in any sensory modality and can come with associated thoughts (Hackmann et al., 2011). Future research should further investigate the present findings, in particular through the presentation of measures of both repetitive negative thinking and mental imagery that assesses both the process and emotional impact of each cognitive product. At this time there is no available measure that assesses the process of repetitive negative thinking and mental imagery separately. Future research could use the RTQ-10, which makes reference to both thoughts and images within the original questions, and separate it into two individual questionnaires, one for the process of repetitive negative thinking, and one for the process of mental imagery. This would allow for a more thorough evaluation of the relative role repetitive negative thinking and mental imagery have as indirect pathways between perfectionism and psychological distress.

Despite these considerations, the present study has identified a potentially important pathway from perfectionism to psychological distress via mental imagery. Mental imagery has been shown to influence the emotional experiences of individuals more powerfully than verbal-linguistic processes, such as repetitive negative thinking (Holmes et al., 2008). Furthermore, Egan, Wade, et al. (2014) identified that imagery-based techniques could easily be incorporated within current perfectionism treatment protocols, just as imagery-based techniques have enhanced treatment protocols for other disorders (Holmes et al., 2009; McEvoy et al., 2015; McEvoy & Saulsman, 2014). Future research could investigate whether imagery-based techniques such as imagery rescripting effectively reduce mental imagery related to perfectionism. Furthermore, imagery-based techniques that promote positive mental imagery can help increase an individual's belief of their own competence, mastery, and self-compassion (Hackmann et al., 2011), which may be of particular benefit for individuals with perfectionism whose self-worth is contingent on meeting excessively high standards.

Chapter 6: Thesis discussion

Major foci for research have been the identification of the transdiagnostic nature of perfectionism and the potential for perfectionism to influence therapeutic outcomes (Egan, Wade, et al., 2011), but to date there has been limited evaluation of the underlying cognitive processes or cognitive products of the cognitive-behavioural model of perfectionism (Shafran et al., 2002). The overall aim of the thesis was to evaluate key hypotheses generated from the cognitive-behavioural model of clinical perfectionism (Shafran et al., 2002) to improve our understanding of the potential cognitive processes and products involved in perfectionism and associated psychological distress. The exploration of cognitive processes, attention and interpretation biases, and cognitive products, repetitive negative thinking and mental imagery, with both experimental and correlational designs addressed important gaps within the perfectionism literature.

The findings from the thesis highlight the presence of an attention bias specific to perfectionism (see Chapter 3). There was a moderate to large effect size noted for the results that indicated that individuals who score high in perfectionistic concerns were more likely to allocate attention to negative information compared to positive information when this information was perfectionism–relevant but not when information was perfectionism-irrelevant. Additionally, a specific perfectionism-relevant interpretation bias was examined with an ambiguous passage task (see Chapter 4). The results indicated that individuals with higher scores on perfectionistic concerns were more likely to impose negative interpretations on scenarios regardless of whether the interpretation depicted an affective or event outcome. Similar to the findings for perfectionistic concerns, individuals with higher scores for perfectionistic strivings were more likely to assign negative interpretations on ambiguous scenarios. An important consideration was that, unlike previous research, we were able to disentangle whether individuals responded to the affective interpretation of perfectionism-relevant scenarios, or whether they responded to their event expectations. Taken together, these findings regarding interpretation bias suggest that individuals rated that there would be a negative outcome as a result of the protagonist not reaching their self-imposed standards. Importantly, the magnitude of the difference between the ratings for negatively and positively valenced test sentences was greater when individuals considered the affective outcome rather than the event outcome. When perfectionistic strivings were considered, individuals

identified that the protagonist would be more likely to experience negative emotions (e.g., sadness) than a negative event outcome (e.g., being ridiculed).

Finally, the relationships between perfectionism, psychological distress, repetitive negative thinking and mental imagery were considered (see Chapter 5). The results indicated that, consistent with previous research investigating repetitive negative thinking alone, perfectionistic concerns predicted repetitive negative thinking, which subsequently predicted greater experiences of psychological distress. However, this relationship was no longer significant when mental imagery was included in the model, which was an important extension to the existing literature. When mental imagery was considered the findings indicated, perfectionistic concerns may lead to repetitive negative thinking and mental imagery, yet only mental imagery continued to predict subsequent psychological distress. Unlike the first model, repetitive negative thinking no longer uniquely predicted psychological distress in the second model. Another important extension to the literature was the inclusion of clinical perfectionism in the model, which resulted in perfectionistic concerns no longer predicting psychological distress or mental imagery. In contrast, clinical perfectionism predicted psychological distress in addition to predicting mental imagery, which was associated with increases in psychological distress. Interestingly, in the final model, higher perfectionistic strivings predicted less mental imagery, which was unexpected given there was no relationship observed between perfectionistic strivings and psychological distress in previous models.

In summary, these findings indicate that mental imagery, rather than repetitive negative thinking, is an important factor to consider in relation to psychological distress. Additionally, clinical perfectionism may be a better measure to capture psychological distress than perfectionistic concerns measured by the FMPS (Frost, Marten, et al., 1990).

6.1. Theoretical Implications of the Thesis

There are several theoretical implications of the current body of research. Most evidently, the present thesis lends weight to the cognitive-behavioural model of clinical perfectionism (Shafran et al., 2002; Shafran et al., 2010). The cognitive-behavioural model of clinical perfectionism predicts that information processing biases play an important role in the development and maintenance of perfectionism. Across two studies in this thesis, concepts related to clinical perfectionism, namely

perfectionistic concerns and perfectionistic strivings were associated with two clear information processing biases (attention and interpretation).

The cognitive-behavioural model of clinical perfectionism suggests that individuals with clinical perfectionism will selectively attend to information that indicates failure, while also discounting their own achievements (Shafran et al., 2002; 2010). The findings demonstrate that perfectionistic concerns are associated with biased attention towards negative, perfectionism-relevant stimuli. The preferential allocation of attention towards negative, perfectionism-relevant stimuli may reflect a plausible mechanism through which individuals may discount their success. If individuals preferentially attend to perfectionism-relevant information that is indicative of negative outcomes (i.e., failure or mistakes) then this information is more likely to be encoded in memory and subsequently recalled (Everaert et al., 2016; Everaert, Koster, & Derakshan, 2012; Everaert, Tierens, Uzieblo, & Koster, 2013; Hirsch, Clark, & Mathews, 2006). This attentional bias may therefore lead to subsequent interpretation and memory biases about the individuals performance (Everaert et al., 2013).

The findings regarding interpretation bias are also broadly consistent with assumptions contained within the cognitive-behavioural model. Based on the cognitive-behavioural model of clinical perfectionism, it was predicted that individuals with higher scores of perfectionistic concerns would demonstrate a negative interpretation bias when an individual did not achieve their original standard, but achieved above what would normally be expected. Based on the cognitive-behavioural model of clinical perfectionism, it is unsurprising to find that perfectionistic strivings is associated with negative interpretations as the very definition of clinical perfectionism includes both the striving for, and concerns about mistakes, in the definition of clinical perfectionism.

These convergent findings across the two core constructs of perfectionism lend further support for the cognitive-behavioural model of clinical perfectionism, which posits that a defining feature of those with clinical perfectionism is an increased tendency to formulate negative interpretations when presented with scenarios that involve perfectionistic beliefs (Shafran et al., 2002). The present results may also provide an explanation for the inconsistent findings observed between perfectionistic strivings and psychological distress (Bieling, Israeli, et al., 2004; Limburg et al., in press; Smith et al., 2016). It is possible that perfectionistic

strivings becomes a vulnerability factor if an individual also demonstrates an interpretation bias towards negative interpretations of scenarios. This explanation is plausible given that depression is characterised by biased interpretations of events (Blackwell & Holmes, 2010; Wisco & Nolen-Hoeksema, 2010; Yiend et al., 2013), and thus may help explain why perfectionistic strivings is a vulnerability factor for depression (Limburg et al., in press).

Theoretical accounts help to explain the link between attention and interpretation and how biases in these processes may influence other cognitive processes (Beck & Clark, 1988, 1997; Shafran et al., 2002). For example, attending to negative, perfectionism-relevant information, may result in extensive elaboration of the meaning and implications of this information (Shafran et al., 2002). Elaboration of the negative, perfectionism-relevant information may lead to biased interpretations, whereby individuals expect negative, perfectionism-relevant information to be more likely, which may subsequently bias their interpretation of outcomes to be consistent with their attentional bias (Maoz et al., 2016; Mathews & MacLeod, 2002; Mathews & MacLeod, 2005; Peschard & Philippot, 2016). It is plausible that once the information is elaborated, and there are biased interpretations of the negative, perfectionism-relevant stimuli originally attended to, this information may be easily stored within long-term memory, thus providing a clear reason why individuals may exhibit a negative bias in memory (Everaert et al., 2016). However, no studies, as far as the author is aware, has evaluated the link between memory biases and perfectionism, which should be explored in future research.

The potential relationships between attention, interpretation, and memory biases is particularly plausible when the attention bias findings for perfectionistic concerns were considered. It is still possible that the findings for clinical perfectionism result in the same process. In this way, if individuals do not attend to perfectionism-relevant information that is indicative of positive outcomes (i.e., success or achievement) then this information may not be encoded in memory and therefore cannot be subsequently elaborated and recalled. Rather, as described in the cognitive-behavioural model of clinical perfectionism (Shafran et al., 2002), individuals who are high in clinical perfectionism may then recall occasions when the individual did not attain their goals, and subsequently make predictions based on these experiences. The present body of research did not aim to test these relationships, and as such is unable to draw conclusions about these predictions. It

would therefore be informative to explore these predictions in future research to investigate the interactions and associations between cognitive processes.

6.1.1. The implications for combined bias hypothesis. An interesting theoretical assumption within the cognitive-behavioural model of clinical perfectionism is that preferential allocation of attention towards negative information may then influence subsequent interpretations made about any given scenario (Shafran et al., 2010). The findings from the present research indicate that individuals with higher levels of perfectionism were more likely to interpret situations as having negative outcomes regardless of the measure of perfectionism used. These findings are consistent with what would be expected from participants who also demonstrate a selective attention towards negative, perfectionism-relevant stimuli, and a reduced attention bias to positive, perfectionism-relevant stimuli.

The present thesis was not sufficiently powered to detect interactions between attention and interpretation biases. Furthermore, due to the nature of the two tasks there were a different number of factors involved with the attention task (perfectionism relevant vs. irrelevant; positive vs. negative) and interpretation task (affect vs. event outcomes; positive vs. negative; target vs. foil). This meant that these tasks could not be explored together in a single GLMM predictive model to determine whether perfectionism-relevant attention bias would predict subsequent interpretation bias.

An important first step addressed in this thesis was to identify whether attentional and interpretational biases exist in perfectionism and, if so, the nature of these biases. It will be important for future perfectionism research to investigate how these biases may interact and influence each other to maintain psychological distress. The prediction that attention biases may influence subsequent information processes is not only based on theoretical accounts, but other studies that have tested the interactions between attention and interpretation cognitive processes and found that a negative attention bias can result in a congruent negative interpretation bias when depressive symptoms are considered (Everaert et al., 2016; Everaert et al., 2012; Everaert et al., 2013).

The true value of the relationship between attentional bias and interpretation bias will critically depend on whether these biases make are causally linked to clinical perfectionism as suggested by Shafran et al. (2002; 2010). The findings from the present thesis cannot determine functional contribution attentional bias to

negative perfectionism-relevant information makes to interpretation bias towards negative interpretations, or the cognitions related to perfectionism. Future researchers should seek to address this issue. One way investigators could evaluate the influence of attention bias on interpretation bias is to modify attention bias and measure the impact of these modifications on subsequent interpretations to perfectionistic scenarios. Equally, given the likely reciprocal nature of these cognitive processes future research could experimentally manipulate an interpretive bias and then assess for any changes in attention bias. Evaluating the results of these manipulations of attention and interpretation, specifically how these manipulations influence other cognitive process, would allow experimenters to determine whether these cognitive processes influence each other equally or whether the strength of the relationship is further moderated by other cognitive processes (e.g., memory bias). Furthermore, the evaluation of the interaction of these cognitive processes could have direct implications for the causal role of cognitive biases in perfectionism.

6.1.2. The implications for cognitive products in perfectionism. The cognitive-behavioural model of clinical perfectionism also predicts that, alongside the cognitive processes, individuals may engage with thoughts or experiences in a way that may maintain perfectionism (Shafran et al., 2002; 2010). The present thesis evaluated two cognitive products, repetitive negative thinking and mental imagery, due to the potential impact these constructs have on behavioural and emotional responses, and their theoretical relationship with clinical perfectionism based on cognitive-behavioural conceptualisations of perfectionism (Egan, Wade, et al., 2014; Lee et al., 2011; Macedo et al., 2015; Shafran et al., 2010).

The present findings indicated when someone is concerned about making mistakes and subsequent implications of those mistakes (i.e., perfectionistic concerns) they are more likely to experience repetitive negative thoughts that may result in increased experiences of psychological distress, which is consistent with previous research (Di Schiena et al., 2012; Egan, Hattaway, et al., 2014; Macedo et al., 2015; Short & Mazmanian, 2013). This initial finding lends support for the cognitive-behavioural model of clinical perfectionism (Shafran et al., 2010), which posits that individuals may engage with repetitive thoughts about their own performance, often scrutinising the same scenario over and over, ultimately leading to psychological distress. Additionally, the finding that perfectionistic concerns was directly associated with psychological distress even after accounting for repetitive

thoughts is also in line with evidence that consistently links maladaptive facets of perfectionism with a range of symptoms of psychopathology in both clinical and non-clinical samples (Egan, Wade, et al., 2011; Limburg et al., in press).

Importantly for the cognitive-behavioural model, when mental imagery was included repetitive negative thinking no longer predicted psychological distress. Rather, perfectionistic concerns predicted increases in mental imagery that lead to increases in psychological distress. Mental imagery also had a stronger association with psychological distress than repetitive negative thinking did. The finding that mental imagery was a stronger predictor of psychological distress than repetitive negative thinking is consistent with previous theory and evidence (e.g., Borkovec et al., 2004; Holmes et al., 2008). Although the cognitive-behavioural model of clinical perfectionism identified that those with clinical perfectionism are more likely to engage with repetitive negative thinking, engagement with mental imagery has only been identified through interviews (e.g., Lee et al., 2011) and observation (Egan, Wade, et al., 2014). The finding that mental imagery is a powerful indirect pathway between perfectionism and psychological distress is consistent with Lee et al. (2011) finding that individuals with elevated perfectionism experience images that are distressing and difficult to dismiss. Importantly, this finding extends Lee et al.'s study by utilising a larger sample size (N = 397 vs. 59). The present findings extend upon previous research, which has not evaluated the relationships between perfectionism and psychological distress when both mental imagery and repetitive negative thinking were considered in the same model. The strong link between perfectionism and psychological distress via mental imagery may be a function of the nature of mental imagery. Mental imagery is defined as mental cognitions that engage with or contain sensory experiences (Horowitz, 1970), which can be experienced as thoughts, mental pictures or images, or physical sensations (Holmes, Arntz, et al., 2007). It may be difficult to disentangle the true effects of thoughts and mental imagery, when mental imagery is conceptualised as a broad multisensory experience that comprises visual, tactile, gustatory, auditory, and olfactory elements, and even verbal-linguistic elements. Nonetheless, the findings from this thesis strongly suggest that perfectionism is more strongly associated with multisensory mental imagery than repetitive negative thinking per se, and that multisensory mental imagery is more strongly associated with psychological distress.

The present thesis has implications for increasing our understanding about how clinical perfectionism may lead to negative outcomes. When individuals strive for a personally demanding standard and their self-worth is dependent on meeting their standard (i.e., clinical perfectionism), they are more likely to experience mental imagery. Interestingly, the findings indicated that when an individual strives for a personally demanding standard, and they did not base their self-worth on the attainment of these standards (i.e., personal strivings), they may be *less* likely to experience images.

6.2. Strengths of the Present Thesis

When considering the present thesis, several methodological strengths of the studies increase confidence in the reliability of the findings. With regards to the attention bias task, attention was measured through a modified dot-probe task, which provided an objective performance indicator (i.e., reaction time) that was not compromised by the demands or expectancy effects typically observed with self-report (Paulhus & Vazire, 2007). Another strength of the attention bias study (presented in Chapter 3) was that the word stimuli presented across the attentional probe task were rated on the qualities of the stimuli (e.g., perfectionism-relevance and valence), by individuals who were not involved in the development of the task or generation of the word stimuli, from a larger pool of candidate words. Adopting this rating approach to stimuli development and subsequent use in the attention bias task ensured that the word stimuli used met the criteria required to achieve the study's aims.

The use of a modified dot-probe task also addresses limitations of previous research that used the emotional Stroop task. The emotional Stroop task assumes that a slowed reaction to colour naming is the result of biased attention towards the semantic meaning of the word (Algom et al., 2004; Bar-Haim et al., 2007). However, the emotional Stroop task cannot distinguish between general behavioural freezing in response to stimuli, or attentional avoidance of the stimuli. The modified dot-probe paradigm used within the present thesis required participants to respond to a neutral probe (a sloping line to the left or right), which reduced concern that there may be slowed responding as a result of a response bias or general arousal (Bar-Haim et al., 2007).

With regards to the interpretation bias task, interpretation was measured through an ambiguous passage task. Similar to the attention bias study, a strength of

the interpretation bias study was the approach used to develop the task stimuli. Scenarios and interpretations were initially rated by the research team to determine the relevance to perfectionism. Only scenarios and interpretations judged to be highly relevant to perfectionism were used for subsequent rating procedures. The interpretations for each scenario were subsequently rated by individuals who were not involved in the development of the task or generation of the word stimuli to ensure that each interpretation met the critical criteria required to achieve the aims of the interpretation task (i.e., target vs. foil, negative vs. positive, affect vs. event).

There are other methodological strengths for the interpretation bias task that required participant to later rate the similarity in meaning or likelihood of the scenario (Hirsch et al., 2016). Participants were required to rate both target and foil interpretations, which allowed for the evaluation of a general response bias (Hirsch et al., 2016). As the target and foil interpretations were rated equally across the different domains (negative vs. positive, affect vs. event), there can be confidence that the disproportionately greater responses on target test sentences relative to foil test sentences reflected specific perfectionism-related differences in interpretative processing, rather than a general perfectionism-related response bias. Furthermore, each participant was required to rate all test sentences independently rather than rank order the likelihood of one interpretation occurring over another. By removing the rank ordering of the interpretations, there are reduced demand, selection, and response bias effects as observed in other interpretation tasks, such as generating interpretations to open ended questions, sentence completion tasks, and scrambled sentence tasks (Hirsch et al., 2016).

With regards to the evaluation of the relationship between perfectionism and psychological distress and whether it is explained, in part, by repetitive negative thinking and mental imagery, a strength was the use of structural equation modelling (Tomarken & Waller, 2005). The advantages of a structural equation model, over other methodologies such as standard or hierarchical regression models, is that it was able to specify the latent variables used from item level data, which allowed for modelling of measurement error not accounted for in other regression models. Not only were measurement models tested, but also the relationships between the constructs (MacCallum & Austin, 2000; Tomarken & Waller, 2005). Furthermore, given the larger sample size, the study was able to address a range of previously unanswered questions. Research on the indirect pathways between perfectionism and

psychological distress have typically only focused on repetitive negative thinking (Egan, Hattaway, et al., 2014; Macedo et al., 2014; Macedo et al., 2015; O'Connor et al., 2007; Olson & Kwon, 2007), whilst no prior research has evaluated mental imagery as an indirect pathway between perfectionism and psychological distress. Furthermore, no prior study has evaluated the relative contribution of both repetitive negative thinking and mental imagery together as intermediate variables between perfectionism and psychological distress.

Another strength of the present thesis is that previous research has not evaluated the relative contribution that different definitions of perfectionism have on the relationship between perfectionism and psychological distress. The present research considered the similarities between the overarching conceptualisation of multidimensional perfectionism and how perfectionistic concerns and perfectionistic strivings align with two fundamental features of the clinical perfectionism definition provided by Shafran et al. (2002). Although the conceptualisations aligned, the present thesis used a measure of perfectionistic concerns, perfectionistic strivings, and clinical perfectionism to determine which measure best accounted for psychological distress.

6.3. Limitations of the Thesis

Despite the strengths of the thesis, it is important to consider the findings within the context of its limitations. Participants were not recruited based on a clinical diagnosis, nor were any diagnostic interviews conducted. The aim for the present research was to provide an initial investigation of the cognitive processes involved in perfectionism, which have not been previously investigated. As such the present findings may not generalise to clinical samples, yet future research should replicate these studies in clinical samples to answer these questions.

The results indicated that there were perfectionism-relevant attention and interpretation biases, which were not due to a general response bias to emotional valence. It would be informative to know whether these perfectionism-relevant biases are distinguishable from attention and interpretation biases observed in clinical disorders such as, but not limited to, depression (Yiend, 2010; Yiend et al., 2013), generalised anxiety (Amir, Beard, et al., 2009), social anxiety (Amir, Bomyea, & Beard, 2010; Amir, Foa, & Coles, 1998), and OCD (Amir, Najmi, & Morrison, 2009; Williams & Grisham, 2013). If there are distinct perfectionism-relevant biases operating within those with clinical disorders, it may lend further evidence to the

conceptualisation of clinical perfectionism as a plausible maintenance factor that may impede the treatment for these disorders. Another consideration for future research is given perfectionism is elevated and present in so many disorders, whether the construct has enough specificity to be discriminatory. It would also be informative, for future research to consider whether there were any overall differences in reaction time between those with higher levels of perfectionism and lower levels of perfectionism for both attention bias tasks, in addition to the reaction time to rate an interpretation in the interpretation bias tasks. Such information may also improve our understanding as to how quickly, on average, perfectionism is associated with a greater, or lower, response time to specific stimuli.

Another consideration is that the cross-sectional nature of the studies included in this thesis precludes conclusions about causality or directionality of effects, which are better addressed in experimental and longitudinal designs. The causal relationships of attention and interpretation biases with clinical perfectionism were not able to be determined as there was no manipulation of either bias within this research. The manipulation of perfectionism-relevant attention or interpretation biases, and the assessment of whether there is a subsequent attenuation of an individuals' perfectionism, would not only confirm that attention and interpretation biases causally contribute to clinical perfectionism, but would also provide further evidence for the use of bias modification techniques as an alternative or potential adjunct to CBT for perfectionism. Additionally, the causal relationship of perfectionism leading to experiences of repetitive negative thinking or mental imagery, which subsequently lead to psychological distress, should be investigated in future prospective studies.

The directionality of the relationship between attention and interpretation biases within clinical perfectionism was not able to be determined. Based on the information processing model (Beck & Clark, 1988, 1997) and the cognitive-behavioural model of clinical perfectionism (Shafran et al., 2002), it is plausible that there are reciprocal interactions between the various attention and interpretation biases and subsequent cognitive products such as repetitive negative thinking and mental imagery. For example, negative interpretation of a conversation (e.g., critical evaluation of one's work) with your boss may lead to preferential allocation of attention towards threatening information (e.g., focus on other signs of disapproval), which in turn impacts on the images experienced (e.g., images of being fired) or

repetitive negative thoughts (e.g., repetitive thoughts about failure). The repetitive images or thoughts may then drive the individual to attend to negative information that confirms the content of their thoughts, which ultimately lead to stronger, negative interpretations of potentially ambiguous information (e.g., being called into the boss's office).

While the reciprocal nature of cognitive biases is credible and many cognitive models assume that there is a link between various processes (c.f. Everaert et al., 2012), there may also be other competing explanations that warrant consideration. For example, it could be that each cognitive process and product works in a unidirectional way, whereby each process or product influences the other in a single direction. In this sequence, initial attention preferences to threat, but not neutral or positive information, may impact on the subsequent interpretation of events, which consequently results in the development of distorted images. It is also possible that the biases operate concurrently, yet are independent from one another and are moderated by another variable. For example, attention and interpretation bias, and repetitive negative thinking or mental imagery may operate independently from one another, whilst a separate construct (e.g., perfectionism) moderates an attention bias to threat, negative interpretations and repetitive negative thoughts or mental imagery. For instance, an individual with higher clinical perfectionism may also demonstrate a stronger perfectionism-relevant attention and interpretation bias, and repetitive negative thinking or mental imagery, whereas an individual with lower clinical perfectionism may demonstrate a weaker perfectionism-relevant attention and interpretation bias, and repetitive negative thinking or mental imagery. The nature of how various cognitive processes and products collectively influence the development and maintenance of various psychological disorders or constructs should be investigated in future experimental studies (Everaert et al., 2016; Everaert et al., 2012; Hirsch et al., 2006).

A final consideration is the use of the same sample of participants across the studies concerning attention and interpretation biases. One advantage of adopting this approach is that attention and interpretation biases could be investigated without concern that there may be sampling differences that contributed towards differential effects. The use of the same sample allows for the control of systematic sampling differences across studies investigating these differences. However, a limitation of this approach is that the generalisability of the effects observed in the present thesis

is unclear. It is important therefore to determine whether the effects observed in the present thesis can be replicated in other samples.

6.4. Future Directions and Clinical Implications

Future research evaluating the relationships between perfectionism, cognitive processes, cognitive products, and psychological distress, could not only improve theoretical understanding of perfectionism but could also be used to further develop interventions specific for perfectionism. The importance of improving our understanding of perfectionism in this context is clear when considering the relative impact that perfectionism has on disorder symptomatology and attenuation of treatment outcomes (Egan, Wade, et al., 2012). The main aim of CBT for perfectionism is to reduce an individual's self-worth being contingent on the attainment of high personal standards, and to modify a range of associated maladaptive cognitions and behaviours (Shafran et al., 2010). It is important to note that the treatment itself does not specifically aim to reduce an individual's standards. Additionally, CBT for perfectionism targets cognitive biases, such as attention bias, at the elaborative level of cognition (Egan, Wade, et al., 2014; Shafran et al., 2010) rather than earlier levels of processing. Future research could look at whether, as an adjunct to CBT for perfectionism, novel techniques such as CBM could facilitate changes at the elaborative level of cognition (Egan, Wade, et al., 2014; Shafran et al., 2010).

6.4.1. Cognitive bias modification. With attention and interpretative biases potentially operating to maintain perfectionism and associated psychological distress, and the significant impact they both have on subsequent emotional experiences, CBM techniques may be useful for reducing attentional and interpretation distortions as a stand-alone intervention, or to augment CBT for perfectionism. CBT has long aimed to reduce cognitive biases through a variety of techniques such as automatic thought disputation (Beck, 2011) or behavioural experiments (Bennett-Levy et al., 2004), and CBM techniques may offer a viable alternative approach for targeting these processes.

Studies have yielded promising results for attention CBM interventions for both GAD (Amir, Beard, et al., 2009) and social anxiety disorder (Schmidt, Richey, Buckner, & Timpano, 2009). Multi-session CBM treatment has yielded significant reductions in participants meeting diagnostic criteria compared to controls (see Amir, Beard, et al., 2009; Schmidt et al., 2009). These improvements were found at post-

treatment and maintained at a 4-month follow-up (Schmidt et al., 2009). However, further research into whether CBM can be used therapeutically needs to be completed (MacLeod, Koster, & Fox, 2009).

The studies by Amir, Beard et al. (2009) and Schmidt et al. (2009) yielded moderate to large effect sizes that are comparable to CBT and pharmacological treatments, which is promising given the short duration of the interventions (generally four weeks), the limited time required to complete the computer tasks, and the absence of clinician contact (Amir, Beard, et al., 2009; Schmidt et al., 2009). The use of computerised interventions could be increasingly important to consider as a supplementary option due to the limited number of therapists available to offer treatments. Another benefit of CBM is that the treatment is easy to deliver via a computer-based interface and could reach clients who do not have access to face-to-face therapy. However, the maintenance of therapeutic effects following CBM needs further research over a longer time period as research has typically only conducted a follow-up for a few months post-intervention (Amir, Beard, et al., 2009; Schmidt et al., 2009).

Recently, research has started to explore multi-session interpretation bias modification treatments (Hoppitt et al., 2013; Lester, Mathews, Davison, Burgess, & Yiend, 2011; MacDonald, Koerner, & Antony, 2013; Micco, Henin, & Hirshfeld-Becker, 2013; Salemink et al., 2014; Yiend et al., 2013). Early results are still mixed on the efficacy in creating change within depression (Micco et al., 2013; Yiend et al., 2013), and anxiety disorders (Hayes et al., 2010; Salemink et al., 2014), in particular social anxiety (Hoppitt et al., 2013; Lester et al., 2011; MacDonald et al., 2013). These results suggest groups trained to interpret scenarios as benign or positive subsequently have more positive/neutral interpretations than respective control groups (Hayes et al., 2010; Salemink et al., 2014; Yiend et al., 2013). There have been inconsistent results regarding the benefit of CBM, with some studies indicating there is no significant difference between training and control groups (Micco et al., 2013; Salemink et al., 2014; Yiend et al., 2013), and others finding significant benefits for those receiving active interpretation bias modification (Hoppitt et al., 2013; MacDonald et al., 2013). The differences in findings are proposed to be a function of the time participants spend with the CBM and number of sessions, rather than the efficacy of various CBM techniques (Yiend et al., 2013), indicating further research into the CBM for interpretation bias is required.

As cognitive theories highlight that these cognitive processes do not operate in isolation, Beard, Weisberg, and Amir (2011) explored a 4-week intervention that compared a combined CBM approach that modified both interpretation and attention biases to a placebo group. Effect sizes for the combined CBM approach were comparable to other CBT and pharmacological treatments for social anxiety. This particular study highlights an issue previously identified in a meta-analysis of CBM for anxiety and depression (Hallion & Ruscio, 2011). Hallion and Ruscio (2011) explained that many CBM paradigms only target one cognitive bias (i.e., attention or interpretation bias), even with evidence to suggest that there are a range of cognitive biases that may interact and amplify symptoms (Everaert et al., 2012; Everaert et al., 2013; Hirsch et al., 2006).

Despite the potential for CBM to provide a treatment that is easy to administer (Amir, Beard, et al., 2009; Amir et al., 2010), several studies have delivered CBM tasks that have not successfully achieved changes in biased attention or disordered symptomatology (Boettcher et al., 2013; Carlbring et al., 2012; Neubauer et al., 2013; Schoorl, Putman, & Van Der Does, 2013), and initial reviews suggested that CBM should not be further pursued (Emmelkamp, 2012). Clarke, Notebaert, and MacLeod (2014) however was critical of such disparate findings regarding CBM, in particular attention bias modification protocols. Clarke et al. (2014) reported that the studies finding that CBM did not observe changes in clinical symptomatology or significant differences in biased attention did not successfully alter the attention bias. Clarke et al. stated that "Without such a change in attention, a change in emotion therefore cannot be expected." (p. 3). They concluded that the difficulty for studies to successfully achieve a modification of cognitive biases highlights variability within the field of research and, as such, CBM is not ready to be used as an adjunct treatment alongside CBT (Clarke et al., 2014).

It is important to remember that the research into CBM as an adjunct treatment, although promising, is still in its infancy (Clarke et al., 2014; Hirsch et al., 2016). There are CBM treatment studies that provide evidence that CBM may be a useful adjunct to CBT (Kuckertz et al., 2014; Riemann, Kuckertz, Rozenman, Weersing, & Amir, 2013; Shechner et al., 2014), while other studies suggest that CBM may not provide any additional benefit as an adjunctive treatment beyond the benefits CBT alone (Boettcher, Hasselrot, Sund, Andersson, & Carlbring, 2014; Rapee et al., 2013; Waters et al., 2014). CBM and CBT may both influence attention

and interpretation biases, and therefore individuals who receive CBT may reach a ceiling effect that restricts the augmentation of therapeutic gains from CBM (Rapee et al., 2013).

Given the potential benefits from CBM, it would be useful for future research to continue to evaluate the utility of CBM techniques. In particular, whether CBM techniques are able to independently reduce cognitive biases, or whether CBM techniques overlap with other standard cognitive-behavioural techniques such as exposure. Exposure is well established as a treatment for reducing threat appraisals for feared stimuli (Beck, 2011; Bennett-Levy et al., 2004). It is possible that the repeated exposure to threatening stimuli in CBM tasks serves as another form of exposure that may contribute to anxiety reduction (Kuckertz et al., 2014; Mogg & Bradley, 2016; Shechner et al., 2014). This may also highlight why CBM does not always augment the therapeutic gains of CBT (Boettcher et al., 2014; Rapee et al., 2013; Waters et al., 2014). Hirsch et al. (2016) argued that although CBM and CBT may not result in better therapeutic gain, further investigation into CBM techniques could be useful, in particular at the beginning of psychotherapy. This is because at the beginning of psychotherapy, cognitive biases are often ingrained (Beck & Clark, 1997; Beck, 2011), and CBT techniques are often effortful and taxing on an individual's ability to remain focused on the task at hand (Hirsch et al., 2016). Hirsch et al. suggested that CBM, in particular CBM for interpretation, may be beneficial to promote more positive biases early in psychotherapy with less effort.

Despite this evidence, the direct implications for CBM in perfectionism are less clear. Prior to the implementation of CBM protocols in perfectionism there are two fundamental questions that need to be answered, 1) does a change in attention bias (or interpretation bias) lead to changes in perfectionistic behaviours, and 2) can a change in attention bias (or interpretation bias) yield clinical benefits as an adjunct to treatment.

Research into CBM has not yet been explored in perfectionism. If an evidence base for these underlying processes in perfectionism is developed, research could test whether the inclusion of CBM as an adjunct to CBT for perfectionism improves the efficacy of treatment. One way through which CBM may prove to be beneficial in a clinical setting would be to reduce the interference perfectionism has with treatment engagement (Pinto et al., 2017). Within a treatment setting, perfectionism may interfere with an individual's ability to engage with behavioural

experiments or exposure to anxiety provoking situations (Pinto et al., 2017). Behavioural experiments and exposure is well established as a treatment for reducing threat appraisals for feared stimuli (Beck, 2011; Bennett-Levy et al., 2004). Providing an individual with the opportunity to use CBM to modify ingrained cognitive biases specific to perfectionism may reduce the barriers that perfectionism pose in therapeutic settings.

Understanding the relative impact of CBM for biased attention or interpretation in perfectionism would also assist in the theoretical understanding of the maintaining factors within perfectionism and whether these can be addressed in treatment. With comparable effect sizes for CBM to more time-consuming and costly evidence-based treatments such as CBT, future research should evaluate CBM as a stand-alone treatment compared to CBT for perfectionism (Amir et al., 2010; Amir & Taylor, 2012; Hirsch et al., 2016; Williams et al., 2015). One consideration is that CBM is a relatively inexpensive, easy to administer therapeutic tool that may reduce emotional disturbance and dysfunctional attentional processes that maintain clinical perfectionism and other disorders. It is also important to consider that CBM does not require the same level of clinical training as CBT, which may prove useful for those who require a minimal support within a stepped care setting. Through exploring techniques that could be implemented easily in therapy for perfectionism, further gains may be observed in improving the effectiveness and cost-effectiveness of perfectionism treatment. Thus, there is potential to significantly reduce a salient predisposing and maintaining factor of multiple disorders (Egan, Wade, et al., 2011).

6.4.2. Mental imagery treatment. It is also possible that incorporating techniques that target mental imagery, such as imagery rescripting, could improve the efficacy of CBT for perfectionism (Egan, Wade, et al., 2014). The potential for mental imagery-based techniques to be a powerful tool in treatment is linked to the greater impact mental imagery has on emotional states than verbal processing (Holmes & Mathews, 2010). Treatment for disorders using mental imagery is not a new concept. Aaron Beck's description of cognition included mental imagery (Beck, 2005; Beck, 2011; Edwards, 2007), and mental imagery has been used in treatment for PTSD and for exposure purposes in social anxiety disorder and OCD (Hackmann et al., 2011). Mental imagery rescripting helps individuals experience, process, and then manipulate negative emotions typically associated with distressing memories or worries about the future, which has been used successfully to target images for

disorders including PTSD, OCD, social anxiety disorder, eating disorders, and depression (Cooper et al., 2007; Holmes, Arntz, et al., 2007; McEvoy et al., 2015; McEvoy & Saulsman, 2014; Nilsson et al., 2012; Wheatley et al., 2007; Wild et al., 2007). Mental imagery rescripting can reduce an individual's perception of helplessness or victimisation, and can encourage positive mental imagery (Hackmann et al., 2011). Positive mental imagery can promote an individual's sense of mastery, competence, and compassion (Hackmann et al., 2011). These improvements have been observed during 1-week, 1-month, 3-month and 12-month follow-ups (Wheatley et al., 2007; Wild et al., 2008).

To date, no research has explored the efficacy of mental imagery treatment within perfectionism, which is important to consider given the impact mental imagery has on emotions and information processing (Egan, Wade, et al., 2014). It is possible that the integration of imagery-based techniques, such as mental imagery rescripting, into existing perfectionism treatments may reduce the negative and overwhelming experiences of individuals with clinical perfectionism (Lee et al., 2011). There is evidence that imagery-based techniques could produce better outcomes when compared to verbal-based treatment that focused on the same key mechanisms such as, but not limited to, negative self-images, safety behaviours, and negative core beliefs (see McEvoy et al., 2015). However further evidence, such as that obtained from randomised controlled trials, on the efficacy of imagery-based techniques is required to better understand the clinical utility of incorporating mental imagery into CBT protocols (McEvoy et al., 2015; Nilsson et al., 2012; Wild & Clark, 2011; Wild et al., 2008).

There have been many approaches to mental imagery techniques. Mental imagery has already been incorporated in group CBT programs for social anxiety with encouraging results. As such, mental imagery-based techniques could easily be transferred into the treatment of perfectionism (McEvoy et al., 2015; McEvoy & Saulsman, 2014). This is an area for future research highlighted by Egan, Wade, et al. (2014), yet it has not been evaluated and has received scant attention in the CBT for perfectionism treatment protocols to date. When perfectionism is considered, an individual may have previous experiences that give rise to the stringent standards they place upon themselves. For example, an individual may have been criticised by their family members on performances, pressured to succeed from loved ones or role models, or praised only when the individual performed at an exceptional standard

(Egan, Wade, et al., 2014; Frost, Marten, et al., 1990; Shafran et al., 2002; Stoeber & Otto, 2006). These experiences may lead to images about what could happen if the individual did not achieve their standard. Mental imagery rescripting could be used to reinterpret a past experience that contributes to their current distress. During this process, an individual may initially imagine a memory where they were criticised (e.g., I was singled out by my teacher at the front of a class for getting a question wrong) and recount the image in the present tense as if it were happening now. Individuals may then be instructed to imagine the same scene, but this time as a bystander, and to discuss the scene and their reactions and thoughts from the perspective of their present self. From the bystander perspective, they could provide suggestions or intervene in a way that would make them feel comfortable and safe (e.g., I would tell myself that the teacher was wrong to do that, it was fine to make a mistake, or I would stop the teacher from picking on a young kid). After the individual intervenes in their image, the individual would then recount the experience from the eyes of their younger self (e.g., My teacher is starting to criticise me, but my adult self has comforted me and told my teacher off). Even if the image is not directly associated with a memory, it is still possible to rescript the image but perhaps without transitions through to a younger self. Throughout this process the therapist is attempting to help the client replace their distressing mental imagery with mental imagery that promotes mastery over, or coping with, the situation, or the client generates an image that is more compassion-based and promotes self-soothing.

The clinical implications for both CBM and mental imagery methods move beyond improving CBT for perfectionism and also provide an avenue for therapists to target comorbid disorders. It is unusual for clinicians to observe clients without some level of comorbidity, which often leads to complex conceptualisations and difficulty implementing disorder-specific CBT programs (McHugh et al., 2009; Shafran et al., 2009). Comorbidity typically forces clinicians to face the dilemma of choosing one evidence-based practice over another, with the realisation that it may treat one condition (e.g., depression) yet have little impact on the comorbid conditions (e.g., OCD) (Craske, 2012). Complicating matters is that clinicians often have limited time, and are therefore unable to facilitate multiple interventions (Egan, Wade, et al., 2012). A transdiagnostic CBT intervention may provide a flexible treatment option for clinicians that can be used as a cost-effective treatment that can provide comparable results to disorder-specific treatments (see McHugh et al., 2009).

The importance of a transdiagnostic CBT intervention for perfectionism is highlighted when the way in which perfectionism can potentially impede the treatment of a disorder is considered. This may take the form of individuals experiencing difficulty completing a behavioural experiment as it may not be perceived to be of any value when it is not related to productivity or reaching their high standards. Treating perfectionism may help to reduce these barriers (Egan, Wade, et al., 2012; Egan, Wade, et al., 2014). As perfectionism is formulated to contribute to the development and maintenance of comorbid disorders, treatment may help reduce comorbidity through a targeted treatment of a shared maintaining factor (Egan, Wade, et al., 2012; Egan, Wade, et al., 2014). Perfectionism-targeted CBT has the potential to be an important transdiagnostic treatment target that could complement the emerging literature on other transdiagnostic approaches to treating comorbid emotional disorders (Andersen, Toner, Bland, & McMillan, 2016; Craske, 2012; Egan, Wade, et al., 2011, 2012; Egan, Wade, et al., 2014; Farchione et al., 2012; McEvoy et al., 2009; Norton et al., 2013; Reinholt & Krogh, 2014; Titov et al., 2015).

6.5. Conclusion

Previous research has focused on the transdiagnostic nature of perfectionism and whether perfectionism specific treatments could reduce associated psychopathology. Despite the potential importance of perfectionism, the underlying assumptions of the cognitive-behavioural model of clinical perfectionism had not been tested. The overall aim of the thesis was to evaluate the relationship between perfectionism and two cognitive processes and cognitive products. Two key findings emerged from the thesis: (1) that clinical perfectionism is characterised by attention and interpretation biases, and (2) that clinical perfectionism is associated with repetitive negative thinking, and to a greater degree mental imagery, which subsequently can lead to greater psychological distress.

The present thesis has increased our understanding of the information processing biases that operate within the construct of perfectionism. These findings provide support for the validity of Shafran et al.'s (2002) cognitive-behavioural model of clinical perfectionism and some of the underlying assumptions within the model. The findings also highlight the utility of further examination of these cognitive constructs within clinical populations and in perfectionism treatments. For example, adjunct novel approaches, such as computerised CBM techniques or

interventions that focus on mental imagery in perfectionism rather than verbal-linguistic processing, warrant further consideration. If there can be improvements in the way perfectionism is understood from an information processing perspective, there could be further refinement of the CBT techniques designed to improve biased cognitions in perfectionism.

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Appendix A: Published Article

Howell, J. A., McEvoy, P. M., Grafton, B., Macleod, C., Kane, R. T., Anderson, R. A., & Egan, S. J. (2016). Selective attention in perfectionism: Dissociating valence from perfectionism-relevance. *Journal of Behavior Therapy and Experimental Psychiatry, 51,* 100-108. doi:10.1016/j.jbtep.2016.01.004

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Selective attention in perfectionism: Dissociating valence from perfectionism-relevance

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ABSTRACT

Background and objectives: Maladaptive perfectionism has been identified as a predisposing and perpetuating factor for a range of disorders, including eating, anxiety, and mood disorders. An influential model of perfectionism, put forward by Shafran, Cooper, and Fairburn (2002), proposes that high perfectionism reflects an attentional bias that operates to afford greater attention to negative information than to positive information, when this information is perfectionism-relevant. The present study is the first to experimentally test this hypothesis..

Method: The present study assessed the type of stimuli that high perfectionists (n = 31) preferentially attend to compared to low perfectionists (n = 25) within a non-clinical population. Using an attentional probe task, we compared high and low perfectionist attentional responding to stimulus words that differed in terms of their emotional valence (positive vs. negative) and perfectionism-relevance (perfectionism-relevant vs. −irrelevant).

Results: Analysis revealed that, unlike low perfectionists, high perfectionists displayed greater attentional preference to negative than to positive information, but only for perfectionism-relevant stimuli..

Limitations: The implications must be considered within the limitations of the present study. The present study did not assess clinical participants, as such conclusions cannot be made regarding attentional bias that characterize clinical disorders in which perfectionism is identified as a predisposing and perpetuating factor.

Conclusions: Theoretically, the attentional dot-probe task lends weight to the cognitive-behavioral model of clinical perfectionism, which proposed a biased attentional processing of negative perfectionism relevant stimuli within perfectionism. This conclusion was previously based on clinical impressions, whereas the present study used an objective performance measure. Clinically, therapists should take this attentional bias into account when planning treatments that involve targeting perfectionism..

1. Introduction

Clinical perfectionism has been defined as the pursuit of perfection and basing self-worth on achievement, despite adverse consequences (Shafran, Cooper, & Fairburn, 2002). This definition of perfectionism has been central to the development of cognitive-behavioral treatments (CBT) for perfectionism, which have been found to be effective in reducing perfectionism, anxiety and depression (for a review see Lloyd, Schmidt, Khondoker, & Tchanturia, 2015). Perfectionism has been identified as a predisposing and perpetuating factor for eating, anxiety, and mood disorders and is associated with poorer treatment outcomes for these disorders (Egan, Wade, & Shafran, 2011). Perfectionism has been proposed to be a transdiagnostic process that underpins numerous psychological disorders (Egan et al., 2011) and this transdiagnostic nature of perfectionism may contribute to the high rates of comorbidity among psychological disorders (Bieling, Summerfeldt, Israeli, & Antony, 2004; Egan, Wade, & Shafran, 2012).

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Consequently, targeting perfectionism may be an efficient way of treating multiple psychological disorders (Egan et al., 2011). This study aims to evaluate the hypothesis that selective attention, which is a type of attentional bias, is a maintaining mechanism of clinical perfectionism. A focus on changing unhelpful patterns of selective attention is already a component of cognitive behavior therapy (CBT) for perfectionism (e.g., Egan, Wade, Shafran, & Antony, 2014), yet little research has examined the role of selective attention in perfectionism. Examining the role of selective attention in perfectionism in an experimental study may be helpful in confirming the need to target selective attention in CBT for perfectionism. Furthermore, this may help determine if additional approaches that can change selective attention, such as attention bias modification (ABM), may be a useful adjunct to CBT for perfectionism in the future.

A cognitive-behavioral model of clinical perfectionism was first proposed by Shafran et al. (2002), and later updated by Shafran, Egan, and Wade (2010). Shafran et al. (2002) postulated that individuals high in clinical perfectionism set excessively high standards for themselves, and base their self-worth on meeting these standards. Shafran et al. (2002) put forward the hypothesis, based on clinical observation, that perfectionism that is clinically relevant is maintained in part by a particular form of attentional bias. Attentional bias can be broadly defined as a systematic tendency to preferentially allocate attention towards specific types of information (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van, 2007). Information can be considered perfectionism-relevant when it concerns the evaluation of performance, and perfectionism-irrelevant when it bears no relationship to performance standards. Such information can be further subdivided according to whether it is negative in emotional tone or positive in emotional tone. Thus, negative perfectionism-relevant information would concern failure and criticism, whereas positive perfectionism-relevant information would concern success and praise. Shafran et al. (2002) proposed that people with high levels of clinical perfectionism, but not those with low levels of clinical perfectionism, allocate greater attention to negative perfectionism-relevant information than to positive perfectionism-relevant information. Shafran et al.'s proposition is consistent with early clinical impressions of perfectionism, such as that put forward by Hollander (1965), who stated that the perfectionist "looks so intently for defects or flaws that he lives his life as though he were an inspector at the end of a production line." (p. 95). According to Shafran and colleagues, because this attentional bias increases the processing of negative perfectionism-relevant information, relative to positive perfectionism-relevant, it gives rise to cognitive distortions such as overgeneralizing failure, and discounting of success (Egan et al., 2011; Shafran et al., 2010).

Shafran et al.'s (2002) proposal has guided the development of therapeutic interventions for perfectionism. CBT for perfectionism includes treatment components that are specifically designed to alter patterns of biased attentional responding to negative perfectionism-relevant information (Egan, Wade, et al., 2014). To date, however, no study has directly tested the key prediction generated by Shafran et al.'s theoretical position that individuals high in clinical perfectionism, but not those low in perfectionism, will display an attentional bias towards negative perfectionism-relevant information compared to positive perfectionism-relevant information. Importantly, if the prediction regarding selective attention were to be confirmed, then this would support the therapeutic value of including such components in CBT for perfectionism. Alternatively, if this prediction were not to be confirmed, then this would suggest that future research would be useful to determine the most effective components of CBT for perfectionism through examining alternative mechanisms of change.

Only one study to date has compared attentional bias in people who score high and low in perfectionism, and while the results of this study are encouraging, interpretation of its findings is constrained by limitations associated with the adopted methodology. Specifically, in this study, Kobori and Tanno (2012) screened 243 undergraduate students on the self-oriented perfectionism subscale of the Hewitt and Flett Multidimensional Perfectionism scale (HMPS; Hewitt & Flett, 1991). They compared the performance of those who scored in the top 25% (high perfectionism) and who scored those in the bottom 25% (low perfectionism) on an emotional Stroop task that required them to color name negative perfectionism-relevant words (e.g., failure, flaw, imperfection) and neutral words unrelated to perfectionism (e.g., air, temperature, printer). Kobori and Tanno assumed that when participants' attention was captured by word content, then their color naming of these words would be slowed. The high perfectionism group took significantly longer than the low perfectionism group to color name the negative perfectionism-relevant words, whereas the groups did not differ in their color naming latencies for the neutral perfectionism-irrelevant words. Although Kobori and Tanno's findings are consistent with the possibility that people high in perfectionism may attend disproportionately to negative perfectionism-relevant information, two limitations prevent the study from adequately testing Shafran et al.'s (2002) hypothesis. The first limitation concerns Kobori and Tanno's use of the emotional Stroop task to assess attentional bias, while the second limitation concerns the nature of the stimulus words used in their study. Each limitation will be considered in turn.

There has been compelling criticism of the assumption that slowing to color name particular words on the emotional Stroop task permits the conclusion that attention is being drawn to the content of such words (Algom, Chajut, & Lev, 2004; Bar-Haim et al., 2007; Macleod, Mathews, & Tata, 1986). As critics have pointed out, some participants may display general response slowing in the presence of certain information, reflecting behavioral freezing, without this involving greater attention to the content of that information. Moreover, critics also have noted that, even if an attentional bias is implicated in slowing to color name certain words, this could just as readily involve attentional avoidance of these particular colored word as attentional vigilance to the semantic content of these words (Lavy & van den Hout, 1994). Such concerns have led researchers to advocate the use of attentional assessment tasks that more clearly index the distribution of selective attention between the differing information of interest. The most widely used approach for achieving this is the attentional probe task, in which pairs of words, with their members differing on the dimension of interest, are briefly exposed on a computer screen, and participants must discriminate small probe stimuli that then appear in the locus where either word was shown. Degree of speeding to discriminate probes that appear in the locus of one category of words, relative to those that appear in the locus of the other category of words, indicates that attention was preferentially allocated to the former type of words compared to the latter (Grafton & Macleod, 2014; Grafton, Watkins, & MacLeod, 2012; Macleod et al., 1986). The use of this attentional probe methodology would permit more rigorous testing of the hypothesis that high perfectionism, unlike low perfectionism, is characterized by greater selective attention to failure related than success related information. This will be the attentional assessment approach adopted in the present study.

The second limitation of Kobori and Tanno (2012) study is that it compared only negative perfectionism-relevant words and neutral perfectionism-irrelevant words. The restriction of consideration to these two categories of stimulus words precludes conclusions concerning whether high perfectionism, but not low perfectionism,

is characterized by greater attention to negative perfectionism-relevant information than to positive perfectionism-relevant information. Kobori and Tanno claim to have shown that high perfectionists attend more than do low perfectionists to negative perfectionism-relevant information, whereas this is not the case for neutral perfectionism-irrelevant information. However, this effect could result from high perfectionists showing an attentional bias shown to all negative information, regardless of whether or not this information is related to perfectionism. The effect may also result from high perfectionists showing an attentional bias to all perfectionism-relevant information regardless of whether or not this information is negative in emotional valence. To adequately test the hypothesis that elevated perfectionism is characterized by greater attention to negative perfectionism-relevant information than to positive perfectionism-relevant information, it is vitally important to include negative and positive words, some of which are perfectionism-relevant (e.g., inept/exceptional) and some of which are perfectionism irrelevant (e.g., attack/fun), when assessing the patterns of attentional bias that characterize heightened perfectionism.

The aim of the present experiment was to investigate the nature of attentional bias in perfectionism while addressing the limitations of previous research. The attentional probe approach was employed to compare the patterns of attentional selectivity exhibited by high and low perfectionists. The physical and temporal parameters we adopted in our current probe task were based on those employed in studies that have used this approach to investigate the attentional basis of anxiety vulnerability (c.f. Bar-Haim et al., 2007). Importantly, our stimulus material included both emotionally negative and emotionally positive words, with half of the words of each emotional category being perfectionism-relevant and the other half being perfectionism-irrelevant. Using such a design enabled us to test the critical prediction based on Shafran et al.'s (2002) model of perfectionism that participants high in perfectionism, but not those low in perfectionism, will exhibit greater attention to negative than to positive information, but only when this information is perfectionism-relevant. The rationale for the study is that if selective attention is shown to be related to perfectionism then this would support its role as a maintaining factor as proposed by Shafran et al. (2002), support the focus on selective attention in CBT for perfectionism, and suggest that future research may examine if it is useful to modify selective attention through paradigms such as ABM in addition to existing methods used in CBT for perfectionism.

2. Method

2.1. Participants

Groups of participants who were high and low in perfectionism were required. Previous research investigating the association between biased patterns of attentional selectivity and individual difference dimensions, such as anxiety and depression, have reported effect sizes in the moderate-large range (c.f. Bar-Haim et al., 2007; Peckham, McHugh, & Otto, 2010). Assuming an effect size of a similar magnitude in the present study, an a priori-power analysis using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) revealed that approximately 50 participants (25 in each perfectionism group) would be required to detect a such an effect (power = .8, two-tailed alpha = .05).

Our criteria for classifying individuals as high in perfectionism were guided by prior CBT treatment studies that included a cut off for elevated perfectionism of ≥24.7 on the Concern over Mistakes (CM) subscale of the Frost Multidimensional Perfectionism Scale (FMPS; Frost, Marten, Lahart, & Rosenblate, 1990) (e.g., Egan, van Noort et al., 2014; Handley, Egan, Kane, & Rees, 2015). This score was based on the average CM score of anxiety disorder samples included in a review by Egan et al. (2011). Low perfectionists were defined as a cut-off of ≤18.5 on CM, which was the average CM score of control participants in the Egan et al. (2011) review.

Seventy-six participants were recruited from the community through flyers placed at a University, and local newspaper and radios ads, were screened. A total of 25 (17 males, 8 females) and 31 (11 males, 20 females) met criteria for the low and high perfectionism groups, respectively and took part in the study (see Table 1). A chi-square test of goodness of fit ($\alpha = .05$) revealed that gender did not differ between the groups, χ^2 (3, N = 56) = 6.43, $p = .09$, $\Phi = .006$. As can be seen in Table 1, the two groups did not differ in age, depression, anxiety, and stress scores. Participants in the high perfectionism group had significant higher scores perfectionism than the low perfectionism group.

2.2. Materials

2.2.1. Questionnaires

2.2.1.1. Concern over mistakes (Frost Multidimensional Perfectionism Scale). (CM; Frost et al., 1990). Concern over Mistakes (CM) is seen as a core component of clinical perfectionism and is highly correlated with a measure of clinical perfectionism (Egan, Shafran, et al., 2014); hence, it was chosen to measure perfectionism in the present study. The CM subscale of the FMPS consists of nine items assessing concern about making errors. Individuals respond using a 5-point Likert-type scale with higher scores indicating higher perfectionism. The CM subscale has good test-retest reliability, and construct validity (Egan et al., 2011). Internal consistency in this study was high ($\alpha = .85$).

2.2.1.2. Depression, anxiety and stress Scale-21. (DASS-21; Lovibond & Lovibond, 1995). This 21-item scale was administered to check whether high- and low-perfectionism groups differed in anxiety, depression or stress, and if so control for this potential confound as attentional responding to emotional information differs as a function of anxiety and depression (Bar-Haim et al., 2007; Harvey, Watkins, Mansell, & Shafran, 2004). Respondents rate items describing emotional symptoms over the past week on a 4-point Likert type scale. The DASS-21 has strong concurrent and discriminant validity (Antony, Bieling, Cox, Enns, & Swinson, 1998). Internal consistencies for were high in this study for depression ($\alpha = .87$), anxiety ($\alpha = .77$), and stress ($\alpha = .79$).

2.2.2. Stimulus words

The attentional probe task allowed for the assessment of attentional preferences for the word members of a word/non-word pair, which was determined by comparing speeding to discriminate probes presented in the locus of the word, compared to probes presented in the locus of the non-word. We were interested in the degree to which attentional preference to words differed across the following four categories of experimental words: 1) negatively valenced and perfectionist-irrelevant (e.g., attack, intimidated, lonely), 2) negatively valenced and perfectionist-relevant (e.g., failure, inept, insufficient), 3) positively valenced and perfectionist-irrelevant (e.g., gregarious, fearless, fun), 4) positively valenced and perfectionist-relevant (e.g., excel, success, exceptional). To select these words, we first created a pool of 200 candidate stimulus words, and had these rated by 6 psychology graduates on two dimensions. Raters assessed the degree to which each word was perfectionism-relevant using a 7-point Likert-type scale ranging from −3 (extremely perfectionist-relevant) to +3 (extremely perfectionist-irrelevant). To help guide these judgments, the raters were provided Shafran et al. (2002) definition of perfectionism i.e.,

Table 1
Participant characteristics (means, with standard deviations in parentheses).

	Low perfectionism (n = 25)	High perfectionism (n = 31)	Group difference $t(1, 54)$	p	Effect size (Cohen's d)
Age	26.08 (11.23)	28.48 (10.25)	.80	.43	.22
CM subscale	15.92 (1.77)	28.86 (3.46)	18.21	<.001	4.71
DASS-21 (depression)	1.48 (1.71)	1.81 (1.14)	.85	.40	.23
DASS-21 (anxiety)	2.80 (2.90)	2.97 (3.124)	.18	.86	.06
DASS-21 (stress)	5.60 (4.03)	6.08 (3.12)	.61	.74	.13

"the over dependence of self-evaluation on the determined pursuit (and achievement) of self-imposed personally demanding, standards of performance in at least one salient domain, despite the occurrence of adverse consequences" (p. 773). The raters also assessed the emotional valence of each word using a 7-point Likert-type scale ranging from −3 (extremely negative) to +3 (extremely positive), where the mid-point (0) was identified as emotionally neutral.

Using these ratings we selected 16 words in each of the four categories listed above. Thus, half of the 64 words were emotionally negative and half were emotionally positive, giving rise to a Stimulus Emotional Valence factor. Half of each emotional subtype were perfectionism-relevant while half were perfectionism-irrelevant, giving rise to a Stimulus Perfectionism Relevance factor. A two-way ANOVA, considering the Stimulus Emotional Valence factor and the Stimulus Perfectionism-Relevance factor, was carried out on the emotional valence ratings given to the selected words by the independent raters. There was a significant main effect of the Stimulus Emotional Valence factor, reflecting as required more negative valence ratings for words in the negative subset than for words in the positive subset; $F(1,60) = 1470.00$, $p < .01$, $\eta^2 = .961$ (negative valenced stimuli $M = -2.47$, $SD = .51$; positive valenced stimuli $M = 2.34$, $SD = .48$). There was no significant main effect of the Stimulus Perfectionism-Relevance factor, $F(1,60) = .001$, *ns*, $\eta^2 < .001$, and no interaction between the two factors, $F(1,60) = .248$, *ns*, $\eta^2 = .004$. Thus, the selected perfectionism-relevant and perfectionism-irrelevant words did not differ in terms of average of emotional valence. When an equivalent ANOVA was carried out on the perfectionism-relevance ratings this revealed the required significant main effect of the Stimulus Perfectionism-Relevance factor, reflecting higher perfectionism-relevance ratings for words in the perfectionism-relevant subset than for words in the perfectionism-irrelevant subset; $F(1,60) = 1069.36$, $p < .01$, $\eta^2 = .947$ (perfectionism-relevant stimuli $M = 2.34$, $SD = .48$; perfectionism-irrelevant stimuli $M = -2.50$, $SD = .67$). There was no significant main effect of the Stimulus Emotional Valence factor, $F(1,60) = .045$, *ns*, $\eta^2 = .001$, and no interaction between the two factors, $F(1,60) = .401$, *ns*, $\eta^2 = .007$. Thus, negative and positive words did not differ in terms of average perfectionism-relevance.

Additional ANOVAs were carried out on word length (expressed as numbers of letters per word), and frequency (according to the norms of Brysbaert & New, 2009). No significant effects emerged from either ANOVA (all $F < 3.40$, $p > .05$), indicating that word length and frequency did not differ as a function of emotional valence or perfectionism-relevance.

Finally, 32 emotionally neutral perfectionism irrelevant words were selected for use in baseline trials. The emotional valence ratings for these 32 words ranged from −1 to 1 with a mean of .03, which did not differ significantly from the emotionally neutral midpoint of zero, $t(1, 31) = .37$, $p = .71$, $d = .10$. The perfectionism relevance ratings of these words ranged from −1 to −3 with a mean of −2.53, which did not differ significantly from the mean rating given to the perfectionism-irrelevant stimuli in the main set of 64 emotional words, $t(1,31) = .23$, $p = .81$, $d = .06$.

2.2.3. Apparatus

A Dell Latitude E6530 laptop with a 17-inch color monitor, and a standard two-button mouse, was employed to present stimuli and to record participant responses, and the attentional assessment task was presented in E-Prime v2.0 (Schneider, Eschman, & Zuccolotto, 2012).

2.3. Experimental task

2.3.1. Attention probe task

The attentional probe task used to assess selective attention delivered 384 trials, across which each stimulus word was exposed a total of 4 times, with presentation order randomized. Each trial began with a fixation display, followed 1150 ms later by the 500 ms exposure of one of the stimulus letter string pairs. One of the letter strings appeared just above and one just below the center of the screen, with the two letter strings separated vertically by 3 cm. The word member of the pair appeared in the upper or lower screen location with equal frequency across trials. Immediately after the letter strings disappeared, a small visual probe appeared in either one of the two screen positions where a letter string had just been shown. This probe appeared equally often in the upper and lower screen location. Thus, on 50% of trials the probe appeared where the word had just been presented, while on 50% of trials it appeared where the nonword had just been presented. The probe was a small gray line that sloped upwards either right or left. Participants were required to make a discriminative response based on the direction of this slope, as soon as they processed the probe. The participant's latency to accurately make this probe discrimination response was the dependent variable of interest.

Speeding to discriminate those probes that appeared in the locus of the words, relative to probes that appeared in the locus of the nonwords, indicated degree of increased attention to the word member of each pair. Using the equation below, we computed for each participant an index of the degree to which greater attention was paid to each of the four experimentally critical word types (i.e. emotionally negative perfectionism-relevant, emotionally negative perfectionism irrelevant, emotionally positive perfectionism-relevant, emotionally positive perfectionism-irrelevant), compared to the baseline words. A higher index score reflects greater attentional preference for that target word subtype.

Attentional Preference for Target Word Subtype X = (discrimination latency for probes in locus of nonword paired with target word subtype X − discrimination latency for probes in locus of target word subtype X) − (discrimination latency probes in locus of nonword paired with baseline word − discrimination latency for probes in locus of baseline word).

2.4. Procedure

The research was approved by the Curtin University Human Research Ethics Committee (approval number HR88/2012). Participants were tested individually and provided informed consent before completing the FMPS and DASS-21. The participant was seated approximately 60 cm from the computer screen, and the

requirements of the probe task were provided in verbal and written form. The instructions emphasized the need to discriminate the probe slope as quickly as possible, and to respond without delay as soon as probe slope was accurately identified. A brief practice period (16 trials) was completed using a separate set of neutral stimuli. Participants then completed the attentional probe task, before being debriefed about the purpose of the study.

3. Results

Participants displayed a high level of accuracy on the probe task, averaging less than 7% errors. Accuracy rates did not differ between the two perfectionism groups, $F(1, 58)$ 1.65, $p = .20$, $\eta^2 = .02$, (High perfectionism group, M = 93.27, SD = 6.44; low perfectionism group, M = 95.04, SD = 2.88). Prior to computing the attentional preference indexes, outlier probe discrimination latency scores (defined as those falling > 2.58 SD from each participant's mean probe discrimination latency) were removed. This resulted in exclusion of 5.32% of latencies. Attentional preference index scores were then computed as shown in Table 2.

These attention preference index scores were subjected to a Generalized Linear Mixed Model (GLMM), that included participants as a random factor, and the following three fixed factors: Perfectionism Group (high perfectionism vs. low perfectionism); Stimulus Perfectionism Relevance (perfectionist-relevant vs. perfectionistic-irrelevant words); and Stimulus Emotional Valence (negative words vs. positive words). Perfectionism Group was a between-groups factor while Stimulus Perfectionism Relevance, and Stimulus Emotional Valence were within-groups factors. GLMM was used in preference to the traditional ANOVA approach because it better accommodates violations concerning normality, linearity, and homogeneity of variance (Stroup, 2012). The findings obtained using GLMM were equivalent to those found using ANOVA.

The analysis revealed a significant main effect of Stimulus Emotional Valence, reflecting higher attentional preference index scores for emotionally negative words (M = 33.95, SD = 159.49) than for emotionally positive words (M = −9.59, SD = 170.83), $F(1,455) = 11.34$, $p = .001$, $\eta^2 = .024$. However, importantly, this main effect was qualified by a significant two-way interaction between Stimulus Perfectionism Relevance × Stimulus Emotional Valence, $F(1,455) = 4.50$, $p = .034$, $\eta^2 = .009$, which was further subsumed within a higher order interaction involving all three factors, $F(1,455) = 9.43$, $p < .01$, $\eta^2 = .020$. The presence of this three-way interaction indicates that the relative impact of perfectionism group on attentional preference for negative information compared to attentional preference for positive information differed depending on the relevance of such information to perfectionism. Hence, we sought to determine whether the specific nature of this higher order interaction was in line with our experimental predictions.

Specifically, we computed the significance of the component simple two-way interactions of Perfectionism Group × Stimulus Emotional Valence was calculated at each level of the Stimulus Perfectionism Relevance factor. Consistent with the hypothesis under test, the simple interaction was not significant when stimuli were perfectionism-irrelevant, $F(1,228) = 2.98$, $p = .09$, $\eta^2 = .013$, but was significant when stimuli were perfectionism relevant, $F(1,228) = 5.96$, $p = .015$, $\eta^2 = .025$.

Fig. 1 illustrates the two way interaction of Perfectionism Group × Stimulus Emotional Valence, observed for perfectionism relevant stimulus materials alone. As can be seen in Fig. 1, the nature of this simple two-way interaction was completely consistent with predictions. Specifically, for these perfectionism-relevant stimuli alone, participants with high perfectionism displayed higher significantly higher attentional preference scores for negative words than for positive words (M = 62.45, SD = 142.78 vs M = −38.47, SD = 181.70, respectively), $t(1,228) = 3.76$, $p < .001$, 95% CI [48.08, 153.76], $d = .62$, while those with low perfectionism did not (M = .51, SD = 137.43 vs M = 20.85, SD = 155.85, respectively), $t(1,228) = 1.06$, $p = .29$, 95% CI [-17.61, 58.29], $d = .13$. Thus, unlike participants with low perfectionism, those with high perfectionism exhibited greater attention to negative than to positive information, but only when this information was perfectionism-relevant.

4. Discussion

This study is the first to test the prediction, generated by Shafran et al.'s (2002) model of clinical perfectionism, that people with high levels of perfectionism, unlike those with low levels of perfectionism, preferentially allocate greater attention to negative information compared to positive information, but only when this information is perfectionism-relevant. Consistent with this hypothesis, our findings indicate that only participants who scored high in perfectionism exhibited greater attention to negative than to positive information, and this pattern of attentional selectivity was evident only when this information was perfectionism-relevant.

The present demonstration of a perfectionism-linked attentional bias has an important theoretical implication. Most obviously, it lends weight to the cognitive-behavioral model of clinical perfectionism, which proposes that biased attentional processing of negative perfectionism-relevant information plays an important role in the development and perpetuation of perfectionism (Shafran et al., 2002, 2010). This contention has been based only on the clinical impressions of therapists concerning the patterns of selective attention they infer from clinical interactions with individuals identified as perfectionists, and on patient self-reports concerning their attentional processing (Glover, Brown, Fairburn, & Shafran, 2007). As pointed out elsewhere, self-report measures of cognitive processes are notoriously inaccurate, and so cannot permit confident conclusions concerning such processes (MacLeod, 1993; Nisbett & Wilson, 1977). In the present study we used an objective performance measure, rather than subjective self-report measures, to infer attentional bias. Thus, our approach can

Table 2
Mean attentional bias index scores (and SD) obtained on attentional probe task.

Perfectionism Group	Stimulus Perfectionism-Relevance			
	Perfectionism-irrelevant		Perfectionism-relevant	
	Stimulus Emotional Valence			
	Positive words	Negative words	Positive words	Negative words
High Perfectionist	26.101 (175.67)	16.701 (130.31)	−38.47 (181.70)	62.45 (142.78)
Low Perfectionist	3.614 (118.28)	44.11 (141.49)	00.51 (137.43)	20.85 (155.85)

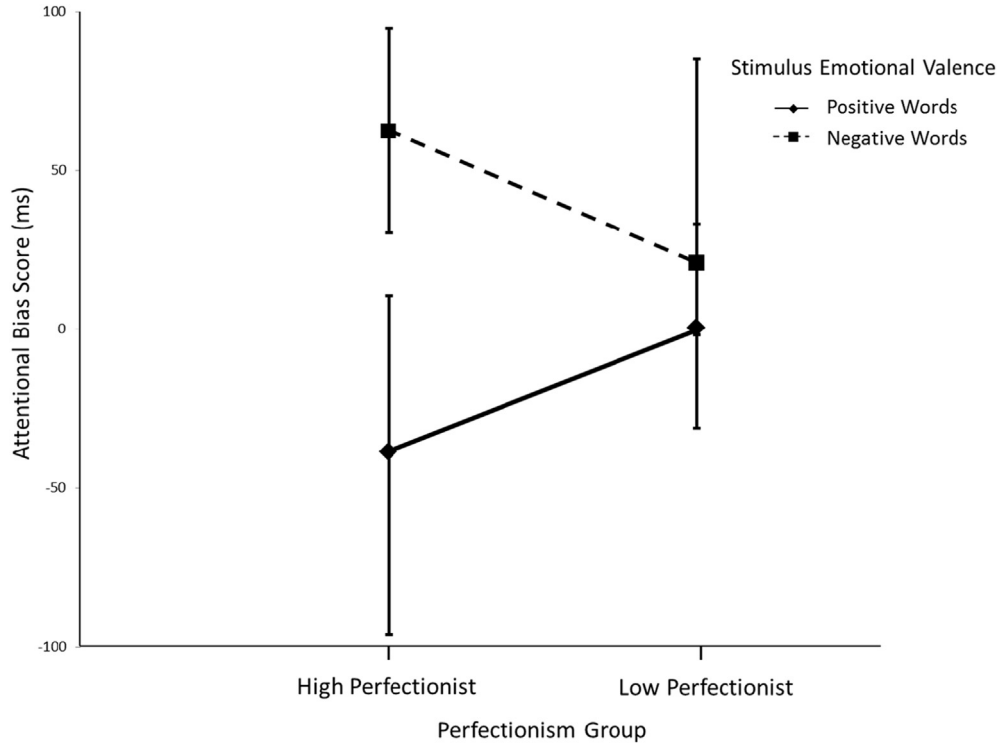

Fig. 1. Significant simple two way interaction between Perfectionism Group × Stimulus Emotional Valence shown on Perfectionism Relevant Words alone.

provide greater confidence in the veracity of the prediction, generated by Shafran and colleagues' cognitive-behavioral model of clinical perfectionism, that high levels of perfectionism are characterized by greater attention to negative than to positive information, when perfectionism-relevant.

Our findings also have applied importance. In recent years, novel cognitive-behavioral therapy (CBT) interventions for perfectionism have been developed. CBT for perfectionism involves treatment components specifically designed to alter biased patterns of selective attention to negative perfectionism-relevant information and this has been found to be effective in reducing perfectionism, anxiety, depression and eating disorders (e.g., Egan & Hine, 2008; Egan, van Noort et al., 2014; Glover et al., 2007; Handley et al., 2015; Riley, Lee, Cooper, Fairburn, & Shafran, 2007; Shafran et al., 2010; Steele & Wade, 2008; Steele et al., 2013). Attention broadening techniques have been used to reduce selective attention in clinical perfectionism. For example, Shafran et al. (2010) described a client who had selective attention to flaws in a cake she produced for a dinner party and thought the whole night was ruined and that she was a failure. The client was encouraged to broaden her attention and consider evidence that others commented the food was excellent, and to shift her attention to external factors such as engaging in conversation, and noticing the details of a friend's shirt color. Egan, Wade, et al. (2014) also provided the example of asking a client how itchy their scalp is and then asking them to rate it, then asking the client to concentrate on the itchiness of their head and to close their eyes and focus on their scalp, and then re-rate the itchiness, resulting in a higher rating and thus a demonstration of how powerful selective attention can be. Behavioral experiments are idiosyncratic to the individual, for example if a student had selective attention to long pauses or saying 'um' too much in public speaking, they could engage in a behavioral experiment where they compare their results in class presentations and the degree of engagement of classmates in the presentation after purposely making more perceived flaws through pauses and saying 'um' more often.

Ultimately, however, the therapeutic value of these components in CBT will critically depend upon whether this attentional bias makes a causal contribution to clinically relevant perfectionism, as argued by Shafran et al. (2002; 2010). The results of the current study cannot determine whether the attentional bias to negative perfectionism-relevant information makes a functional contribution to the symptoms of perfectionism. Future researchers should seek to address this issue. One way in which investigators could appraise the causal role of such attentional bias in contributing to heightened perfectionism would be to assess attentional bias to negative perfectionism-relevant information immediately before, and immediately after, CBT treatment for perfectionism. Of course, such attentional bias may be a consequence of heightened perfectionism, in which case reductions in perfectionism produced by CBT would be expected to mediate reductions of this attentional bias over the course of treatment. However, if attentional bias to negative perfectionism-relevant information plays a causal role in perfectionism, then the reduction of this attentional bias over the course of treatment would instead be expected to mediate the attenuation of perfectionism.

Another way in which investigators could interrogate the causal involvement of this attentional bias in perfectionism would be to employ appropriately designed variants of ABM procedures. The ABM approach involves exposing participants to training versions of the present attentional probe procedure, configured in a manner designed to implicitly alter attentional bias. Thus, for example, to increase or reduce attentional bias to a given category of information, probes are consistently presented either proximally or distally to such information, across many hundreds of trials. Such procedures have proven effective in experimentally manipulating selective attentional responding to target types of information (c.f. MacLeod & Mathews, 2012). It remains to be seen whether the

use of this ABM approach, to directly reduce attention to emotionally negative perfectionism-relevant information in people with heightened perfectionism, would contribute to the attenuation of their perfectionism. Such a finding would not only confirm that this attentional bias does make a causal contribution to the expression of perfectionist symptomatology, but also would open the door to the development of ABM based therapeutic interventions for clinical perfectionism. Despite limited evidence that perfectionism is associated with a specific attentional bias, CBT for perfectionism (e.g., Egan, Wade et al., 2014) includes a range of techniques designed to correct attentional biases and increase attentional flexibility, such as attending to competing information indicative of success. If a specific attentional bias is found to causally contribute to perfectionism, then future research should determine whether adjunctive ABM offers additive benefits to CBT in terms of treatment outcomes. Furthermore, it would be useful for future research to determine if selective attention mediates reductions in perfectionism during CBT for perfectionism. If selective attention is identified as a mediator then, following the recommendations of Kraemer, Wilson, Fairburn, and Agras (2002) on establishing mechanisms of change, trials using protocols enhanced with techniques to address selective attention may help to determine if it is a mechanism of change. This would have important clinical implications with regard to whether or not changing selective attention should be a treatment focus for perfectionism.

Though our findings may yield some interesting theoretical and clinical implications, it is appropriate to acknowledge some limitations of the current study. As we did not assess clinically diagnosed participants, we cannot draw conclusions regarding the patterns of attentional selectivity that characterize clinical disorders in which high perfectionism has been identified as a predisposing and perpetuating factor (e.g., eating, anxiety and mood disorders). Future research should directly examine the patterns of attentional bias to negative perfectionism-relevant information that characterize such clinical conditions. We also recognize that the attentional probe assessment procedure used in the present study provides only a snapshot of selective attention at the specific point in time when the probes appeared. A more continuous measure of attention, such as that which can be obtained using eye-movement technology, could illuminate the temporal dynamics of the pattern of selective attention that characterizes heightened perfectionism. If the use of eye movement assessment approaches in future research yields similar results to those we have presently obtained using the attentional probe task, then this would represent powerful converging support for our current conclusion, that heightened perfectionism involves an attentional bias that favors negative information over positive information, when this is related to perfectionism-relevant concerns.

In the current study, the word stimuli presented in our attentional probe task were selected from a larger pool of candidate words that had previously been judged in terms of their relevance to perfectionism by a panel of independent raters. An advantage of adopting this common approach to stimulus development is that it helped ensure that the word stimuli ultimately selected for use, in general, were perfectionism relevant or irrelevant. A potential downside to this approach, however, is that not all of the word stimuli presented necessarily will have been perfectionism-relevant or −irrelevant for every participant. For example, the words ‘lonely’ and ‘intimidated’ would likely be perfectionism-relevant for an individual with high perfectionism who is concerned about their social performance, but not for an individual who is concerned about their performance at work. While our current approach revealed perfectionism-linked biases in attentional responding to information that, in general, can be classed as perfectionism-relevant, future researchers could consider maximising personal relevance of all stimulus words by selecting stimulus materials for each participant based on that individual's ratings. If each participant were to rate the candidate stimulus words, prior to completing the probe task, then it would be possible to use only those words judged by that participant to be perfectionism-relevant as the perfectionism-relevant stimuli presented in the probe task (e.g., Amir, Najmi, & Morrison, 2009). The use of such idiosyncratic word stimuli may enable an even more sensitive assessment of the patterns of attentional bias that characterize perfectionists.

To assess individual differences in perfectionism in the present research we employed the widely used Concern over Mistakes (CM) subscale of the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990). The FMPS has undergone extensive psychometric analysis, which has consistently revealed that it has very good reliability and validity (e.g. Egan et al., 2011; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993; Frost et al., 1990), providing high confidence in the scores obtained. However, some investigators have argued that other more recently developed questionnaire measures, such as the Clinical Perfectionism Questionnaire (CPQ; Fairburn, Cooper, & Shafran, 2003), include items that are more tightly aligned with Shafran et al.’s the definition of perfectionism, and so may better capture individual differences in this dimension (Dickie, Surgenor, Wilson, & McDowall, 2012). Although the CM subscale is highly correlated with the Clinical Perfectionism Questionnaire (Egan, Shafran, et al., 2014), and the psychometric properties of the CPQ are relatively less well established (Dickie et al., 2012; Egan, Shafran, et al., 2014), future researchers should deliver our current attentional probe task, and employ the CPQ to assess individual differences in perfectionism. Work of this type could provide important converging evidence for our presently observed findings.

Future research should also consider recruiting participants from across the full distribution of perfectionism scores, irrespective of whether perfectionism is assessed by the CM subscale of the FMPS, the CPQ, or any other measure of perfectionism. In the present study, we adopted the commonly used extreme group approach (EGA) to recruit participants, whereby individuals were invited to take part in the study only if they met our criteria for high vs. low levels of perfectionism, which we based on established cut-offs reflecting perfectionism scores obtained by individuals with vs. without a diagnosis of clinical pathology, respectively. However, some investigators have pointed out that the EGA approach may obscure the detection of non-linear relationships between the variables of interest (Preacher, Rucker, MacCallum, & Nicewander, 2005). Thus, we suggest that future researchers should recruit participants from across the entire distribution of perfectionism scores, as such work could potentially extend understanding of the attentional basis of heightened perfectionism, which we have shown in the current study to be characterized by an attentional bias that favors negative information over positive information, but only when this is related to perfectionism-relevant concerns.

The present study has demonstrated that heightened perfectionism is characterized an attentional bias towards negative perfectionism relevant information. Heightened perfectionism has been shown elsewhere to be characterized by an increased tendency to impose negative interpretations on situations that are perfectionism relevant (Yiend, Savulich, Coughtrey, & Shafran, 2011), and also by an increased tendency to forgo efficient task completion in order to achieve high levels of task performance (Stoeber, 2011). It could be informative for future research to investigate whether or not these different cognitive anomalies represent independent characteristics of high perfectionism. An intriguing possibility is that this attentional bias to negative

perfectionism-relevant information may be the primary cognitive distortion that gives rise to these other anomalies. Future researchers equipped with the capacity to directly manipulate this attentional bias would be well positioned to test this hypothesis by examining the impact of this attentional manipulation on these other anomalies.

It can be concluded that heightened levels of perfectionism, unlike low levels of perfectionism, are characterized by a bias that involves greater attention to negative than to positive information, but only when this information is perfectionism-relevant. We hope that this research serves to stimulate further research into the attentional basis of perfectionism, given the pervasive role that heightened perfectionism appears to play across a wide range of psychological disorders.

Acknowledgments

All authors declare that they do not have any interests that may be interpreted as influencing the research. All APA ethical standards were upheld and followed in the conduct of the study. The manuscript has not been submitted for publication or published in its current form elsewhere.

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Appendix B: Confirmation of Author Contributions

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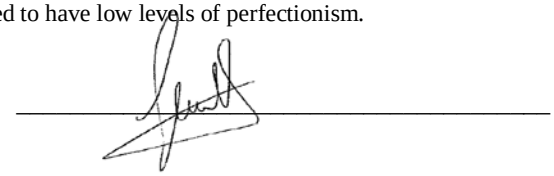
To whom it may concern,

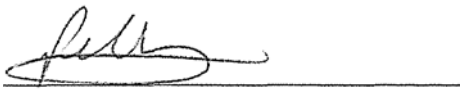
I, Joel Howell, was the major contributor to the conceptualisation, coordination, and implementation of my PhD project, *An examination of cognitive biases and imagery in perfectionism,* which resulted in the following paper.

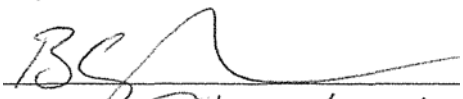
Selective attention in perfectionism: Dissociating valence from perfectionism relevance. By Howell, J. A., Peter, M. McEvoy, Grafton, B., Macleod, C., Kane, R. T., Anderson, R. A., & Egan, S. J. (2016). Published in the *Journal of Behavior Therapy and Experimental Psychiatry, 51,* 100-108. doi:10.1016/j.jbtep.2016.01.004

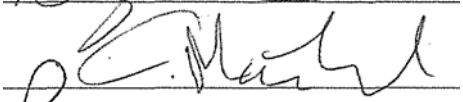
I am the lead author, and it was primarily my responsibility to conceptualise, draft, and proofread the paper based on data collected for my PhD thesis, which involved the development of a computerised dot-probe attention task, individual assessment on the computerised task with each participant, collation and analysis of data, and draft writing and editing of the present paper. This paper investigated the relationship between those considered to have high levels of perfectionism and whether their attention was captured differently by any particular stimuli compared to those considered to have low levels of perfectionism.

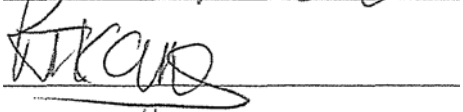
Joel Howell 

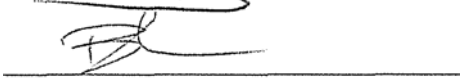
I, as Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate. As co-author, I contributed to the development of the research, statistical analyses, and interpretation of the data.

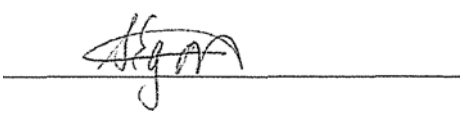
Peter McEvoy 

Ben Grafton 

Colin Macleod 

Robert Kane 

Rebecca Anderson 

Sarah Egan 

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Appendix D: Information Sheet

My name is Joel Howell and I am currently completing my PhD program at Curtin University.

PURPOSE OF THIS RESEARCH
The goal of my research is to investigate how individuals with high perfectionism compare with individuals low on perfectionism when completing cognitive tasks. The purpose is to help our understanding of how individuals with perfectionism focus their attention, interpret situations, and how this may impact their day-to-day life. Studies have found that high levels of perfectionism can result in people experiencing symptoms of anxiety, depression and eating disorders. By understanding how perfectionism impacts on individuals then better treatments can be developed.

PARTICIPATION IS VOLUNTARY
Participation in this research is voluntary. You do not have to participate if you do not want to, and if you do choose to participate and change your mind, you can withdraw from the research without any negative consequences. You can withdraw up until the data collected has been entered; this is because random numbers are allocated to the information that is gathered from questionnaires or cognitive tasks to ensure that everything is completely confidential.

WHAT DOES IT INVOLVE?
- If you want to participate then please sign the consent form provided and complete the questionnaire attached, you can then send it back in the envelope provided.
- You will be asked a few quick questions to see if you are eligible for the study. If you are eligible to participate I will invite you to come to the School of Psychology and Speech Pathology at Curtin University to complete the study.
- Upon meeting me, I will take you to one of the computer rooms that are located in the School of Psychology and Speech Pathology.
- The computer task will take between 40 to 60 minutes and consists of a few questionnaires about perfectionism, and then two computer tasks will be completed. One will examine how quickly you can react to a line that will appear on the screen, while the second task will involve you reading series of short paragraphs and then rating interpretations of the scenarios.

POTENTIAL RISKS
There is no anticipated risk. This research is completely voluntary and you may withdraw at any time, for any reason, before the data you provide is saved. You will not face any negative consequences if you do withdraw from the study.

POTENTIAL BENEFITS
Though there are no immediate benefits for yourself, this research will help developing our understanding about perfectionism. All participants will be able to submit an e-mail upon completion of the study that will not be linked to your answers and will put you in to a draw to win 1 of 10 $25 gift vouchers for Coles Group & Myer Gift Card**.**

CONFIDENTIALITY
All information will remain confidential to those outside the study. All information provided will be stored in a locked data file that only the primary researcher and supervisors will have access to. The data from each person will be given a randomised code when starting the experiment, which is what will be used to link all of your answers. If the study is published no identifying information will be revealed. Data will be retained for a 5 year period in a

locked cabinet only accessible to myself and my supervisors (Dr Sarah Egan, Dr. Rebecca Anderson and Dr. Robert Kane).

FOR MORE INFORMATION

If you have any questions you can contact Joel Howell on 0416 165 635, or by email joel.howell@postgrad.curtin.edu.au. Alternatively, if you wished to contact my supervisors Dr. Sarah Egan: (08) 9266 2367; s.egan@curtin.edu.au or Dr. Rebecca Anderson: (08) 9266 3012; Rebecca.Anderson@curtin.edu.au

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 88/2012). 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, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au

Consent Form

Principal Researcher: Joel Howell, Curtin University
Research Supervisor: Dr. Sarah Egan, Curtin University
Research Co-Supervisor: Dr. Rebecca Anderson, Curtin Universtiy

I _____,

have read the information sheet and voluntarily consent to participate in this research.

- I acknowledge that I have been informed of and understand the purposes of the study.
- I have been given the opportunity to ask questions about the study.
- I understand that after I sign and return this consent form it will be retained by the researcher as a record of my consent.
- I understand that my participation in this research is voluntary, and that I can withdraw from this study until data collation without negative consequences.
- I understand that this study may be published; however no information will be used to identify me.
- I agree to participate in the study as outlined to me.

SIGNED_____

NAME _____

DATE _____

Appendix E: Word Stimuli Used for Attention Bias Task

Negative (perfectionist irrelevant)	Negative (perfectionist relevant)	Neutral	Positive (perfectionist irrelevant)	Positive (perfectionist relevant)
attack	unsuccessful	socks	kind	achievement
dangerous	inadequate	alphabet	cheerful	progress
despised	useless	transfer	ecstatic	expert
desperate	flaw	sentence	pleasure	flawless
forlorn	inept	structures	fun	success
harm	inefficient	supercomputer	safe	excel
ignored	fail	prune	fearless	superior
intimidated	unacceptable	flipper	courageous	proficient
lonely	losing	whim	euphoric	distinction
sad	incorrect	lake	friendly	supreme
tragedy	inferior	xylophone	gregarious	accomplished
suffocating	insufficient	path	brightness	exceptional
unpopular	unemployed	collect	glee	outstanding
emptiness	incapable	pillow	assertive	finest
miserable	deficient	member	heroic	perfection
futile	disappointed	physiologically	passionate	ideal
		cartoonist		
		telephone		
		downtown		
		meant		
		adjustment		
		client		
		historical		
		directly		
		graphics		
		particles		
		identity		
		before		
		telescope		
		went		
		skip		
		shadow		

Appendix F: Interpretation Bias Stimuli Development

To develop the scenarios and the range of associated test sentences used in the study, Yiend et al. (2011) provided a copy of their interpretation stimuli used in their study. These stimulus materials consisted of 75 scenarios previously identified as perfectionism relevant. The scenarios from Yiend et al. were screened for the present study based on their relevance to perfectionism by clinical researchers (JH, RA, and SE) with experience treating clinical perfectionism. From this screening, with possible options ranging from not relevant, slightly relevant, moderately relevant and highly relevant, 20 scenarios were identified as being highly relevant by all three raters to perfectionism and were subsequently chosen for the current study. An additional 45 scenarios were developed and rated as being highly relevant by clinical researchers (JH, RA, SE), with a focus on domains pertinent to perfectionism, including employment, academics, social interactions, physical appearance, sporting activities, and domestic situations.

The 20 scenarios from Yiend et al (2010) and the newly developed 45 scenarios (65 scenarios in total) had eight test sentences that were designed by the primary researcher (JH) to meet the critical subtypes required. For each scenario, four of the interpretations focused on the affective outcome/experience of the protagonist and the other four interpretations focused on the event outcome/experience of the protagonist. Six clinical psychology trainees rated all candidate interpretations on emotionality (-3 = extremely negative to +3 = extremely positive), and interpretation type to distinguish between target and foil interpretations (i.e. "*can this possible extrapolative interpretation in principle be drawn from the detailed imperfection event detailed?*" [yes / no]). These ratings were used to determine which scenarios would be used in the present study.

As the scenarios were already identified as highly relevant to perfectionism, the materials used in the present study were selected by ensuring any scenario had all eight test sentences that were rated as meeting each critical subtype. This selection was to ensure that across the interpretations for the scenarios there would be an equitable average rating of the positive/negative ratings across both affective and event oriented interpretations. On this basis, the scenarios that contained interpretations that were above a rating of 2 (moderately positive) or below rating of -2 (moderately negative) were initially selected to ensure that each interpretation

clearly belonged to either the positive emotional valence or the negative emotional valence. On this basis 40 scenarios met these criteria and were used to assess the critical subtypes. Means and standard deviations of perfectionism and emotional ratings for the final interpretations from the raters are listed in Table 9.

To ensure that these interpretations were adequately distinguished from one another a four-way ANOVA was carried out on the emotional valence ratings for the selected sentences by the independent raters, with test sentence situation type (affect vs. event), Interpretation test sentence valence (positive vs. negative), and tests sentence status (target vs. foil) as within-participants factors. This analysis revealed a significant main effect for the Test sentence valence factor, reflecting, as required, more negative valence ratings for interpretations in the negative subset than for interpretations classified in the positive subset; $F(1, 312) = 21726.97$, $p < .001$, $\eta^2 = .99$ (negative valenced stimuli $M = -2.44$, $SD = .27$; positive valenced stimuli $M = 2.50$, $SD = .31$). It should be noted that a consequence of selecting items that were rated high (above 2) or low (below - 2) in affect was that the mean difference score (i.e., the difference score between the positive and negative items averaged across raters) was relatively large compared to the standard error of the mean difference score (i.e., the difference score within the positive and negative items averaged across raters). The test statistic for the 'Emotional Valence Ratings' was derived by dividing the mean difference score by its standard error, which explains why the magnitude of the test statistic (i.e., $F[1, 312] = 21726.97$) was extremely large.

There was no significant main effect on valence ratings for either the Test sentence situation type factor, $F(1,312) = 0.52$, *ns*, $\eta^2 < .002$, or Test sentence stats factor, $F(1,312) = 0.70$, *ns*, $\eta^2 < .002$). There was also no two-way (all $F(1,312) < 0.70$, *ns*, $\eta^2 < .01$), or three-way interaction, $F[1,197] = 0.60$, *ns*, $\eta^2 < .002$) between Test sentence valence, Test sentence situation type, and Test sentence stats factors. Thus, as intended, the selected interpretations for perfectionist scenarios, the affective and event focused interpretations, and the target and foil interpretations, did not differ in terms of average of emotional valence.

Table 10. *Mean interpretation rating scores (and SD) for emotional valence and domain as obtained on ratings by six independent raters.*

Rating category	*Test sentence situation type*							
	Affect				Event			
	Test sentence valence							
	Negative interpretations		Positive interpretations		Negative interpretations		Positive interpretations	
	Test sentence stats							
	Target	Foil	Target	Foil	Target	Foil	Target	Foil
Emotional Valence	-2.48 (.25)	-2.42 (.28)	2.48 (.28)	2.49 (.30)	-2.42 (.32)	-2.43 (.28)	2.49 (.34)	2.54 (.34)

Appendix G: Questionnaire Package

ID Code:

Attention and Interpretation in Clinical Perfectionism

The questions in this booklet are designed to help us better understand clinical perfectionism.

Please answer all questions as honestly as you can.

Your answers will remain strictly confidential. It is important that you complete all of the questions, but if you feel you cannot answer a particular question, or if you have any questions feel free to ask the researcher with you.

Thank you for filling out this booklet. Your assistance is important and appreciated.

FMPS

Please consider each statement and circle the corresponding number that best reflects your agreement with the statement. Please be sure to read each statement carefully.

(Please circle one number on each line)

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
1. My parents set very high standards for me.	1	2	3	4	5
2. Organisation is very important to me.	1	2	3	4	5
3. As a child, I was punished for doing things less than perfect.	1	2	3	4	5
4. If I do not set the highest standards for myself, I am likely to end up a second-rate person.	1	2	3	4	5
5. My parents never tried to understand my mistakes.	1	2	3	4	5
6. It is important to me that I be thoroughly competent in everything I do.	1	2	3	4	5
7. I am a neat person.	1	2	3	4	5
8. I try to be an organised person.	1	2	3	4	5
9. If I fail at work/school, I am a failure as a person.	1	2	3	4	5
10. I should be upset if I make a mistake.	1	2	3	4	5
11. My parents wanted me to be the best at everything.	1	2	3	4	5
12. I set higher goals than most people.	1	2	3	4	5
13. If someone does a task at work/school better than I, then I feel like I failed at the whole task.	1	2	3	4	5
14. If I fail partly, it is as bad as being a complete failure.	1	2	3	4	5
15. Only outstanding performance is good enough in my family.	1	2	3	4	5
16. I am very good at focusing efforts on attaining a goal.	1	2	3	4	5
17. Even when I do something very carefully, I often feel that it is not quite right.	1	2	3	4	5
18. I hate being less than the best at things.	1	2	3	4	5

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
19. I have extremely high goals.	1	2	3	4	5
20. My parents have expected excellence from me.	1	2	3	4	5
21. People will probably think less of me if I make a mistake.	1	2	3	4	5
22. I never felt like I could meet my parents' expectations.	1	2	3	4	5
23. If I do not do as well as other people, it means that I am an inferior human being.	1	2	3	4	5
24. Other people seem to accept lower standards from themselves than I do.	1	2	3	4	5
25. If I do not do as well all the time, people will not respect me.	1	2	3	4	5
26. My parents have always had higher expectations for my future than I have.	1	2	3	4	5
27. I try to be a neat person.	1	2	3	4	5
28. I usually have doubts about the simple everyday things I do.	1	2	3	4	5
29. Neatness is very important to me.	1	2	3	4	5
30. I expect higher performance in my daily tasks than most people.	1	2	3	4	5
31. I am an organised person.	1	2	3	4	5
32. I tend to get behind in my work because I repeat things over and over.	1	2	3	4	5
33. It takes me a long time to do something "right".	1	2	3	4	5
34. The fewer mistakes I make, the more people will like me.	1	2	3	4	5
35. I never felt like I could meet my parents' standards.	1	2	3	4	5

CPQ

INSTRUCTIONS

This questionnaire is concerned with "perfectionism". By perfectionism, we mean trying to meet really high standards whether or not you actually succeed in reaching them.

In this questionnaire we are only concerned with perfectionism that affects areas of life other than your eating, weight, or appearance.

Have you been trying to achieve high standards over the past month whether or not you have succeeded (excluding standards for your eating, weight or appearance)?
Please circle YES or NO.

YES / NO

If so, in what areas of your life (other than eating, weight or appearance) has this applied?
- For example, it might have been in your performance at work, at sport, at music, at home, etc. Please note these below:

……

……

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……

Please consider each statement and circle the corresponding number that best reflects your agreement with the statement. Please be sure to read each statement carefully.

(Please circle one number on each line)

Over the past month…	Not at all	Some of the time	Most of the time	All of the time
1. Over the past month, have you pushed yourself really hard to meet your goals?	1	2	3	4
2. Over the past month, have you tended to focus on what you have achieved, rather than on what you have not achieved?	1	2	3	4
3. Over the past month, have you been told your standards are too high?	1	2	3	4
4. Over the past month, have you felt a failure as a person because you have not succeeded in meeting your goals?	1	2	3	4
5. Over the past month, have you been afraid that you might not reach your standards?	1	2	3	4
6. Over the past month, have you raised your standards because you thought they were too easy?	1	2	3	4
7. Over the past month, have you judged yourself on the basis of your ability to achieve high standards?	1	2	3	4
8. Over the past month, have you done just enough to get by?	1	2	3	4
9. Over the past month, have you repeatedly checked how well you are doing at meeting your standards (for example, by comparing your performance with that of others)?	1	2	3	4
10. Over the past month, do you think that other people would have thought of you as a “perfectionist”?	1	2	3	4
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?	1	2	3	4
12. Over the past month, have you avoided any tests of your performance (at meeting your goals) in case you failed?	1	2	3	4

DASS-21

Please consider each statement and circle the corresponding number that best indicates how much the statement applied to you over the PAST WEEK.

Please be sure to read each statement carefully.

(Please circle one number on each line)

Over the past week…	Did not apply to me at all	Applied to me to some degree, or some of the time	Applied to me to a considerable degree, or a good part of time	Applied to me very much, or most of the time
1. I found it hard to wind down.	0	1	2	3
2. I was aware of dryness of my mouth.	0	1	2	3
3. I couldn't seem to experience any positive feeling at all.	0	1	2	3
4. I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion).	0	1	2	3
5. I found it difficult to work up the initiative to do things.	0	1	2	3
6. I tended to over-react to situations.	0	1	2	3
7. I experienced trembling (e.g., in the hands).	0	1	2	3
8. I felt that I was using a lot of nervous energy.	0	1	2	3
9. I was worried about situations in which I might panic and make a fool of myself.	0	1	2	3
10. I felt that I had nothing to look forward to.	0	1	2	3
11. I found myself getting agitated.	0	1	2	3
12. I found it difficult to relax.	0	1	2	3
13. I felt down-hearted and blue.	0	1	2	3
14. I was intolerant of anything that kept me from getting on with what I was doing.	0	1	2	3
15. I felt I was close to panic.	0	1	2	3
16. I was unable to become enthusiastic about anything.	0	1	2	3
17. I felt I wasn't worth much as a person.	0	1	2	3

18. I felt that I was rather touchy.	0	1	2	3
19. I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat).	0	1	2	3
20. I felt scared without any good reason.	0	1	2	3
21. I felt that life was meaningless.	0	1	2	3

RNT-10

Please consider how you respond when you feel distressed or upset and circle the corresponding number that best reflects your experience WHEN YOU ARE DISTRESSED OR UPSET.

Please be sure to read each statement carefully.

(Please circle one number on each line)

When you are distressed or upset…	Not true at all		Somewhat true		Very true
1. You have thoughts about all your shortcomings, failings, faults, mistakes.	1	2	3	4	5
2. You have thoughts about events that come into your head even when you do not wish to think about them again	1	2	3	4	5
3. You have thoughts that "*I won't be able to do my job/work because I feel so badly.*"	1	2	3	4	5
4. You have thoughts that are difficult to forget.	1	2	3	4	5
5. Once you start thinking about the situation, you can't stop.	1	2	3	4	5
6. You notice that you think about the situation a lot.	1	2	3	4	5
7. You have thoughts of the situation that you try to resist thinking about.	1	2	3	4	5
8. You think about the situation all the time.	1	2	3	4	5
9. You know you shouldn't think about the situation, but can't help it	1	2	3	4	5
10. You have thoughts about the situation and wish it would go better.	1	2	3	4	5

This next section will explore what goes through your mind when you are striving to meet personally demanding standards that are very important to the way you think, feel, or judge yourself.

In particular, any thoughts or fleeting pictures you experience when you are trying to achieve a very important goal that you feel reflects on the sort of person you are…

Note: When referring to mental images are remembered or invented events you can imagine, that you can picture in your mind's eye, but can also involve smells, sounds and feelings

IFES

Please IDENTIFY THREE FUTURE events which you have been thinking about by imagining over the past 7 days (e.g. positive or stressful life events). For each event, please indicate whether your imagining of it was positive or negative by circling the appropriate response below.

1. _____
(Positive/Negative)

2. _____
(Positive/Negative)

3. _____
(Positive/Negative)

Please consider each statement on the following page about imagining events in the future and select the corresponding number that best reflects how frequently each comment was true for you during the past 7 days due to imagining the future. Please be sure to read each statement carefully.

(Please circle one number on each line)

The way I felt about future life events over the past week…	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. I believed my thoughts about the future would definitely happen and would become real.	0	1	2	3	4
2. I had trouble staying asleep.	0	1	2	3	4
3. Other things prompted me to think about the future.	0	1	2	3	4
4. I felt irritable and angry.	0	1	2	3	4
5. I avoided letting myself get emotional when I thought about the future or was reminded about it.	0	1	2	3	4
6. I thought about the future when I didn't mean to.	0	1	2	3	4
7. Any reminders evoked feelings about the future.	0	1	2	3	4
8. I stayed away from reminders of the future.	0	1	2	3	4
9. Pictures about the future popped into my mind.	0	1	2	3	4
10. I was jumpy and easily startled.	0	1	2	3	4
11. I tried not to think about the future.	0	1	2	3	4
12. I was aware that I had a lot of feelings about the future, but I didn't deal with them.	0	1	2	3	4
13. My feelings about the future were kind of numb.	0	1	2	3	4
14. I found myself acting or feeling like it was really happening.	0	1	2	3	4
15. I had trouble falling asleep.	0	1	2	3	4
16. I had waves of strong feelings about the future.	0	1	2	3	4
17. I tried to remove thoughts of the future from my mind.	0	1	2	3	4
18. I had trouble concentrating	0	1	2	3	4

19. Reminders of the future caused me to have physical reactions, such as sweating, faster breathing, or a racing heart.	0	1	2	3	4
20. I had dreams about the future.	0	1	2	3	4
21. I felt watchful and alert.	0	1	2	3	4
22. I tried not to talk about the future.	0	1	2	3	4
23. I felt energetic and excitable.	0	1	2	3	4
24. I felt elated and optimistic.	0	1	2	3	4

Thank you ☺

We appreciate your effort to complete this package