

Distress Intolerance: Measurement and Aetiology of a Five-Factor Bifactor Model

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by

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Abstract

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This thesis reports on six studies that have examined a new conceptualisation of distress intolerance, the measurement issues in this area and the relation networks of distress intolerance. In particular, the studies address three issues which are fundamental to understanding the nature of distress intolerance. Furthermore, an examination of these issues is essential if a fully comprehensive account of distress intolerance, which is currently not well specified, is to be gained. The first issue to be addressed is insularity and the multifaceted conceptualisation of distress intolerance. This issue was investigated in Study One, whereby a new conceptualisation of distress intolerance was employed. The second issue here pertains to measuring the construct of distress intolerance. This issue was investigated in Studies One, Two and Three. Study One introduced the Distress Intolerance Five Factor – Short (DIFF-S), as a parsimonious measure of the general factor and the five facets of distress intolerance. Study Two supported the concurrent and construct validity and the test–retest reliability of the DIFF-S. Study Three suggested that the DIFF-S demonstrates an association with the Mirror-Tracing Persistence Task and the Cold Pressor Task. The third issue here is the relation networks of distress intolerance as they relate to other relevant constructs. This was investigated in Studies Four, Five and Six. Study Four suggests that there is an emphasis on neuroticism in predicting general distress intolerance and the majority of the distress intolerance facets. Study Five suggests the involvement of attentional networks and directed attention in the structure of the five facets of distress intolerance. Study Six reveal that, retrospectively, the mechanisms of the family of origin and parental bonding are involved in the five facets of distress intolerance. Overall, this thesis provides an advanced solution as to the conceptualisation and measurement issues of distress intolerance and also explores its relation networks.

Declaration

I hereby declare that this thesis has been composed by myself and that the research reported herein has been conducted by myself.

February 2017

Saeed M. N. T. Bebane

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Chapter One

General Introduction

In recent years, increasing attention has been paid, and research undertaken, as to the concept of distress intolerance, primarily due to the central role the concept plays in contributing to our understanding of the inability of individuals to withstand some types of physical or emotional distress – particularly in relation to the ambiguous, uncertain, frustrating or negative emotions and physical discomfort that feature in modern life. The research in this area has focused upon investigating the underlying factors that inhibit individuals from overcoming the barriers they face (Lejuez, Banducci, & Long, 2013).

However, this line of work has mostly been extrapolated from different areas of study and disparate conceptualisations of distress intolerance. Therefore, the primary means by which the limitations of this empirical knowledge is to be addressed pertain to gaining a more comprehensive overview as to the nature of distress intolerance, its conceptualisation, how it is to be measured and its relations network. This thesis is therefore concerned with the fragmentation that has arisen across the different conceptualisations of distress intolerance. More specifically, this thesis addresses three important gaps in our understanding of these issues by (a) providing a new definition of distress intolerance, (b) implementing an integrated approach when measuring distress intolerance, and (c) examining the relations network of distress intolerance in respect of personality, executive functions and the family of origin and parental bonding.

This chapter provides an overview of the theoretical issues pertinent to the contemporary study of distress intolerance and details the motivations of the present study. Section 1.1 sets out an introduction to the topic of distress intolerance, including the provision of an overview of the heterogeneity found in the conceptualisation and definition of the concept, as well as the multidimensional approach that can be employed when approaching this conceptualisation. Section 1.2 details the measurement of distress intolerance, including the behavioural and self-report measures utilised in this area. Section 1.3 summarises the discussions of this chapter and outlines the research that is to be detailed in the subsequent chapters.

1.1: Introduction to Distress Intolerance

This section provides an overview of the conceptualisations and definitions of distress intolerance that have been given in previous research. Section 1.1.1 discusses the heterogeneity found in the conceptualisations of distress intolerance. Section 1.1.2 discusses the variability found in the definitions assigned to distress intolerance. Finally, Section 1.1.3 conveys a brief overview of the multidimensional approach utilised when conceptualising distress intolerance. The aim of this approach is to highlight the gaps that need to be filled in if a fully comprehensive account of the nature of distress intolerance is to be gained.

1.1.1: Conceptualisation Heterogeneity

In the last century, increasing attention has been given to the concept of distress intolerance, with a natural degree of overlap arising in the understanding of this construct – a result of researchers having conceptualised distress intolerance through focusing on a number of different areas. For instance, Budner (1962) and Buhr and Dugas (2002) focused on intolerance in relation to personal threat, thereby detailing the consequences of ambiguous and uncertain life situations. Other studies have been theoretically oriented in regard to the tolerance people give to unpleasant emotional states (e.g. Simons & Gaher, 2005), to aversive physical sensations (e.g. Schmidt, Richey, & Fitzpatrick, 2006) and to frustrating situations (e.g. Harrington, 2005). More recently, Lynch and Mizon (2011) discussed two areas of distress intolerance: distress intolerance capacity and behavioural distress intolerance.

In addition, a growing body of literature has explored specific forms of distress intolerance (Zvolensky, Leyro, Bernstein, & Vujanovic, 2011) – such as experiential avoidance (e.g. Kashdan, Barrios, Forsyth, & Steger, 2006), emotional suppression, emotional dysregulation (e.g. Linehan, 1993a) and anxiety sensitivity (e.g. McHugh & Otto, 2012; Weems, 2011).

However, this conceptual overlap witnesses attention being given to experiential avoidance in terms of the events that lead individuals to avoid distress. Individuals who undertake avoidance may shun particular events due to previous personal experiences (Hayes et al., 2004), even if these were positive encounters (Kashdan et al., 2006).

Individuals who suffer from distress intolerance are usually desperate to evade situations that involve ambiguity, uncertainty, frustration, strong emotional responses and/or physical discomfort. This differs from emotional suppression as the latter consciously hinders ongoing emotional experiences (Gross, 1998). Additionally, individuals with distress intolerance do not suffer the expected consequences of anxiety in a catastrophic manner – as is encountered by those individuals with anxiety sensitivity. Therefore, this construct is not a component of anxiety sensitivity (Bardeen, Fergus, & Orcutt, 2013; Leyro, Zvolensky, & Bernstein, 2010). Researchers have thus suggested that distress intolerance is a component of high-order emotional dysregulation, with those individuals who face distress intolerance not being considered to be isomorphic (Leyro et al., 2010; Zvolensky et al., 2011).

In summary, there is a natural degree of overlap in the understanding of distress intolerance, a result of disparate constructions being held of distress intolerance. Furthermore, some of these constructs such as anxiety sensitivity (McHugh & Otto, 2012), emotional dysregulation (Linehan, 1993a) and experiential avoidance (Zvolensky et al., 2011) have detailed a specific form of distress intolerance.

1.1.2: Definition Variability

Given the heterogeneity found in the conceptual perspectives held of distress intolerance, multifaceted definitions have arisen regarding this construct in the available literature (Zvolensky et al., 2011), including defining such intolerance in relation to behavioural or cognitive aspects. Behaviourally, distress intolerance pertains to the capacity of individuals to tolerate unpleasant internal states evoked by different types of stress. In contrast, distress intolerance can be understood, in a cognitive way, as the inability of individuals to withstand unpleasant emotional situations (Zvolensky, Vujanovic, Bernstein, & Leyro, 2010).

In recognising the variety of definitions held in relation to distress intolerance, a significant theme in this literature regards the construct as simply reflecting low levels of distress tolerance. According to Linehan (1993a), distress tolerance is “the ability to perceive one’s environment without putting demands on it to be different” (p.147). In the context of this perspective, it can be concluded that individuals with distress intolerance are unable to accurately perceive their surrounding environment and are

unable to observe their own actions and thoughts in distressing situations. Although Linehan does not explicitly mention distress intolerance, in a unique contribution to this area she attempted to identify “low distress tolerance” – as it refers to the limited ability of individuals to withstand unpleasant states. Linehan suggested that a low ability to withstand pain and distress in life could underlie numerous clinical and health conditions (Linehan, 1993b). This is because, in this argument, the ability to tolerate distress is an important aspect of strong mental health. The possession of distress tolerance skills is vital in maintaining mental health and decreasing and/or changing painful circumstances. Research that has conceptualised distress intolerance in this way has constructed the notion as a significant feature of psychopathology (e.g. Leyro et al., 2010; Corstorphine, Mountford, Tomlinson, Waller, & Meyer, 2007; Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006).

In addition, Brown, Lejuez, Kahler, Strong, and Zvolensky (2005) have stated that individuals who are able to utilise distress tolerance are interested in achieving their goals even when facing psychological or physical barriers. It can therefore be understood that individuals who encounter distress intolerance are unable to withstand emotional or physical obstacles. However, despite this variety of definitions being given to distress intolerance, the key narratives that have emerged in the pertinent literature have denoted the concept as a single component rather than simply a negative valence of distress tolerance. These discussions have highlighted the need for strong theory to be employed in this area, whereby research is identified as being required to explain the negative states that accompany distress intolerance.

In summary, multifaceted definitions have been given to distress intolerance within the pertinent literature in this area (Zvolensky et al., 2011). In addition, the key narratives that have emerged within this literature have denoted the concept as a single component rather than simply as a negative valence of distress tolerance.

1.1.3: Multidimensional Approaches Used in Conceptualising Distress Intolerance

In a unique contribution, Leyro et al. (2010) undertook a theoretical review of the distress (in)tolerance research conducted to date. Building upon this theoretical review, Zvolensky et al. (2010) suggested that five core facets underlie distress intolerance – indicating that the inability to tolerate some types of physical or emotional

distress arises in relation to: (a) intolerance of ambiguity, that is, distress emerging from ambiguous life situations (Budner, 1962); (b) intolerance from uncertainty, that is, distress as a response to personal uncertainty (Buhr & Dugas, 2002); (c) frustration intolerance, that is, discomfort that things are not the way they should be (Harrington, 2005); (d) intolerance of negative emotion, that is, a need to escape those states that involve unpleasant emotions (Simons & Gaher, 2005); and (e) intolerance of physical discomfort, that is, an inability to tolerate uncomfortable physical sensations (Schmidt, Richey, & Fitzpatrick, 2006). Within the hierarchical conceptualisation of distress (in)tolerance, higher-order “global experiential distress (in)tolerance” is viewed as being comprised of five “lower-order” dimensions. Below, the five dimensions are outlined in brief.

Ambiguity

Frenkel-Brunswik (1949) introduced the notion of intolerance of ambiguity. In her early work, she assumed this concept to be an emotional and perceptual personality variable (e.g. Frenkel-Brunswik, 1949). However, in later literature, she suggested that intolerance of ambiguity is generalised to the different cognitive and emotional functioning of individuals and their responses to negative situations (e.g. Frenkel-Brunswik, 1951). Subsequently, Budner (1962) defined this construct as a “tendency to perceive ambiguous situations as sources of threat” (p. 29). For Budner, ambiguous situations are characterised by novelty, complexity or insolubility. In addition, research suggests that individuals who demonstrate an intolerance of ambiguity possess relatively poorer coping skills, thereby believing situations to be more ambiguous than they may actually be (e.g. Raphael, Moss, & Cross, 1978). In addition, Furnham and Ribchester (1995) suggested that such people are more likely to avoid ambiguous situations. Furthermore, Bhushan and Amal (1986) summarised three reactions as being manifestations of ambiguity intolerance:

- Emotional reactions (e.g. dislike, discomfort, anxiety and anger).
- Cognitive reactions, referring to the possession of a rigid attitude towards ambiguous stimuli.
- Behavioural reactions (e.g. rejection and avoidance behaviour).

Uncertainty

The emergence of intolerance being held towards uncertainty is linked with the personality model of coping as developed by Krohne (1989, 1993). The central theme of this model clarifies that an individual's response to distressing situations – such as threatening and ambiguous conditions – denotes their tolerance of uncertainty. Here, intolerance of uncertainty pertains to the emotions that are provoked by aversive stimuli.

Subsequently, the cognitive-behavioural perspective of generalised anxiety disorders is dominated by the definition given towards the intolerance of uncertainty. This model identifies four underlying cognitive factors that influence pathological worry: intolerance of uncertainty, cognitive avoidance, negative-problem orientation and positive beliefs about worry. From this perspective, individuals with generalised anxiety disorders are expected to encounter difficulties when dealing with uncertain situations (Dugas, Gagnon, Ladouceur, & Freeston, 1998).

Recently, intolerance of uncertainty has been considered to be a dispositional trait, primarily as it reflects an unfavourable outlook in regard to unpredictable consequences and outcomes (e.g. Dugas & Robichaud, 2007; Zvolensky et al., 2011), with studies having defined this concept as relating to an individual's tendency to demonstrate a low level of tolerance (cognitive, emotional or behavioural) in the face of uncertain situations. It can therefore be understood that individuals who possess intolerance towards uncertainty could find uncertain states in life intolerable.

Within the relevant literature, there is an overlap between intolerance being held towards ambiguity and intolerance being held towards uncertainty. This could be because of the similarities that arise in both situations, with both relating to an explanation of the surrounding environment (Grenier, Barrette, & Ladouceur, 2005). However, Krohne (1993) asserted that the main difference between these two concepts is that, in ambiguous states, the arisen stimuli can be complex and unpredictable, with intolerance of uncertainty being an emotional aspect that is provoked by such ambiguous stimuli.

Frustration

Under rational–emotive behaviour therapy, intolerance of frustration is a fundamental category of dysfunctional belief (Ellis, 1979, 1980). Within this context, self-defeating or “irrational” sentiments are a consequence of ego disturbance (the requirement to gain approval when achieving self-worth) and discomfort disturbance (the requirement for comfort and gratification). Additionally, Jibeen (2013) assumes that discomfort disturbance is a synonym of frustration intolerance. However, Dryden (1999) indicated that these terms are used separately in the literature of rational–emotive behaviour therapy.

Frustration is a consequence of failing to achieve one’s personal aims in regard to the reality of one’s respective desires (Harrington, 2011). In addition, individuals who demonstrate an intolerance of frustration are expected to exhibit a high level of avoidance behaviour in response to distressing events, evasion of unpleasant tasks, distress at relatively small problems and seeking of immediate pleasure (Froggatt, 2005).

Harrington (2007) identified different forms of frustration intolerance – such as discomfort intolerance, emotional intolerance, entitlement and achievement perfectionism. Additionally, Froggatt (2005) has suggested two slightly different reasons for developing frustration intolerance: low frustration tolerance (resulting from unexpected events) and low discomfort tolerance (resulting from unexpected experiences, emotional discomfort or physical distress).

Negative Emotion

Through the emergence of negative emotion as a domain with five core facets, aspects that underlie the general factors of distress intolerance being linked with Simons and Gaher (2005), the theoretical basis of this domain is reflected in Linehan’s (1993a) dialectical behaviour therapy model. For instance, within Linehan’s biosocial model, individuals with a low ability to withstand negative states are expected to demonstrate a lower capacity in terms of perceiving their surrounding environment and are unable to observe their own actions and thoughts in distressing situations (Linehan, 1993a).

Along these lines, a growing body of research within acceptance and commitment therapy has targeted intolerance of negative emotion (Blackledge & Hayes, 2001).

In the perspective of Simons and Gaher (2005), intolerance of negative emotion is a consequence of cognitive or physical processes yet it nonetheless manifests as emotional states. Accordingly, they suggest that identifying such emotional states is the best way of evaluating an individual's ability to withstand distressing states.

Physical Discomfort

Intolerance of physical discomfort pertains to an individual's inability to tolerate physical disorders or uncomfortable bodily states (Schmidt et al., 2006). Within the literature, physical discomfort is linked with the concept of anxiety. Accordingly, Schmidt and Cook (1999) suggest that intolerance of physical discomfort is likely to be high among patients with anxiety disorders. Additionally, intolerance of physical discomfort differs from one's "pain threshold" in terms of the acceptance level of an existing pain. Here, a "pain threshold" refers to "the least amount of pain that a person can recognize" (Greenspan, 2009, p.3080). Intolerance of physical discomfort refers to a lower level of ability to withstand physical disorders or uncomfortable bodily states. Research has held that uncomfortable body sensations are not necessarily painful (e.g. Leyro et al., 2010) and that they can relate to other types of unpleasant physical sensation (in terms of pressure or numbness for example) (e.g. Schmidt & Lerew, 1998).

To summarise the multidimensional approaches used in conceptualising distress intolerance, building upon Leyro et al.'s (2010) theoretical review of the distress (in)tolerance research conducted to date, Zvolensky et al. (2010) suggested that five core facets underlie distress intolerance – indicating that the inability to tolerate some types of physical or emotional distress arise in relation to ambiguity, uncertainty, frustration, negative emotion and physical discomfort.

1.1.4: Summary

Recently the field of distress intolerance has gained increasing attention from researchers. However, there is a natural degree of overlap that has arisen in the

understanding of this construct. Therefore, as discussed throughout the present thesis, further research is needed, particularly in relation to integrating the different conceptualisations of distress intolerance and in clarifying its relations network with other pertinent constructs.

1.2: Introduction to Measuring Distress Intolerance

This section provides a brief overview of the measures that have been used to assess distress intolerance. Section 1.2.1 discusses the methodological issues of distress intolerance. Section 1.2.2 reviews the behavioural approaches that are used to assess distress intolerance. Section 1.2.3 details the self-report measures employed to develop evaluations in relation to the construct(s) of distress intolerance.

1.2.1: Methodological Issues of Distress Intolerance

In the literature that has been produced in relation to this construct, multifaceted measurements have been used (Bernstein, Marshall, & Zvolensky, 2011; McHugh & Otto, 2012; Zvolensky et al., 2011). Because of this, the measuring of distress intolerance as a lower level of distress tolerance is problematic for a number of reasons, for example, how conceptual responses impact upon the measurements used (Zvolensky et al., 2011). Lynch and Mizon (2011) have discussed two concepts in relation to this construct, noting distress intolerance behaviour as pertaining to cognitive or capacity aspects. Accordingly, two distinct methodological areas of literature as to this construct have emerged. The cognitive-focused literature has predominantly employed self-report measurements. Behaviour-focused literature has mainly analysed actual behavioural ability in regard to withstanding distressing states (Leyro et al., 2010). Thus, it can be asserted that self-report and behavioural measures have been used to assess different forms of distress (Bernstein, Marshall, & Zvolensky, 2011), with such literature having exposed a lack of clarity held in relation to the understanding of distress intolerance (Ameral, Palm Reed, Cameron, & Armstrong, 2014; McHugh, Hearon, Halperin, & Otto, 2011).

Different methods have been used to measure distress intolerance, with two primary and distinct forms having emerged: behavioural approaches and self-report

measures. Behavioural approaches, in this sense, comprise different forms of experimental research, methodologies that have been adapted in order to assess the tolerance distress stimuli encountered via real-time experimental paradigms. These approaches can be characterised in two ways: the timescale of measuring distress and the breadth of distress symptoms (Matthews, 2000). For the former, there are three timescales in relation to assessing distress: (a) a transient short-term state such as a few minutes, (b) a medium-term episodic condition such as weeks or months, and (c) a personality trait (Matthews, 2000). Accordingly, it seems that the majority of behavioural measures utilised for this construct employ a short-term timescale.

In summary, multifaceted measurements have been used when researching distress intolerance (Bernstein, Marshall, & Zvolensky, 2011; McHugh & Otto, 2012). Furthermore, conceptual issues have impacted upon the forms of measurement employed (Zvolensky et al., 2011). Therefore, two distinct forms of literature in this area have emerged – methodologies that focus on behavioural approaches and those that primarily use self-report measures.

1.2.2: Behavioural Approaches

Despite behavioural measures having been widely used to investigate the ability of individuals to respond appropriately to distressing states, they “have been developed without specific reference to a particular conceptual model or theory of distress tolerance” (Zvolensky et al., 2011, p. 14). Furthermore, there is ambiguity as to what these approaches actually assess (McHugh et al., 2011). For instance, in response to cognitive tolerance tasks, it seems that participant performance is held to depend upon the receiving of a task’s reward rather than the ability of individuals to withstand distressing states. In light of this, further investigation is required in regard to evaluating validity indices.

Overall, the approaches that have been used in this area can be divided into two categories: physical tolerance tasks and cognitive tolerance tasks. Within the former, both pain challenge tasks and biological challenge tasks are used.

Physical Tolerance Tasks

Physical tolerance tasks are a set of behavioural approaches that can be used to examine the ability of individuals to withstand acute physical challenges. Within these tasks, individuals who possess distress intolerance are expected to demonstrate a low ability to withstand unpleasant states or acute physical distress. The usage of these approaches responds to the attempt to reduce an individual's ability to withstand bodily unpleasantness/distress by reducing their ability to process information, thereby forcing such subjects to allocate greater attention to the actual threat at hand (Hancock, Ross, & Szalma, 2007). The ultimate goal of this is to decrease a person's capacity for tolerance.

There are two methods in this area, the pain challenge tasks and the biological challenge tasks, with both having been widely used to evaluate the capacity of individuals to tolerate distressing states. The following is a brief overview of these methods.

Pain Challenge Tasks

Pain challenge tasks are a set of tools that can be used to assess an individual's capacity to withstand unpleasant states via the inflicting of acute physical distress (thereby measuring areas such as thermal stress tolerance and pain thresholds).

The Cold Pressor Task (Hines & Brown, 1936) manifests as an experimental technique within the study of thermal stress tolerance, whereby it is held that the induction of pain can be used to assess an individual's ability to withstand such distress. This methodology has been used to evaluate both children and adults (e.g. MacPherson, Stipelman, Duplinsky, Brown, & Lejuez, 2008; Miller, Barr, & Young, 1994). In this area, different apparatuses have been used to maintain a constant water temperature (Baeyer, Piira, Chambers, Trapanotto, & Zeltzer, 2005).

Biological Challenge Tasks

According to McNally (1994), the strategies used to elicit sensations that produce natural anxiety are called "biological challenges", these being bio-behavioural approaches. Such methods are used to elicit the symptoms of physiological arousal and

anxiety, whereby subsequent examination is given towards an individual's capacity to withstand the manipulation of oxygen and carbon-dioxide levels (Zvolensky & Eifert, 2001).

In previous research, different challenges (such as voluntary hyperventilation and the administration of flumazenil, sodium lactate and carbon dioxide) have been employed (Zvolensky & Eifert, 2001). In the study of distress intolerance, focus has been given to the usage of carbon dioxide challenges (e.g. Brown, Lejuez, Kahler, & Strong, 2002) and breath holding (e.g. Anestis, Tull, Bagge, & Gratz, 2012; Sütterlin et al., 2013).

The Carbon Dioxide Challenge (Brown et al., 2002) is a well-used tool within the available biological challenges, with this involving the inhalation of carbon dioxide-enriched air by research participants. This approach has been used to identify the capacity of individuals to withstand physiological arousal and anxiety (e.g. Brown et al., 2002; Zvolensky & Eifert, 2001).

The Breath-Holding Test (Anestis et al., 2012) is a well-known strategy that can be used to elicit the symptoms of physiological arousal and anxiety while also measuring an individual's capacity to tolerate breath-holding (via assessing the duration of the breath-holding; Anestis et al., 2012; Sütterlin et al., 2013).

Cognitive Tolerance Tasks

Cognitive tolerance tasks comprise a number of psychological approaches that can be used to assess the duration of an individual's tolerance in relation to cognitive challenges. The main focus of these approaches relates to cognitive performance, whereas the focus of the physical approaches pertains to psychomotor and perceptual aspects (Hancock et al., 2007).

In addition, these approaches have been used to evaluate an individual's capacity to withstand unpleasant cognitive states. Accordingly, early work in this area attempted to utilise psychologically stressful tasks – such as the Anagram Persistence Task (Eisenberger & Leonard, 1980) and the Mirror Tracing Persistence Task – challenges that are now available in computerised versions (Strong et al., 2003).

Researchers have further developed the Paced Auditory Serial Addition Task (Lejuez, Kahler, & Brown, 2003).

The Anagram Persistence Task (Eisenberger & Leonard, 1980) is a tool used within the cognitive tasks employed in this area. This task utilises a stack of numbered index cards and involves a solution sheet with the same number of lines. Within this task, participants are asked to solve a series of complex anagrams (Eisenberger & Leonard, 1980). The difficulty of the trials differ, ranging from relatively easy to more difficult. Typically, distress intolerance will be assessed by calculating the mean time spent on the unsolved anagram trials before giving up and proceeding to the next anagram (Quinn, Brandon, & Copeland, 1996).

The Mirror Tracing Persistence Task (Strong et al., 2003) is a computerised tool used within the cognitive tasks. This task involves tracing complex geometric shapes via a mirror, with the participant tracing a dot along the lines of different shapes by using a computer mouse. This involves three main rounds: two short rounds (about 1 minute in duration) and one longer round (about 7 minutes in duration). Typically, distress intolerance will be assessed by the latency in the seconds to task termination.

The Paced Auditory Serial Addition Task (Lejuez et al., 2003) is a well-known computerised tool that measures attention. This task was originally developed in order to measure information processing and the ability of patients with a brain injury (Gronwall, 1977). Lejuez et al. (2003) suggested that this tool can be used for multiple purposes – including providing a comprehensive examination of behavioural/motor and psychological response modes. Additionally, the task has been used to assess the capacity of individuals to withstand unpleasant states as it can elicit psychological stress (Lejuez et al., 2003) and can produce a negative effect upon participants (Holdwick & Wingenfeld, 1999). Each level of this task differs in relation to the number of flashes shown sequentially across a computer screen. Here, the participant should indicate the correct answer as to the previously presented number in order to earn one point.

To summarise the behavioural approaches in this area are divided into two categories: physical tolerance tasks and cognitive tolerance tasks. Within the physical tolerance tasks, both pain challenge tasks and biological challenge tasks are utilised. However, ambiguity exists in relation to what these approaches actually assess

(McHugh et al., 2011), primarily as they may not depend upon any conceptual model of distress intolerance (Zvolensky et al., 2011).

1.2.3: Self-Report Measures

Despite the assessment of distress intolerance beginning with experimental measures (i.e. the Cat and Dog Test; Frenkel-Brunswik, 1949), research has also employed self-report measures in parallel to assessing this construct. In the existing literature, this step started with the Tolerance/Intolerance of Ambiguity Scale (Budner, 1962), which was designed to produce a specific response model in relation to specific ambiguous situations – namely phenomenological denial (repression and denial), phenomenological submission (anxiety and discomfort), operative denial (destructive or reconstructive behaviour) and operative submission (avoidance behaviour).

Various self-report measures have been developed in order to evaluate distress intolerance, with each having been derived from distinct models of this construct. Therefore, inconsistency exists in the utilisation of these measures. A fundamental reason for this is that the method and assessment perspectives held regarding distress intolerance are a product of a construct method composition (Bernstein, Vujanovic, Leyro, & Zvolensky, 2011).

Given the diversity found within the construct of distress intolerance, the various models differ in their focus on respective distress intolerance domains – that is, by focusing on ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort. Therefore, an overview is given below as to each form of self-report in relation to the respective theoretical bases given towards the construct of distress intolerance.

Intolerance of Ambiguity

Frenkel-Brunswik (1949) introduced the concept of intolerance of ambiguity, with this having now developed as a five-facet model of distress intolerance. This approach views intolerance of ambiguity as a construct denoting an individual's lack of capacity to tolerate or act appropriately in ambiguous situations. Researchers have developed various self-report instruments to assess this area.

The use of self-report measures as to this construct began with the development of the Tolerance/Intolerance of Ambiguity Scale (TIAS; Budner, 1962). This scale comprises 16 items (half positive, half negative). Each item within this scale is designed to evoke a specific response to a specific ambiguous situation – namely phenomenological denial (repression and denial), phenomenological submission (anxiety and discomfort), operative denial (destructive or reconstructive behaviour) and operative submission (avoidance behaviour). Budner suggested that the elicitation of any of these responses (behaviours) – as characterised by novelty, complexity or insolubility – could lead to an intolerance of ambiguity. However, this scale is criticised due to its reliability index. Budner reported alpha coefficients for the 17 samples ranging from 0.39 to 0.62 (with a mean of $\alpha = 0.49$). In response to criticism, Budner argued that this could relate to the nature and complexity of the construct. Despite such concerns, this scale is one of the most-used measurement tools in this area (Furnham & Marks, 2013).

Later, researchers developed the Tolerance of Ambiguity Scale (TAS; Rydell & Rosen, 1966). This scale is different from Budner's scale because it is designed to assess the higher-order factor of tolerance of ambiguity. Within this scale, items are formulated to cover different ambiguous areas, such as attitudes towards the resolution of different problem-solving situations, social situations and chance events. Items are administered into six groups of solving situations that range in size from 10 to 40. The basis of this measure derives from the 13 items that maintain an approximate 50–50% true/false split during the testing sessions. To make the test longer, three items are added to produce 16 items. Rydell and Rosen (1966) are not report the internal consistency coefficients of this scale. An explanation of this could relate to the low internal consistency of this scale. In this context, MacDonald (1970) reported the alpha coefficient of the TAS at $\alpha = 0.64$.

MacDonald (1970) attempted to address the reliability issue of the Rydell and Rosen scale by developing the Ambiguity Tolerance Test. MacDonald used the latent factor structure of three measures: 16 items from the Tolerance of Ambiguity Scale, two items from the California Personality Inventory (Gough, 1987) and two items from Barron's Conformity Scale (Barron, 1953). The alpha coefficient of this test has been measured at $\alpha = 0.86$ (MacDonald, 1970).

More recently, McLain (1993) developed the Multiple Stimulus Types Ambiguity Tolerance-I, a 22-item self-report scale to assess an individual's ability to tolerate ambiguous situations. The scale's name derives from the stimuli its items assess (Furnham & Marks, 2013). Responses are scored on a 7-point Likert scale ranging between 1 = strongly disagree and 7 = strongly agree. The alpha coefficient of the MSTAT-I is $\alpha = 0.86$ (McLain, 1993). In 2009, McLain developed the second version of this instrument, a 13-item self-report scale building upon the MSTAT-I. This version is appropriately short, whereas the psychometric characteristics are stronger and contextually independent. This scale involves five subscales: insoluble stimuli, novel stimuli, complex stimuli, uncertain stimulus and generally ambiguous stimuli. Responses are scored on a 5-point scale ranging between 1 = strongly disagree and 5 = strongly agree. A higher score indicates a higher ability to tolerate ambiguous stimuli. The alpha coefficient of the MSTAT-II is $\alpha = 0.83$ (McLain, 2009), with this being slightly lower than that found in relation to the MSTAT-I.

Intolerance of Uncertainty

This construction is predominantly linked with the earlier work of Krohne (1989, 1993). In his perspective, intolerance of uncertainty refers to the emotional aspects that are provoked by aversive stimuli. The use of self-report measures in relation to evaluating intolerance of uncertainty is linked with the development of the French version of the Intolerance of Uncertainty Scale (IUS; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994). This scale is a 27-item self-report measure, designed to assess the emotional and behavioural reactions of individuals to uncertain situations. Responses are scored on a 5-point Likert scale between 1 = Not at all representative and 5 = Completely representative. The IUS internal consistency has been measured at $\alpha = 0.91$ (Freeston et al., 1994). In addition, Buhr and Dugas (2002) examined the psychometric properties of the English version of the Intolerance of Uncertainty Scale. The results of their factor analysis indicates that this version is a sound instrument for this construct, primarily due to its high degree of internal consistency and good test-retest reliability.

More recently, researchers have attempted to develop a short version of the Intolerance of Uncertainty Scale (IUS-12; Carleton, Norton, & Asmundson, 2007). This

version is a 12-item self-report measure that builds upon the IUS. In this scale, responses are scored on a 5-point Likert scale ranging between 1 = Not at all characteristic of me and 5 = Entirely characteristic of me). The alpha coefficient is measured at $\alpha = 0.91$ (Carleton et al., 2007).

Intolerance of Frustration

Zvolensky et al. (2010) suggests intolerance of frustration as a domain with five core facets, aspects that underlie the general factors of distress intolerance. To assess this construct, Harrington (2005) developed the Frustration Discomfort Scale. This scale is a well-used 28-item self-report measure with seven additional items that form separate gratification and fairness subscales. This scale has been designed in order to assess the capacity of individuals to withstand frustration discomfort. The four 7-item subscales employed are discomfort intolerance, entitlement, emotional intolerance and achievement. Responses are scored on a 5-point Likert scale whereby 0 = Absent, 1 = Mild, 2 = Moderate, 3 = Strong and 4 = Very Strong. Harrington (2005) has reported an alpha coefficient of $\alpha = 0.95$ for this, with the subscale alpha coefficients being measured as follows: discomfort intolerance ($\alpha = 0.88$), emotional intolerance ($\alpha = 0.87$), entitlement ($\alpha = 0.85$) and achievement ($\alpha = 0.84$).

Intolerance of Negative Emotion

The emergence of the concept of intolerance of negative emotion is linked with the development of the Distress Tolerance Scale (DTS; Simons & Gaher, 2005). Zvolensky et al. (2010) assert this construct to be a domain with five core facets, aspects that underlie the general factors of distress intolerance. Simons and Gaher (2005) assume that distress intolerance is a consequence of cognitive or physical processes yet it nonetheless manifests as emotional states. Accordingly, they suggest that identifying such emotional states is the best way of evaluating an individual's ability to withstand distressing states. To assess this construct, they developed the Distress Tolerance Scale, a 15-item self-report measure. This scale is designed to assess the higher-order factor of an individual's ability to withstand unpleasant emotions. The DTS involves four subscales: tolerance, appraisal, absorption and regulation.

Furthermore, in order to assess negatively valenced affective states or emotions that may be distressing and to which a person may be more or less tolerant, Bernstein and Brantz (2013) developed the Tolerance of Negative Affective States Scale (TNASS). This instrument is a 25-item self-report measure, designed to assess the ability of individuals to tolerate multiple negative-valence affective states. The TNASS involves six factors: tolerance of anxious-apprehension, tolerance of fear-distress, tolerance of anger, tolerance of disgust, tolerance of negative social emotions and tolerance of sadness-depression. Here, responders are required to rate how often they have felt each of the 25 emotional states listed in the past year.

Bernstein and Brantz (2013) summarised four features which distinguish the TNASS from the DTS:

- The TNASS measures the capacity of individuals to tolerate a number of specific and distinct affective states.
- The TNASS has been developed in order to assess perceived tolerance to different emotional states in a more conceptually narrow sense.
- The TNASS provides an explicit definition of tolerance and intolerance, and then asks participants to determine how able they are to withstand this with respect to a list of affective states.
- The TNASS differs conceptually and operationally from the DTS.

Intolerance of Physical Discomfort

The emergence of this construct is linked with the concept of anxiety. Additionally, Zvolensky et al. (2010) proposed this construct as one of the five core facets that underlie the general factors of distress intolerance. Although a huge amount of research that has targeted intolerance of physical discomfort has employed behavioural measures (e.g. Hancock et al., 2007; Hines & Brown, 1932; MacPherson et al., 2008), studies have also employed self-report measures in parallel when assessing this construct (e.g. Bernstein, Zvolensky, Vujanovic, & Moos, 2009; Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010; Schmidt, Richey, Cromer, & Buckner, 2007). The Discomfort Intolerance Scale, as developed by Schmidt, Richey, and Fitzpatrick (2006), is a well-used 5-item self-report measure in this area. This scale is designed to

assess an individual's ability to tolerate uncomfortable physical sensations and involves two subscales: discomfort intolerance and discomfort avoidance.

To summarise the usage of self-report measures in this area is a step forward in the research pertinent to distress intolerance as they have been primarily developed with specific reference to the respective conceptual models held regarding this construct. Nonetheless, the measures have been derived from models that differ in their focus as to the domains of distress intolerance, including ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort.

1.2.4: Summary

Two distinct methodological approaches have emerged within the literature on distress intolerance: behavioural approaches and self-report measures. Each of these methods are further divided into different measures. However, differences arise in the types of distress they each assess (Bernstein, Vujanovic et al., 2011; McHugh & Otto, 2011). Because of this, the studies conducted have produced contradictory findings in relation to distress intolerance. Thus, increased focus needs to be given towards evaluating the theory that pertains to the assessment methodology used in each study, particularly in relation to the integration of the disparate approaches employed in this area. It is this requirement that the present thesis responds to.

1.3: Summary and Thesis Outline

Chapter One has provided an overview of the literature pertinent to distress intolerance, giving due attention to its conceptualisation, definition and measurement. This chapter has also highlighted the gaps that need to be addressed should a comprehensive account of distress intolerance be reached. The first gap in this sense is the multifaceted approaches employed when conceptualising distress intolerance. Addressing this gap has important implications for future theoretical and empirical work in terms of systematic focus being given to the nature of distress within distress intolerance research. The second gap that requires a response in contemporary research is how this construct is measured. Addressing this gap has important implications for our understanding of distress intolerance due to consideration needing to be given

towards the methods used to index the construct. The third and final gap relates to the relations network that exists with other relevant constructs. Addressing this gap can assist in elucidating the nature of distress intolerance, thereby advancing its operationalisation and its relations with other constructs.

Accordingly, the present thesis has two broad aims. The first is to re-refine the measurements of distress intolerance, with this being focused upon in Chapter Two, Three and Four. Chapter Two surveys two studies, the first of which aims to analyse the exploratory factors that underlie a number of well-used distress intolerance scales (measuring five distress intolerance constructs). The second study aims to explore the structural validity and stability of a five-factor interpretation of a 20-item version of distress intolerance. The confirmatory factor analysis suggests that a bifactor model of distress intolerance best accounts for the variance of items that comprise the Distress Intolerance Five Factor – Short (DIFF-S) tool. Chapter Three reports two studies. The first study aims to investigate the concurrent validity of the DIFF-S tool by examining its correlations in terms of general and multidimensional factors, here utilising a group of standard self-report measures used to assess distress intolerance construct(s). This study also aims to investigate the construct validity of the DIFF-S tool by examining its discriminant validity. The second study aims to investigate the reliability over time of DIFF-S by examining its test–retest reliability in relation to a sample over two weeks. Chapter Four reports upon two experiments. The first experiment aims to investigate the relationship between the DIFF-S tool and cognitive tolerance tasks, achieved by examining its association with the Mirror-Tracing Persistence Task. The second experiment aims to investigate the relationship between the DIFF-S tool and physical tolerance tasks, achieved by examining the association between DIFF-S, the Cold Pressor Task and the Breath-Holding Test.

The second aim of this thesis pertains to examining the relations network of the five-facet model of distress intolerance with other relevant constructs. This is undertaken in chapter Five, Six and Seven. Chapter Five details a study designed to investigate the position of the five facets of distress intolerance within the extant lexical (i.e. the five-factor model) and a number of biological models (i.e. Gray’s bio-psychological model and the subcortical emotion model) of personality. Chapter Six reports on an experiment designed to investigate the relationship between the five-facet model of distress intolerance and the executive functions, achieved by examining the

association between the five-facet model of distress intolerance and three executive functions (i.e. attentional networks, directed attention and working memory). Chapter Seven details a retrospective examination of the relationship that exists between the five-facet model of distress intolerance and family of origin and parental bonding, achieved by examining the association of the five-facet model with the self-perceived levels of health held within an individual's family of origin, the fundamental parental dimensions of care and overprotection and the parental bonding quadrants. Finally, Chapter Eight discusses the broad implications of the thesis's findings as well as the more specific implications for distress intolerance. Additionally, this thesis employed nine independent samples which in total included 1625 participants.

Chapter Two

Re-Refining the Measurement of Distress Intolerance

Abstract

The current study aims to present a parsimonious measure of five factors of distress intolerance as proposed by Zvolensky, Vujanovic, Bernstein and Leyro (2010). Exploratory ($n = 511$) and confirmatory ($n = 157$) factor analytic studies of items from five established measures of distress intolerance suggest a 20-item measure representing five dimensions of distress intolerance (ambiguity, uncertainty, frustration, negative emotion and physical discomfort). A comparison of latent factor models suggests that a bifactor model may present the best fit to the data, reflecting the identification of a general factor of distress intolerance while also recognising the multidimensionality of the five group factors. The current findings suggest a parsimonious measure of five factors of distress intolerance, though further research may consider method and measurement biases and the convergent and discriminant validity of the subscales.

2.1: Introduction

Various self-report measures have been developed (as discussed in Chapter One) in order to evaluate distress intolerance, with each having been derived from distinct models of this construct. Therefore, inconsistency exists in the utilisation of these measures. A fundamental reason for this is that the method and assessment perspectives regarding distress intolerance are a product of a construct method composition (Bernstein, Vujanovic, Leyro, & Zvolensky, 2011).

Given the plethora of measures that have been used to assess distress intolerance (either through distress intolerance or distress tolerance, subsequently referred to as simply distress intolerance in this study), there have been attempts recently to refine its measurement. McHugh and Otto (2012) were the first to comprehensively synthesise a number of distress intolerance measures. They tested whether distress intolerance is composed of a single construct by analysing the latent factor structure of four measures, including the Anxiety Sensitivity Index (ASI; Peterson & Reiss, 1992), the Frustration Discomfort Scale (FDS; Harrington, 2005), the Discomfort Intolerance Scale (DIS; Schmidt, Richey, & Fitzpatrick, 2006) and the Distress Tolerance Scale (DTS; Simons & Gaher, 2005). Factor analysis of the subscales scores support a single-factor latent structure. Furthermore, McHugh and Otto (2012) identified 10 items from the subscales that had the highest degree of concordance with the latent structure. Here they proposed that these items could be used as a unidimensional measure of distress intolerance.

Bardeen, Fergus, and Orcutt (2013) employed eight indices of distress intolerance to assess the latter's measurement in line with the summary of Zvolensky et al. (2010) regarding the distress intolerance measurement literature. This summary suggests that the distress intolerance construct is represented by five distress intolerance constructs: ambiguity, uncertainty, frustration, negative emotion and physical discomfort. Bardeen et al. (2013) confirmed this summary based on a factor analysis of the subscales scores derived from the Intolerance of Uncertainty Index-Part A (IUI-A; Carleton, Gosselin, & Asmundson, 2010), the Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2002), the Multiple Stimulus Types Ambiguity Tolerance-I (MSTAT-I McLain, 1993), the Tolerance of Ambiguity Scale-12 (TAS-12; Herman, Stevens, Bird, Mendenhall, & Oddou, 2010, a revised version of Budner's (1962) 16-item version), the Somatosensory Amplification Scale (SAS; Barsky, Wyshak, & Klerman, 1990), the DIS (Schmidt et al., 2006), the FDS (Harrington, 2005) and the DTS (Simons & Gaher, 2005).

The present study integrates the approaches employed by McHugh and Otto (2012) and Bardeen et al. (2013). McHugh and Otto (2012) provided a parsimonious 10-item unidimensional measure of distress intolerance. Bardeen et al. (2013) further provided evidence that distress intolerance comprises five factors. However, the existing literature does not suggest a parsimonious measure that also measures the five factors of distress intolerance. This study has aimed to identify individual items from the measures employed by McHugh and Otto (2012) and Bardeen et al. (2013) in order to measure distress intolerance in terms of its lower-order constructs (ambiguity, uncertainty, frustration, negative emotion and physical discomfort).

2.2: Method

Participants

Two samples of data were collected. Sample One was used for an exploratory factor analysis while Sample Two was used for a confirmatory factor analysis.

The first sample comprised 511 respondents (82 males, 429 females) who were either undergraduates or postgraduates enrolled on university courses over a two-year period. The participants ranged in age between 18 and 36 years old ($M = 19.77$ years, $SD = 2.40$). The sample was predominantly Caucasian (60.7%), with 12.3% and 11.4% identifying themselves as Black and South Asian respectively.

The second sample allowed us to test whether the findings from the first sample could be replicated in a non-student population. The second sample comprised 157 older adults (45 males and 112 females) aged between 18 and 58 years ($M = 27.55$ years, $SD = 7.9$). This sample was also predominantly Caucasian (72.6%), with Asian being the next highest reported ethnicity; 46.5% of the respondents denoted that they were single, while 45.9% identified themselves as being married. Finally, the most commonly reported occupations were being in sales/marketing/advertising (14.6%) and computer-related roles (10.8%). The recruitment procedure combined opportunistic and snowball sampling, with social networking sites used first to contact participants who were then asked to forward details of the study to acquaintances. Fourteen respondents were removed from the analysis because they were students, while 22 respondents did not complete the survey.

Materials

Across their studies, McHugh and Otto (2012) and Bardeen et al. (2013) employed nine scales, three of which featured in both studies. In choosing candidates from these nine scales for the current study, we aimed to (a) have as much overlap as possible with the two previous studies, (b) obtain a five-factor structure of distress intolerance, (c) administer a number of items that were not too arduous for respondents to complete, and (d) facilitate an adequate item-to-respondent ratio. The respondents in Sample One were asked to complete five distress intolerance scales.

The Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2002; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994) is a 27-item self-report measure designed to assess an individual's emotional and behavioural reaction to uncertain situations. Responses are scored on a 5-point Likert scale ranging from 1 (Not at all representative) to 5 (Completely representative). Freeston et al. (1994) reported the internal consistency for the IUS as $\alpha = 0.91$. Buhr and Dugas (2002) examined the psychometric properties of the English version of the IUS, as has been validated in the French version. The results of their factor analysis indicated that the IUS is a sound instrument of this construct and that it has a high internal consistency.

The Tolerance/Intolerance of Ambiguity Scale (TIAS; Budner, 1962) is a 16-item (half positive, half negative) self-report instrument, developed to assess "the tendency to perceive ambiguous situations as sources of threat" (Budner, 1962, p. 29). Within the TIAS, each item is designed to evoke a specific mode of response to a specific kind of ambiguous situation, namely phenomenological denial (repression and denial), phenomenological submission (anxiety and discomfort), operative denial (destructive or reconstructive behaviour) and operative submission (avoidance behaviour). Here, eliciting any of these responses (behaviours) via a situation characterised by novelty, complexity or insolubility could lead to intolerance of ambiguity. This scale comprises three subscales, namely novelty (e.g. "What we are used to is always preferable to what is unfamiliar"), complexity (e.g. "A good teacher is one who makes you wonder about your way of looking at things") and insolubility (e.g. "There is really no such thing as a problem that can't be solved"). Responses are scored on a 6-point Likert scale ranging, whereby 7 = Strongly Agree, 6 = Moderately Agree, 5 = Slightly Agree, 3 = Slightly Disagree, 2 = Moderately Disagree and 1 = Strongly Disagree towards positively worded items. The scoring of negative items is undertaken in the reverse direction. All omissions are scored 4. Budner (1962) reported reliabilities

(alpha coefficients) for 17 samples, with these being found to range from 0.39 to 0.62 (with a mean $\alpha = 0.49$). Although Bardeen et al. (2013) used a shortened version of this scale, current study employed all of the items in order to provide a full range of items from which to consider “ambiguous” distress intolerance.

The Discomfort Intolerance Scale (DIS; Schmidt et al., 2006) is a 5-item self-report measure (from an originally proposed seven items), developed to assess the ability of individuals to tolerate uncomfortable physical sensations. This scale comprises two subscales, namely discomfort intolerance (e.g. “I can tolerate a great deal of physical discomfort”) and discomfort avoidance (e.g. “I take extreme measures to avoid feeling physically uncomfortable”). Here, responses are scored on a 7-point Likert scale ranging from 0 (Not at all like me) to 6 (Extremely like me). The DIS’s internal consistency of both factors have been measured as: discomfort intolerance ($\alpha = 0.91$) and discomfort avoidance ($\alpha = 0.72$) (Schmidt et al., 2006). This study administered all of the original seven items devised by Schmidt et al. (2006) in order to provide a full consideration of “physical discomfort” distress intolerance.

The Frustration Discomfort Scale (FDS; Harrington, 2005) is a 35-item self-report measure (with 7 items forming separate gratification and fairness subscales), designed to assess the capacity of individuals’ capacity to withstand frustration discomfort. The FDS contains four seven-item subscales, namely discomfort intolerance (e.g. “I can’t stand having to persist at unpleasant tasks”), entitlement (e.g. “I can’t bear it if other people stand in the way of what I want”), emotional intolerance (e.g. “I can’t bear to feel that I am losing my mind”) and achievement (e.g. “I can’t stand being prevented from achieving my full potential”). Responses are scored on a 5-point Likert scale, whereby 0 = Absent, 1 = Mild, 2 = Moderate, 3 = Strong and 4 = Very Strong. The Cronbach’s alpha coefficients for the FDS has been measured at $\alpha = 0.95$ while the subscale alpha coefficients were found to be: discomfort intolerance ($\alpha = 0.88$), emotional intolerance ($\alpha = 0.87$), entitlement ($\alpha = 0.85$) and achievement ($\alpha = 0.84$) (Harrington, 2005).

The Distress Tolerance Scale (DTS; Simons & Gaher, 2005) is a 15-item self-report measure developed to assess the ability of individuals to withstand unpleasant emotions. The DTS contains four subscales, namely tolerance (e.g. “I can’t handle feeling distressed or upset”), appraisal (e.g. “My feelings of distress or being upset are not acceptable”), absorption (e.g. “My feelings of distress are so intense that they completely take over”) and regulation (e.g. “I’ll do anything to avoid feeling distressed

or upset”). Responses are scored on a 5-point Likert scale, whereby 5 = Strongly Disagree, 4 = Mildly Disagree, 3 = Agree and Disagree equally, 2 = Mildly Agree and 1 = Strongly Agree. The DTS internal consistency was identified ($\alpha = 0.85$). The Alpha coefficients for the first-order factors were found to be: tolerance ($\alpha = 0.73$), appraisal ($\alpha = 0.84$), absorption ($\alpha = 0.77$) and regulation ($\alpha = 0.74$) (Simons & Gaher, 2005). Within the DTS, high scores represent a high level of distress tolerance.

The participants in Sample Two were asked to complete 20 items that we deemed suitable for measuring distress intolerance following the exploratory factor analysis that is outlined below. A change was made to standardise the response format to a 7-point Likert scale with the following responses: 1 = Disagree Strongly, 2 = Disagree Mildly, 3 = Disagree, 4 = Neither Agree nor Disagree, 5 = Agree, 6 = Agree Mildly and 7 = Agree Strongly.

Procedure

For both surveys, questionnaires were completed via the Experimental Participation Requirement - University of Leicester, which is an electronic survey system that was set up in such a way that the respondents had to answer all of the questions. For Sample One, the software allowed the order of the administration of the scales to be randomised.

Ethical Consent

Both data collection procedures received ethical approval from the University of Leicester’s Department of Neuroscience, Psychology & Behaviour Ethics Board. Respondents provided consent via the first page of the Experimental Participation Requirement, where they had to indicate agreement before they proceeded or were allowed to exit the survey. The consent form contained statements and directions regarding the nature of the study, the anonymity of the data, respondents’ ability to withdraw from the study both during and after participation, how the data would be stored in a coded form, how to obtain the results of the study if required and the intended use, length of storage and disposal of the data.

2.3: Results

Exploratory Factor Analysis

The first step of the analysis was to determine the factor structure of the items, using exploratory factor analysis to allow any such structure to emerge. The participants (511) to variables (100) ratio exceeded the recommended minimum ratio for exploratory factor analysis of 5 to 1 (with a minimum number of participants of 150) (Gorsuch, 1983). All items were subjected to maximum likelihood analysis (Kaiser-Meyer-Olkin measure of sampling adequacy = 0.91; Bartlett's test of sphericity, $\chi^2 = 24000.39$, $df = 4950$, $p < 0.001$).

The decision as to the number of factors to retain is crucial when carrying out the exploratory factor analysis; this can be based on the K1 method (eigenvalues greater than 1; Kaiser, 1960), a scree plot (Cattell, 1966) and/or a parallel analysis of Monte Carlo simulations (Horn, 1965). Reports have suggested that parallel analysis is the most accurate method for determining the number of factors, primarily as it demonstrates the least variability and compares favourably to other methods (Ledesma & Valero-Mora, 2007). Therefore, parallel analysis was used as the definitive guide. The ninth eigenvalue obtained using a maximum likelihood extraction (18.95, 6.40, 4.87, 4.21, 3.15, 2.75, 2.11, 1.83 and 1.63) failed to exceed the ninth eigenvalue from the parallel analysis (2.03, 1.96, 1.91, 1.86, 1.83, 1.79, 1.76, 1.73 and 1.70) calculated from 1,000 generated datasets with 511 cases and 100 variables, with this suggesting an eight-factor solution.

Therefore, an eight-factor solution (see Table 2.1) was sought through the use of promax rotation, undertaken as we expected the factors to be correlated when the delta is set to 0. Meaningful loading was assessed using the criteria of 0.32 (poor), 0.45 (fair), 0.55 (good), 0.63 (very good) or 0.71 (excellent) (Tabachnick & Fidell, 2007). Using these criteria, 95 of the 100 items loaded above 0.32 on one of the factors, with four items loading at 0.32 or above (but equal to or below 0.45) across two factors. A truncated version of the analysis is presented in Table 2.1, listing the items by the order in which the factors loaded and the salience of each item to that factor. All loadings above 0.55 (i.e. good to excellent) are in bold. These bold loadings will be the central consideration of current study.

When considering these loadings, five factors emerge as having items with good to excellent loadings, with the first, second, third, fifth, and sixth factors reflecting Zvolensky et al.'s (2010) five-factor model of uncertainty, frustration, negative emotion, ambiguity and physical discomfort respectively. The items from the five different measures map onto these five different factors. To further consider this finding, we conducted a five-factor interpretation using a maximum likelihood extraction with promax rotation. Within this solution, 26 of the 27 items of the Intolerance of Uncertainty Scale loaded (between 0.36 and 0.78) on the first factor, 32 of the 35 items of the Frustration Discomfort Scale loaded (between 0.32 and 0.69) on the second factor, all items of the Distress Tolerance Scale loaded (between 0.34 and 0.78) on the third factor, 8 of the 16 items of the Tolerance/Intolerance of Ambiguity Scale loaded (between 0.34 and 0.64) on the fourth factor and 6 of the 7 items of the Discomfort Intolerance Scale loaded (between 0.36 and 0.90) on the fifth factor. These findings suggest a five-factor interpretation among the current items. Therefore, we make two proposals: first, that five factors from the exploratory factor analysis can be used as a basis for measuring Zvolensky et al.'s (2010) five-factor summary of distress intolerance and, secondly, that five scales, using four items each, can be created using items that load on these factors under a good or better criteria.

The magnitudes of the correlations between the originally extracted five factors range from $r = 0.01$ (negative emotion and physical discomfort) to $r = 0.55$ (uncertainty and negative emotion), with this suggesting that the factors share no more than 30.25% common variance. The Cronbach's alpha coefficients for the five four-item scales (uncertainty, $\alpha = 0.82$; frustration, $\alpha = 0.71$; negative emotion, $\alpha = 0.83$; ambiguity, $\alpha = 0.68$; physical discomfort, $\alpha = 0.82$) satisfy either the internal reliability criterion of $0.6 \leq \alpha < 0.7$ (acceptable; one case) or that of $\alpha > 0.7$ (good; four cases; Kline, 2000).

Table 2.1

Maximum Likelihood Extraction with Promax Rotation of the Items from the Distress Intolerance Scales.

	Factor							
	1	2	3	4	5	6	7	8
1. Uncertainty makes me vulnerable, unhappy or sad. (IUS 17)	.816	-.121	.085	-.082	-.018	.044	.072	.004
2. When I am uncertain, I can't go forward. (IUS 14)	.792	-.093	-.043	.028	-.051	.035	.019	.118
3. I can't stand being taken by surprise. (IUS 19)	.763	.004	-.074	-.002	.007	.012	-.109	-.225
4. I must get away from all uncertain situations. (IUS 25)	.755	.019	-.084	.064	.043	.012	-.059	-.022
5. Being uncertain means that I am not first rate. (IUS 13)	.754	-.094	-.149	-.032	.044	.038	.121	.260
6. When I am uncertain, I can't function very well. (IUS 15)	.731	-.066	-.008	-.133	-.041	-.005	.170	.160
7. Uncertainty keeps me from living a full life. (IUS 9)	.719	.047	.021	.003	-.067	-.084	-.196	-.040
8. Unforeseen events upset me greatly. (IUS 7)	.718	-.077	.047	-.005	-.041	.006	.002	-.177
9. My mind can't be relaxed if I don't know what will happen tomorrow. (IUS 5)	.705	-.123	.052	.038	-.022	-.023	.061	-.142
10. The ambiguities in life stress me. (IUS 26)	.699	.082	.109	-.016	-.037	-.062	-.062	-.137
11. The smallest doubt can stop me from acting. (IUS 20)	.696	.101	-.110	.015	-.019	-.027	.009	-.120

12. Being uncertain means that I lack confidence. (IUS 22)	.673 -.098 .059 .027 .098 .051 .089 .051
13. Uncertainty makes me uneasy, anxious or stressed. (IUS 6)	.666 -.040 .119 -.088 .049 -.005 .150 -.068
14. When it's time to act, uncertainty paralyses me. (IUS 12)	.655 -.099 .009 .212 -.021 .030 .112 .159
15. Uncertainty keeps me from sleeping soundly. (IUS 24)	.638 -.071 .126 -.043 -.071 -.122 -.088 .020
16. Unlike me, others always seem to know where they are going with their lives. (IUS 16)	.626 -.024 .052 -.182 .034 .022 -.103 .057
17. One should always look ahead so as to avoid surprises. (IUS 10)	.587 .040 -.052 .078 .058 -.014 -.015 -.383
18. It frustrates me not having all the information I need. (IUS 8)	.584 .155 -.043 -.128 .055 .058 .085 -.322
19. I think it is unfair that other people seem sure about their future. (IUS 23)	.569 -.089 .077 .201 .051 -.014 -.106 .046
20. I always want to know what the future has in store for me. (IUS 18)	.565 .157 -.039 -.051 .060 .021 .114 -.276
21. A small unforeseen event can spoil everything, even with the best of planning. (IUS 11)	.560 .089 -.065 .021 -.044 -.063 -.055 -.152
22. I should be able to organize everything in advance. (IUS 21)	.557 .059 -.049 .249 .085 -.011 .120 -.339
23. I can't stand being undecided about my future. (IUS 27)	.538 .106 -.039 .135 .066 -.041 .147 -.255
24. Uncertainty makes life intolerable. (IUS 3)	.524 .116 .018 -.006 -.077 -.034 -.092 .054
25. It is unfair not having any guarantees in life. (IUS 4)	.438 .195 .039 .044 -.024 .045 -.203 -.069
26. Uncertainty stops me from having a firm opinion. (IUS 1)	.347 .035 .098 -.341 -.033 -.016 -.147 .075
27. I can't bear it if other people stand in the way of what I want. (FDS10)	-.026 .643 -.180 -.004 .014 -.020 .251 .071

28. I can't tolerate being overlooked. (FDS29)	-.110	.632	.070	.049	-.035	-.061	-.071	-.092
29. I can't tolerate being treated with disrespect. (FDS33)	-.139	.630	.007	-.097	-.063	.010	.060	-.163
30. I can't stand having to change when others are at fault. (FDS22)	-.089	.620	.027	-.189	.049	.009	-.060	-.071
31. I can't stand being left in the dark with no explanations. (FDS31)	.032	.595	-.018	-.295	.050	.042	-.128	.072
32. I can't tolerate being taken for granted. (FDS14)	-.095	.594	-.129	-.004	-.059	-.049	.176	-.015
33. I can't bear to have been treated unjustly. (FDS30)	-.149	.582	-.012	.169	.026	.011	.048	-.118
34. I can't tolerate other people's bad or stupid behaviour. (FDS35)	.076	.565	-.226	.083	.061	.047	-.040	-.103
35. I can't stand doing things that involve a lot of hassle. (FDS21)	.183	.560	-.124	.050	-.098	.134	-.108	.057
36. I can't stand having to persist at unpleasant tasks. (FDS25)	.065	.546	.097	.064	-.061	-.015	.104	-.029
37. I can't tolerate criticism, especially when I know I'm right. (FDS26)	-.152	.539	.056	.286	.015	-.024	-.001	-.078
38. I can't stand having to give in to other people's demands. (FDS18)	.103	.521	-.121	.068	.081	-.119	-.099	-.034
39. I can't bear disturbing feelings. (FDS19)	.073	.491	.146	-.027	-.067	-.038	.123	-.051
40. I can't stand the hassle of having to do things right now. (FDS17)	.193	.487	.052	-.175	-.077	.033	-.135	.205
41. I can't stand situations where I might feel upset. (FDS15)	-.026	.481	.253	.026	-.095	.129	.091	-.021
42. I can't stand to lose control of my feelings. (FDS27)	-.013	.465	.114	-.150	.025	-.015	.142	.021
43. I can't stand doing a job if I'm unable to do it well. (FDS20)	.051	.456	.023	-.155	.038	-.004	.227	-.054

44. I can't stand doing tasks when I'm not in the mood. (FDS9)	-.007	.447	.114	-.090	.083	-.014	.038	.063
45. I can't stand having to wait for things I would like now. (FDS2)	.037	.439	-.126	.271	.080	.025	.183	.098
46. I can't stand being prevented from achieving my full potential. (FDS4)	-.069	.426	-.069	-.160	.093	-.016	.396	-.038
47. I must be free of disturbing feelings as quickly as possible; I can't bear if they continue. (FDS3)	-.052	.422	.212	.018	-.015	.003	.302	.130
48. I can't stand it if other people act against my wishes. (FDS6)	-.062	.417	.048	.349	.124	.035	.041	.076
49. I can't bear to feel that I am losing my mind. (FDS7)	.097	.394	.100	.047	-.001	.065	.225	.091
50. I need the easiest way around problems; I can't stand making a hard time of it. (FDS1)	.155	.373	.030	-.247	-.188	.008	.027	.029
51. I can't stand giving up immediate pleasures for the sake of a distant goal. (FDS32)	.065	.371	.040	.254	-.002	-.003	-.084	.195
52. I can't tolerate lowering my standards even when it would be useful to do so. (FDS12)	.099	.354	-.077	.033	.093	.039	.098	.123
53. I can't stand doing tasks that seem too difficult. (FDS5)	.122	.340	-.065	.085	-.061	.092	.064	.050
54. I can't stand feeling that I'm not on top of my work. (FDS24)	.054	.310	.103	-.297	-.034	-.017	.276	-.139
55. I can't handle feeling distressed or upset. (DTS3)	.079	-.009	-.785	-.011	-.008	.008	.035	.025
56. I am ashamed of myself when I feel distressed or upset. (DTS11)	.051	.010	-.778	-.183	-.005	-.032	.018	.006
57. Feeling distressed or upset is unbearable to me. (DTS1)	.109	-.021	-.760	-.039	-.101	-.028	-.030	-.055
58. My feelings of distress are so intense that they completely take over. (DTS4)	-.096	.105	-.753	-.006	.008	.069	.082	-.011
59. My feelings of distress or being upset scare me. (DTS12)	-.042	.135	-.699	-.207	-.031	-.034	-.078	.023

60. When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels. (DTS15)	-.029 -.069 -.677 .145 .008 -.084 -.030 .043
61. Other people seem to be able to tolerate feeling distressed or upset better than I can. (DTS9)	-.075 .018 -.658 .138 .016 -.074 -.004 .053
62. When I feel distressed or upset, all I can think about is how bad I feel. (DTS2)	.002 -.060 -.658 .105 -.091 -.050 .085 .065
63. There's nothing worse than feeling distressed or upset. (DTS5)	-.018 .030 -.581 .048 -.107 -.028 -.030 .034
64. I can tolerate being distressed or upset as well as most people. (DTS6) (R)	-.079 .019 -.567 -.185 .168 .051 .074 .093
65. I'll do anything to stop feeling distressed or upset. (DTS13)	.096 -.103 -.533 -.037 -.056 .053 -.120 -.048
66. My feelings of distress or being upset are not acceptable. (DTS7)	-.184 .096 -.530 -.001 .144 .084 -.014 .022
67. Being distressed or upset is always a major ordeal for me. (DTS10)	-.152 .135 -.527 -.003 -.049 .018 .036 -.110
68. I'll do anything to avoid feeling distressed or upset. (DTS8)	.084 -.131 -.470 .040 -.077 .044 -.095 -.076
69. The sooner we all acquire similar values and ideals the better. (TIAS15)	.019 .045 -.032 -.554 -.024 -.037 .034 .003
70. I would like to live in a foreign country for a while. (TIAS2) (R)	-.022 .049 -.007 -.531 .257 -.009 -.069 .215
71. An expert who doesn't come up with a definite answer probably doesn't know too much. (TIAS1)	-.025 .052 .014 -.450 -.043 .019 -.010 -.163
72. I can't bear being deprived now of things I lacked in the past. (FDS34)	-.077 .440 .038 -.450 -.044 -.075 -.055 .050
73. I can't stand having to push myself at tasks. (FDS13)	.152 .273 .085 -.418 .048 -.002 -.070 .185
74. A good job is one where what is to be done and how it is to be done are always clear. (TAS5)	.096 -.018 -.008 -.396 -.135 -.055 -.068 .054
75. When I feel distressed or upset, I must do something about it immediately. (DTS14)	.106 .008 .339 -.381 -.055 .025 .016 -.026

76. Being uncertain means that a person is disorganized. (IUS 2)	-.264 .078 -.030 -.358 -.067 -.020 .120 -.151
77. What we are used to is always preferable to what is unfamiliar. (TIAS9)	-.091 -.042 -.088 -.342 -.227 -.050 .061 .135
78. A person who leads an even, regular life in which few surprises or unexpected happenings arise really has a lot to be grateful for. (TIAS11)	-.179 -.010 .016 -.327 -.240 -.010 .051 .027
79. A good teacher is one who makes you wonder about your way of looking at things. (TIAS16) (R)	.012 -.003 .027 -.102 .760 -.017 -.022 .027
80. It is more fun to tackle a complicated problem than to solve a simple one. (TIAS6) (R)	-.045 -.061 .098 .301 .599 .011 -.002 .119
81. Often the most interesting and stimulating people are those who don't mind being different and original.(TIAS8) (R)	.039 .060 .044 -.319 .564 -.070 -.094 .228
82. People who fit their lives to a schedule probably miss most of the joy of living. (TIAS4) (R)	-.050 .019 .042 .162 .560 .022 .015 .076
83. Many of our most important decisions are based on insufficient information. (TIAS12) (R)	-.111 -.027 .009 -.063 .468 -.041 .057 .100
84. I like parties where I know most of the people more than ones where all or most of the people are complete strangers.(TIAS13)	-.066 -.029 -.089 .178 .469 -.016 .080 .089
85. Teachers who hand out vague assignments have given one a chance to show initiative and originality. (TIAS14)	-.045 .004 -.056 -.023 .434 -.079 -.014 .376
86. People who insist upon a "yes" or "no" answer just don't know how complicated things really are. (TIAS10) (R)	.048 .004 -.036 .137 .414 .080 .070 .028
87. I can tolerate a great deal of physical discomfort. (DIS1) (R)	.013 -.023 -.053 .033 .004 .899 -.064 -.044
88. I have a high pain threshold. (DIS2) (R)	-.018 -.068 .006 .056 .016 .838 -.073 -.025
89. When I begin to feel physically uncomfortable, I quickly take steps to relieve the discomfort. (DIS6)	-.075 -.013 .060 -.086 .032 .598 .018 -.045
90. I am more sensitive to feeling discomfort compared to most persons. (DIS7)	-.088 .063 -.002 .094 -.023 .587 -.033 -.012
91. I'm the kind of person who never takes medication, like aspirin, when I have aches and pains. (DIS4) (R)	.015 .088 .037 -.221 -.021 .387 .020 -.004

92. I push my physical limits when I exercise. (DIS5) (R)	.043	.067	-.022	.171	.009	.372	-.089	.027
93. I can't bear the frustration of not achieving my goals. (FDS8)	-.027	.481	.012	.038	.026	-.026	.560	-.023
94. I can't bear to move on from work I'm not fully satisfied with. (FDS16)	.017	.220	.020	-.031	-.027	-.060	.386	.019
95. I can't tolerate any lapse in my self-discipline. (FDS28)	-.011	.221	.085	.320	-.075	-.057	.347	-.142
96. I can't bear to have certain thoughts. (FDS11)	.103	.297	.151	.051	-.014	-.009	.135	.061
97. I can't get on with my life, or be happy, if things don't change. (FDS23)	.095	.274	.065	.253	-.068	-.057	.018	.122
98. There is really no such things as a problem that can't be solved. (TIAS3)	.133	.010	.007	.279	-.095	.066	-.064	-.148
99. In the long run, it is possible to get more done by tackling small, simple problems rather than large and complicated ones. (TIAS7)	-.152	.003	-.096	-.103	-.248	.054	.017	.067
100. I take extreme measures to avoid feeling physically uncomfortable. (DIS3)	-.025	-.076	.082	.153	-.063	.300	-.019	-.037

Note. IUS = Intolerance of Uncertainty Scale (Buhr & Dugas, 2002); TIAS = Tolerance/Intolerance of Ambiguity Scale (Budner, 1962); DIS = Discomfort Intolerance Scale (Schmidt et al., 2006); FDS = Frustration Discomfort Scale (Harrington, 2005); DTS = Distress Tolerance Scale (Simons & Gaher, 2005). R = reversed item.

Confirmatory Factor Analysis

To explore the structural validity and stability of a five-factor interpretation of a 20-item version of distress intolerance, the data collected from Sample Two was used in a comparison confirmatory factor analysis series. Here, we compared the five-factor interpretation of the data against three models: (a) a unidimensional model proposing that all 20 items would load on one factor, reflecting an underlying latent factor of distress intolerance as suggested by McHugh and Otto's (2012) work; (b) a higher-order factor model to examine whether the correlations between the first-order factors are explained in terms of a higher-order factor; and (c) a bifactor model to allow for the identification of a single common construct (e.g. "general distress intolerance") while also recognising multidimensionality (the five group factors of distress intolerance).

The fit statistics for the four models are presented in Table 2.2. To assess the goodness-of-fit of the data, five statistics and accompanying criteria, as recommended by Hu and Bentler (1999) and Kline (2005), were used: the chi-square (χ^2) to assess the difference between the expected and observed covariance matrices, the comparative fit index (CFI) to assess the discrepancy function adjusted for the sample size, the non-normed fit index (NNFI) or Tucker–Lewis index to resolve some of the issues of negative bias, the root mean square error of approximation (RMSEA) to evaluate the discrepancy between the hypothesised model with optimally chosen parameter estimates and the population covariance matrix, and the standardised root mean square residual (SRMR) to measure the square root of the discrepancy between the sample covariance matrix and the model covariance matrix. Additionally, current study report the relative chi-square (CMIN/DF) to assess the fit of a model in the confirmatory factor analyses and modelling in which the minimum discrepancy is divided by its degrees of freedom. Furthermore, we report the chi-square and degrees of freedom. This study used the following criteria to assess whether the model fit was adequate (noting that any chi-square test was likely to be significant due to the large sample size: (a) that the relative chi-square (CMIN/DF) should be less than 3 to be acceptable, (b) that the CFI and NNFI should exceed 0.90 in order to be acceptable, (c) that the RMSEA should not exceed 0.08 in order to be acceptable and (d) that SRMR values less than 0.08 would be acceptable.

Table 2.2

Confirmatory Factor Analysis Fit Statistics for the Different Models Proposed for the 20-item Distress Intolerance Scale.

	χ^2	df	$p = <$	CMIN/DF	CFI	NNFI	RMSEA	SRMR
Unidimensional	683.830	170	.000	4.023	.617	.572	.139	.107
Five-factor lower-order	272.874	160	.000	1.705	.916	.900	.067	.061
Higher-order	274.425	165	.000	1.663	.918	.906	.065	.062
Bifactor	250.096	150	.000	1.667	.925	.905	.065	.055

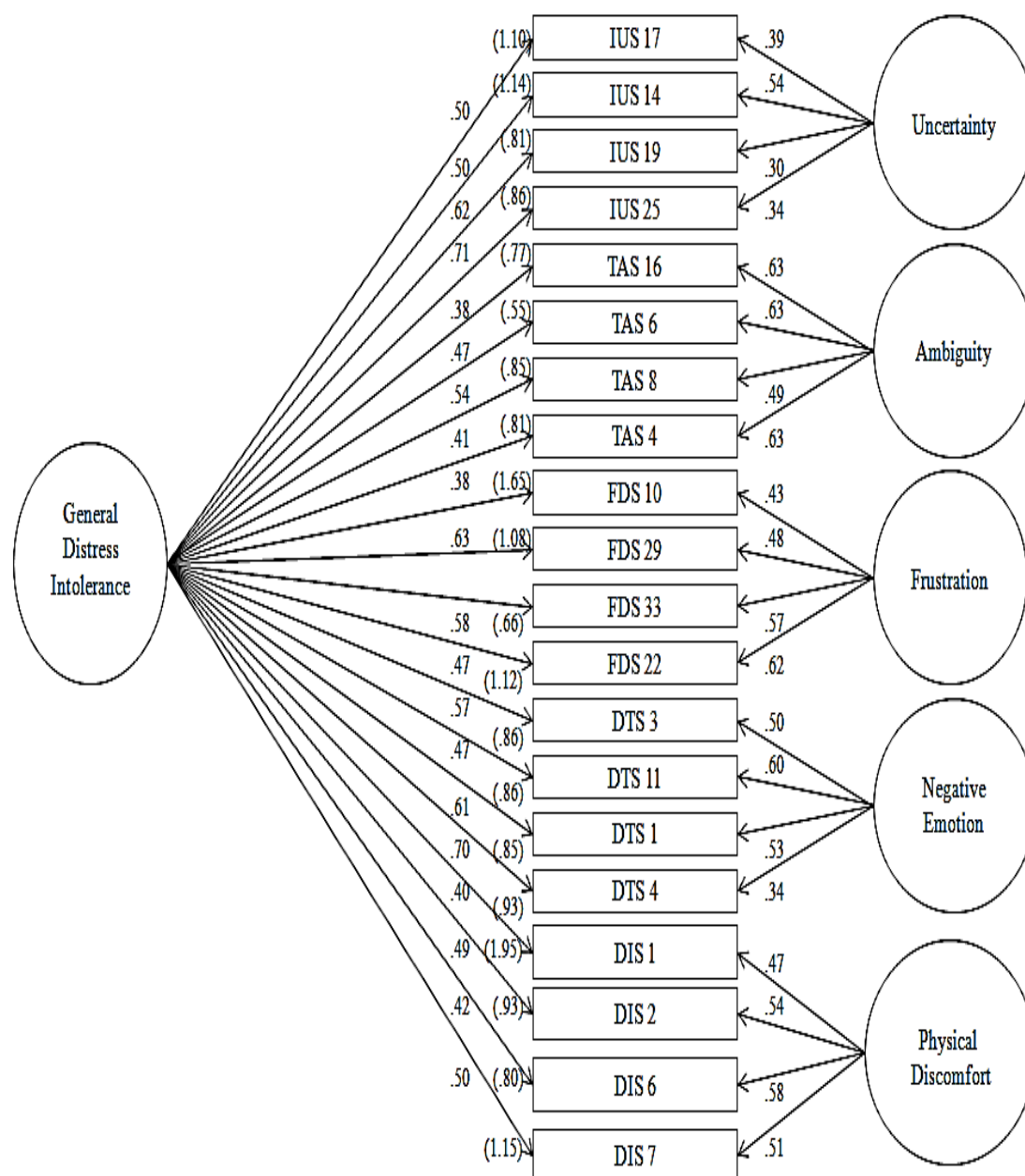
Note. χ^2 = chi-square; df = degrees of freedom; p = p-value; CMIN/DF = relative chi-square (chi square/degree of freedom ratio); CFI = comparative fit index; NNFI = non-normed fit index; RMSEA = root mean square error of approximation; SRMR = standardised root mean square residual.

For the five-factor model of distress intolerance,¹ the hierarchical higher-order factor and the bifactor model, the fit statistics meet the aforementioned criteria for acceptability, with the models demonstrating measurement equivalence under the assumption that a ΔCFI larger than 0.01 would be indicative of non-equivalence (Cheung & Rensvold, 2002). Within these criteria, the findings suggest that the higher-order solution does not result in a significant decrease in model fit and therefore provides a good explanation of the correlations among the lower-order factors (Brown, 2006). However, the use of a more conservative cut-off of 0.002 for ΔCFI has also been recommended (Meade, Johnson, & Braddy, 2008). Using this criterion, the bifactor model demonstrates an improved set of goodness-of-fit statistics and may offer an improved explanation of the data. Figure 2.1 shows the standardised loadings and measurement error terms for the 20-item bifactor model. The variance accounted for the general factor in this model was 0.51%, with the distress intolerance group factors explaining 6% (uncertainty), 10.3% (frustration), 9.3% (negative emotion), 13.2% (ambiguity) and 10.2% (physical discomfort).

The Cronbach's alpha coefficients for the five four-item scales (uncertainty, $\alpha = 0.79$; frustration, $\alpha = 0.82$; negative emotion, $\alpha = 0.85$; ambiguity, $\alpha = 0.83$; physical discomfort, $\alpha = 0.77$) exceed the internal reliability criterion of $\alpha > 0.7$ as good.

¹ In accordance with classical test theory for verifying measurement models (e.g. Kenny, 1979), the chi-square difference test and $\Delta\text{CFI} > 0.01$ criterion showed that the congeneric model for the five-group factor model presented a better fit of the data than either the tau-equivalent model ($\Delta\text{CMIN} = 23.57$, $\Delta\text{df} = 7$, $p = 0.001$; $\Delta\text{CFI} = 0.015$) or the parallel model ($\Delta\text{CMIN} = 46.16$, $\Delta\text{df} = 15$, $p < 0.001$; $\Delta\text{CFI} = 0.077$).

Figure 2.1. Standardised loadings (with measurement error terms in parentheses) for the 20-item Distress Intolerance Scale Bifactor Structure.



Note. IUS = Intolerance of Uncertainty Scale (Buhr & Dugas, 2002); TAS = Tolerance/Intolerance of Ambiguity Scale (Budner, 1962); DIS = Discomfort Intolerance Scale (Schmidt et al., 2006); FDS = Frustration Discomfort Scale (Harrington, 2005); DTS = Distress Tolerance Scale (Simons & Gaher, 2005). All items have been recoded to indicate greater levels of distress intolerance.

2.4: Discussion

Researchers have begun trying to define distress intolerance through parsimonious measures of the construct (e.g. McHugh & Otto, 2012), thereby assessing the multifaceted nature of the construct (e.g. Bardeen et al., 2013). The findings of this thesis integrate these approaches by proposing a 20-item measure that comprises five replicable factors that assess the ambiguity, uncertainty, frustration, negative emotion and physical discomfort components of distress intolerance, with this being consistent with Zvolensky et al.'s (2010) summary of possible distress intolerance factors within the available literature in this area. The findings also suggest that the bifactor model provides the best description of the data, identifying a general factor of distress intolerance (accounting for just over 51% of the common variance) while also recognising the multidimensionality of the five group factors (together accounting for 49% of the variance). In noting the near equivalence of this variance shared and that the loadings are high for both the general factor and the group factors, both the creation of a general factor and the subscale scores can be considered. Such a shortened multidimensional measure will be most useful when relatively few items can be administered in a research study (whether this is because of time or space constraints).

Limitations of the current findings include a series of method biases and measure-specific variance (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003) being concerned with response sets in relation to instructions, wording, response format, number of items and subscales, reversal of items and the use of five separate scales. This being said, the confirmatory factor analysis addresses some of these concerns by using the same instructions and response format and, by considering latent factors, there still exists the possibility that the current five-factor model is a reflection of measurement variance. Furthermore, although current study has replicated the findings across two samples, the current findings apply to populations that differ in terms of participant-to-item ratio, age range, educational level, marital status and gender balance. Therefore, further research is needed to explore the stability and dimensional nature of the factor structure of the scales among different populations. In addition, much would be gained from considering how these subscales function in terms of the convergent and discriminant validity of their scores, particularly in terms of other measures of distress intolerance and personality, cognitive and affect systems.

In summary, the findings suggest that a 20-item measure (Distress Intolerance Five Factor – Short) representing a bifactor summary of distress intolerance emerges from the exploratory and confirmatory factor analysis of items from five established measures of distress intolerance. The resulting tool includes a unique combination of items that is not currently used by any other single distress intolerance measure. In addition, it is recommended that further research and practice concerning distress intolerance may benefit from using this measure. For this purpose, Chapter Three will examine the concurrent and construct validity and test–retest reliability of the DIFF-S while Chapter Four will consider its relationship with the behavioural approaches of distress intolerance.

Chapter Three

Distress Intolerance Five Factor – Short: Examination of the Concurrent and Construct Validity and Test–Retest Reliability

Abstract

The Distress Intolerance Five Factor – Short (DIFF-S) tool is a parsimonious measure developed from the five-facet model of distress intolerance as proposed by Zvolensky, Vujanovic, Bernstein and Leyro (2010). However, its concurrent and construct validity and its reliability over time have not been examined. This study aims to investigate two forms of its validity and one form of its reliability among two samples ($n = 365$). The findings of the concurrent validity analysis indicate that the DIFF-S shows a positive correlations with its parent measures (from which the DIFF-S tool was derived). There are differential levels of concurrent validity across the five scales within the DIFF-S in regard to their associations with the parent measures. The findings of the construct validity analysis indicate that the DIFF-S and its five facet scales observed discriminant validity. Finally, the findings of the reliability analyses indicate that its reliability over time is acceptable with differential levels of reliability over time across the five-facet scales of the DIFF-S. Overall, the findings suggest that the validity and reliability of the DIFF-S are acceptable, with differential levels of validity and reliability being found across the five-facet scales of the DIFF-S.

3.1: Introduction

Various self-report measures have been developed in order to evaluate distress intolerance (or a lack of capacity to tolerate or behave appropriately in situations that involve ambiguity, uncertainty, frustration, negative emotion and physical discomfort), with each having been derived from distinct models of this construct. One area of these models focuses on intolerance of personal threat as a consequence of uncertainty (Buhr & Dugas, 2002) and ambiguous life situations (Budner, 1962). Others, in contrast, are theoretically oriented with a desperate need to escape the states that involve unpleasant emotions (Simons & Gaher, 2005), frustrating conditions (Harrington, 2005) and uncomfortable body sensations (Schmidt, Richey, & Fitzpatrick, 2006).

However, literature has emerged that offers contradictory findings in respect of this construct due to the multifaceted nature of the measurements employed in this area (McHugh & Otto, 2012; Zvolensky, Leyro, Bernstein, & Vujanovic, 2011). Therefore, inconsistency exists in the utilisation of these measures. A fundamental reason for this is that the method and assessment perspectives held regarding distress intolerance are a product of a construct method composition (Bernstein, Vujanovic, Leyro, & Zvolensky, 2011).

Therefore, increased focus needs to be given towards creating an integrated approach. This would advance our understanding as to the nature of distress intolerance due to it clarifying the methods used in indexing the construct. From the model of distress intolerance as proposed by Zvolensky et al. (2010), five core facets are proposed as underlying the general factors of distress intolerance, with this pertaining to the inability of individuals to tolerate some types of physical or emotional distress in situations that involve some form of ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort. Bebane, Flowe, and Maltby (2015), in exploring the underlying factors that lay among a number of well-used distress intolerance scales, measured each of the proposed distress intolerance factors. From this, the authors identified a 20-item scale (Distress Intolerance Five Factor – Short) comprising measures pertinent to ambiguity, uncertainty, frustration, negative emotion and physical discomfort. Moreover, the confirmatory factor analysis of the 20-item scale suggests that a bifactor model of distress intolerance is able to best account for the variance of the items, with an equal split in the variance being explained by the general notion of

distress intolerance and the five facets. Overall, this suggests that the DIFF-S tool can be used as both a measure of general distress intolerance and of the five facets.

Nonetheless, there is no empirical evidence in respect of the reliability of the DIFF-S tool over time or in the construct and concurrent validity, this being despite previous studies having used Cronbach's alpha as a statistical technique for examining the internal consistency of the DIFF-S tool (Bebane et al., 2015). The Cronbach's alpha coefficient for the DIFF-S tool has been measured at $\alpha = 0.90$, with the five facets being found as follows: intolerance of ambiguity ($\alpha = 0.83$), intolerance of uncertainty ($\alpha = 0.79$), intolerance of frustration ($\alpha = 0.82$), intolerance of negative emotion ($\alpha = 0.85$) and intolerance of physical discomfort ($\alpha = 0.77$) (Bebane et al., 2015).

This study aims at further examining the validity and reliability indices of the DIFF-S. In terms of the validity indices, further examination of the DIFF-S tool allows further indices to emerge in regard to the degree of accuracy of this measure. This can enable researchers to ensure that the measures employed are measuring what it claims rather than something else (Goodwin, 2010). In terms of the reliability over time index, greater attention being paid to this area can provide indices in regard to the consistency of the DIFF-S across different circumstances. This is essential as, without such indices, it is not possible to determine what a score on a particular measure means in practice – with this being true for any psychological test (Goodwin, 2010). Accordingly, this study proposes two forms of validity (i.e. concurrent validity and construct validity) and test–retest reliability through which empirical evidence is to be provided in regard to the validity and reliability of the DIFF-S tool.

The first consideration here is validity. This concept, first introduced by Kelley (1927), holds that a measure is valid if it assesses what it is designed to measure. While there are different forms of validity, this study focuses on two forms. The first of these forms is concurrent validity (or criterion validity), which is concerned with whether a given measure can show acceptable correlations with other standard measures of that construct (Kline, 2000). This study seeks to investigate the concurrent validity of the DIFF-S tool by targeting its correlations in terms of general and multidimensional factors – namely in relation to parent measures (from which the DIFF-S is derived), including five self-report scales: the Tolerance/Intolerance of Ambiguity Scale (TIAS; Budner, 1962), the Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2002;

Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994), the Frustration Discomfort Scale (FDS; Harrington, 2005), the Distress Tolerance Scale (DTS; Simons & Gaher, 2005) and the Discomfort Intolerance Scale (DIS; Schmidt et al., 2006).

The second area of focus here is construct validity, which relates to whether a particular measurement truly measures the theoretical construct that it is designed to measure (Goodwin, 2010). To assess the construct validity of the DIFF-S, the present study seeks to investigate the discriminant validity introduced by Campbell and Fiske (1952). Discriminant validity holds that measures that are apparently assessing theoretically different concepts should not correlate highly with each other (Kline, 2000). This study will investigate the construct validity of the DIFF-S tool by comparing it with the Neuroticism Scale within the Short Five (S5; Konstabel, Lönnqvist, Walkowitz, Konstabel, & Verkasalo, 2012).

The final consideration is reliability. This index refers to the consistency of a given measure across different circumstances (Howitt & Cramer, 2011). This study will consider reliability over time for the DIFF-S, with this pertaining to the consistency of results found across a given duration in relation to the same measure. In investigating this form of reliability, the present study seeks to use the test–retest technique, which refers to the ability of a measure to be consistent over a period of time. In terms of the sample size for the test-retest reliability, it is suggested that the samples should contain at least 100 participants (Kline, 2000). Furthermore, in terms of the length of interval, a two weeks is generally recommended retest period (Peter, 1979).

Thus, the rationale for this study is that currently there is no empirical evidence regarding the concurrent and construct validity and reliability over time of the DIFF-S tool. This will help further indices to emerge in regard to the degree of accuracy and in regard to the consistency of the DIFF-S tool across different circumstances. Further investigation of these indices is essential. This is because the validity indices will enable us to ensure that the DIFF-S is measuring what it claims to measure rather than something else. Furthermore, the reliability over time index will provide further evidence in regard to the consistency of the DIFF-S across different circumstances. Accordingly, the main purpose of the present study is to investigate the empirical evidence that relates to the validity and reliability of the DIFF-S, achieved by examining its reliability over time by using the test–retest technique. Alongside this,

validity in terms of concurrent validity and construct validity is to be investigated by detailing the discriminant validity that can be found.

3.2: Method

Participants

Two data samples were collected. Sample One was used for validity analysis and Sample Two was used for reliability analysis.

The first sample comprised 256 respondents (74 males, 182 females) who were all university students. These participants ranged in age between 18 and 36 years old ($M = 19.78$ years, $SD = 2.72$). In regard to race, the sample was predominantly Caucasian (60.2%), with the next highest reported ethnicities being South Asian (13.7%) and Black (11.3%).

The second sample comprised 109 respondents (15 males, 94 females) who were all university students. The participants ranged in age between 18 and 38 years old ($M = 19.43$ years, $SD = 2.83$). In regard to race, the sample was predominantly Caucasian (64.2%), with the next highest reported ethnicities being South Asian (12.8%) and Black (10.1%).

Materials and Procedures

To examine the concurrent validity, participants were asked to respond to six self-report measures, including measures of the different facets of distress intolerance.

The Distress Intolerance Five Factor – Short (DIFF-S; Bebane et al., 2015) is a 20-item self-report measure, designed to assess the inability of individuals to withstand distress and to act in ways that will lead to the avoidance of distress. The DIFF-S can be used as both a measure of general distress intolerance and as a measure of the five facets of distress intolerance. This means that it reflects the identification of a general factor of distress intolerance while also recognising the multidimensionality of the five group factors that comprise: Intolerance of Ambiguity (e.g. “It is more fun to tackle a

complicated problem than to solve a simple one (R¹)”), Intolerance of Uncertainty (e.g. “Uncertainty makes me vulnerable, unhappy, or sad”), intolerance of frustration (e.g. “i can’t bear it if other people stand in the way of what i want”), intolerance of negative emotion (e.g. “my feelings of distress are so intense that they completely take over”) and intolerance of physical discomfort (e.g. “I can tolerate a great deal of physical discomfort” (R)). Responses are scored on a 5-point Likert scale, whereby 1 = Disagree Strongly, 2 = Disagree, 3 = Neither Agree or Disagree, 4 = Agree and 5 = Agree Strongly. The Cronbach’s alpha coefficient for the DIFF-S has been found to be $\alpha = 0.90$. In terms of the five factors, the Cronbach’s alpha coefficients were found to be: intolerance of ambiguity ($\alpha = 0.83$), intolerance of uncertainty ($\alpha = 0.79$), intolerance of frustration ($\alpha = 0.82$), intolerance of negative emotion ($\alpha = 0.85$) and intolerance of physical discomfort ($\alpha = 0.77$) (Bebane et al., 2015).

The Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994; Buhr & Dugas, 2002) is a 27-item self-report measure, designed to assess the emotional and behavioural reactions of individuals to uncertain situations. Responses are scored on a 5-point Likert scale between 1 = Not at all representative and 5 = Completely representative. The IUS internal consistency has been measured at $\alpha = 0.91$ (Buhr & Dugas, 2002).

The Tolerance/Intolerance of Ambiguity Scale (TIAS; Budner, 1962) is a 16-item (half positive, half negative) self-report instrument, developed to assess “the tendency to perceive ambiguous situations as sources of threat” (Budner, 1962, p. 29). Within this scale, each item is designed to tap into a specific mode of response being given towards a specific kind of ambiguous situation – namely phenomenological denial (repression and denial), phenomenological submission (anxiety and discomfort), operative denial (destructive or reconstructive behaviour) and operative submission (avoidance behaviour). Here, the responses (behaviours) are elicited by situations characterised by novelty, complexity or insolubility, with the consequences of this leading to an intolerance of ambiguity. This scale comprises three subscales: novelty (e.g. “What we are used to is always preferable to what is unfamiliar”), complexity (e.g. “A good teacher is one who makes you wonder about your way of looking at things”) and insolubility (e.g. “There is really no such thing as a problem that can’t be solved”).

¹ Reversed item

Responses are scored on a 6-point Likert scale – whereby 7 = Strongly Agree, 6 = Moderately Agree, 5 = Slightly Agree, 3 = Slightly Disagree, 2 = Moderately Disagree and 1 = Strongly Disagree – towards positively worded items. In contrast, the scoring of negative items is denoted in the reverse direction. All omissions are scored 4. Budner (1962) reported that the Cronbach's alpha coefficients for the 17 samples ranged from 0.39 to 0.62 (with a mean of $\alpha = 0.49$).

The Frustration Discomfort Scale (FDS; Harrington, 2005) is a 28-item self-report measure, which is administered alongside an additional 7 items to form separate gratification and fairness subscales. This scale is designed to assess the capacity of individuals to withstand discomfort derived from frustration. This scale contains four seven-item subscales: discomfort intolerance (e.g. "I can't stand having to persist at unpleasant tasks"), entitlement (e.g. "I can't bear it if other people stand in the way of what I want"), emotional intolerance (e.g. "I can't bear to feel that I am losing my mind") and achievement (e.g. "I can't stand being prevented from achieving my full potential"). Responses are scored on a 5-point Likert scale, whereby 0 = Absent, 1 = Mild, 2 = Moderate, 3 = Strong and 4 = Very Strong. The Cronbach's alpha coefficient for the FDS was measured at $\alpha = 0.95$. The subscale alpha coefficients were further denoted as: discomfort intolerance ($\alpha = 0.88$), emotional intolerance ($\alpha = 0.87$), entitlement ($\alpha = 0.85$) and achievement ($\alpha = 0.84$) (Harrington, 2005).

The Distress Tolerance Scale (DTS; Simons & Gaher, 2005) is a 15-item self-report measure designed to assess the ability of individuals to withstand unpleasant emotions. The DTS contains four subscales: tolerance (e.g. "I can't handle feeling distressed or upset"), appraisal (e.g. "My feelings of distress or being upset are not acceptable"), absorption (e.g. "My feelings of distress are so intense that they completely take over") and regulation (e.g. "I'll do anything to avoid feeling distressed or upset"). Responses are scored on a 5-point Likert scale, whereby 5 = Strongly Disagree, 4 = Mildly Disagree, 3 = Agree and Disagree Equally, 2 = Mildly Agree and 1 = Strongly Agree. The DTS internal consistency was measured at $\alpha = 0.85$. The Cronbach's alpha coefficients for the first-order factors were as follows: tolerance ($\alpha = 0.73$), appraisal ($\alpha = 0.84$), absorption ($\alpha = 0.77$) and regulation ($\alpha = 0.74$) (Simons & Gaher, 2005). Within the DTS, high scores represent the possession of a high degree of distress tolerance.

The Discomfort Intolerance Scale (DIS; Schmidt et al., 2006) is a 5-item self-report measure, developed to assess the ability of individuals to tolerate uncomfortable physical sensations. This comprises two subscales, discomfort intolerance (e.g. “I can tolerate a great deal of physical discomfort (R)”) and discomfort avoidance (e.g. “I take extreme measures to avoid feeling physically uncomfortable”). Responses are scored on a 7-point Likert scale ranging from 0 = Not at all like me to 6 = Extremely like me. The DIS internal consistency for discomfort intolerance was measured at $\alpha = 0.91$ and discomfort avoidance at $\alpha = 0.72$ (Schmidt et al., 2006).

The ‘Short Five’ (S5; Konstel et al., 2012) is a 60-item self-report measure, designed to assess the five factors and 30 facets of the five-factor model. Within the S5, each facet is assessed by positive and negative-assigned items. Responses are scored on a 7-point Likert scale, which ranges from -3 (Completely Disagree) to +3 (Completely Agree) – with 0 here being designated as a neutral option. The Cronbach’s alpha coefficients for the S5 have been measured as $\alpha = 0.84, 0.91, 0.76, 0.76,$ and 0.87 for Extraversion, Neuroticism, Openness, Agreeableness and Conscientiousness respectively (Konstel et al., 2012). This study uses the Neuroticism scale for examining the construct validity.

To examine the reliability over time, the research participants of Sample Two were asked to respond to the DIFF-S and, after a two-week period as generally recommended retest period, were asked to complete the DIFF-S again.

Ethical Consent

Both data collection procedures received ethical approval from the University of Leicester’s Department of Neuroscience, Psychology & Behaviour Ethics Board. In addition, all of the respondents provided a respective consent form whereby they indicated their agreement to participate in the study. Should a respondent fail to provide a consent form, they would not be able to proceed with the research.

The consent form contained statements and directions regarding the nature of the study, a declaration as to how the data collected would remain anonymous and the freedom of the participants to withdraw from the study at any point (both during and subsequent to their participation). Within this conveyed information, details were given

as to how the data would be stored in a coded form, how the results of the study could be obtained if required, the intended use of the data, the duration the data would be stored for and the plans for the ultimate disposal of the data.

Statistical Analysis

This study employed zero-order correlations to examine the correlation between variables. Campbell and Fiske's formula (the correlation of two scales divided by the square root of the multiplication of both reliabilities of the compared scales) was used for the correction for attenuation to demonstrate discriminant validity. In addition, the effect sizes are measured by holding that a small size manifests as $r = 0.1$, a medium size as $r = 0.24$ and a large size as $r = 0.37$ (McGrath & Meyer, 2006).

3.3: Results

Preliminary Analysis

The findings of the independent-samples t-tests indicate that there are no significant gender differences in regard to general distress intolerance or among the five facets of distress intolerance with the exception of intolerance of physical discomfort, $t(254) = -2.380, p = 0.018$. In relation to intolerance of physical discomfort, the female sample reported higher scores than the male sample ($M_s = 11.88$ and 10.35 respectively). Moreover, the findings indicate that increased age is not related to general distress intolerance, where $r(256) = -0.066, p = .294$, or in relation to any of the five facets of distress intolerance. It was found, however, that ethnicity related to intolerance of uncertainty, where $F(6, 249) = 2.231, p = 0.041$, and intolerance of physical discomfort, where $F(6, 249) = 2.618, p = 0.018$.

Validity Analysis

To provide empirical evidence as to the validity of the DIFF-S tool, two forms of validity – concurrent validity and construct validity – were examined.

Concurrent Validity (or Criterion Validity)

This study sought to investigate the concurrent validity of the DIFF-S tool by examining the identified correlations in terms of both the general and multidimensional factors. Here, a group of standard self-report measures (i.e. the parent measures from which the DIFF-S tool was derived) were used to assess the distress intolerance construct(s).

Correlations Among the Parent Measures

Table 3.1 illustrates the zero-order correlations found between the DIFF-S tool and its parent measures (from which the DIFF-S tool is derived). All significant correlations between the DIFF-S tool and its parent measures are in bold. In terms of the general factors, it was found that the DIFF-S shares a significant positive association with all of the parent measures with the exception of the Distress Tolerance Scale, the latter being significantly and negatively associated with the DIFF-S tool. Additionally, in terms of the multidimensional factors, the results indicate that all five facet scales within the DIFF-S tool are strongly associated with their parent measures. In terms of effect size, the zero-order correlations between the DIFF-S scales and their parent measures were recorded as $r = 0.92, 0.38, 0.75, 0.96,$ and 0.92 respectively, with this suggesting that these correlations are of a large effect size.

Table 3.1*The Zero-Order Correlations Between the Distress Intolerance Five Factor – Short and its Parent Measures (N = 256).*

	1	2	3	4	5	6	7	8	9	10	11
1. DIFF-S	1	.310**	.125*	.221**	.352**	.312**	.299**	.191**	.286**	-.335**	.323**
2. Intolerance of Uncertainty		1	.146*	.188**	.391**	.146*	.924**	.119	.434**	-.470**	.150*
3. Intolerance of Ambiguity			1	-.177**	.050	.128*	.158*	.388**	-.018	-.039	.124*
4. Intolerance of Frustration				1	.180**	.003	.236**	.019	.755**	-.208**	.011
5. Intolerance of Negative Emotion					1	.117	.440**	.059	.414**	-.927**	.122
6. Intolerance of Physical Discomfort						1	.083	.178**	.069	-.131*	.968**
Parent Measures											
7. Intolerance of Uncertainty Scale							1	.146*	.511**	-.527**	.089
8. Tolerance/Intolerance of Ambiguity Scale								1	.080	-.075	.156*
9. Frustration Discomfort Scale									1	-.484**	.080
10. Distress Tolerance Scale										1	-.136*
11. Discomfort Intolerance Scale											1

Note. DIFF-S = Distress Intolerance Five Factor-Short (Bebane et al., 2015); ** $p < 0.01$; * $p < 0.05$.

Construct Validity

The construct validity of the DIFF-S tool was assessed by comparing it with the scores on the Neuroticism Scale. Table 3.2 illustrates the correlations, reliabilities, square roots and correction for attenuation of the correlations between the DIFF-S and Neuroticism Scale. Accordingly, the findings of Campbell and Fiske's formula for evaluating discriminant validity found that correlations between the DIFF-S tool and its five facet scales with the Neuroticism Scale are below 0.85.

Table 3.2

The Zero-Order Correlations, Reliabilities, Square Roots and Correction for Attenuation for the Correlations Between all Measures that were used for Discriminant Validity (N =256).

	<i>r</i>	α	Square Root	Correction for Attenuation
DIFF_S	.281**	0.90	0.90	0.31
Intolerance of Ambiguity	.129*	0.83	0.86	0.15
Intolerance of Uncertainty	.497**	0.79	0.85	0.58
Intolerance of Frustration	.205**	0.82	0.86	0.23
Intolerance of Negative Emotion	.494**	0.85	0.87	0.56
Intolerance of Physical Discomfort	.181**	0.77	0.83	0.21
Neuroticism	-	0.91	-	-

Note. DIFF-S = Distress Intolerance Five Factor-Short (Bebane et al., 2015); *r* = The Zero-Order Correlation; α = The Cronbach's Alpha Coefficient; ** $p < 0.01$; * $p < 0.05$.

Reliability Analysis

In order to investigate the reliability of the DIFF-S tool over time, this study has used the test–retest technique.

Test–Retest Reliability

In order to examine this type of reliability, participants from Sample Two undertook the DIFF-S test, repeating this after two weeks in similar conditions. Table 3.3 illustrates the zero-order correlations found between the DIFF-S tool undertaken across two different times.

Table 3.3

The Zero-Order Correlations Between the DIFF-S in Two Different Times (N = 109).

	Time 2					
	1	2	3	4	5	6
Time 1						
1. DIFF-S	.773**					
2. Intolerance of Uncertainty		.710**				
3. Intolerance of Ambiguity			.508**			
4. Intolerance of Frustration				.641**		
5. Intolerance of Negative Emotion					.610**	
6. Intolerance of Physical Discomfort						.713**

Note. DIFF-S = Distress Intolerance Five Factor – Short (Bebane et al., 2015); ** $p < 0.01$.

3.4: Discussion

The present study has focused upon concurrent and construct validity and reliability over time for the Distress Intolerance Five Factor – Short (DIFF-S) tool. The findings suggest that the DIFF-S possesses an acceptable level of concurrent validity. This is established by the correlations between the five facet scales of the DIFF-S tool and their parent measures (from which the DIFF-S is derived). However, differences arise among these scales. For example, three facet scales – Intolerance of Physical Discomfort, Negative Emotion and Uncertainty – account for just over 94%, 86% and 85% of the common variance respectively with their parent measures. Intolerance of frustration accounts for just over 59% of the common variance with its parent measure.

Finally, intolerance of ambiguity accounts for just over 15% of the common variance with its parent measure. From this, it can be noted that the shared variance of the intolerance of ambiguity scale is low. An explanation of this could relate to the low internal consistency of the Tolerance/Intolerance of Ambiguity Scale (from which intolerance of ambiguity was derived).

In addition, the findings suggest that the DIFF-S tool (together and separately) possesses a discriminant validity. This is demonstrated by the findings of the correction for attenuation as proposed by Campbell and Fiske (1952) as to the correlations between the DIFF-S and Neuroticism Scale. Overall, these findings provide evidence as to the construct validity of the DIFF-S tool as a measure of the distress intolerance construct(s).

In terms of reliability, while previous research has examined the internal consistency of the DIFF-S tool (Bebane et al., 2015), this study has targeted the consistency of the DIFF-S across different circumstances. The findings suggest that the DIFF-S (together) possesses an acceptable degree of reliability over time. This is consistent with previous research as to the internal consistency of the DIFF-S tool (Bebane et al., 2015). However, in general, and in relation to the differing aspects of the five facet scales of the DIFF-S in terms of its reliability, the test–retest estimates are lower than the internal consistency. This is because this form of reliability involves taking measurements at different times.

These findings therefore provide evidence as to the validity of the DIFF-S tool in terms of its ability to show acceptable correlations with the other standard measures of the distress intolerance construct(s). Furthermore, the ability of the DIFF-S tool to measure the theoretical construct(s) is proven. These findings subsequently support the consistency of the DIFF-S across different circumstances. Overall, the findings support the notion that the DIFF-S is an advanced measure in this area due to: (a) it representing the first bifactor measure of distress intolerance, and (b) it having been developed based on the five-facet model of distress intolerance. This latter consideration is an advancement as most of the measures in this area (e.g. self-report measures) have been developed from models that are influenced by a number of personality, experiential avoidance and coping contexts (Zvolensky et al., 2010). Moreover, some models (e.g. behavioural approaches) “have been developed without specific reference to a particular

conceptual model or theory of distress tolerance” (Zvolensky et al., 2011, p. 14). Additionally, it can be claimed that this instrument is able to refine our understanding of this construct because our knowledge as to the respective constructs could depend upon the methods (and measurement tools) used to index them (Bernstein, Vujanovic et al., 2011).

However, there are limitations to the present study. The first relates to the undergraduate sample used, with future research being required to replicate the study with different populations. The second limitation here pertains to the employment of self-report measures in relation to distress intolerance. In this sense, further consideration should be given as to the validity of the DIFF-S tool through the use of experimental measures. This is particularly prudent given the ambiguity that arises among the methods of examination held towards distress intolerance (i.e. behavioural approaches versus self-report measures) (Bernstein, Marshall, & Zvolensky, 2011; McHugh & Otto, 2012; Zvolensky et al., 2011).

In summary, the main findings of this research suggest that the DIFF-S possesses concurrent and construct validity and reliability over time. However, in terms of the five facet scales of the DIFF-S tool, differential levels arise in regard to the concurrent validity and test–retest reliability. Overall, the findings suggest that the validity and reliability of the DIFF-S tool is acceptable, with differential aspects being found across the five facet scales of the DIFF-S method.

Chapter Four

Distress Intolerance Five Factor – Short: Further Examination of its Relationship with the Behavioural Approaches of Distress Intolerance

Abstract

Recent research has used self-report measures when assessing the specific aspects of distress intolerance and its relationship with behavioural approaches. There is, therefore, a lack of research that considers the measures that are employed to assess the distress intolerance construct(s) against behavioural measures. As a result, this study seeks to investigate the relationship between the Distress Intolerance Five Factor – Short (DIFF-S) tool and the Mirror-Tracing Persistence Task (as an approach within cognitive tolerance tasks), the Cold Pressor Task (as an approach within physical tolerance tasks/pain challenge tasks) and the Breath-Holding Test (as an approach within physical tolerance tasks/biological challenge tasks) among a sample of university students ($n = 88$). The findings indicate that the DIFF-S significantly correlates with higher physical distress intolerance (as indicated by the Cold Pressor Task) and cognitive distress intolerance (as indicated by the Mirror-Tracing Persistence Task). In their associations with the Cold Pressor Task and the Mirror-Tracing Persistence Task, differential aspects are found across the five facet scales of the DIFF-S but not, notably, with the Breath-Holding Test. Overall, the findings suggest that the DIFF-S tool shares an association with behavioural approaches, with this pointing to the fact that it could replace the Cold Pressor Task and the Mirror-Tracing Persistence Task.

4.1: Introduction

Multifaceted measurements have been used to evaluate distress intolerance (or a lack of capacity to tolerate or behave appropriately in situations that involve ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort), with two primary and distinct forms having emerged: behavioural approaches and self-report measures. Behavioural approaches, in this sense, have comprised different forms of experimental research, methodologies that have been adapted in order to assess the tolerance distress stimuli encountered via real-time experimental paradigms.

However, such behavioural approaches have mainly been targeted on the behaviour-focused studies of distress intolerance (or actual behavioural ability in regard to withstanding distressing states) (Leyro, Zvolensky, & Bernstein, 2010). In contrast, the cognitive-focused literature (or the inability of individuals to withstand unpleasant emotional situations) (Zvolensky, Vujanovic, Bernstein, & Leyro, 2010) has predominantly employed self-report measurements. Thus it can be asserted that self-report and behavioural measures have been used to assess different forms of distress (Bernstein, Vujanovic, Leyro, & Zvolensky, 2011; McHugh & Otto, 2011).

Therefore, increasing focus must be given to evaluating theory in the context of the assessment methodology used, given that the measures of distress intolerance mostly comprise a construct method composition (Bernstein, Vujanovic et al., 2011). In this context, recent attempts have been made to utilise self-report methodologies (e.g. Bebane, Flowe, & Maltby, 2015) by employing a hierarchical conceptualisation of distress (in)tolerance as proposed by Zvolensky et al. (2010). Within this hierarchical perspective, there are five core facets that underlie distress intolerance, which indicates that the inability to tolerate some types of physical or emotional distress arises in relation to ambiguity, uncertainty, frustration, negative emotion and physical discomfort.

Furthermore, by following the hierarchical conceptualisation of distress (in)tolerance as proposed by Zvolensky et al. (2010), Bebane et al. (2015) identified five latent factors among five well-used distress intolerance scales and thereby introduced the Distress Intolerance Five Factor – Short (DIFF-S) tool which maps onto each of the proposed distress intolerance factors: ambiguity, uncertainty, frustration, negative emotion and physical discomfort. Furthermore, confirmatory factor analysis of

the items of the scale suggest that a bifactor model of distress intolerance best accounts for the variance between the items, with an equal split of variance explained between the general factor of distress intolerance and the five facets, with this suggesting that the DIFF-S items can be used as both a measure of general distress intolerance and of the five separate facets.

Currently, no knowledge is held as to how the DIFF-S tool relates to the behavioural approaches used to assess distress intolerance. This is because, within the available literature, research has focused on examining the relationship between self-report and the behavioural measures of distress intolerance. For example, the Distress Tolerance Scale with the Paced Auditory Serial Addition Task and the Mirror Tracing Persistence Task (Ameral, Palm Reed, Cameron, & Armstrong, 2014), the Discomfort Intolerance Scale with the Mirror Tracing Persistence Task, the Breath-Holding Test, and the CO₂-Enriched Air Tolerance Task (Bernstein, Marshall, & Zvolensky, 2011), and the Frustration Discomfort Scale and the Mirror Tracing Persistence Task (McHugh, Hearon, Halperin, & Otto, 2011). Such studies have mostly targeted those measures that assess specific aspects of the distress intolerance construct(s), with this resulting in a lack of research being undertaken that considers the measurement of the five facets of distress intolerance (together) and the behavioural measures. Overall, the literature has become largely fragmented across the different conceptualisation measures held of this construct.

The development of the DIFF-S tool therefore provides researchers with an opportunity to assess how a measure of general distress intolerance and the five facets of distress intolerance interrelate with the behavioural approaches of distress intolerance. Furthermore, new avenues arise through this methodology to expand the considerations given as to the relationship between the specific aspects of self-report, behavioural measures and the five facets of distress intolerance as proposed by Zvolensky et al. (2010). This can advance our understanding as to how the five facets of distress intolerance and the behavioural approaches are measured. The present study thereby proposes a number of novel behavioural approaches of distress intolerance.

The first consideration of this study is the physical tolerance tasks. These tasks are a set of behavioural approaches that can be used to examine the ability of individuals to withstand acute physical challenges. The mechanism that underlies the

effects of these tasks pertains to reducing the capacity of individuals to withstand unpleasant bodily distress through reducing their ability to process information, thereby forcing the participants to allocate more attention to the threat at hand (Hancock, Ross, & Szalma, 2007). Here, the participants encounter a decrease in their capacity to tolerate or behave appropriately in the situation. Within the physical tolerance tasks, this study will consider two tasks. First is the Cold Pressor Task (CPT; Hines & Brown, 1936). The CPT is an experimental technique relating to thermal stress tolerance. As an experimental model for the induction of pain, it can be used to assess the ability of individuals to withstand painful bodily challenges. Second is the Breath-Holding Test (BHT; Hajek, Belcher, & Stapleton, 1987). The BHT is a strategy that can be used to elicit the symptoms of physiological arousal and anxiety while also measuring an individual's capacity to tolerate breath-holding (via assessing the duration of the breath-holding; Anestis, Tull, Bagge, & Gratz, 2012; Sütterlin et al., 2013). The consideration of these two physical tolerance tasks against the DIFF-S tool assists us in understanding how the measures of general distress intolerance and the five facet scales of distress intolerance will correlate with the behavioural approaches of the pain and biological challenges of distress intolerance. This is an advancement in terms of the consideration given between the behavioural and self-report measures of distress intolerance, given that previous work has become largely fragmented across the different measures of distress intolerance (e.g. Ameral et al., 2014; Bernstein, Marshall et al., 2011; McHugh et al., 2011).

The second consideration of this study is given to cognitive tolerance tasks. These tasks employ a number of psychological approaches and can be used to assess the duration of time that an individual can tolerate a cognitive challenge. Here, cognitive performances are focused upon, whereas the attention of the physical approaches is given to the psychomotor and perceptual aspects (Hancock et al., 2007). Within these tasks, the current study will consider the Mirror-Tracing Persistence Task (MTPT-C; Strong et al., 2003). The MTPT is a computerised cognitive task that is commonly used as a measure of persistence when undertaking a frustrating task, whereby the participant traces complex geometric shapes via a mirror by tracing a dot along the lines of these shapes by using a computer mouse. Although previous work in this area has mostly targeted these tasks, concentration has been directed towards some of the specific facets of distress intolerance – such as negative emotion and frustration (e.g. Ameral et al.,

2014; Kiselica, Rojas, Bornovalova, & Dube, 2014; McHugh et al., 2011). Therefore, it is useful to compare the five facets of distress intolerance with this approach, through which an appreciation can be gained as to what extent the measurement of the five distress intolerance constructs converge or diverge in terms of their relationship with these measures.

The rationale for this study is that currently there is no information as to how the DIFF-S tool relates to the behavioural approaches. Gaining such information will help us understand to what extent the measure of the five facets of distress intolerance (together and separately) converge or diverge in terms of their relationship to the behavioural approaches of distress intolerance. In particular this study is interested in the measures that assess cognitive and physical distress intolerance. Accordingly, this study aims to investigate the relationship between the DIFF-S tool and two forms of the behavioural approaches: cognitive tolerance tasks (i.e. the Mirror-Tracing Persistence Task) and physical tolerance tasks (i.e. the Cold Pressor Task and Breath-Holding Test).

4.2: Method

Participants

Two samples of data were collected. Sample One was used for undertaking experiments as to the integration between the DIFF-S tool and the Mirror-Tracing Persistence Task, while Sample Two was used for undertaking experiments as to the relationships between the DIFF-S tool and two physical tasks (i.e. the Cold Pressor Task and Breath-Holding Test).

The first sample comprised 56 university student respondents (10 males, 46 females). The participants ranged in age between 18 and 21 years old ($M = 19.46$ years, $SD = 0.934$). In regard to race, the respondents were predominantly Caucasian (50%), with the next highest reported ethnicity being Black (23.2%) and South Asian (16.1%).

The second sample comprised 32 university student respondents (3 males, 29 females). The participants ranged in age between 18 and 32 years old ($M = 20.28$ years old, $SD = 2.88$). In regard to race, the respondents were mostly Caucasian (40.6 %), with the next highest reported ethnicity being Black (18.8 %) and East Asian (15.6 %).

Materials

The present study employed two different methods through which to investigate the association between the self-report measure and the lab-based tasks of distress intolerance. Sample One was given one set of measures including the DIFF-S tool and the Mirror-Tracing Persistence Task. Sample Two was given one set of measures including the DIFF-S tool, the Cold Pressor Task and Breath-Holding Test. Below, the measures used within both experiments are briefly outlined.

The Distress Intolerance Five Factor – Short (DIFF-S; Bebane et al., 2015) is a 20-item self-report measure, designed to assess the lack of ability of some individuals to withstand distress and to act in ways that will lead to an avoidance of distress. The DIFF-S tool can be used as a measure of both general distress intolerance and of the five facets of distress intolerance. This approach can therefore identify the general factors of distress intolerance while also recognising the multidimensionality of the five group factors: Intolerance of Uncertainty (e.g. “Uncertainty makes me vulnerable, unhappy, or sad”), Intolerance of Ambiguity (e.g. “It is more fun to tackle a complicated problem than to solve a simple one” (R¹)), intolerance of frustration (e.g. “i can’t bear it if other people stand in the way of what i want”), intolerance of negative emotion (e.g. “my feelings of distress are so intense that they completely take over”) and intolerance of physical discomfort (e.g. “I can tolerate a great deal of physical discomfort” (R)). Responses are scored on a five-point Likert scale, whereby 1 = Disagree Strongly, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree and 5 = Agree Strongly. The Cronbach’s alpha coefficient for the DIFF-S tool has been measured at $\alpha = 0.90$, while the five factors have been found to be as follows: intolerance of ambiguity ($\alpha = 0.83$), intolerance of uncertainty ($\alpha = 0.79$), intolerance of frustration ($\alpha = 0.82$), intolerance of negative emotion ($\alpha = 0.85$) and intolerance of physical discomfort ($\alpha = 0.77$) (Bebane et al., 2015).

The Mirror-Tracing Persistence Task (MTPT; Strong et al., 2003) is a computerised cognitive task that is commonly used as a measure of persistence when undertaking a frustrating task. Within this task, participants are required to trace complex geometric shapes via a mirror by using a computer mouse through three rounds of difficulty. The first two rounds take about 1 minute each, while the last round has a

¹ Reversed item

duration of approximately 7 minutes. Here, the participants have an option to finish the task at any point during the final round. Typically, distress intolerance will be assessed by the latency in the seconds to task termination. This version has a good degree of reliability, having been measured at $\alpha = 0.92$ (Brandon et al., 2003). Within this task, in order to assess the emotional impact of the behavioural measures, the participants are asked to rate their level of irritability, frustration, anxiety, difficulty in concentrating and discomfort on a scale of 0–100 both before and after completing the MTPT. This ensures that (a) the task has indeed induced distress and (b) the time it took to quit the task did not simply index a level of distress but rather highlights the participants' ability to tolerate it.

The Cold Pressor Task (CPT; Hines & Brown, 1932) is a technique designed to test thermal stress tolerance. As an experimental model for the induction of pain, it can be used to assess the ability of individuals to withstand painful bodily challenges. From the “Refrigerated Baths” approach developed by the Techne Company for commercial purposes, this study employed three different products to reduce the water temperature to 0–2 degrees Celsius; the first product was a plastic water Jugs (25-litre capacity), the second product was a digital thermometer while the third product was ice cube. The first step of this task is to chill the water in a plastic water Jugs to approximately 0–2 degrees Celsius. The second step sees the participant being guided to notify the examiner by ringing a bell when they begin to feel uncomfortable. The final step witnesses each participant being asked to submerge their left hand in the Jugs of chilled water. Within this task, an individual's pain threshold is determined by assessing the time it takes for a participant to indicate that they feel pain or discomfort. Distress intolerance is assessed by the duration between when the pain threshold is identified and when the participant takes their hand out of the water.

The Breath-Holding Test (BHT; Hajek et al. 1987) is a well-known strategy for eliciting the symptoms of physiological arousal and anxiety. It is used to measure the capacity of individuals to tolerate the holding of their breath. The first step of this strategy is the issuing of instructions, whereby the examiner conveys advice to the participant(s) as to: (a) how the challenge shall begin, (b) how they are to notify the examiner upon them feeling uncomfortable – that is, by pressing the button of a bell – and (c) how they are to finish the challenge. The second step sees the participant(s) being instructed to breathe normally for 30 seconds and then to completely exhale.

Following this, they are then required to inhale and hold their breath for as long as possible (Zvolensky, Feldner, Eifert, & Brown, 2001). The experimental challenge consists of asking participants to take a deep breath and to keep it held as long as possible. Distress intolerance is assessed by employing the index of minimum breath-holding duration.

Procedure

An electronic survey system was used to advertise for both experiments (in such a way that participants were able to gain knowledge as to the aim of the study and the experiments they would be involved in). Participants were then asked to complete a self-report measure before participating in the lab-based tasks. An HP Inspiron 2500 laptop computer with a 12-by-9 inch screen was used for administering the Mirror-Tracing Persistence Task. Both prior to and following this task, a manipulation check was used to measure the Mirror-Tracing Persistence Task's emotional impact upon five variables: irritability, frustration, anxiety, difficulty concentrating and discomfort. Moreover, before the Cold Pressor Task is undertaken, a modified form of the University of Leicester's "Medical History Form" was applied to ensure that data was collected solely from healthy participants. Additionally, both the oxygen and heart rate of each participant was measured before, during and after the Breath-Holding Test, undertaken by using a "Fingertip Pulse Oximeter SpO2 Blood Oxygen Saturate Heart Rate Monitor".

Ethical Consent

The experimental procedures for both experiments received ethical approval from the University of Leicester's Department of Neuroscience, Psychology & Behaviour Ethics Board. Furthermore, the participants all provided a consent form whereby they indicated their agreement to participate in the experiment prior to them being allowed to progress in the experiment. Should the consent form not be received from a respondent, they would not be able to progress any further in the experiment. In addition, before to fill the consent form, Sample Two participants were asked to fill a modified form of the University of Leicester's "Medical History Form" to ensure that

data was collected solely from healthy participants. Additionally, both the oxygen and heart rate of each participant was measured. The consent form contained statements and directions regarding the nature of the experiment, how the anonymity of the respondents would be protected in regard to the collected data, the ability of the participants to withdraw from the experiment both during and after their participation, how the data would be stored in a coded form, how the results of the experiment could be obtained if required and the intended use of the data, length of time the data would be stored for and the ultimate disposal of the data.

Statistical Analysis

This study employed paired-sample t-tests to evaluate the manipulation check as to the emotional impact of the Mirror-Tracing Persistence Task upon the five variables: irritability, frustration, anxiety, difficulty in concentrating and bodily discomfort. The zero-order correlations are used to examine the correlations between the variables. In addition, the effect sizes are measured by holding that a small size manifests as $r = 0.1$, a medium size as $r = 0.24$ and a large size as $r = 0.37$ (McGrath & Meyer, 2006).

4.3: Results

Manipulation Check of the Mirror-Tracing Persistence Task

A manipulation check was used to measure the emotional impact of the Mirror-Tracing Persistence Task upon the five variables: irritability, frustration, anxiety, difficulty in concentrating and discomfort, achieved by running paired-sample t-tests. Accordingly, the results reveal a significant increase in irritability where $t(55) = -8.042$, $p = 0.000$, in frustration where $t(55) = -10.227$, $p = 0.000$ and in anxiety where $t(55) = 2.323$, $p = 0.024$. However, no significant increases were found for the other two variables: difficulty in concentrating and bodily discomfort.

Correlation Between the DIFF-S and the Mirror-Tracing Persistence Task

Table 4.1 illustrates the mean scores, standard deviation and zero-order correlations between the DIFF-S and the Mirror-Tracing Persistence Task. All

significant correlations between the DIFF-S and the Mirror-Tracing Persistence Task are in bold. Accordingly, the results of the zero-order correlations between the DIFF-S and the Mirror-Tracing Persistence Task indicate that they share a significant negative association. Additionally, three facet scales within the DIFF-S tool share a significant negative association with the Mirror-Tracing Persistence Task. Furthermore, in terms of effect size, the zero-order correlations ($r = -0.25, -0.26, -0.24, -0.25$ respectively) suggest that these correlations are of a medium effect size.

Table 4.1

Mean Scores, Standard Deviation and Zero-Order Correlations Between the DIFF-S and Mirror-Tracing Persistence Task (N = 56).

	M(SD)	1	2	3	4	5	6	7
1. DIFF-S	57.13(8.69)	1	.778**	.514**	.537**	.688**	.572**	-.252*
2. Intolerance of Uncertainty	10.57(2.97)		1	.305*	.315**	.462**	.298*	-.167
3. Intolerance of Ambiguity	11.00(1.74)			1	-.103	.382**	.303*	-.260*
4. Intolerance of Frustration	14.20(2.92)				1	.301*	.033	.103
5. Intolerance of Negative Emotion	9.43(2.91)					1	.044	-.244*
6. Intolerance of Physical Discomfort	11.93(3.33)						1	-.250*
Behavioural Approaches								
7. Mirror-Tracing Persistence Task	269.68(294.82)							1

Note. DIFF-S = Distress Intolerance Five Factor-Short (Bebane et al., 2015); *M* = Mean; *SD* = Standard Deviation; ** $p < 0.01$; * $p < 0.05$.

Correlation Between the DIFF-S and the Cold Pressor Task

Table 4.2 illustrates the mean scores, standard deviation and zero-order correlations found between the DIFF-S and the Cold Pressor Task and the Breath-Holding Test. All significant correlations between the DIFF-S and the Cold Pressor Task and the Breath-Holding Test are in bold. Accordingly, the results of the zero-order correlations between the DIFF-S and the Cold Pressor Task indicate that they share significant negative associations. Additionally, three facet scales within the DIFF-S tool (i.e. the intolerance of uncertainty, intolerance of frustration and intolerance of physical discomfort scales) share significant negative associations with the Cold Pressor Task. In terms of effect size, the zero-order correlations ($r = 0.37, 0.36, 0.34, 0.30$ respectively) suggest that these correlations are of a medium to large effect size.

Correlation Between the DIFF-S and the Breath-Holding Test

The results of the zero-order correlation between the DIFF-S and the Breath-Holding Test indicate that, statistically, no significant correlations are noted between these measures of distress intolerance (see Table 4.2).

Table 4.2

Mean Scores, Standard Deviation and Zero-Order Correlations Between the DIFF-S, Mirror-Tracing Persistence Task and Breath Holding Test (N = 32)

	M(SD)	1	2	3	4	5	6	7	8
1. DIFF-S	60.06(7.67)	1	.675**	.366*	.777**	.686**	.678**	-.372*	-.002
2. Intolerance of Uncertainty	10.47(2.27)		1	.146	.300*	.409*	.297*	-.362*	-.029
3. Intolerance of Ambiguity	13.56(1.31)			1	.238	-.206	.517**	-.015	.154
4. Intolerance of Frustration	14.16(2.49)				1	.471**	.433**	-.342*	.063
5. Intolerance of Negative Emotion	9.34(3.11)					1	.138	-.142	-.114
6. Intolerance of Physical Discomfort	12.53(2.34)						1	-.308*	.019
Behavioural Approaches									
7. Cold Pressor Task	14.22(20.6)							1	.209
8. Breath-Holding Test	8.04(8.38)								1

Note. DIFF-S = Distress Intolerance Five Factor-Short (Bebane et al., 2015); *M* = Mean; *SD* = Standard Deviation; ** $p < 0.01$; * $p < 0.05$.

4.4: Discussion

The findings of this study highlight that the DIFF-S tool, which incorporates five replicable factors that measure ambiguity, uncertainty, frustration, negative emotion and physical discomfort (Bebane et al., 2015) interrelate with the Mirror-Tracing Persistence Task (as an approach within cognitive tolerance tasks) and the Cold Pressor Task (as an approach within physical tolerance tasks). This re-refines our understanding as to the interrelation between the self-report and behavioural approach methods of distress intolerance, given the fact that previous research has failed to find such an interrelation between these methods (e.g. Ameral et al., 2014; Bernstein, Marshall et al., 2011; Kiselica et al., 2014; McHugh et al., 2011). An explanation of the current findings relates to the DIFF-S tool having been designed to cover five facets of distress intolerance (including those facets that the behavioural approaches were devised to assess – such as physical discomfort and frustration). In contrast, previous research has mostly targeted those measures that assess specific aspects of the distress intolerance construct(s) in terms of their relationship with behavioural measures (e.g. Kiselica et al., 2014; McHugh et al., 2011).

In addition, the findings suggest that there are differential correlations across the five facet scales of the DIFF-S tool with the Mirror-Tracing Persistence Task and the Cold Pressor Task. For instance, the intolerance of physical discomfort scale tends to show a wide correlation with both the Cold Pressor Task and the Mirror-Tracing Persistence Task. The intolerance of frustration scale, on the other hand, fails to observe a significant correlation with the Mirror-Tracing Persistence Task. Given that each behavioural approach is designed to assess specific facets of distress intolerance, they can be expected to correlate with the pair scale implemented within the DIFF-S tool – such as the Cold Pressor Task and the intolerance of physical discomfort scale.

The findings of this study are able to refine our understanding as to the interrelation between both methods of distress intolerance. The study provides us with evidence in regard to the ability of the DIFF-S tool to identify the associations between these methods. Therefore, future work in this area is required to overcome the need to use measures that assess the specific aspects of distress intolerance in relation to the strategies employed in measuring the five aspects together (at least in terms of investigating the integration between these methods).

There are, however, limitations to our study. The first limitation in this regard relates to the sample used. This is because the study has relied upon unselected university students as the sample, so the sample is not representative of the general population. Therefore, the current findings regarding the DIFF-S relationship with behaviour approaches need to be replicated in subsequent research. This is particularly prudent when considering the association between the DIFF-S tool and the Breath-Holding Test, where different samples (in terms of size and population) should be explored. Secondly, although the present study has attempted to consider cognitive tolerance tasks (e.g. the Mirror-Tracing Persistence Task) and physical tolerance tasks including pain challenges (e.g. the Cold Pressor Task) and the biological measures (e.g. the Breath-Holding Test), some of the well-known tools in this area – such as the Algometer, Carbon Dioxide Test (CO₂; Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005) and Paced Auditory Serial Addition Test (PASAT-C; Lejuez, Kahler, & Brown, 2003) – are now well covered. Therefore, ambiguity exists in regard to the integration of the DIFF-S tool and these measures.

In summary, the main findings suggest that the DIFF-S tool demonstrates an association with the Mirror-Tracing Persistence Task and the Cold Pressor Task. However, no significant association is found with the Breath-Holding Test. Furthermore, there are differential aspects across the five facet scales of the DIFF-S tool in terms of their relationship with both the Mirror-Tracing Persistence Task and the Cold Pressor Task, but not with the Breath-Holding Test. Overall, the findings suggest that the DIFF-S tool can balance the benefits of the behavioural and self-report methods, thus making it able to replace the Cold Pressor Task and the Mirror-Tracing Persistence Task.

Chapter Five

Distress Intolerance and Personality: The Position of the Five Facets of Distress Intolerance Within the Extant Lexical and Biological Models of Personality

Abstract

Recent research has proposed that distress intolerance can be best considered as a composite variable comprising five facets (ambiguity, uncertainty, frustration, negative emotion and physical discomfort). The current study examines the relationship between a five-facet model of distress intolerance and the latent factors that emerge from the measures of the five-factor, Gray's bio-psychological and subcortical emotion models of personality. Here, 210 participants (35 males, 175 females) completed the Distress Intolerance Five Factor – Short, Ten-Item Personality Inventory, Behavioural Inhibition System and Behavioural Approach System scales and the Brief Affective Neuroscience Personality Scales. An exploratory factor analysis of the personality measures suggests five latent factors (which are similar to the five-factor model of personality), with this comprising neuroticism, extraversion, behavioural activation/openness to experience, agreeableness and conscientiousness. A neuroticism factor score was largely central in predicting unique variance in both general distress intolerance and the majority of the distress intolerance facets. Further distinctions were found for different personality dimensions (notably contrasting constructs representing low arousal and low appetitive motivation) predicting particular distress intolerance facets. Overall, the findings suggest that there are differential theoretical and empirical personality accounts of the five facets of distress intolerance, results that may prove useful for guiding future distress intolerance research.

5.1: Introduction

Distress intolerance, as a concept, is broadly defined as an inability of individuals to withstand physical, cognitive or emotional distress or ambiguity, with this having been linked to numerous personality variables. Generally, distress intolerance is considered to be a maladaptive expression of personality (e.g. Leyro, Zvolensky, & Bernstein, 2010; Norton & Mehta, 2007). These researches have focused primarily upon distress intolerance by considering this subject within the development and maintenance of several forms of psychopathology where there is an evident inability of individuals to cope with emotional distress or where such individuals demonstrate a preoccupation with cognitive and emotional avoidance, these traits being viewed as leading to general negative affectivity and greater mental anxiety (e.g. Ellis, 1994; Leyro et al., 2010). Therefore, when considering the five-factor model of personality (Costa & McCrae, 1992), this theoretical emphasis as to distress intolerance represents a lower-order factor of higher-order neuroticism (Norton & Mehta, 2007) or, alternatively, measures of distress intolerance (e.g. Intolerance of Negative Emotion, Intolerance of Physical Discomfort or Intolerance of Uncertainty) share a large effect size association with neuroticism (Berenbaum, Bredemeier, & Thompson, 2008; de Bruin, Rassin, & Muris, 2007; Fergus & Rowatt, 2014; Vossen, van Os, Hermens, & Lousberg, 2006).

However, research findings have also signalled other theoretical contexts within which distress intolerance can be considered. Those measures of distress intolerance that reflect intolerance of uncertainty have been found to share significant associations with lower levels of extraversion and a lower openness to experience being demonstrated (Berenbaum et al., 2008; Fergus & Rowatt, 2014). This suggests a further theoretical context through which distress intolerance can be considered. For example, the relationship between distress intolerance and low extraversion may represent inhibitory behaviours that are related to the conditioned avoidance of arousal states, the latter being part of the ascending reticular activating system (Eysenck, 1967). The relationship between distress intolerance and lower openness to experience being exhibited may be considered within the context of the authoritarian personality and, furthermore, the theory that a preference for conventional norms and the expression of certainty norms represents a defence mechanism of intrapsychic conflicts around personal uncertainty and insecurity (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950).

The reason for this disparate understanding of distress intolerance from a personality perspective arises from the recognition that there is an absence of a single context from which to assess and define distress intolerance. Recently, Zvolensky, Leyro, Bernstein, and Vujanovic (2010) have sought to address this disparateness within the distress intolerance literature by theoretically defining the five main components of distress intolerance, noting these to be: (a) intolerance of ambiguity – distress emerging from ambiguous life situations (Budner, 1962); (b) intolerance of uncertainty – distress as a response to personal uncertainty (Buhr & Dugas, 2002); (c) frustration intolerance – discomfort from the fact that things are not the way they should be (Harrington, 2005); (d) intolerance of negative emotion – the need to escape those states that involve unpleasant emotions (Simons & Gaher, 2005); and (e) intolerance of physical discomfort – an inability to tolerate uncomfortable physical sensations (Schmidt, Richey, & Fitzpatrick, 2006).

Bebane, Flowe, and Maltby (2015) followed this work by identifying five latent factors among five well-used distress intolerance scales and further introduced the Distress Intolerance Five Factor – Short Scale (DIFF-S), with this scale being mapped onto each of the proposed distress intolerance factors: ambiguity, uncertainty, frustration, negative emotion and physical discomfort. Furthermore, confirmatory factor analysis of the items of the scale suggest that a bifactor model of distress intolerance can best account for the variance between the items, with an equal split of variance explained between the general factor of distress intolerance and the five facets. Overall, it is suggested that the DIFF-S items can be used as both a measure of general distress intolerance and of the five separate facets.

In terms of distress intolerance and personality, the development of the DIFF-S provides an opportunity to assess how distress intolerance, both generally and as comprising the five main facets, is related to the major personality dimensions. Furthermore, as the majority of research examines the relationship between distress intolerance and the five-factor model of personality, an opportunity arises to expand this and thereby consider other major models of personality. This helps clarify some of the theoretical and empirical underpinnings of each of the five distress intolerance facets in terms of the pertinent trait personality theories, particularly given the range of theoretical perspectives through which researchers might consider distress intolerance. To this end, we propose three possible theories through which such a consideration of

the five distress intolerance constructs can be given: (a) the five-factor model of personality (McCrae & John, 1992), (b) Gray's bio-psychological model of personality (Gray & McNaughton, 2000), and (c) the subcortical emotion model (Panksepp, 1982, 2005).

The first consideration is how the five facets of distress intolerance map onto the broad dimensions of the five-factor model of personality (McCrae & John, 1992), a personality model that is informed by the lexical hypothesis. The five-factor model of personality has been the most used when researchers have previously considered the relationship between distress intolerance and personality. Here, research has tended to employ only one specific facet of distress intolerance when establishing those associations that correspond with personality – for example, emotional distress intolerance and neuroticism (Kaiser, Milich, Lynam, & Charnigo, 2012), uncertainty distress intolerance and extraversion (Fergus & Rowatt, 2014) and ambiguity distress intolerance and openness to experience (Bardi, Guerra, & Ramdeny, 2009). However, to date, no research has examined the relationship between the five facets of distress intolerance together and the five-factor model of personality. This research therefore considers how distress intolerance, as comprising five dimensions, both generally and separately, maps onto the five major personality dimensions, particularly in terms of: (a) higher neuroticism through general emotional psychopathology and anxiety (Ellis, 1994), (b) lower extraversion, through low arousal or arousal avoidance (Eysenck, 1967), (c) lower openness to experience, a preference for convention and certainty via the authoritarian personality dimension (Adorno et al., 1950), (d) lower agreeableness through avoidance of antagonistic interactions (e.g. Nock & Mendes, 2008), and (e) lower conscientiousness and low levels of goal-directed behaviour and achievement (e.g. Amstadter et al., 2012).

The second model of personality that is proposed as being able to explore the relationship between the five facets of distress intolerance and personality is Gray's bio-psychological model of personality (Gray & McNaughton, 2000). Within this model, personality comprises an account of neural systems with associated short-term emotions and behaviours alongside descriptions of longer-term traits that underpin emotion and behaviours (Corr & McNaughton, 2008). This model assumes three independent basic systems, comprising two systems involving inhibition and avoidance (the behavioural inhibition system and the fight-flight-freeze system) and one approach system (the

behavioural approach system). The rationale for linking distress intolerance to the bio-psychological model of personality is the emphasis given to avoidance and inhibition, with distress intolerance primarily being concerned with avoiding or fearing stimuli or situations (Kertz, Stevens, McHugh, & Björgvinsson, 2014; Leyro et al., 2010; McHugh, Hearon, Halperin, & Otto, 2011). Therefore, considering the five-facet model of distress intolerance within the bio-psychological model of personality will provide an account of how distress intolerance maps onto the approach and avoidance systems associated with biological and neural systems.

The third model of personality that is suggested as being able to explore the relationship between the five facets of distress intolerance and personality is the subcortical emotion model of personality (Panksepp, 1982, 2005). This model is a description of the human mind, with focus being given to six basic affective mechanisms that reflect distinct emotional systems that have evolved in the subcortical regions of a mammalian brain. Within this model, emphasis is placed on subcortical networks, rather than neocortical specialisation, in order to provide a biological model of human personality (Panksepp, 1982, 1998, 2005). This model hypothesises the existence of six traits that reflect distinct emotional systems (which represent pleasant and aversive feelings comprising seeking, playing, caring, fear, anger and sadness) (Panksepp, 1982). These systems can be activated by various classes of external environmental events – such as positive incentives (e.g. anticipation) for seeking and pain and threat of destruction (e.g. anxiety) for fear. Alternatively, such systems can represent internal states such as autonomic reafferences and homeostatic states of the body. Davis and Panksepp (2011) suggest that these systems interact to represent trait adaptations of thoughts, perceptions, feelings and behaviours around six affective mechanisms. The rationale for linking distress intolerance to this personality model pertains to the subcortical emotion model providing a cognate framework through which one can consider how distress intolerance represents different emotional systems (which represent pleasant and aversive feelings). Therefore, considering the five-facet model of distress intolerance within the subcortical emotion personality model can provide an account of how multiple dimensions of distress intolerance map onto the trait adaptations of affect.

Thus, the rationale for this study is that, to date, no knowledge has been gained as to how the five facets of distress intolerance (as measured by the DIFF-S), when

examined together, fit into wider personality constructs. Holding such knowledge will assist us in understanding to what extent these five facets of distress intolerance converge or diverge in terms of their relationship to the personality traits. In particular, we are interested in traits that reflect affect, arousal, activation and avoidance, thereby demonstrating key theoretical and empirical personality underpinnings of each of the distress intolerance facets. Accordingly, this study aims to investigate the relationship between distress intolerance and personality by examining the associations between the five-facet model of distress intolerance and three personality models: the five-factor model, Gray's bio-psychological model of personality and the subcortical emotion systems of personality.

5.2: Method

Participants

This study employed data from a sample of 210 participants (35 males, 175 females), comprising both undergraduates and postgraduates enrolled on psychology-related university courses and who were completing a course experiment participation scheme. The sample ranged in age from 17 to 37 years old ($M = 19.15$ years, $SD = 1.97$) and were predominantly Caucasian (55.9%), with the next highest reported ethnicity being Black (15.6%) and South Asian (14.7%).

Materials and Procedure

Participants were asked to complete a set of self-report measures using an online survey software system, with this including a distress intolerance measure and personality measures.

The Distress Intolerance Five Factor – Short (DIFF-S; Bebane et al., 2015) is a 20-item self-report measure, designed to assess the inability of individuals to withstand distress and to act in ways that will lead to the avoidance of distress. The DIFF-S can be used as both a measure of general distress intolerance and as a measure of the five facets of distress intolerance. This means that it reflects the identification of the general factor of distress intolerance while also recognising the multidimensionality of the five

group factors, namely: Intolerance of Ambiguity (e.g. “It is more fun to tackle a complicated problem than to solve a simple one” (R¹)), Intolerance of Uncertainty (e.g. “Uncertainty makes me vulnerable, unhappy, or sad”), intolerance of frustration (e.g. “i can’t bear it if other people stand in the way of what i want”), intolerance of negative emotion (e.g. “my feelings of distress are so intense that they completely take over”) and intolerance of physical discomfort (e.g. “I can tolerate a great deal of physical discomfort” (R)). Responses are scored on a 5-point Likert scale, whereby 1 = Disagree Strongly, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree and 5 = Agree Strongly. The Cronbach’s alpha coefficient for the DIFF-S has been found to be $\alpha = 0.90$. In terms of the five factors, the Cronbach’s alpha coefficients were found to be: intolerance of ambiguity ($\alpha = 0.83$), intolerance of uncertainty ($\alpha = 0.79$), intolerance of frustration ($\alpha = 0.82$), intolerance of negative emotion ($\alpha = 0.85$) and intolerance of physical discomfort ($\alpha = 0.77$) (Bebane et al., 2015). This scale was used to measure the five-facet model of distress intolerance.

The Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003) is a very brief measure of the big five personality domains. It contains a 10-item self-report measure that participants use to rate the extent to which each of the 10 pairs of traits applies to them. Within the TIPI, each of the big five dimensions is measured with two trait pairs. Responses are scored on a 7-point Likert scale ranging from 1 (Disagree strongly) to 7 (Agree strongly). This scale was used to measure the five-factor model of personality.

The Behavioural Inhibition System and Behavioural Approach System Scale (BIS/BAS; Carver & White, 1994) is a 24-item self-report measure (4 items are fillers) designed to assess Gray’s bio-psychological model of personality. It was designed to assess two general motivational systems that underlie the behaviour of individuals. The first of these systems is the BAS scale (13 items), which assesses an individual’s predisposition to approach appetitive stimuli. This scale has three subscales: reward responsiveness (5 items), drive (4 items) and fun seeking (4 items). The second of these systems is the BIS (7 items), which measures an individual’s predisposition to avoiding threatening or punishing stimuli. Later, Heym, Ferguson, and Lawrence (2008) suggested that the BIS scale can be separated between a fight-flight-freeze system

¹ Reversed item

(referred to as FFFS-Fear) scale (3 items) and a behavioural inhibition system (referred to as BIS-Anxiety) scale (4 items). Here, responses are scored on a 4-point Likert scale ranging from 1 (Very True for Me) to 4 (Very False for Me). Carver and White (1994) reported the Cronbach's alpha coefficients for the two subscales as being $\alpha = 0.74$ for the BIS while the BAS has three subscales measured at: BAS-reward responsiveness ($\alpha = 0.73$), the BAS-drive ($\alpha = 0.76$) and BAS-fun seeking ($\alpha = 0.66$). Furthermore, Heym et al. (2008) reported the Cronbach's alphas for the BIS-Anxiety and FFFS-Fear at $\alpha = 0.75, 0.73$ respectively.

The Brief Affective Neuroscience Personality Scale (BANPS; Barrett, Robins, & Janata, 2013) is a 33-item self-report measure, designed to assess the potential primary processes of the brain's emotional system in regard to the foundations of personality. This involves six subscales: Play (6 items), Anger (6 items), Seek (6 items), Care (4 items), Fear (5 items) and Sadness (6 items). Responses are scored on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The Cronbach's alpha coefficients have been identified as: Play ($\alpha = 0.68$), Seek ($\alpha = 0.55$), Care ($\alpha = 0.56$), Fear ($\alpha = 0.66$), Anger ($\alpha = 0.69$) and Sadness ($\alpha = 0.56$). This scale was used to measure the subcortical emotion systems of personality.

Ethical Consent

The data collection procedure has received ethical approval from the University of Leicester's Department of Neuroscience, Psychology & Behaviour Ethics Board. In addition, all of the respondents provided a respective consent form whereby they indicated their agreement to participate in the study. Should a respondent have failed to provide a consent form, they would not be able to proceed in the research.

The consent form contained statements and directions regarding the nature of the study, a declaration as to how the data collected would remain anonymous and the freedom of the participants to withdraw from the study at any point (both during and subsequent to their participation). Within this conveyed information, details were given as to how the data would be stored in a coded form, how the results of the study could be obtained if required, the intended use of the data, the duration the data would be stored for and the plans for the ultimate disposal of the data.

Statistical Analysis

Two main analyses were placed at the centre of the study. First, there is theoretical (Revelle, 1995) and empirical evidence (Maltby, Wood, Day, & Pinto, 2012) of an overlap between many of the main personality variables that are derived from the theories (e.g. neuroticism and the behavioural inhibition system). Therefore, it is prudent to examine the underlying latent factors of those variables that comprise these three personality theories so that we may produce the most parsimonious account possible of the relationship between distress intolerance and personality. The latent factors of the personality variables were explored using exploratory factor analysis. The decision as to the number of factors that were to be retained was considered using three methods: the K1 method (Kaiser, 1960), the Scree Test (Cattell, 1966) and through the use of parallel analysis (Horn, 1965). Proposed models were subjected to oblique (promax) rotation with delta set to 0. An oblique rotation was used as the factors were expected to be correlated. Meaningful loadings were assessed by considering the criteria of 0.32 loadings as poor, 0.45 loadings as fair, 0.55 loadings as good, 0.63 loadings as very good and 0.71 loadings as excellent (Comrey & Lee, 1992; Tabachnick & Fidell, 2007). In order to establish a parsimonious account of the latent factors that underpin the personality measures, this study sought to achieve a “simple structure” whereby items load strongly on one factor and weakly on the remaining factors. Here, the overall findings are theoretically consistent (Cattell, 1973). Factor scores were computed from the exploratory factor analysis to represent each latent factor.

Secondly, a series of multiple regressions were performed with each dimension of distress intolerance (general and the five facet scores), with these being used as dependent variables and the latent personality factor scores being used as the predictor variables. To judge the importance of these personality factor scores in predicting distress intolerance, this study also employed an effect size criteria for the multiple regression models, with $f^2 > 0.35$ representing a large effect size, $f^2 0.35 \leq f^2 \leq 0.15$ representing a moderate effect size and $0.02 \leq f^2 < 0.15$ representing a small effect size.

5.3: Results

Means (SD) and Internal Reliability Statistics

Table 5.1 illustrates the mean, standard deviation and Cronbach's alpha internal reliability statistics for all of the scales, where exceed the internal reliability criterion of $\alpha > 0.7$ as good (Kline, 2000), with exception of three scales (i.e., Intolerance of Ambiguity, Intolerance of Physical Discomfort, and Care). The computation of the reliability statistics for the Ten-Item Personality Inventory is not recommended due to 2-item pairs comprising the scales (Gosling et al., 2003).

Table 5.1

Alpha Coefficients, Means, and Standard Deviation for the Five-Facet Model of Distress Intolerance, Five Factor Model, Gray's Bio-Psychological Model and Subcortical Emotion Model of Personality.

	α	$M(SD)$
Five-Facet Model of Distress Intolerance		
1. DIFF-S	0.77	73.83(12.16)
2. Intolerance of Ambiguity	0.65	14.50(3.56)
3. Intolerance of Uncertainty	0.80	13.66(4.35)
4. Intolerance of Frustration	0.80	16.96(4.26)
5. Intolerance of Negative Emotion	0.85	12.55(5.23)
6. Intolerance of Physical Discomfort	0.62	16.17(3.93)
TIPI		
7. Neuroticism	N/A	7.30(2.90)
8. Extraversion	N/A	8.97(2.99)
9. Openness	N/A	10.05(2.23)
10. Agreeableness	N/A	9.92(2.26)
11. Conscientiousness	N/A	10.10(2.54)
Gray's Bio-Psychological Model of Personality		
12. BAS	0.83	40.43(4.95)
13. BIS	0.82	21.81(3.70)
14. BIS-Anxiety	0.76	13.05(2.26)
15. FFFS-Fear	0.71	8.76(1.87)
Subcortical Emotion Model of Personality		
16. Anger	0.79	16.97(4.64)
17. Fear	0.77	17.42(3.77)
18. Sadness	0.85	17.52(2.62)
19. Play	0.77	23.32(3.57)
20. Seek	0.75	18.64(2.47)
21. Care	0.69	12.78(2.31)

Note. DIFF-S = Distress Intolerance Five Factor – Short (Bebane et al., 2015); TIPI= Ten-Item Personality Inventory (Gosling et al., 2003); BAS = Behavioural Approach System (Carver & White, 1994); BIS = Behavioural Inhibition System (Carver & White, 1994); FFFS-Fear = Fight-Flight-Freeze System (Heym et al., 2008); M = Mean; SD = Standard Deviation; α = Alpha Coefficients

The Latent Factor Structure of the Personality Measures

The 16 personality measures were subjected to maximum likelihood extraction (Kaiser–Meyer–Olkin Measure of Sampling Adequacy = 0.74; Bartlett’s Test of Sphericity, $\chi^2 = 1051.78$, $df = 120$, $p < 0.001$). The results of the K1 method suggests a five-factor solution with the first five factors accounting for 22.15%, 17.01%, 11.37%, 7.77% and 6.79% of the variance, respectively. For the Scree Test, the results suggest a three-factor solution with the first three factors accounting for 22.15%, 17.01% and 11.37% of the variance, respectively. The results of the parallel analysis indicate that the 5th eigenvalues (3.54, 2.72, 1.82, 1.24 and 1.08) failed to exceed the 5th eigenvalue from the parallel analysis (1.50, 1.39, 1.31, 1.23 and 1.17), with this being calculated from 1000 generated datasets with 210 cases and 16 measures which suggests a four-factor solution.

Table 5.2 illustrates the pattern matrix for each possible rotated solution. Accordingly, the results suggest that five latent factors emerge from the 16 measures: (a) neuroticism loading alongside both behavioural inhibition systems and BANPS-fear, (b) openness to experience loading alongside the three behavioural approach systems and BANPS-seek, (c) extraversion, loading alongside the BANPS-play and low BANPS-sadness, (d), agreeableness loading alongside BANPS-care and lower BANPS-anger, and (e) conscientiousness. The factor scores were then computed for each of these factors. What can be concluded from this is that the results of the pattern matrix indicate that the five-factor solution demonstrates a simple structure as: (a) all items load strongly on one factor and (b) it demonstrates theoretical consistency with the wider literature, thus demonstrating high loadings on the separate factors of neuroticism, openness to experience, extraversion, agreeableness and conscientiousness that represent the dominant five-factor interpretation of personality found within the literature.

Table 5.2

The Pattern Matrix for the Three-Rotated Solution: K1, Scree Test and Parallel Analysis for the Five-Factor Model, Gray's Bio-Psychological Model and Subcortical Emotion Model.

	K1					Scree Test			Parallel Analysis			
	1	2	3	4	5	1	2	3	1	2	3	4
Five-Factor Model												
Neuroticism	.579	-.008	-.365	-.106	.237	.757	-.107	-.253	.704	-.157	-.202	.219
Extraversion	.003	-.025	.825	-.180	.108	-.182	.505	.087	-.213	.485	.092	.127
Openness	-.254	.711	-.213	.246	-.059	-.167	.503	.040	-.136	.522	.025	-.066
Agreeableness	.108	.020	-.161	.862	-.069	.178	-.069	.768	.166	-.085	.781	-.081
Conscientiousness	.093	.218	-.136	.218	-.848	-.193	-.046	.276	.043	.107	.185	-.822
Gray's Bio-Psychological Model												
BAS (Drive)	-.009	.790	-.021	-.273	-.222	-.071	.684	-.365	.029	.746	-.400	-.212
BAS (Fun Seeking)	-.163	.661	.200	-.100	.150	-.125	.762	-.177	-.142	.749	-.173	.150
BAS (Reward Responsiveness)	.417	.562	.320	-.045	-.217	.265	.737	.008	.348	.777	-.006	-.201
BIS (Anxiety)	.866	.033	.050	.072	-.187	.772	.136	.125	.830	.151	.139	-.180
FFFS (Fear)	.865	-.217	.095	.074	.067	.851	-.020	.140	.829	-.056	.186	.065
Subcortical Emotion Model												
Play	.065	.225	.652	.122	.259	.017	.681	.242	-.056	.627	.273	.264
Anger	.100	.164	-.054	-.764	.203	.155	.169	-.801	.136	.157	-.788	.202
Seek	-.123	.476	-.126	.075	.435	.118	.455	-.137	.012	.381	-.093	.413
Care	.190	.101	.165	.442	.397	.340	.315	.383	.216	.223	.443	.381
Fear	.870	-.071	-.109	-.032	-.087	.847	-.041	-.025	.879	-.041	.001	-.087
Sadness	.258	.156	-.658	-.086	.182	.504	-.184	-.355	.471	-.214	-.322	.158

Note. BAS = Behavioural Approach System, BIS = Behavioural Inhibition System, FFFS = Fight-Flight-Freeze System. Loadings above 0.32 (i.e. poor to excellent) for each factor are in bold.

Multiple Regression Analysis

The second step of the analysis was to determine how the factor scores, when computed for the five factors, predicted the overall scores on the distress intolerance measure and on each of the five facets of distress intolerance. Table 5.3 illustrates the results of the six multiple regression analysis series in which all of the regression models were significant for general distress intolerance ($R = 0.56$, $R^2 = 0.31$, $F = 18.72$, $p = 0.001$; $f^2 = 0.45$), for intolerance of uncertainty ($R = 0.53$, $R^2 = 0.28$, $F = 15.92$, $p = 0.001$; $f^2 = 0.39$), for intolerance of ambiguity ($R = 0.30$, $R^2 = 0.10$, $F = 4.29$, $p = 0.001$; $f^2 = 0.11$), for intolerance of frustration ($R = 0.30$, $R^2 = 0.09$, $F = 4.02$, $p = 0.002$; $f^2 = 0.10$), for intolerance of negative emotion ($R = 0.59$, $R^2 = 0.35$, $F = 21.99$, $p < 0.001$; $f^2 = 0.54$) and for intolerance of physical discomfort ($R = 0.23$, $R^2 = 0.06$, $F = 2.40$, $p = 0.038$; $f^2 = 0.06$). For these models, the variance of the predictors was of a large effect size for general distress intolerance, for intolerance of uncertainty and for intolerance of negative emotion, and of a small effect size for intolerance of ambiguity, intolerance of frustration and intolerance of physical discomfort. In terms of the unique variance accounted for by the latent factor score predictors of these six aspects of distress intolerance, higher neuroticism-behavioural inhibition and lower extraversion factor scores are paired in predicting higher levels of general distress intolerance, intolerance of uncertainty and intolerance of negative emotion. In addition, the lower agreeableness factor scores are found to predict intolerance of frustration, higher neuroticism, while lower openness-behavioural activation factor scores predict intolerance of ambiguity. Finally, the lower conscientiousness factor score predicts a higher intolerance of physical discomfort.

Table 5.3

Multiple Regression Analysis with the General and Five Facets of Distress Intolerance as Used as Dependent Variables and the Five Factors of Personality Used as Predictor Variables.

	General Distress Intolerance				Intolerance of Uncertainty				Intolerance of Ambiguity			
	<i>b</i>	β	<i>t</i>	<i>p</i>	<i>b</i>	β	<i>t</i>	<i>p</i>	<i>b</i>	β	<i>t</i>	<i>p</i>
Neuroticism/BIS	4.73	.389	6.33	.000	1.37	.32	5.03	.000	.520	.146	2.06	.040
Activation/Openness	-1.28	-.105	-1.66	.098	-.482	-.11	-1.70	.090	-1.02	-.287	-3.94	.000
Extraversion	-3.15	-.259	-3.91	.000	-1.38	-.31	-4.67	.000	.427	.120	1.57	.117
Agreeableness	-1.10	-.091	-1.50	.134	-.141	-.03	-.527	.599	-.353	-.099	-1.42	.154
Conscientiousness	.549	.045	.738	.461	.091	.021	.332	.740	-.201	-.056	-.802	.423
	Intolerance of Frustration				Intolerance of Negative Emotion				Intolerance of Physical Discomfort			
Neuroticism/BIS	.694	.163	2.299	.023	1.769	.338	5.651	.000	.369	.094	1.303	.194
Activation/Openness	.870	.204	2.789	.006	-.258	-.049	-.797	.427	-.386	-.098	-1.319	.189
Extraversion	-.256	-.060	-.787	.432	-1.876	-.358	-5.55	.000	-.066	-.017	-.215	.830
Agreeableness	-.640	-.150	-2.16	.032	-.312	-.060	-1.01	.311	.344	.087	1.239	.217
Conscientiousness	-.516	-.121	-1.71	.087	.561	.107	1.801	.073	-.614	.156	2.178	.031

Note. BIS = Behavioural Inhibition System, All significant multiple regression models are in bold

5.4: Discussion

The current findings suggest that five latent factors underpin the scales used to assess the five-factor, Gray's bio-psychological and the subcortical emotion models of personality. These latent factors largely map onto the five-factor model of personality, and, where there are overlaps, they are largely consistent in terms of theory. For example neuroticism and behavioural inhibition loading alongside one another represent the wider domain of anxiety or fear-based inhibition behaviours (Maltby et al., 2012; Revelle, 1995). The only unexpected finding in terms of earlier theoretical accounts relates to the loading of the openness to experience scale of the Ten-Item Personality Inventory alongside the three measures of behavioural activation. Here, it might be considered that extraversion is more closely aligned to behavioural activation in this context (Maltby et al., 2012). However, in his formulation of the behavioural activation system, Gray was keen to point out differences between behavioural activation and extraversion, particularly in terms of Eysenck's (1967) formulation of extraversion – that is, while extraversion may represent conditioned behavioural traits in terms of arousal seeking, behavioural activation represents goal-directed, reward-based physiological responses of appetitive motivation to pursue and achieve goals (Gray, 1981, 1982). Therefore, the current findings suggest, in this sample at least, that congruence exists between appetitive motivation around goals (behavioural activation; Gable, Reis, & Elliot, 2000) and a preference for variety, novelty and curiosity (openness to experience; Costa & McCrae, 1992).

Subsequently, these five latent factors are useful in describing differences in terms of the key theoretical and empirical personality underpinnings of overall distress intolerance and each of the distress intolerance facets. The findings suggest that overall distress intolerance, when described in personality terms, is best accounted for as a combination of higher neuroticism (representing general psychopathology and general negative affectivity; Leyro et al., 2010) and lower extraversion (best considered as reflecting lower levels of need for arousal; Eysenck, 1967). This theoretical description is then echoed for two of the distress intolerance facets: Intolerance of Uncertainty and Intolerance of Negative Emotion.

In terms of the other distress intolerance facets, our aforementioned distinction between extraversion and behavioural activation/openness is very useful in drawing a

theoretical distinction between intolerance of ambiguity and intolerance of frustration. Here, in addition to neuroticism, lower behavioural activation/openness to experience (rather than low levels of extraversion/arousal) predicts the distress intolerance facets of ambiguity and frustration, which may be understood in terms of lower levels of appetitive motivation to pursue and achieve goal-related experiences (Costa & McCrae, 1992; Gray, 1981, 1982). This provides a dynamic theoretical comparison between these sets of distress intolerance facets, with a low arousal context for describing intolerance of uncertainty and intolerance of negative emotion, and a low appetitive motivation to describe intolerance of ambiguity and intolerance of frustration. Furthermore, low agreeableness also predicts unique variance in terms of intolerance of frustration, with this suggesting that traits such as being unkind, unempathetic and uncooperative (Costa & McCrae, 1992) may define some aspects of intolerance of frustration, perhaps reflecting a theoretical context (such as the frustration–aggression hypothesis in which aggression emerges as a result of failure to obtain particular goals) (Dollard, Doob, Miller, Mowrer, & Sears, 1939). Finally, the intolerance of physical discomfort was the only facet of distress intolerance in which the neuroticism factor score did not predict unique variance. Although neuroticism is a risk factor in increasing sensitivity to physical discomfort (Denissen & Penke 2008), the development of intolerance of physical discomfort depends upon psychological indices and, furthermore, uncomfortable body sensations are not necessarily painful (Leyro et al., 2010; Schmidt & Lerew, 1998). This facet may be better understood in terms of low levels of conscientiousness. This suggests that personality traits such as low levels of self-discipline, goal pursuit, organisation and working hard are associated with higher levels of intolerance of physical discomfort. This fits within the wider theoretical context that low conscientiousness will demonstrate less motivation or impulse control in response to disturbance (Costa & McCrae, 1992; Roberts, Jackson, Fayard, Edmonds, & Meints, 2009).

Overall, the findings suggest that it can readily consider the five facets of distress intolerance (together and separately) with three extant personality theories, but different dynamics emerge for the five facets of distress intolerance in terms of how each can be considered within personality theory. However, there are limitations to current findings. The first is that the effect size of the regression models for personality predicting distress intolerance differ, with large effect sizes being found for overall

distress intolerance, intolerance of uncertainty and intolerance of negative emotion, and small effect sizes being found for intolerance of ambiguity, intolerance of frustration and intolerance of physical discomfort. Therefore, the importance of personality models in explaining variance in distress intolerance potentially varies across the respective facets of distress intolerance. Secondly, the sample is based upon an undergraduate sample, and therefore the findings of the latent factor structure of the personality measures require replication. This is particularly prudent given the finding that behavioural activation and openness to experience load on the same factor and, while this makes theoretical sense in terms of an appetitive motivation to pursue and achieve goal-related experiences (Costa & McCrae, 1992; Gray 1981, 1982), this does contrast with previous findings (Maltby et al., 2012). Therefore, this finding is worthy of further consideration, not least because of its contribution to making a theoretical distinction between the different facets of distress intolerance.

In summary, the main findings that have emerged suggest that although there is an emphasis on neuroticism in predicting general distress intolerance and the majority of the distress intolerance facets, there are differential aspects of personality that inform our understanding of distress intolerance across the dimensions. Moreover, some facets would appear to be explained by trait personality theories, but some more than others. Overall, the findings suggest that there are both dynamic and useful theoretical and empirical accounts in terms of the five facets of distress intolerance that demonstrate convergence or divergence with respective personality traits.

Chapter Six

Distress Intolerance and Executive Functions: Exploring the Theoretical and Empirical Accounts of the Five Facets of Distress Intolerance Within the Executive Functions

Abstract

The distress intolerance construct(s) are suggested to be influenced by cognitive processes. However, limited research has been conducted as to the effects of cognitive processes in the internal structure of the five facets of distress intolerance. This study aims to investigate the associations that exist between the five-facet model of distress intolerance and the three executive functions of attentional networks, directed attention and working memory, exploring this via a sample of university students ($n = 65$). The findings suggest that there is no association between general distress intolerance and either attentional networks, directed attention or working memory. However, in terms of the five facets of distress intolerance, the involvement of attentional networks and directed attention was found with the differential aspects across the five facets of distress intolerance. Intolerance of uncertainty was found to be negatively associated with the alerting network. Both the intolerance of ambiguity and intolerance of negative emotion facets are negatively correlated with the orienting network. Intolerance of frustration has been found to be negatively associated with the executive control network. Intolerance of frustration is negatively associated with directed attention. Overall, the findings suggest that there are some useful theoretical and empirical accounts in terms of the five facets of distress intolerance, namely in them demonstrating convergence or divergence in their relationship with the executive functions.

6.1: Introduction

The last few decades have seen increased interest being given to the effectiveness of cognitive processes on distress intolerance or the inability of individuals to tolerate or behave appropriately in situations that involve ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort. Various theoretical perspectives have been used in relation to the involvement of some cognitive processes in the structure of distress intolerance. One of these perspectives holds that distress intolerance is a function of automatic (e.g. unconscious) and effortful (e.g. voluntary) actions (e.g. Zvolensky, Leyro, Bernstein, & Vujanovic, 2011). Another perspective assumes that distress intolerance is a result of the integration of cognitive and physical processes that manifest in an emotional state (Simons & Gaher, 2005).

However, this theoretical attention is not paralleled by empirical evidence, primarily due to the lack of empirical research that has focused upon the investigation of the influence of cognitive processes on distress intolerance. Although previous research has suggested that there is an involvement of cognitive processes within the structure of some distress intolerance facets – such as Intolerance of Ambiguity (Frenkel-Brunswik, 1949), Intolerance of Uncertainty (Dugas, Gagnon, Ladouceur, & Freeston, 1998; Grenier, Barrette, Ladouceur, 2005) and Intolerance of Negative Emotion (Simons & Gaher, 2005), further examination is needed but in a more systematic manner than has previously been observed. This can be achieved by considering the different facets of distress intolerance (together and separately) in a coherent and unfragmented manner.

Therefore, increasing focus must be given to evaluating the effectiveness of cognitive processes across the different facets of distress intolerance (together and separately). In order to address the fragmentation that has arisen across the different conceptualisations of distress intolerance, the present study seeks to employ the Distress Intolerance Five Factor – Short (DIFF-S; Bebane, Flowe, & Maltby, 2015) tool, which comprises measures of ambiguity, uncertainty, frustration, negative emotion and physical discomfort, noting that this can be used as both a measure of general distress intolerance and of the five facets of distress intolerance. Therefore, employing the DIFF-S tool can provide further evidence as to the involvement of cognitive processes within the different facets of distress intolerance (together and separately) and can

address the overriding issue of fragmentation across the discussions of distress intolerance facets within the pertinent literature.

In addition, to date, no knowledge has been gained as to how the measurement of these five facets of distress intolerance respond to the cognitive processes. Within the available literature, the constructs of distress intolerance have primarily been focused upon in regard to the pertinent cognitive processes. As a result, limited research has been conducted as to the association(s) between distress intolerance and the major cognitive processes. The consideration of the DIFF-S tool therefore provides an opportunity to assess how general distress intolerance can be measured and how the five facets of distress intolerance are related to the cognitive functions. Such an understanding assists in clarifying the theoretical and empirical underpinnings relevant to each of the five distress intolerance constructs within the five-facet model of distress intolerance in terms of its cognitive processes. Accordingly, this study seeks to identify the executive functions of three cognitive processes.

The first consideration here is given towards the three attentional networks within the attentional networks model (Posner & Petersen, 1990; Posner, 1994, 2008), a result of the unique roles they play within the various mental processes. This model suggests three relatively independent neural networks as being responsible for controlling the different attentional functions (Posner & Petersen, 1990). The first, the orienting network, is responsible for managing the capacity of individuals to focus on and select the to-be-attended-to stimulus (Federico, Marotta, Adriani, Maccari, & Casagrande, 2013). The second neural network, executive control, is responsible for the capacity of individuals to manage their behaviour in resolving conflict among alternative responses (Federico et al., 2013). The third neural network, the alerting network, is responsible for an individual's capacity to keep a state of sensitivity in regard to incoming stimuli (Federico et al., 2013). While these networks can provide further support to the arguments set out in some of the theoretical and empirical underpinnings of each of the five distress intolerance constructs, their associations with these constructs are poorly understood. It is expected that in comparing the different facets of distress intolerance with the attentional networks model, a greater understanding will be gained as to how the five facets of distress intolerance might relate to the attentional functions. This is important due to such findings being able to

point to how the involvement of these networks impacts upon an individual's ability to tolerate or behave appropriately in aversive states.

The second consideration pertains to directed attention within “attention restoration theory” (ART; Kaplan, 1995). Directed attention is an alternative name for “voluntary attention” (Kaplan & Berman, 2010), which was used by William James (1892). This relates to the ability of individuals to control their attention, behaviour, thoughts and/or emotions (Kaplan, 1995). This ability allows individuals to inhibit internal predispositions or external lures in regard to doing what is most appropriate in a given situation (Diamond, 2013; Murray & Wojciulik, 2004; Posner, Snyder, & Davidson, 1980). It should be noted that this mental resource is scarce and finite and, if used for an extended period of time, can result in a condition termed “directed attention fatigue” (DAF). DAF may be experienced by an individual after or during a prolonged period of attentional activity (Boksem, Meijman, & Lorist, 2005). Such a condition may lead to a decrease in the mental effectiveness of an individual, an occurrence which would consequently make the consideration of abstract concepts and long-term goals difficult. In addition, such fatigue leads to: (a) distractibility that allows the immediate environment to have a greatly magnified effect upon decision making, (b) irritability, (c) impatience, and (d) a cumulative loss of effectiveness in thinking. Therefore, giving consideration to this cognitive ability is a step forward as, to date, no study has targeted this area in relation to the distress intolerance construct(s). Furthermore, in comparing different distress intolerance constructs with the theory of attention restoration, a comprehensive understanding can be gained as to how the five facets of distress intolerance might relate to the focus given towards the managing of goals, particularly in terms of inhibition. Additionally, this is also important due to it assisting us in understanding the role of DAF in frustrating situations, a result of the coping mechanisms employed in such states depending upon the employment of a good management strategy being given to thoughts (whereby options are inhibited and focus is given to alternative choices).

The third consideration to be given here relates to the working memory model (Baddeley & Hitch, 1974). In this sense, working memory refers to the “temporary storage and manipulation of information” (Logie, 1995, p. 64), which holds specific systems for different types of information. The central executive is a main part of working memory as it allocates data to the phonological loop and the visuo-spatial

sketch pad while also managing cognitive tasks (such as problem solving). This function is also responsible for (a) updating functions, which refers to modifying the content of working memory in accordance with incoming stimulus; (b) evoking inhibition, which represents the restriction of access to goal-irrelevant information, strong but inappropriate responses to the given situation and no-longer-relevant information (Collette & Linden, 2002); (c) shifting processes that assist in instigating efficient reactions to the given stimulations of that environment, whereby rapid and frequent shifts between the different aspects of the stimuli need to be processed among several cognitive operations; and (d) ensuring dual-task coordination is implemented (Collette & Linden, 2002). Although understanding the association(s) between working memory and distress intolerance could demonstrate a number of key theoretical and empirical underpinnings of some domains of distress intolerance, this area remains poorly understood.

Thus the rationale for this study is that currently there is no information as to how the five facets of distress intolerance (as measured by the DIFF-S), when examined together, fit into three executive functions: attentional networks, directed attention and working memory. This will help us understand to what extent these five facets of distress intolerance converge or diverge in terms of their relationship to three major executive functions. In particular, the current study is interested in cognitive controls that are responsible for controlling oversensitivity being given towards uncertain incoming stimuli, directing attention properly, resolving conflict and choosing the most appropriate course of action among alternative responses. Such cognitive controls also relate to the inhibitory control of attention, cognitive inhibition and self-control. Therefore, this study aims to investigate the correlations that arise between the five-facet model of distress intolerance and the executive functions. This is to be achieved by examining the association between the five-facet model of distress intolerance (as assessed by the DIFF-S tool) and three executive functions: attentional networks, directed attention and working memory.

6.2: Method

Participants

This study employed data from a sample comprising 65 university student respondents (13 males, 52 females). The sample ranged in age between 18 and 40 years old ($M = 20.97$ years, $SD = 4.87$).

Materials

Participants were asked to complete a self-report measure before being invited to participate in a number of lab-based tasks. Below, a brief overview of the measures that were used within this study is provided.

The Distress Intolerance Five Factor – Short (DIFF-S; Bebane et al., 2015) is a 20-item self-report measure, designed to assess the lack of ability of individuals to withstand distress and to act in ways that will lead to an avoidance of distress. The DIFF-S tool can be used as both a measure of general distress intolerance and of the five facets of distress intolerance. This allows the DIFF-S to identify the general factors of distress intolerance while also recognising the multidimensionality of the five group factors, which comprise intolerance of uncertainty (e.g. “uncertainty makes me vulnerable, unhappy, or sad”), intolerance of ambiguity (e.g. “it is more fun to tackle a complicated problem than to solve a simple one” (R^1)), intolerance of frustration (e.g. “i can’t bear it if other people stand in the way of what i want”), intolerance of negative emotion (e.g. “my feelings of distress are so intense that they completely take over”) and intolerance of physical discomfort (e.g. “I can tolerate a great deal of physical discomfort” (R)). Here, responses are scored on a 5-point Likert scale, whereby 1 = Disagree Strongly, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree and 5 = Agree Strongly. The Cronbach’s alpha coefficient for the DIFF-S tool has been measured at $\alpha = 0.90$, while the levels of the five factors have been noted as: intolerance of ambiguity ($\alpha = 0.83$), intolerance of uncertainty ($\alpha = 0.79$), intolerance of frustration ($\alpha = 0.82$), intolerance of negative emotion ($\alpha = 0.85$) and intolerance of physical discomfort ($\alpha = 0.77$) (Bebane et al., 2015).

¹ Reversed item

The Attention Network Test (ANT; Mueller, 2012) is a computerised paradigm, designed to assess three types of attentional network: alerting, orienting and executive control. It comprises a number of trials. Here, each trial begins with a central fixation point of variable duration (400ms to 1,600ms), with each fixation point being followed by one of four cue conditions: (a) a centre cue, (b) a double cue, (c) a spatial cue or (d) no cue. Cues are presented for 100ms and consist of asterisks that are equally likely to appear at a fixation point (centre cue), both above and below a fixation point (double cue), in the same location as the upcoming target (spatial cue) or not at all. A target display appears 400ms after the offset of the cue. The target display is equally likely to appear above or below a fixation point. Each target display contains a central arrow to which participants respond by using the keyboard to indicate the direction in which the arrow is pointing. The target display also contains one of three types of flanker on either side of the central arrow (two flankers per side). In congruent trials, the flankers manifest as arrows pointing in the same direction as the central arrow while, in incongruent trials, the flankers manifest as arrows pointing in the opposite direction to the central arrow. Finally, in neutral trials, the flankers are either dashes or entirely absent. Each flanker type is equally likely. The target display remains on the screen until either a response is made or 1,700ms elapse. The final outcome of this task indicates the individual differences among the three types of attentional network.

The Stroop Test (Mueller, 2012) is a computerised version of the Stroop test as developed by Stroop (1935) to assess the Stroop effect – this being a test of interference in the reaction time of a task or, alternatively, a method that is able to demonstrate the attentional vitality and mental flexibility of an individual. Within this version, participants will use numbered keys (1, 2, 3 and 4) on a keyboard, which are mapped onto different colours (red, green, yellow and blue). Furthermore, the colour-to-key mapping will be displayed at the bottom of the screen throughout all of the trials and are randomised across the participants (i.e. 1, 2, 3 and 4 are randomly associated with red, blue, yellow and green). The colour-to-key mapping is consistent and comprises three trials presented in the same order to all participants (D, W and C). In Trial D, participants are required to identify the colours of the dots (red, green, yellow and blue). Trial W requires the participants to name the colours from a list of non-colour words (“hard”, “when”, “over” and “and”). In Trial C, colour words (“red”, “green” and “blue”) are presented in colours that do not respond to the printed word (e.g. the word

“red” may be presented in a green font). In all trials, the items are presented in a 6x4 rectangular array and are evenly distributed spatially. Participants are asked to key in their responses, working sequentially from left to right, as quickly as possible while being careful not to make any errors. A high Stroop effect score is indicative of high individual attentional vitality and mental flexibility.

The Corsi Block Tapping Test (Mueller, 2012) is a computerised test, as originally developed by Philip Corsi (1972), which has been utilised as a measure of working memory in both clinical and experimental contexts for several decades. This version contains up to nine identical spatially separated blocks. The sequence starts out simply, usually using two blocks, but becomes more complex until the subject's performance suffers. Participants need to use a computer mouse to click blocks, one after another, starting with two blocks. Here, the participants are required to tap the same two blocks in the same order. A high total score is indicative of a high ability in regard to temporarily storing and manipulating information.

Procedure

An electronic survey system was used to advertise this study, designed in such a way as to allow potential participants to possess knowledge as to the aims of the study and the experimental techniques they would be involved in. The computerised tests were administered on two HP Inspiron 2500 laptop computers, each equipped with a 12x9 inch screen. The Stroop effect was calculated based on subtracting the response time (RT incongruent) from the response time (RT neutral). In measuring working memory, two different scores were considered for each participant. The first of these was the “block span”, which refers to the length of the last correctly repeated sequence. The second score that was considered was the “total score” (representing the product of the block span) and the number of correctly repeated sequences until the test was discontinued (i.e. the number of correct trials) (Kessels, van Zandvoort, Postma, Kappelle, & de Haan, 2000).

Ethical Consent

Prior to the active research being undertaken, the data collection procedure received ethical approval from the University of Leicester's Department of Neuroscience, Psychology & Behaviour Ethics Board. Prior to the data collection, the respondents were required to provide a consent form, whereby they indicated their agreement to participate in the study. Should the consent form not be provided to the researcher, the respondent would not be able to participate in the study. The consent form contained statements and directions as to the nature of the study, how the data collected would maintain the anonymity of the respondent, the ability of the respondent to withdraw from the study both during and after their participation, how the data would be stored in a coded form, how to obtain the results of the study if this was required and the plans held as to the intended use, length of storage and ultimate disposal of the data.

Statistical Analysis

This study employed different statistical tests. The independent-samples t-tests have been used to examine the variance between males and females in regard to the distress intolerance construct(s). The zero-order correlations were here used to examine the role that age plays in distress intolerance as well as in examining the correlations that arose between the variables. In addition, the effect sizes are measured by holding that a small size manifests as $r = 0.1$, a medium size as $r = 0.24$ and a large size as $r = 0.37$ (McGrath & Meyer, 2006).

6.3: Results

Preliminary Analysis

The findings of the independent-samples t-tests indicate that there are no significant gender differences in regard to distress intolerance, nor between any of the five facets of distress intolerance. It was found, however, that increased age significantly relates to both general distress intolerance $r(65) = -0.220, p = 0.039$ and the five facets of distress intolerance – whereby the findings suggest that increased age significantly relates to intolerance of frustration $r(65) = -0.359, p = 0.002$ and intolerance of negative emotion $r(256) = -0.237, p = 0.029$.

Correlation Between Distress Intolerance and Attentional Networks

Table 6.1 illustrates the mean scores and standard deviation for all of the variables and zero-order correlations that arise between the DIFF-S tool and the Attention Network Test. All significant correlations between the DIFF-S and the Attentional Networks Task are in bold. The findings indicate that no significant correlation can be found between general distress intolerance and any of the attentional networks. However, the findings reveal that there are differential aspects across the five facets of distress intolerance in terms of their associations with the three attentional networks. This is discussed in more detail below.

Alerting Network and Distress Intolerance

The findings as to the correlations between the five facets of distress intolerance and the alerting network indicate that intolerance of uncertainty shares a significant negative association with the alerting network (see Table 6.1). In terms of effect size, this correlation ($r = 0.25$) was found to be of a medium effect size. The other four facets (i.e., ambiguity, frustration, negative emotion and physical discomfort) failed to observe a significant association with this network.

Orienting Network and Distress Intolerance

The findings reveal that the orienting network shares a significant negative association with two facets of distress intolerance: intolerance of ambiguity and intolerance of negative emotion (see Table 6.1). Nonetheless, no significant association was observed between the orienting network and three facets of distress intolerance (i.e. uncertainty, frustration and physical discomfort).

Executive Control Network and Distress Intolerance

The results indicate that the executive control network shares a significant negative association with intolerance of frustration (see Table 6.1), yet fails to observe a significant correlation with the other four facets of distress intolerance.

Table 6.1

Mean scores, Standard Deviation and Zero-Order Correlations Between the DIFF-S and the Attentional Networks Task (N = 65).

	M(SD)	1	2	3	4	5	6	7	8	9
Distress Intolerance										
1. DIFF-S	56.52(10.10)	1	.301**	.740**	.383**	.740**	.569**	.100	-.164	.044
2. Intolerance of Ambiguity	7.91(3.18)		1	.259*	-.249*	.056	-.135	-.001	-.213*	.110
3. Intolerance of Uncertainty	11.09(3.27)			1	.066	.516**	.237*	-.257*	-.071	.098
4. Intolerance of Frustration	13.71(2.78)				1	.261*	.129	-.073	-.117	-.222*
5. Intolerance of Negative Emotion	11.17(4.28)					1	.146	-.109	-.210*	-.057
6. Intolerance of Physical Discomfort	12.65(4.44)						1	.194	.110	.141
Attentional Networks										
7. Alerting Network	52.90(31.34)							1	.243*	.099
8. Orienting Network	21.66(27.26)								1	-.152
9. Executive Control Network	106.65(56.1)									1

Note. DIFF-S = *Distress Intolerance Five Factor – Short* (Bebane et al., 2015); *M* = Mean; *SD* = Standard Deviation; ** $p < 0.01$; * $p < 0.05$.

Correlations Between Distress Intolerance and Directed Attention

Table 6.2 illustrates the mean scores, standard deviation and zero-order correlations found between the DIFF-S tool, the Stroop Test and the Corsi Block Tapping Test. The significant correlation between the DIFF-S and the Stroop Test is in bold. Accordingly, the findings reveal that no significant correlation is observed between general distress intolerance and directed attention. Furthermore, in terms of the five facets of distress intolerance, the findings indicate that intolerance of frustration shares a significant negative association with directed attention. The correlation of $r = 0.25$ is held to be of a medium effect size.

Correlations Between Distress Intolerance and Working Memory

The findings of the correlations between distress intolerance and working memory, as assessed by the Corsi Block Tapping Test, indicate that no significant correlation is observed between working memory and general distress intolerance, nor between any of the five facets of distress intolerance (see Table 6.2).

Table 6.2
Mean Scores, Standard Deviation and Zero-Order Correlations Between Distress Intolerance Five Factor-Short, the Stroop Test and the Corsi Block Tapping Test (N = 65).

	<i>M(SD)</i>	1	2	3	4	5	6	7	8	9
Distress Intolerance										
1. DIFF-S	56.52(10.10)	1	.301**	.740**	.383**	.740**	.569**	-.060	-.012	-.043
2. Intolerance of Ambiguity	7.91(3.18)		1	.259*	-.249*	.056	-.135	.110	-.071	-.071
3. Intolerance of Uncertainty	11.09(3.27)			1	.066	.516**	.237*	-.109	.055	.048
4. Intolerance of Frustration	13.71(2.78)				1	.261*	.129	-.256*	.048	.020
5. Intolerance of Negative Emotion	11.17(4.28)					1	.146	-.006	-.043	-.062
6. Intolerance of Physical Discomfort	12.65(4.44)						1	.026	-.002	-.032
Directed Attention										
7. Stroop Effect	89.68(80.57)							1	-.194	-.207*
Working Memory										
8. Block Span	6.18(1.34)								1	.955**
9. Total Score	56.60(22.42)									1

Note. DIFF-S = Distress Intolerance Five Factor – Short (Bebane et al., 2015); Stroop Effect = RT Incongruent - RT Neutral; Block Span = refers to the length of the last correctly repeated sequence; Total Score = the number of correct trials; *M* = Mean; *SD* = Standard Deviation; ** $p < 0.01$; * $p < 0.05$.

6.4: Discussion

The findings of this study suggest that, statistically, general distress intolerance fails to observe a significant association with attentional networks, directed attention or working memory. However, in terms of the five facets of distress intolerance, the findings suggest that there are differential aspects across the five facets in terms of their respective relationships with the attentional networks and directed attention. This is consistent with previous research as to the involvement of cognitive processes in the structure of some distress intolerance facets – such as intolerance of ambiguity (Frenkel-Brunswik, 1949), intolerance of uncertainty (Dugas et al., 1998; Grenier et al., 2005) and intolerance of negative emotion (Simons & Gaher, 2005). The unexpected finding here is the negative association identified between working memory and the distress intolerance construct(s). This cognitive process is responsible (via the central executive) for the shifting process that assists in evoking efficient reactions among individuals towards the stimulations of the surrounding environment (Collette & Linden, 2002).

The overall findings suggest that attentional networks provide some useful theoretical and empirical underpinnings for the five facets of distress intolerance. In particular, the results highlight the possible involvement of attentional functions on the capacity of individuals to withstand or behave appropriately in aversive states, situations that involve tolerating the personal threat that arises in uncertain or ambiguous contexts. Instead, in such moments, individuals encounter a desperate need to escape those states that invoke unpleasant emotions or frustrating conditions. For instance, it has been found that lowering the alerting network of an individual is associated with intolerance of uncertainty. Given that this network is assumed to be involved in the capacity of individuals to maintain a state of sensitivity towards incoming stimuli (Federico et al., 2013), lowering the level of this capacity could increase the state of sensitivity held in relation to the incoming stimuli. Therefore, oversensitivity towards uncertain incoming stimuli could explain why some individuals consider uncertain situations to be personal threats and thereby demonstrate an intolerance of uncertainty (Dugas et al., 1998). Furthermore, the lowering of the orienting network is able to interact with two facets of distress intolerance: intolerance of ambiguity and intolerance of negative emotion. This network is assumed to be involved with managing the ability of individuals to focus or select specific attended

stimuli (Federico et al., 2013; Raz & Buhle, 2006). Therefore, lowering the orienting network could decrease the ability of an individual in terms of dealing with ambiguous or unpleasant incoming stimuli. The final aspect that has been highlighted from the findings relates to intolerance of frustration or the desperate need to escape from states that involve frustrating conditions (Harrington, 2005), with this being found to correlate with lower levels of the executive control network, the latter assuming responsibility for the managing of behaviour towards resolving conflict and choosing the most appropriate course of action among alternative responses (Federico et al., 2013). From this, it can be concluded that individuals who possess an intolerance of frustration are unable to deal with states that involve different options due to their inability to withstand unexpected events (Froggatt, 2005).

In terms of directed attention and the five facets of distress intolerance, the findings suggest that intolerance of frustration best accounts for lower directed attention as a combination of lower inhibitory control of attention, cognitive inhibition and self-control (Boksem et al., 2005; Diamond, 2013; Murray & Wojciulik, 2004; Posner & Snyder, 1980). Therefore, individuals with a higher level of intolerance of frustration (characterised by the seeking of immediate pleasure; Froggatt, 2005) could show a lower degree of interference control at the level of perception, lower suppressing prepotent mental representations and a lower ability to resist temptations and act impulsively in states that involve frustration. This is consistent with what rational-emotive behaviour therapy suggests in regard to intolerance of frustration being a fundamental category of dysfunctional belief (Ellis, 1979, 1980). From this, it can be concluded that this executive cognitive function can explain, even if only partially, why some individuals demonstrate a desperate need to escape situations that involve frustrating conditions.

Overall, the findings suggest the involvement of attentional networks and directed attention in the structure of the five facets of distress intolerance. However, different dynamics emerge for these facets of distress intolerance with the exception of intolerance of physical discomfort. However, limitations do exist in relation to this present study. The first limitation exists in the usage of three complicated experimental approaches, with the same participants, in one experiment. Some might see this as complicated, although the researcher gave participants a five-minute rest between each experiment. Therefore, further examination is recommended in relation to utilising

different samples and in isolating the pertinent issue. The second limitation is the sample, which was based on a population of university students. In response to this, further research should replicate this study with different populations. This is particularly prudent given the findings that working memory is poorly associated with the five facets of distress intolerance (together and separately). This is because the central executive function (which represents a major constituent part of working memory) is responsible for managing cognitive tasks (such as problem solving) (Collette & Linden, 2002). The possession of a lower problem-solving ability, for example, could be related to those domains that relate to frustrating cases or unpleasant states. These findings are therefore worthy of further consideration due to their ability to contribute to key theoretical and empirical knowledge as to some of the facets of distress intolerance.

In summary, this study's findings suggest that although general distress intolerance fails to observe a significant association with the three executive functions, there are differential aspects of two of these functions (i.e. attentional networks and directed attention) that inform our understanding as to the five facets of distress intolerance. Furthermore, the intolerance of physical discomfort is the only facet of distress intolerance that is not associated with these executive functions. Overall, the findings suggest that there are some useful theoretical and empirical underpinnings within the five facets of distress intolerance, whereby both convergence and divergence is observed in relation to the executive functions.

Chapter Seven

Distress Intolerance and Early Experiences: A Retrospective Examination of the Relationships Between the Five Facets of Distress Intolerance and the Family of Origin and Parental Bonding

Abstract

Recently, research has shown increased interest in distress intolerance, primarily as a result of the heightened importance of this construct. Nonetheless, a lack of knowledge exists as to the non-biological mechanisms that underlie this concept. The present study aims at investigating, retrospectively, the relationships that arise between the five facets of distress intolerance and the family of origin and parental bonding found among a sample of university students ($n = 229$). The findings reveal that emphasis is given to lower degrees of intimacy being given within dysfunctional family functioning and also to the higher levels of overprotection found within parental affectionless control in terms of their associations with the five facets of distress intolerance. Despite the significant effects upon both the family of origin and parental bonding quadrants of the five facets of distress intolerance, there are differential aspects across these five facets. Overall, the findings suggest that, retrospectively, the mechanisms of the family of origin and parental bonding are involved in the five facets of distress intolerance, albeit with this being mediated by the family form and parental style present.

7.1: Introduction

Research has shown an increased interest in understanding the underlying factors of distress intolerance or the inability of individuals to tolerate or behave appropriately in states that involve ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort (e.g. Amstadter et al., 2012; Linehan, 1993a; Lynch & Mizon, 2011). This is because understanding the foundational factors of the distress intolerance construct(s) may be particularly fruitful and clinically significant. Therefore, a complementary line of research has arisen that is mainly concerned with investigating the underlying factors of distress intolerance.

However, the research that has been conducted in this area has primarily focused upon innate readiness (e.g. Amstadter et al., 2012). Therefore, there is a lack of knowledge as to the other underlying factors of distress intolerance (Bernstein, Vujanovic, Leyro, & Zvolensky 2011) – that is, the social factors in relation to one's social upbringing or surrounding environment. Given the different theoretical perspectives that have arisen, disagreement can be found in terms of the underlying factors of the distress intolerance construct(s) (Linehan, 1993a; Lynch & Mizon, 2011).

In recognising non-biological factors, various theoretical perspectives have assumed different social environment mechanisms in regard to underlying the factors of distress intolerance. For instance, Linehan (1993a) has suggested that the “invalidating environment” is characterised by intolerance being held towards the expression of specific emotional experiences – in particular, emotions that are not supported by observable events – which can have a positive effect on distress intolerance. In Linehan's perspective, this factor could underlie the failure of individuals to develop appropriate emotional regulation in early life and therefore could lead to the development of negative behaviours. Furthermore, Lynch and Mizon (2011) discussed “sociobiographic influences” – which refers to an individual's learning history being derived from their social interactions and the behavioural patterns that result from it – as an underlying factor of distress intolerance. Lynch and Mizon further suggest that the acquisition of behavioural patterns in early life is a risk factor in regard to the emergence of distress intolerance. In their opinion, the most extreme distress intolerance behaviours are a consequence of sociobiographic feedback, especially that which manifests as persistent and pervasive invalidation. They also suggest that children with

a biological predisposition towards intense emotionality are more likely to encounter painful invalidating feedback (such as being punished, ignored or contradicted). However, there is a lack of empirical research that has targeted social factors as mechanisms that underlie distress intolerance.

Currently, there is a lack of information as to the possible effects of such social factors upon distress intolerance. Although research has focused upon innate readiness, in particular the genetic factors in this area (e.g. Amstadter et al., 2012), very little study has been given to the non-biological factors that are assumed to relate to the development and maintenance of distress intolerance (Bernstein, Vujanovic et al., 2011). Further examination of these factors is needed, but in a systematic manner. This can be achieved by considering the different facets of distress intolerance (together and separately) in a coherent and unfragmented manner.

Therefore, in order to address this gap in the literature, the present study seeks to examine the possible involvement of non-biological factors within the structure of the five facets of distress intolerance. For this purpose, the present study employs the Distress Intolerance Five Factor-Short (DIFF-S; Bebane, Flowe, & Maltby, 2015) tool, which comprises measures of ambiguity, uncertainty, frustration, negative emotion and physical discomfort, noting this as being able to be used as both a measure of general distress intolerance and of the five facets of distress intolerance. Accordingly, two social mechanisms are provided here.

The first consideration is the family of origin, with this representing the family within which individuals gain their initial physiological, psychological and emotional experiences (Hovestadt, Anderson, Piercy, Cochran, & Fine, 1985). It is assumed, in this sense, that such primary roots play a deep and continuous role in the day-to-day responses of individuals. Autonomy and intimacy are essential and interwoven concepts within the life of a healthy family, with these factors or issues thereby being used to assess the family of origin within the Family-of-Origin Scale (FOS; Hovestadt et al., 1985). In the FOS paradigm, a healthy family develops autonomy by emphasising personal responsibility, clarity of expression, openness to others in the family, respect for other family members and the open dealing with occurrences such as separation and loss. Concurrently, the family develops intimacy by encouraging expression on a wide range of feelings (such as developing warm relations within the family, promoting

sensitivity among family members, dealing positively with conflicts especially under stressful situations and recognising or acknowledging that human nature is basically good). Under the FOS, the total score gained indicates the degree of perceived health in regard to the family of origin. With scores ranging from 40 to 200, those scores that reside within the highest third of this range indicate healthy family functioning, the middle third indicates moderate family functioning and the bottom third indicates dysfunctional family functioning. However, the possible variances in the five facets of distress intolerance among individuals from these family forms are poorly understood. Therefore, the present study seeks to consider the possible influences of these three family forms across the five domains of distress intolerance. It is believed that, in undertaking such research, a better understanding will be gained as to the five domains of distress intolerance in terms of the effects of early family experiences. Moreover, this will help us to understand the variance between these five domains in terms of them being influenced by the three types of family functioning, a result of it being expected that not all domains are equal in regard to the influence of family of origin.

The second consideration here pertains to parental bonding. Parental bonding is defined as the attachment between an individual and their parents in early life (Parker, Tupling, & Brown, 1979). Within this context, attachment refers to the emotional bond between individuals and their primary caregivers in early life and its influences upon their future social, cognitive and emotional development (Bowlby, 1977). This paradigm responds to parental caring (i.e. warmth, sensitivity) and overprotection (i.e. control, intrusion) as two parenting styles that can retrospectively contribute to understanding parent–child relationships in early life. This paradigm differs from the family of origin in terms of the types of early family experience. For instance, while the primary concern of the family of origin responds to the influence of each family form, parental bonding is focused upon the parental styles and their impact upon individuals. To assess this paradigm, the present study considers the Parental Bonding Instrument (PBI; Parker et al., 1979), due to the tool allowing an assessment of the fundamental parental dimensions of care and overprotection retrospectively. In doing this, parental contributions can be quantified in relation to subsequent psychological conditions – namely via the parental bonding quadrants, whereby parents can be effectively “assigned” to one of four quadrants: affectionate constraint (high care and high protection), affectionless control (high protection and low care), optimal parenting (high

care and low protection) and neglectful parenting (low care and low protection). The possible variances in the five facets of distress intolerance, as arise among individuals who grow up under these respective parental styles, have not been studied before. Gaining such an understanding therefore allows a more nuanced appreciation to be held as to the possible interactions of these parental bonding quadrants alongside the five facets of distress intolerance.

Accordingly, this study aims to investigate, retrospectively, the associations between the five facets of distress intolerance, autonomy and intimacy as mechanisms within the family of origin, undertaking this in relation to three family forms: healthy family functioning, moderate family functioning and dysfunctional family functioning. Furthermore, the correlations that arise between the five facets of distress intolerance, care and overprotection is examined in regard to these aspects acting as mechanisms within the parental bonding of the four parental styles: affectionate constraint, affectionless control, optimal parenting and neglectful parenting. Additionally, this study seeks to investigate the differences between these three family forms and the four parental styles across the five facets of distress intolerance.

7.2: Method

Participants

This study employs data from a sample comprising 229 university student respondents (43 males, 186 females). The sample ranges in age from 18 to 38 years old ($M = 19.27$ years, $SD = 2.10$). In regard to race, the respondents were predominantly Caucasian (49.4%), with the next highest reported ethnicity being Black (14.3%) and South Asian (13.5%).

Materials

Participants were asked to complete a set of self-report measures, which included distress intolerance measures and early family experience measures.

The Distress Intolerance Five Factor – Short (DIFF-S; Bebane et al., 2015) tool is a 20-item self-report measure, designed to assess the lack of ability among some individuals to withstand distress and to act in ways that will lead to the avoidance of

distress. The DIFF-S tool can be used as both a measure of general distress intolerance and of the five facets of distress intolerance. This means that the tool reflects the identification of the general factors of distress intolerance while simultaneously recognising the multidimensionality of the five group factors, comprising intolerance of uncertainty (e.g. “Uncertainty makes me vulnerable, unhappy, or sad”), intolerance of ambiguity (e.g. “It is more fun to tackle a complicated problem than to solve a simple one” (R¹)), intolerance of frustration (e.g. “I can’t bear it if other people stand in the way of what I want”), intolerance of negative emotion (e.g. “My feelings of distress are so intense that they completely take over”) and intolerance of physical discomfort (e.g. “I can tolerate a great deal of physical discomfort” (R)). Here, responses are scored on a 5-point Likert scale, whereby 1 = Disagree Strongly, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree and 5 = Agree Strongly. The Cronbach’s alpha coefficient for the DIFF-S tool has been measured at $\alpha = 0.90$, while the five factors have been found as follows: intolerance of ambiguity ($\alpha = 0.83$), intolerance of uncertainty ($\alpha = 0.79$), intolerance of frustration ($\alpha = 0.82$), intolerance of negative emotion ($\alpha = 0.85$) and intolerance of physical discomfort ($\alpha = 0.77$) (Bebane et al., 2015).

The Family of Origin Scale (FOS; Hovestadt et al., 1985) is a 40-item self-report measure, designed to retrospectively assess self-perceived levels of health in the family of origin of individuals. This scale is based upon the psychodynamic models of family functioning and holds autonomy and intimacy to be the two main concepts of a healthy family. The FOS comprises two main scales. The first scale is autonomy, as defined by personal responsibility (e.g. “In my family, people took responsibility for what they did”), the possession of clarity of expression (e.g. “I found it easy in my family to express what I thought and how I felt”), the demonstration of openness to others in the family (e.g. “The members of my family were not receptive to one another’s views”), the respecting of other family members (e.g. “I found it difficult to express my own opinions in my family”) and the dealing openly with separation and loss (e.g. “We never talked about our grief when a relative or family friend died”). The second main scale of the FOS is intimacy, as defined by the ability to express a wide range of feelings (e.g. “In my family, certain feelings were not allowed to be expressed”), the ability to develop warm relations within the family (e.g. “The atmosphere in my family was cold and negative”), the ability to promote sensitivity among family members (e.g.

¹ Reversed item

“In my family, no one cared about the feelings of other family members”), the dealing positively with conflicts especially under stressed situations (e.g. “Resolving conflicts in my family was a very stressful experience”) and the ability to see that human nature is basically good (e.g. “My family believed that people usually took advantage of you”). Here, responses are scored on a 5-point Likert scale, whereby 1 = Strongly disagree that it describes my family of origin, 2 = Disagree that it describes my family of origin, 3 = Neutral, 4 = Agree that it describes my family of origin and 5 = Strongly agree that it describes my family of origin. Hovestadt et al. (1985) reported the test–retest reliability coefficient of this scale as $r = 0.97$.

The Parental Bonding Instrument (PBI; Parker et al., 1979) is a 25-item self-report measure, designed to retrospectively assess the fundamental parental dimensions of care and overprotection. This instrument has also been constructed to allow a quantification of any parental contributions that arise in regard to the possession of psychological dysregulations. This instrument comprises two scales: care as a parental characteristic (e.g. “Appeared to understand my problems and worries”) and overprotection as a parental characteristic (e.g. “Tried to control everything I did”). Within the PBI, parenting can be effectively assigned to one of four quadrants: “affectionate constraint” = high care and high protection, “affectionless control” = high protection and low care, “optimal parenting” = high care and low protection and “neglectful parenting” = low care and low protection. The PBI has two 25-item forms of mother and father and three versions – a 2-factor model (Parker et al., 1979), a 3-factor model (Cubis, Lewin, & Dawes, 1989; Murphy, Brewin, & Silka, 1997) and a 4-factor model (Uji, Tanaka, Shono, & Kitamura, 2006). Responses are scored on a 4-point Likert scale, whereby 3 = Very Like, 2 = Moderately Like, 1 = Moderately Unlike and 0 = Very Unlike. The PBI has demonstrated an acceptable degree of internal consistency, with split half reliability coefficients for care ($r = 0.88$) and for overprotection ($r = 0.74$) being found (Parker et al., 1979).

Procedure

An electronic survey system was used to advertise the study, with this being produced in such a way that the (potential) participants could gain knowledge as to the aim of the study, the measures that were to be used and the requirements of participating in the research. Additionally, in doing this, the researcher was able to

ensure that the respondents answered all of the required questions. In order to participate in the research, the participants were required to have grown up with both a father and mother before the age of 16.

Ethical Consent

The data collection procedure received ethical approval from the University of Leicester's Department of Neuroscience, Psychology and Behaviour Ethics Board. The respondents also provided a consent form, through which they indicated their agreement in terms of proceeding with the research. Should a respondent not have provided a consent form, they were prevented from continuing with the study. The consent form contained statements and directions as to the nature of the study, how the anonymity of the data was to be maintained, respondents' ability to withdraw from the study (both during and after their participation), how the data would be stored in a coded form, how the results of the study could be obtained if required and the intended use, storage duration and disposal plans of the data.

Statistical Analysis

The present study employed the independent-samples t-test to determine any gender differences. A one-way ANOVA was used to determine the effects of ethnicity. The zero-order correlations were employed in order to identify the role that increased age plays in regard to the five facets of distress intolerance and the association between the five facets of distress intolerance, autonomy, intimacy, care and overprotection. The one-way MANOVA was used to determine the differences that arise among the five facets of distress intolerance in relation to different types of family and parental bonding styles. The total score of the Family-of-Origin Scale was used to determine the family type. Here, scores ranging between 160 and 198 indicate the top one-third (healthy family functioning), while scores ranging between 135 and 159 indicate the middle one-third (moderate family functioning) and scores ranging between 63 and 134 indicate the bottom one-third (dysfunctional family functioning). Furthermore, the assignment of the "high" or "low" categories within the Parental Bonding Instrument is based upon the following cut-off scores – for mothers, a Care score of 27.0 and a Protection score of 13.5, while, for fathers, a Care score of 24.0 and a Protection score of 12.5. In addition,

the effect sizes are measured by holding that a small size manifests as $r = 0.1$, a medium size as $r = 0.24$ and a large size as $r = 0.37$ (McGrath & Meyer, 2006) for the zero-order correlations. For the one-way MANOVA analysis, the effect size was considered small at $\eta^2 = 0.01$, medium at $\eta^2 = 0.06$ and large at $\eta^2 = 0.13$ (Cohen, 1988).

7.3: Results

Preliminary Analysis

The findings of the independent-samples t-tests indicate that there are no significant gender differences in regard to general distress intolerance or among the five facets of distress intolerance with the exception of intolerance of ambiguity, $t(227) = -2.163$, $p = 0.032$). In relation to intolerance of ambiguity, the female sample reported higher scores than the male sample ($M_s = 11.32$ and 10.72 respectively). Furthermore, no differences as to ethnicity were found in regard to distress intolerance, where $F(6, 222) = 0.742$, $p = 0.616$), or in the five facets of distress intolerance. Moreover, the findings indicate that increased age is not related to distress intolerance, where $r(229) = -0.064$, $p = .333$, or in relation to any of the five facets of distress intolerance.

Correlations Between Distress Intolerance, Autonomy and Intimacy

For greater accuracy in terms of identifying the correlations that arise between the five facets of distress intolerance and both autonomy and intimacy (as mechanisms that manifest within the family of origin), this study examined these correlations in relation to the three family forms. Table 7.1 illustrates the zero-order correlations that arise between the five facets of distress intolerance, autonomy and intimacy among the three family forms. All significant correlations between the DIFF-S, autonomy and intimacy are in bold.

Healthy Family Functioning

The findings as to the correlations that were identified among this family form indicate that there are no significant associations between autonomy and any of the five facets of distress intolerance (see Table 7.1). Furthermore, no significant correlations

can be found between intimacy and the five facets of distress intolerance with the exception of intolerance of negative emotion, which is negatively correlated with intimacy and observes a medium effect size of $r = -0.28$.

Moderate Family Functioning

The findings as to the correlations that were identified among this family form indicate that there is no significant association between autonomy and any of the five facets of distress intolerance (see Table 7.1). Furthermore, no significant associations can be found between intimacy and the five facets of distress intolerance with the exception of intolerance of frustration, which is negatively associated with intimacy and observes a medium effect size of $r = -0.25$.

Dysfunctional Family Functioning

The findings as to the correlations that were identified among this family form reveal that there is a significant negative association between general distress intolerance and autonomy, with this being observed with a small effect size of $r = -0.23$ (see Table 7.1). In terms of the five facets of distress intolerance, intolerance of frustration is negatively correlated with autonomy, with this found to be possessing a medium effect size of $r = -0.32$. In addition, a significant negative association can be observed between general distress intolerance and intimacy, which is identified as having a small effect size of $r = -0.23$. Furthermore, intimacy is negatively associated with intolerance of frustration and intolerance of negative emotion, with a medium effect size of $r = -0.27$ and -0.24 respectively.

Table 7.1

Zero-Order Correlations Between Five Facets of Distress Intolerance, Autonomy and Intimacy Among Three Types of Family.

	General Distress Intolerance	Intolerance Of Ambiguity	Intolerance of Uncertainty	Intolerance of Frustration	Intolerance of Negative Emotion	Intolerance of Physical Discomfort
Healthy Family Functioning (<i>N</i> = 53)						
Autonomy	-.168	-.069	-.228	-.013	-.204	.050
Intimacy	-.171	-.037	-.218	.080	-.283*	.012
Moderate Family Functioning (<i>N</i> = 84)						
Autonomy	.026	-.149	-.050	.086	.063	.029
Intimacy	-.079	-.022	-.109	-.258*	.129	.059
Dysfunctional Family Functioning (<i>N</i> = 92)						
Autonomy	-.239*	.138	-.198	-.326**	-.119	-.110
Intimacy	-.239*	.162	-.152	-.271**	-.240*	-.057

Note. Healthy Family Functioning = the top one-third score (between 160 and 198); Moderate Family Functioning = the middle one-third score (between 135 and 159); Dysfunctional Family Functioning = the bottom one-third score (between 63 and 134); *N* = number of sample; ** $p < 0.01$; * $p < 0.05$.

Correlations Between Distress Intolerance, Maternal Care and Overprotection

To investigate the correlations that arise between the five facets of distress intolerance, maternal care and overprotection (manifesting as mechanisms within parental bonding), the current study has examined these correlations in relation to four parental styles. Table 7.2 illustrates the zero-order correlations that can be identified between the five facets of distress intolerance, care and overprotection among four maternal styles. All significant correlations between the DIFF-S, care and overprotection among four maternal styles are in bold.

Maternal Affectionate Constraint

The findings as to the correlations observed among the maternal affectionate constraint style indicate that there are no significant associations between the five facets of distress intolerance and either maternal care or overprotection (see Table 7.2).

Maternal Affectionless Control

The findings as to the correlations among the maternal affectionless control style reveal that there is a significant negative correlation between intolerance of ambiguity and maternal care, this being found to have a large effect size of $r = -0.38$ (see Table 7.2). Furthermore, a significant positive association can be observed between general distress intolerance and maternal overprotection, with this possessing a large effect size of $r = 0.49$. In addition, in terms of the five facets of distress intolerance, the findings also indicate that maternal overprotection is positively correlated with intolerance of uncertainty, intolerance of frustration, intolerance of negative emotion and intolerance of physical discomfort with a medium to large effect size of $r = 0.39, 0.42, 0.40$ and 0.31 respectively.

Maternal Optimal Parenting

The findings of the correlations in relation to maternal optimal parenting reveal a significant positive association between intolerance of uncertainty and maternal care

with a large effect size of $r = 0.33$. Furthermore, intolerance of frustration is negatively associated with maternal overprotection with a small effect size of $r = -0.22$.

Maternal Neglectful Parenting

The findings at to the correlations in relation to this maternal style indicate that there are no significant associations between the five facets of distress intolerance and either maternal care or overprotection (see Table 7.2).

Table 7.2
Zero-Order Correlations Between the Five Facets of Distress Intolerance, Care and Overprotection Among Four Maternal Styles.

	General Distress Intolerance	Intolerance of Ambiguity	Intolerance of Uncertainty	Intolerance of Frustration	Intolerance of Negative Emotion	Intolerance of Physical Discomfort
Maternal Affectionate Constraint (<i>N</i> = 81)						
Care	-.097	-.103	-.123	-.123	-.044	.090
Overprotection	.141	.174	.183	.177	-.038	-.025
Maternal Affectionless Control (<i>N</i> = 43)						
Care	.001	-.383*	-.055	-.171	-.011	.041
Overprotection	.491**	-.178	.398**	.427**	.405**	.318*
Maternal Optimal Parenting (<i>N</i> = 79)						
Care	-.180	-.067	.331**	-.004	-.080	-.001
Overprotection	.014	.212	.087	-.226*	.080	-.042
Maternal Neglectful Parenting (<i>N</i> = 26)						
Care	-.230	.051	-.272	-.327	-.210	.232
Overprotection	.321	-.024	.343	.133	.225	.154

Note. Maternal Affectionate Constraint = high care and high protection; Maternal Affectionless Control = high protection and low care; Maternal Optimal Parenting = high care and low protection; Maternal Neglectful Parenting = low care and low protection; *N* = number of sample; ** $p < 0.01$; * $p < 0.05$.

Correlations Between Distress Intolerance and Paternal Care and Overprotection

In order to investigate the correlations between the five facets of distress intolerance, paternal care and overprotection (manifesting as mechanisms within parental bonding), this study has examined these correlations in relation to four parental styles. Table 7.3 illustrates the zero-order correlations found between the five facets of distress intolerance, care and overprotection among four paternal styles. All significant correlations between the DIFF-S, care and overprotection among four paternal styles are in bold.

Paternal Affectionate Constraint

The findings as to the correlations identified among the paternal affectionate constraint style reveal that there are no significant associations between the five facets of distress intolerance and paternal care (see Table 7.3). However, a significant positive association has been found between intolerance of frustration and paternal overprotection, with this observing a large effect size of $r = 0.45$.

Paternal Affectionless Control

The findings as to the correlations identifiable among the paternal affectionless control style reveal that there are no significant correlations between the five facets of distress intolerance and paternal care (see Table 7.3). However, paternal overprotection is positively associated with general distress intolerance and three facets of distress intolerance (intolerance of frustration, intolerance of negative emotion and intolerance of physical discomfort), with this observing a large effect size of $r = 0.50, 0.37, 0.38$ and 0.40 respectively.

Paternal Optimal Parenting

The findings as to the correlations seen in relation to paternal optimal parenting reveal that there is no significant correlation between the five facets of distress intolerance and paternal care (see Table 7.3). Furthermore, intolerance of ambiguity is positively associated with paternal overprotection with a small effect size of $r = -0.22$.

Paternal Neglectful Parenting

The findings as to the correlations that arise in relation to this paternal style indicate that there are no significant associations between the five facets of distress intolerance and either paternal care or overprotection (see Table 7.3).

Table 7.3

Zero-Order Correlations Between the Five Facets of Distress Intolerance, Care and Overprotection Among Four Paternal Styles.

	General Distress Intolerance	Intolerance of Ambiguity	Intolerance of Uncertainty	Intolerance of Frustration	Intolerance of Negative Emotion	Intolerance of Physical Discomfort
Paternal Affectionate Constraint (N = 34)						
Care	-.335	-.127	-.172	-.277	-.226	.036
Overprotection	.291	.069	-.152	.451**	.018	.255
Paternal Affectionless Control (N = 62)						
Care	-.142	.103	-.063	-.100	-.082	-.186
Overprotection	.508**	-.017	.165	.377**	.388**	.402**
Paternal Optimal Parenting (N = 87)						
Care	-.097	-.044	-.087	-.046	.049	-.198
Overprotection	.112	.221*	.178	-.136	.132	.024
Paternal Neglectful Parenting (N = 46)						
Care	-.106	.221	-.172	-.137	-.086	-.001
Overprotection	.152	.209	.158	.039	-.019	.136

Note. Paternal Affectionate Constraint = high care and high protection; Paternal Affectionless Control = high protection and low care; Paternal Optimal Parenting = high care and low protection; Paternal Neglectful Parenting = low care and low protection; N = number of sample; ** $p < 0.01$; * $p < 0.05$.

The Variances Between the Five Facets of Distress Intolerance

This study has examined the variances between the five facets of distress intolerance in relation to three family forms and four parental styles. Table 7.4 illustrates the results of a number of multivariate tests that were conducted in relation to disparate family forms and the parental bonding quadrants on the five facets of distress intolerance. All significant multivariate tests that were conducted in relation to disparate family forms and the parental bonding quadrants on the five facets of distress intolerance are in bold.

Family Forms

The findings as to the one-way MANOVA analysis reveal a significant multivariate in respect of the different family forms and their associated effects upon the five facets of distress intolerance, here demonstrating a medium effect size of partial eta squared = 0.090. Furthermore, a significant univariate can be identified in relation to the family forms and general distress intolerance. In this regard, dysfunctional family functioning gained a higher score than moderate family functioning and healthy family functioning ($M_s = 63.41, 59.24$ and 58.98 respectively). In terms of the facets of distress intolerance, intolerance of uncertainty alongside the dysfunctional family functioning reported a higher score than the other family forms ($M_s = 13.04, 11.30$ and 10.62 respectively), intolerance of negative emotion alongside the dysfunctional family functioning reported a higher score than the other family forms ($M_s = 12.12, 10.31$ and 9.83 respectively) while intolerance of frustration alongside dysfunctional family functioning reported a higher score than moderate family functioning ($M_s = 15.10$ and 13.80 respectively) (see Table 7.5 for more details as to the results of the tests pertinent to the between-subjects effects). In terms of the effect size, the findings of the partial eta squared (partial $\eta^2 = 0.121$) suggest a large effect size for intolerance of uncertainty. However, the family of origin effects in relation to intolerance of ambiguity and intolerance of physical discomfort were not significant.

Table 7.4

Results of the Multivariate Tests For Types of Family and the Parental Bonding Quadrants on the Five Facets of Distress Intolerance.

	Effect	Value	<i>F</i>	Hypothesis df	Error df	Sig.	Partial Eta Squared	Observed Power
Types of Family								
	Pillai's Trace	.175	4.269	10.000	446.000	.000	.087	.999
	Wilks' Lambda	.828	4.403	10.000	444.000	.000	.090	.999
	Hotelling's Trace	.205	4.536	10.000	442.000	.000	.093	.999
	Roy's Largest Root	.190	8.472	5.000	223.000	.000	.160	1.000
Parental Bonding Quadrants (Mother)								
	Pillai's Trace	.143	2.225	15.000	669.000	.005	.048	.979
	Wilks' Lambda	.862	2.252	15.000	610.485	.004	.048	.968
	Hotelling's Trace	.155	2.273	15.000	659.000	.004	.049	.982
	Roy's Largest Root	.111	4.933 ^c	5.000	223.000	.000	.100	.981
Parental Bonding Quadrants (Father)								
	Pillai's Trace	.114	1.760	15.000	669.000	.037	.038	.931
	Wilks' Lambda	.889	1.776	15.000	610.485	.034	.039	.906
	Hotelling's Trace	.122	1.789	15.000	659.000	.033	.039	.936
	Roy's Largest Root	.089	3.986 ^c	5.000	223.000	.002	.082	.946

Note. *F* = the value of the *F* ratio; Sig = the significance of that *F* ratio.

Parental Bonding Quadrants

The findings indicate a significant multivariate for the parental bonding quadrants effects in relation to both mothers and fathers on the five facets of distress intolerance (see Table 7.4). Furthermore, the findings reveal a significant univariate in terms of the parental bonding quadrant (mother) effects upon general distress intolerance, with the maternal affectionless control style gaining a higher score than the maternal affectionate constraint, maternal neglectful parenting and maternal optimal parenting styles ($M_s = 63.26, 61.48, 60.62$ and 58.99 respectively). In regard to the facets of distress intolerance: intolerance of uncertainty alongside the maternal affectionless control reported a higher score than the other maternal styles ($M_s = 12.72, 12.50, 12.05$ and 10.94 respectively), intolerance of negative emotion alongside maternal neglectful parenting reported a higher score than the other maternal styles ($M_s = 12.00, 11.98, 10.81$ and 10.11 respectively) while intolerance of physical discomfort alongside maternal optimal parenting reported higher scores than the other maternal styles ($M_s = 12.80, 12.59, 12.33$ and 10.81 respectively) (see Table 7.5). Here, the findings suggest a small effect size (partial $\eta^2 = 0.057, 0.040$ and 0.040 respectively).

In addition, a significant univariate as to the effects of the parental bonding quadrants (father) is found in regard to intolerance of uncertainty alongside the paternal affectionless control style, with this reporting a higher score than the paternal affectionate constraint, paternal neglectful parenting and paternal optimal parenting styles ($M_s = 12.39, 12.35, 12.33$ and 11.00 respectively), observed as having a small effect size (partial $\eta^2 = 0.051$).

Table 7.5*The Results of Tests of Between-Subjects Effects for all Independent and Dependent Variables.*

Source	Dependent Variable	df	Mean Square	F	Sig.	Partial Eta Squared	Observed Power
Types of Family	General Distress Intolerance	2	503.860	7.438	.001	.062	.939
	Intolerance of Uncertainty	2	118.251	15.503	.000	.121	.999
	Intolerance of Ambiguity	2	.001	.001	.999	.000	.050
	Intolerance of Frustration	2	37.153	3.986	.020	.034	.710
	Intolerance of Negative Emotion	2	113.315	8.499	.000	.070	.965
	Intolerance of Physical Discomfort	2	17.778	2.007	.137	.017	.412
Parental Bonding Quadrants (Mother)	General Distress Intolerance	3	185.565	2.649	.050	.034	.642
	Intolerance of Uncertainty	3	37.568	4.575	.004	.057	.884
	Intolerance of Ambiguity	3	4.610	1.694	.169	.022	.440
	Intolerance of Frustration	3	4.040	.419	.739	.006	.133
	Intolerance of Negative Emotion	3	43.521	3.149	.026	.040	.726
	Intolerance of Physical Discomfort	3	27.206	3.130	.027	.040	.723
Parental Bonding Quadrants (Father)	General Distress Intolerance	3	90.640	1.271	.285	.017	.337
	Intolerance of Uncertainty	3	33.253	4.021	.008	.051	.835
	Intolerance of Ambiguity	3	2.318	.843	.472	.011	.232
	Intolerance of Frustration	3	15.688	1.654	.178	.022	.431
	Intolerance of Negative Emotion	3	28.125	2.006	.114	.026	.512
	Intolerance of Physical Discomfort	3	10.395	1.166	.324	.015	.311

Note. *df* = degree of freedom *F* = the value of the F ratio; Sig = the significance of that F ratio.

7.4: Discussion

The findings suggest that, retrospectively, both family forms and parental styles mediate the associations between the five facets of distress intolerance and both autonomy and intimacy (manifesting as mechanisms within the family of origin) as well as both care and overprotection (manifesting as mechanisms within parental bonding). This is consistent with what theoretical perspectives suggest as to the possible involvement of non-biological factors in distress intolerance (e.g. Linehan, 1993a; Lynch & Mizon, 2011). However, the unexpected finding here in terms of the earlier theoretical accounts relates to the weak association between lower care (which manifests as a mechanism within the neglectful parenting style, this being characterised by a lower degree of care being given and lower overprotection being employed) and the five facets of distress intolerance. This is not consistent with Linehan's (1993a) suggestion that the "invalidating environment" is an underlying factor of distress intolerance. In her perspective, within such an environment, a child is required to learn to cope with emotions internally and without care from parents. This neglectful parenting style could therefore result in a lack of learning as to how to withstand emotional dysregulation in early life. From such an outcome, negative behaviours could develop towards stressful events that involve ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort.

In addition, the findings that have emerged suggest that although the emphasis is mainly on dysfunctional family functioning (referring to families that are characterised by low degrees of autonomy and intimacy; Hovestadt et al., 1985) in relation to the mediation between the five facets of distress intolerance and both autonomy and intimacy, other family forms also mediate the associations between lower degrees of intimacy, intolerance of negative emotion and intolerance of frustration. From this, it can be concluded that there are differential aspects across the five facets of distress intolerance in terms of their associations with these mechanisms as to the family of origin. Moreover, these mechanisms share associations with the five facets of distress intolerance in relation to different family forms. For instance, the findings suggest that individuals who gained a lower intimacy score recall their family form as being healthy, with dysfunctional family functioning demonstrating a higher score in relation to intolerance of negative emotion. Likewise, individuals who gained a lower intimacy score recall their family form as moderate, with dysfunctional family functioning

gaining a higher score as to intolerance of frustration. These findings are able to provide evidence in regard to the ability of lower degrees of intimacy to impact upon specific facets of distress intolerance, even under healthy family conditions. Such results highlight that, retrospectively, lower degrees of intimacy tend to correspond with wider associations in relation to the five facets of distress intolerance across the three family forms.

In terms of parental bonding, the main emphasis of the findings pertain to the affectionless control style mediating the correlations that arise between the five facets of distress intolerance and both care and overprotection. Although emphasis here is primarily aimed at overprotection, maternal care has been found to predominantly share an association with two facets of distress intolerance across two maternal bonding styles. For example, the findings point to the fact that individuals who gain a lower care score who recall early maternal bonding (as the affectionless control style) demonstrate a higher score in terms of intolerance of ambiguity. In the same context, individuals that gained a higher score in relation to care and who can recall early maternal bonding (as representing maternal optimal parenting) gained a higher score in relation to intolerance of uncertainty. This could be held to explain the role that dependency plays as a consequence of excessive maternal care in terms of developing personal fears towards those states that involve uncertainty.

Overall, the findings imply that, retrospectively, the mechanisms of the family of origin and parental bonding are relevant to the manifestation of the five facets of distress intolerance, yet this involvement is mediated by family form and parental style. From this, it can be concluded that the involvement of these mechanisms is conditioned by the family form or parental style experienced by each individual. For example, lower degrees of autonomy have been found to be involved in general distress intolerance and intolerance of frustration among individuals who recall their family form as manifesting as dysfunctional family functioning. Despite this, such a correlation does not exist in relation to any of the five facets of distress intolerance among individuals who recall their family form as being healthy or moderate. Therefore, to simplify the possible roles of these family forms and parental styles, this study has considered the variances between the five facets of distress intolerance in accordance with the three family forms and four parental styles explored.

Despite the findings suggesting that both the family of origin and the parental bonding quadrants have significant effects upon the five facets of distress intolerance, it can be noted that there are differential aspects across these five facets in terms of the effects caused by the respective family forms and parental styles. Accordingly, it can be concluded that individuals who grow up within the context of dysfunctional family functioning could develop an inability to withstand or behave appropriately in states that involve uncertainty, negative emotions or frustration. Furthermore, the findings suggest that individuals who grow up under the conditions of the maternal affectionless control style, which represents a high degree of protection and a low degree of care being given, could develop an intolerance of uncertainty or intolerance of negative emotion. However, those who developed within the context of the maternal affectionate constraint style, which refers to a high degree of care and overprotection being given, could develop an inability to withstand or behave appropriately in situations that involve physical discomfort. The same can be said for those individuals who grew up with maternal optimal parenting, which represents a high degree of care and a low degree of overprotection being given. Moreover, intolerance of uncertainty has been found to be affected by the paternal affectionless control style, which refers to a high degree of overprotection and a low degree of care being given.

In addition, although family forms and parental bonding styles affect the mediation found in the correlations between their mechanisms and the five facets of distress intolerance, differences further arise between the maternal and paternal styles in terms of the mediation of the association between both care and overprotection. For example, while maternal care shares a significant association with two facets of distress intolerance (via the affectionless control and optimal parenting styles), paternal care fails to demonstrate an association with the five facets of distress intolerance. In the same context, maternal and paternal styles differ in their mediation of the correlations that arise between overprotection and the five facets of distress intolerance. This can be noted across the bonding styles (e.g. the parental affectionate constraint style) and the facets of distress intolerance (e.g. intolerance of frustration and intolerance of ambiguity via optimal parenting). However, both parental forms mediate affectionless control and optimal parenting in terms of the associations observed between higher degrees of overprotection and the five facets of distress intolerance. Overall, it can be concluded that a higher degree of overprotection tends to result in wide associations across the five

facets of distress intolerance – particularly with maternal care in terms of the involvement of intolerance of ambiguity and intolerance of uncertainty. In addition, the findings suggest that there are differences in the effects of the parental bonding quadrants between mothers and fathers on the five facets of distress intolerance. Accordingly, the parental bonding quadrants of mothers demonstrate significant effects upon three facets of distress intolerance (i.e. intolerance of uncertainty, intolerance of negative emotion and intolerance of physical discomfort), while the parental bonding quadrants of fathers show a significant effect upon a single facet (i.e. intolerance of uncertainty). It can be concluded therefore that maternal styles can effectively influence an individual's inability to withstand and act appropriately in situations that involve uncertain states, emotions and/or physical discomfort. In contrast, paternal styles can affect the inability of individuals to tolerate or behave appropriately in uncertain situations.

However, there are limitations to these findings. The first limitation relates to the methodology of the study, with retrospective studies depending upon the accuracy of the participants' recollections. Accordingly, such findings are prone to bias. Further investigation is therefore recommended, namely in using participants who can be diagnosed in terms of their family form or parental bonding style. The second limitation relates to the undergraduate sample employed, with the findings therefore requiring replication. This is particularly prudent given that low degrees of care being given within the neglectful parenting style have been found not to relate to the five facets of distress intolerance. This is not consistent with the previously held theoretical perspective as to this area (e.g. Linehan, 1993a) and therefore demands further consideration.

In summary, the findings suggest that, retrospectively, the main emphasis is given towards the low degree of intimacy provided within dysfunctional family functioning and also on the higher degree of overprotection given within the parental affectionless control in terms of their pertinent associations with the five facets of distress intolerance. Furthermore, despite both the family of origin and parental bonding quadrants having significant effects upon the five facets of distress intolerance, differential aspects exist across these facets. Overall, the findings imply that, retrospectively, the mechanisms of the family of origin and parental bonding are

involved in the five facets of distress intolerance, yet this involvement is mediated by family forms and parental styles.

Chapter Eight

General Discussion

The overall aims of the thesis relate to refining the measurement of distress intolerance and to examining the relation networks of distress intolerance. This final chapter reviews the pertinent findings of the studies and discusses the implications that have emerged in regard to refining the measurement of distress intolerance and to the relation networks of distress intolerance. Section 8.1 summarises the findings of Study One, thereby discussing its implications in terms of refining our understanding of the measurement of distress intolerance. Section 8.2 summarises the findings of Study Two and, in doing so, discusses its implications for the understanding of the DIFF-S tool's concurrent and construct validity as well as its test-retest reliability. Section 8.3 summarises the findings of Study Three, in the process discussing its implications as to how we understand the relationship between the DIFF-S tool and the behavioural approaches of distress intolerance. Section 8.4 summarises the findings of Study Four, here giving consideration towards the implications that arise in regard to our knowledge as to the position of the five facets of distress intolerance within the extant lexical and biological models of personality. Section 8.5 summarises the findings of Study Five, denoting how this can impact upon the theoretical and empirical accounts of the five facets of distress intolerance within the executive functions. Section 8.6 summarises the findings of Study Six, examining the new information as to the relationships between the five facets of distress intolerance and the family of origin and parental bonding. Section 8.7 suggests a number of future directions that the research in this area could take. Finally, Section 8.8 provides the conclusion of the thesis.

8.1: Re-refining the Measurement of Distress Intolerance.

Section 8.1 reviews Study One (Section 8.1.1) and discusses its implications (Section 8.1.2).

8.1.1: Summary of the Study's Novel Findings

Study One is the first study to have been conducted that focuses on re-refining the measurement of distress intolerance, with this being based on a new conceptualisation of distress intolerance as proposed by Zvolensky, Vujanovic, Bernstein, and Leyro (2010). The findings of the exploratory and confirmatory factor analytic studies of the items from five established measures of distress intolerance have suggested a 20-item measure representing the five facets of distress intolerance (i.e. intolerance of ambiguity, intolerance of uncertainty, intolerance of frustration, intolerance of negative emotion and intolerance of physical discomfort). A comparison of the latent factor models suggests that a bifactor model may present the best fit for the data, with this reflecting the identification of the general factors of distress intolerance while also recognising the multidimensionality of the five group factors.

8.1.2: Implications

The present section discusses the implications of the findings of Study One in terms of re-refining the measurement of distress intolerance. This section begins by reviewing the new conceptualisation of distress intolerance as proposed by Zvolensky et al. (2010), subsequently discussing the implications that have emerged in relation to re-refining the measurement of distress intolerance.

From Leyro, Zvolensky, and Bernstein's (2010) theoretical review of the extant distress intolerance literature, Zvolensky et al. (2010) identified five core dimensions of distress intolerance. In their perspective, these five core facets underlie the general factors of distress intolerance, with this indicating the inability of some individuals to tolerate some types of physical or emotional distress that occurs in situations associated with ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort. This is a conceptualisation of this construct that is informed by the literature of distress intolerance, while other conceptualisations are influenced by a number of personality, experiential avoidance and coping contexts (Zvolensky, Leyro, Bernstein, & Vujanovic, 2011). This can therefore reduce disagreements in respect of the conceptualisation of distress intolerance, achieved by providing a hierarchical way of integrating the

different conceptualisations of distress intolerance that have emerged within the pertinent literature (Bardeen, Fergus, & Orcutt, 2013).

Subsequently, to fill the existing gap in the literature regarding the absence of a parsimonious measure can assess five facets of distress intolerance, and by using this hierarchical conceptualisation, Bebane, Flowe and Maltby (2015) explored the underlying factors of distress intolerance among a number of well-used distress intolerance scales, each designed to measure the proposed distress intolerance factors among two separate samples. Sample One was used for an exploratory factor analysis while Sample Two was used for a confirmatory factor analysis. From this, Bebane et al. identified a 20-item scale (Distress Intolerance Five Factor – Short [DIFF-S]), comprising measures of ambiguity, uncertainty, frustration, negative emotion and physical discomfort. Moreover, the confirmatory factor analysis of the scale suggests that a bifactor model best accounts for the variance of these items – with an equal split of variance explained between the general notion of distress intolerance and the five facets of distress intolerance. This suggests, overall, that the DIFF-S tool can be used as both a measure of general distress intolerance and of the five facets of distress intolerance.

The findings of this study integrate two different approaches found within the literature of this area. The first approach seeks to define distress intolerance through parsimonious measures of the construct (e.g. McHugh & Otto, 2012). The second approach attempts to assess the multifaceted nature of the construct (e.g. Bardeen, Fergus, & Orcutt, 2013). Furthermore, the findings also suggest that the bifactor model provides the best description of the data in identifying the general concept of distress intolerance (accounting for just over 51% of the common variance) while simultaneously recognising the multidimensionality of the five group factors (together accounting for 49% of the variance). Therefore, such a shortened multidimensional measure is most useful when relatively few items can be administered in a research study, whether because of time or space constraints. Furthermore, the DIFF-S tool manifests as a unique combination of items that are not currently used by any other single distress intolerance measure.

In addition, the DIFF-S tool is able to test our understandings of distress intolerance while also reducing the exacerbation faced in relation to a broad range of deleterious outcomes. This is because it is the first measure to be developed from one of the most comprehensive conceptualisations of distress intolerance produced to date,

whereby the measures respond to both distress intolerance and its five facets (ambiguity, uncertainty, frustration, negative emotion and physical discomfort). Subsequently, such an approach is able to determine the transdiagnostic status of distress intolerance, with previous attempts at this having being restricted due to the limited consensus that exists in respect of the conceptualisation and measurement of distress intolerance. The DIFF-S tool provides a platform through which cross-study comparisons can be made. Nonetheless, there is still much work to be done in terms of exploring the stability and dimensional nature of the factor structure of the scales among different populations.

8.2: Distress Intolerance Five Factor – Short: An Examination of its Concurrent and Construct Validity and Test–Retest Reliability.

Section 8.2 reviews Study Two (Section 8.2.1) and discusses its implications (Section 8.2.2).

8.2.1: Summary of the Study’s Novel Findings

Study Two represents the first study to conduct a close examination as to the concurrent and construct validity and the test–retest reliability of the DIFF-S tool. The findings as to the concurrent validity analysis indicate that the DIFF-S tool observes a positive correlation with its parent measures (from which the DIFF-S tool was derived). There are differential levels of concurrent validity across the five scales within the DIFF-S in regard to their associations with the parent measures. The findings of the construct validity analysis indicate that the DIFF-S and its five facet scales observe discriminant validity. Finally, the findings of the reliability analyses indicate that its reliability over time is acceptable with differential levels of reliability over time across the five-facet scales of the DIFF-S.

8.2.2: Implications

The present section discusses the implications of the findings in regard to the examination of the concurrent and construct validity and the test–retest reliability of the DIFF-S tool. The section begins by reviewing the DIFF-S tool, following this by discussing the implications that arise in regard to examining such validity and reliability.

The DIFF-S tool is the first parsimonious measure to employ respective items from a number of established measures of distress intolerance while simultaneously utilising a multi-faceted approach when conceptualising this construct, whereby considerations are given as to states that involve ambiguity, uncertainty, frustration, negative emotion and physical discomfort (Bebane et al., 2015). The DIFF-S tool has been developed via an incorporation of the five core facets that underlie the general construct of distress intolerance, with this indicating the inability of some individuals to tolerate some types of physical or emotional distress when encountering states that involve ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort (Zvolensky et al., 2010). The underlying factors focused upon in the DIFF-S tool relate to a number of well-used distress intolerance scales that are designed to measure the distress intolerance construct(s) (which consists of a number of distress intolerance factors). The results of the exploratory factor analysis has identified a 20-item scale comprising measures of ambiguity, uncertainty, frustration, negative emotion and physical discomfort. Furthermore, the confirmatory factor analysis of the scale suggests that a bifactor model can best account for the variance of the items, with an equal split of variance being explained between the general construct of distress intolerance and its five facets. Overall, this suggests that the DIFF-S tool can be used as both a measure of general distress intolerance and of its five facets.

However, the concurrent and construct validity and reliability over time of the DIFF-S tool is not studied. To address this, current study aimed at investigating the empirical evidence that relates to the validity and reliability of the DIFF-S. For this purpose two separate samples employed. Sample One was used for validity analysis and Sample Two was used for reliability analysis. The findings provide evidence as to the validity of the DIFF-S tool in terms of its ability to show acceptable correlations with the parent measures (from which the DIFF-S tool was derived). Furthermore, the DIFF-S tool has been demonstrated to be able to measure the theoretical construct(s) that it has been designed to measure. Moreover, these findings support the consistency of the DIFF-S tool across different circumstances. This therefore supports the notion that the DIFF-S tool is able to assess the particular construct that it has been designed to measure as well as its shared variance with the parent measures (from which the DIFF-S tool was derived). Likewise, the tool's consistency as a measure across different circumstances in terms of internal reliability and reliability over time has been demonstrated to be strong.

Overall, the findings support the assertion that the DIFF-S tool is an advanced measure in this area due to it representing the first bifactor measure of distress intolerance, a result of it having been developed in consideration of the five-facet model of distress intolerance. This is novel in this area of research as most of the measures of this construct (e.g. self-report measures) have been developed from models that are influenced by a number of personality, experiential avoidance and coping contexts (Zvolensky et al., 2010). Furthermore, some of these measures (e.g. behavioural approaches) “have been developed without specific reference to a particular conceptual model or theory of distress tolerance” (Zvolensky et al., 2011, p. 14). Additionally, the DIFF-S tool is able to refine our understanding as to this construct, with Bernstein, Vujanovic, Leyro and Zvolensky (2011) suggesting that the gaining of an understanding of any construct depends upon the methods used to index that construct and/or the confounds related to the measurement tools employed in indexing that construct. However, this study has only covered the self-report measures of distress intolerance, thereby avoiding the behavioural approaches of distress intolerance in terms of the DIFF-S tool’s concurrent validity.

8.3: Distress Intolerance Five Factor-Short: A Further Examination of its Relationship with the Behavioural Approaches of Distress Intolerance.

Section 8.3 reviews Study Three (Section 8.3.1) and discusses its implications (Section 8.3.2).

8.3.1: Summary of the Study’s Novel Findings

Study Three is the first study to date to have conducted a close examination of the relationship between the DIFF-S tool and the Mirror-Tracing Persistence Task (as an approach utilised within cognitive tolerance tasks), the Cold Pressor Task (as an approach utilised within physical tolerance tasks/pain challenges) and the Breath-Holding Test (as an approach utilised within physical tolerance tasks/biological challenges). The findings indicate that the DIFF-S is significantly correlated with higher physical distress intolerance (as indicated by the Cold Pressor Task) and cognitive distress intolerance (as indicated by the Mirror-Tracing Persistence Task). In their associations with the Cold Pressor Task and the Mirror-Tracing Persistence Task,

differential aspects are found across the five facet scales of the DIFF-S but not, notably, with the Breath-Holding Test.

8.3.2: Implications

The present section discusses the implications of the findings as to Study Three in regard to the relationship between the DIFF-S tool and the behavioural approaches of distress intolerance. This section begins by reviewing the pertinent behavioural approaches, following this by discussing the implications for the relationships that arise between these behavioural approaches and the DIFF-S tool.

The behavioural approaches of distress intolerance manifest as different forms of experimental approaches that have been adapted in order to assess the toleration of distress stimuli in real-time experimental paradigms. These approaches differ in two main respects (Matthews, 2000). The first difference relates to the timescale of measuring distress, while the second difference pertains to the breadth of distress symptoms. Additionally, these measures are divided into two categories: physical tolerance tasks and cognitive tolerance tasks. Here, the physical tolerance tasks comprise both pain challenges and biological measures.

However, a little information is held as to how these behavioural measures are related to the measurement of the five facets of distress intolerance (as positioned together). This is because most previous research has focused on the examination of the relationship that arises between the self-report and behavioural measures of distress intolerance (e.g. Ameral, Palm Reed, Cameron, & Armstrong, 2014; Bernstein, Marshall, & Zvolensky, 2011; McHugh, Hearon, Halperin and Otto, 2011), here mostly targeting those measures that assess some specific aspects of this construct. There is thus a lack of research that has considered the measurement of the five facets of distress intolerance together alongside the behavioural measures. As a result, the available literature is significantly fragmented across the different conceptualisation measures employed in relation to this construct. To address this gap within the literature, currently study aimed at investigating the interrelations between the DIFF-S tool and two forms of the behavioural approaches, by employing two separate samples. Sample One was used for undertaking experiments as to the integration between the DIFF-S tool and the Mirror-Tracing Persistence Task, while Sample Two was used for undertaking experiments as to the relationships between the DIFF-S tool and two physical tasks (i.e. the Cold Pressor Task and Breath-Holding Test).

Therefore, Study Three has advanced this area of study by using measurements as to the five facets of distress intolerance, which can be considered to be of an advanced transmission in terms of the usage of instruments that assess specific facets of distress intolerance. In other words, this study has moved the research in this area forward by examining the five facets of distress intolerance (ambiguity, uncertainty, frustration, negative emotion and physical discomfort) together. This has further refined our understanding as to the integration of self-report and behavioural measures utilised in relation to this construct. This is because it provides us with evidence as to the ability of the DIFF-S tool in terms of identifying the associations that exist between these methods. Overall, this study introduces a new tool within the available self-report measures, one that can effectively show the differential associations that arise across the pertinent behavioural measures and different dimensions of distress intolerance. The DIFF-S tool is able to balance the benefits of the behavioural and self-report methods and could therefore replace the usage of the Cold Pressor Task and the Mirror-Tracing Persistence Task. However, although this study has attempted to consider cognitive tolerance tasks (e.g. Mirror-Tracing Persistence Task), physical tolerance tasks that include pain challenges (e.g. Cold Pressor Task) and biological measures (e.g. Breath-Holding Test), it does not cover some well-known tools in this area – such as the Paced Auditory Serial Addition Test (PASAT-C; Lejuez, Kahler, & Brown, 2003), the Algometer test and the Carbon Dioxide test (CO₂; Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005). Therefore, there is ambiguity in regard to the integration of the DIFF-S tool and these measures.

8.4: Distress Intolerance and Personality: The Position of the Five Facets of Distress Intolerance Within the Extant Lexical and Biological Models of Personality.

Section 8.4 reviews Study Four (Section 8.4.1) and discusses its implications (Section 8.4.2).

8.4.1: Summary of the Study's Novel Findings

Study Four is the first study to have examined the position of the five facets of distress intolerance within the extant lexical and biological models of personality. The exploratory factor analysis of the personality measures suggests five latent factors (which are similar to the five factors found in the model of personality), comprising

neuroticism, extraversion, behavioural activation/openness to experience, agreeableness and conscientiousness. A neuroticism factor score is central in predicting unique variance in both general distress intolerance and the majority of distress intolerance facets. Further distinctions have been found in relation to different personality dimensions (notably contrasting the constructs that represent low arousal and low appetitive motivation) in predicting particular distress intolerance facets.

8.4.2: Implications

The present section discusses the implications of the findings of Study Four, which examined the position of the five facets of distress intolerance within the extant lexical and biological models of personality. The section begins by reviewing the importance of this examination, subsequently discussing the implications of this study in terms of demonstrating the key theoretical and empirical underpinnings of each of the five facets of distress intolerance.

Within the available literature, the concept of distress intolerance has been linked to numerous personality variables (e.g. neuroticism – Norton & Mehta, 2007; extraversion – Berenbaum, Bredemeier, & Thompson, 2008; openness to experience – Fergus & Rowatt, 2014; authoritarian personality – Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950). Research suggests that there are wide theoretical contexts within which distress intolerance can be considered (e.g. Berenbaum et al., 2008; Fergus & Rowatt, 2014; Leyro et al., 2010; Norton & Mehta, 2007). However, disparate understandings as to distress intolerance arise from the personality perspective, this predominantly emerging from the recognition that no single context exists from which to assess and define distress intolerance. The development of the DIFF-S tool as an advanced measure as to the domain-general and the domain-specific five facets of distress intolerance (i.e. ambiguity, uncertainty, frustration, negative emotion and physical discomfort) (Bebane et al., 2015) provides an opportunity to explore the position of the five facets of distress intolerance within the various personality theories. This assists researchers in clarifying some of the theoretical and empirical underpinnings of each of the five distress intolerance facets in terms of the pertinent personality theories. Furthermore, the advances made in research in this area allow consideration to be given as to the position of the five facets of distress intolerance within the lexical (i.e. the five-factor model of personality; McCrae & John, 1992), biological (i.e. the bio-psychological model; Gray & McNaughton, 2000) and

subcortical emotion (Panksepp, 1982, 2005) models of personality. Here, previous research has primarily targeted the five-factor model of personality and distress intolerance, albeit with such studies being largely fragmented across the different conceptualisations of distress intolerance (e.g. Adorno et al., 1950; Berenbaum et al., 2008; Fergus & Rowatt, 2014; Norton & Mehta, 2007). Finally, this step forward helps us to understand to what extent the five facets of distress intolerance converge or diverge in terms of their relationship(s) with various personality traits – such as approach–avoidance behaviour, maladaptive behaviour and adaptiveness of thoughts, perceptions, feelings and behaviours.

Overall, the findings suggest that there are both dynamic and useful theoretical and empirical accounts in terms of the five facets of distress intolerance, with these demonstrating the convergences or divergences that arise in their relationships with a number of different personality traits. For instance, in terms of general distress intolerance, it is best accounted for as a combination of higher degrees of neuroticism (as representing general psychopathology and general negative affectivity; Leyro et al., 2010) and lower degrees of extraversion (best considered to reflect lower levels of need for arousal; Eysenck, 1967). This theoretical description is then echoed for two of the distress intolerance facets: intolerance of uncertainty and intolerance of negative emotion. Furthermore, the distinction between extraversion and behavioural activation/openness is very useful in drawing a theoretical distinction for both intolerance of ambiguity and intolerance of frustration. Here, in addition to neuroticism, lower behavioural activation/openness to experience (rather than low levels of extraversion/arousal) is able to predict the distress intolerance facets of ambiguity and frustration, with this being able to be understood in terms of lower levels of appetitive motivation to pursue and achieve goal-related experiences (Costa & McCrae, 1992; Gray, 1981, 1982). This provides a dynamic theoretical comparison between these sets of distress intolerance facets, with a low arousal context for describing intolerance of uncertainty and intolerance of negative emotion, and a low appetitive motivation to describe intolerance of ambiguity and intolerance of frustration. Furthermore, low agreeableness also predicts the unique variance in intolerance of frustration, with this suggesting that traits such as being unkind, unempathetic and uncooperative (Costa & McCrae, 1992) may define some aspects of intolerance of frustration, perhaps reflecting a theoretical context such as the frustration–aggression hypothesis whereby it is held that aggression emerges as a result of a failure to obtain particular goals (Dollard, Doob,

Miller, Mowrer, & Sears, 1939). Although neuroticism is a risk factor in increasing sensitivity towards physical discomfort (Denissen & Penke 2008), the development of intolerance of physical discomfort depends upon the psychological indices and the fact that uncomfortable bodily sensations are not necessarily painful (Leyro et al., 2010; Schmidt & Lerew, 1998). This facet may be better understood in terms of low levels of conscientiousness. This suggests that personality traits (such as low levels of self-discipline, goal pursuit, organisation and working hard) are associated with a higher degree of intolerance of physical discomfort, with this fitting within the wider theoretical context that low conscientiousness will result in less motivation or impulse control being held in response to disturbance (Costa & McCrae, 1992; Roberts, Jackson, Fayard, Edmonds & Meints, 2009). However, the possible importance of personality models in explaining the variance of distress intolerance diverges across the facets of distress intolerance. Furthermore, the findings of the latent factor structure of the personality measures require replication due to this step being able to contribute to the theoretical distinction between the different facets of distress intolerance.

8.5: Distress Intolerance and Executive Functions: Exploring the Theoretical and Empirical Accounts of the Five Facets of Distress Intolerance Within the Executive Functions.

Section 8.5 reviews Study Five (Section 8.5.1) and discusses its implications (Section 8.5.2).

8.5.1: Summary of the Study's Novel Findings

Study Five is the first study to have explored the theoretical and empirical accounts of the five facets of distress intolerance within the executive functions in terms of directed attention, working memory and the attentional networks. The findings suggest that there are no associations that arise between general distress intolerance and directed attention, working memory or the attentional networks. However, in terms of the five facets of distress intolerance, directed attention and the attentional networks were found to be involved with differential aspects across these five facets of distress intolerance. Intolerance of uncertainty has been found to be negatively associated with the alerting network. Intolerance of ambiguity and intolerance of negative emotion have been observed to be negatively correlated with the orienting network. Intolerance of frustration has been demonstrated to be negatively associated with the executive control

network. Finally, intolerance of frustration has been identified as having a negative association with directed attention.

8.5.2: Implications

The present section discusses the implications of the findings of Study Five in regard to them exploring the theoretical and empirical accounts of the five facets of distress intolerance within the executive functions in terms of directed attention, working memory and the attentional networks. The section begins by reviewing the pertinent literature in this area, following this with a discussion as to the implications of the findings of Study Five.

Within the available literature, although a growing body has detailed some of the distress intolerance facets (e.g. intolerance of ambiguity – Frenkel-Brunswik, 1949; intolerance of uncertainty – Dugas, Gagnon, Ladouceur, & Freeston, 1998; Grenier, Barrette, & Ladouceur, 2005; and intolerance of negative emotion – Simons & Gaher, 2005), noting these to be a result of cognitive processes, limited research has been undertaken that has considered the involvement of the cognitive processes in the structures of the five facets of distress intolerance. Therefore, the development of the DIFF-S tool provides researchers with an opportunity to assess how these facets of distress intolerance are related to cognitive processes. Here, exploring the connections that exist between the five facets of distress intolerance and directed attention, working memory and the attentional networks is able to clarify some of the theoretical and empirical underpinnings that relate to each of the five distress intolerance facets. For this purpose, current study aimed at investigating the correlations that arise between the five-facet model of distress intolerance and the executive functions by employing a sample of university students.

Overall, the findings suggest that there are some useful theoretical and empirical accounts that can be identified in terms of the five facets of distress intolerance and how they converge or diverge in their relationships with the executive functions. These findings provide essential support for research that suggests the involvement of cognitive processes within the structure of some of the facets of distress intolerance. For example, in terms of the attentional networks, the findings suggest the involvement of these functions upon an individual's capacity to withstand or behave appropriately in aversive states that involve tolerance of personal threat (arising as a consequence of uncertain and/or ambiguous life situations and a desperate need to escape those states

that involve unpleasant emotions or frustrating conditions). In particular, the lowering of the alerting network is associated with intolerance of uncertainty. Given that this network is assumed to be involved in the capacity of individuals to maintain a state of sensitivity towards incoming stimuli (Federico, Marotta, Adriani, Maccari, & Casagrande, 2013), the lower this capacity is the higher the sensitivity to incoming stimuli will be. Therefore, oversensitivity towards incoming uncertain stimuli could explain why uncertain situations are considered to represent a personal threat for those individuals who demonstrate intolerance of uncertainty (Dugas et al., 1998).

Furthermore, lower levels of the orienting network are correlated with two facets of distress intolerance: intolerance of ambiguity and intolerance of negative emotion. This network is assumed to be involved in the ability of individuals to focus on or select specific stimulus to attend to (Federico et al., 2013; Raz & Buhle, 2006). This aids individuals in regard to directing their attention appropriately. Therefore, lowering the level of orienting could decrease an individual's ability in terms of dealing with ambiguous or unpleasant incoming stimuli. Finally, the findings indicate that intolerance of frustration or a desperate need to escape states that involve frustrating conditions (Harrington, 2005) is correlated with a lower degree of the executive control network, this being assumed to be responsible for individuals being able to manage their behaviour in regard to resolving conflict when faced with alternative responses (Federico et al., 2013). From this, it can be concluded that individuals who demonstrate intolerance of frustration are unable to deal with states that involve different options due to their inability to withstand unexpected events (Froggatt, 2005).

In terms of directed attention and the five facets of distress intolerance, the findings suggest that intolerance of frustration is best accounted for as a combination of a lower degree of directed attention (which represents irritability and impatience) and a cumulative loss of effectiveness in thinking (Boksem, Meijman, & Lorist, 2005). Individuals who demonstrate a low degree of directed attention may encounter lower coping skills in states that involve frustration. So it can be concluded that this executive cognitive mechanism can explain, if only partially, the underlying reason as to the desperate need to escape those states that involve frustrating conditions. However, in employing three complex experimental approaches with the same participant via one experiment could affect the performance of that participant. Furthermore, the sample is based upon a university student population and therefore the current findings regarding the DIFF-S relationship with behaviour approaches need to be replicated in subsequent

research. This is particularly prudent given the finding that working memory is poorly associated with the five facets of distress intolerance (together and separately). As the central executive network (which represents a core aspect of working memory) is responsible for managing cognitive tasks such as problem solving (Collette & Linden, 2002), the possession of a lower problem-solving ability could be related to the domains that involve frustrating cases or unpleasant states. These findings are therefore worthy of further consideration due to their contribution towards demonstrating the key theoretical and empirical underpinnings of some of the facets of distress intolerance.

8.6: Distress Intolerance and Early Experiences: A Retrospective Examination of the Relationships Between the Five Facets of Distress Intolerance and the Family of Origin and Parental Bonding.

Section 8.6 reviews Study Six (Section 8.6.1) and discusses its implications (Section 8.6.2).

8.6.1: Summary of the Study's Novel Findings

Study Six is the first study to conduct a retrospective examination as to the relationships that exist between the five facets of distress intolerance and the family of origin and parental bonding. The findings reveal that there is emphasis on lower intimacy within dysfunctional family functioning, while higher levels of overprotection are related to the parental affectionless control style in terms of the associations with the five facets of distress intolerance. Despite the significant effects of both the family of origin and the parental bonding quadrants upon the five facets of distress intolerance, differential aspects arise across these five facets. Overall, the findings suggest that, retrospectively, the mechanisms of the family of origin and parental bonding are involved in the five facets of distress intolerance, yet these relationships are mediated by the respective family form and parental style experienced by the individual.

8.6.2: Implications

The present section discusses the implications of the findings that have arisen in Study Six, which comprised a retrospective examination as to the relationships that exist between the five facets of distress intolerance and the family of origin and parental bonding. The section begins by reviewing the pertinent literature in this area, following this by discussing the implications as to the retrospective examination of the

relationships that exist between the five facets of distress intolerance and the family of origin and parental bonding.

Although a complementary line of research exists that mainly focuses upon the underlying factors of distress intolerance, such work has primarily pertained to innate readiness (e.g., Amstadter et al., 2012). There is, therefore, a lack of knowledge as to other underlying factors in terms of the non-biological factors of distress intolerance (Bernstein, Vujanovic et al., 2011). It is held that exploring these possible underlying factors that relate to the inability of some individuals to tolerate or behave appropriately in states that involve ambiguity, uncertainty, frustration, negative emotion and/or physical discomfort may be particularly fruitful and clinically significant (Amstadter et al., 2012; Linehan, 1993a; Lynch & Mizon, 2011). Further examination of these factors is needed, but in a systematic manner. This can be achieved by considering the different facets of distress intolerance (together and separately) rather than in a fragmented manner (as has been found in much of the previous research in this area). Therefore, the development of the DIFF-S tool provides us with an opportunity to explore the underlying factors of distress intolerance in a systematic manner while simultaneously extending our understanding of this area by considering non-biological factors. In addition to investigating the relation networks of the five facets of distress intolerance, this would provide a greater degree of clarity as to some of the theoretical and empirical underpinnings that exist in relation to each of the five distress intolerance facets. For this, current study aimed at in investigate, retrospectively, the associations between the five facets model of distress intolerance and two early experiences, by employing a sample of university students.

The findings suggest that, retrospectively, the mechanisms of the family of origin and parental bonding impact upon the five facets of distress intolerance, but that these involvements are mediated by the respective family form and parental style experienced by each individual. Overall, this provides support to the generally held theoretical perspectives as to the possible involvement of non-biological factors in distress intolerance (e.g. Linehan, 1993a; Lynch & Mizon, 2011). Furthermore, the findings highlight three main points in regard to the possible involvement of different family forms and parental styles. The first relates to dysfunctional family functioning, which refers to families that are characterised by the provision of low degrees of autonomy and intimacy (Hovestadt, Anderson, Piercy, Cochran, & Fine, 1985). Individuals who grow up under such family conditions are expected to demonstrate a

strong inability to withstand or behave appropriately in states that involve frustration or negative emotion. The second finding here relates to the affectionless control style, which refers to the parental style that is characterised by the provision of a high degree of overprotection yet a low degree of care being given. The findings emphasise that individuals who grow up under such conditions tend to demonstrate a strong inability to tolerate or behave appropriately in states that involve uncertainty, frustration, negative emotion and/or physical discomfort. The third finding here pertains to the variances observed between the maternal and paternal styles. The maternal style tends to be more effective than the paternal style in terms of the mediation between both overprotection and care being given and the five facets of distress intolerance. However, retrospective studies depend upon the accuracy of the respondents in terms of what they can recall from past events. Therefore, this form of research is prone to bias because with retrospective studies depending upon the accuracy of the participants' recollections. Further investigation is therefore recommended. This is particularly prudent given the finding that a low degree of care being given within the neglectful parenting style is not related to the five facets of distress intolerance – a finding that is not consistent with the theoretical perspectives held as to this area (e.g. Linehan, 1993a). Therefore, this demands further consideration. Such step would provide an essential support regarding the nature of the connections that arise between both the family of origin and parental bonding quadrants and distress intolerance.

8.7: Future Directions

The findings of the studies presented in this thesis demonstrate that the DIFF-S tool, which represents a bifactor summary of distress intolerance, provides an advanced solution as to the conceptualisation and measurement issues of distress intolerance while also allowing a deep exploration of its relation networks. However, Section 8.1.2 noted that further research is needed in regard to exploring the stability and dimensional nature of the factor structure of the scales among different populations (such as the clinical population). Undertaking such research will provide further evidence as to the stability and validity of the DIFF-S tool and will prove the benefits of using this measure among different populations.

Section 8.2.2 noted that Study Two has only covered the self-report measures of distress intolerance, with additional attention being required in the area of the DIFF-S tool's validity, achievable by approaching this aim through experimental measures of

distress intolerance. This is particularly prudent given the ambiguity that arises in regard to the integration between both methods of distress intolerance and behavioural approaches versus self-report measures.

Section 8.3.2 discussed that although Study Three has attempted to consider the correlations between the DIFF-S and cognitive tolerance tasks (e.g. Mirror-Tracing Persistence Task), physical tolerance tasks, including pain challenges (e.g. Cold Pressor Task), and biological measures (e.g. Breath-Holding Test), it does not cover some well-known tools in this area – such as the Paced Auditory Serial Addition Test (PASAT-C; Lejuez et al., 2003), the Algometer test and the Carbon Dioxide test (CO₂; Brown et al., 2005). Therefore, ambiguity exists in regard to the integration between the DIFF-S tool and these measures. Further consideration being given as to the associations between the DIFF-S tool and these behavioural approaches is essential in terms of exploring the nature of the connections that arise between these methods of distress intolerance.

Section 8.4.2 explored the possible importance of personality models in explaining the variance found in distress intolerance across the different facets of distress intolerance. Furthermore, this section suggested that some of the findings need to be replicated with different samples. This is particularly prudent in regard to the finding that suggested that behavioural activation and openness to experience is related, with this making theoretical sense in terms of the possession of an appetitive motivation to pursue and achieve goal-related experiences (Gray 1981, 1982; Costa & McCrae, 1992). This finding is therefore very worthy of further consideration, not least because of its contribution towards making a theoretical distinction between different facets of distress intolerance.

Section 8.5.2 notes how using three experimental approaches with the same participant via one experiment could increase the possibility of side effects arising in regard to using different experimental measures. Therefore, further examination is required in terms of using a different sample and isolating the side effects of this approach. Furthermore, this section recommended the replication of the research in order to identify whether the same findings could be gained. This is particularly prudent given the finding that working memory is poorly associated with the five facets of distress intolerance (together and separately). This is because the possession of a low problem-solving ability could, for example, be related to the domains that involve frustrating situations or unpleasant states. These findings are therefore worthy of further

consideration due to their contribution towards demonstrating the key theoretical and empirical underpinnings of some of the facets of distress intolerance.

Finally, Section 8.6.2 asserted that further investigation is needed due to the findings of retrospective studies depending upon the accuracy of the participants' recollections as to past events, so that this form of research is prone to bias. Further investigation is therefore recommended, particularly in using participants whose family forms and parental bonding styles can be accurately recalled. Undertaking such step will provide further support regarding the nature of the connections that arise between both the family of origin and parental bonding quadrants and distress intolerance.

8.8: Conclusions

This thesis has reported six studies, all of which have examined a new conceptualisation of distress intolerance, its measurement issues and its relation networks. Study One has rerefined the measurement of distress intolerance, identifying a 20-item scale (Distress Intolerance Five Factor – Short [DIFF-S]) which comprises measures of ambiguity, uncertainty, frustration, negative emotion and physical discomfort. Study Two has examined the concurrent and construct validity and test–retest reliability of the DIFF-S tool, here indicating that the concurrent and construct validity of the DIFF-S tool is acceptable. Furthermore, its reliability over time is acceptable, with differential levels of validity and reliability being found across the DIFF-S tool's facets. Study Three has examined the relationship between the DIFF-S tool and the behavioural approaches of distress intolerance. The findings indicate that the DIFF-S is significantly correlated with higher physical distress intolerance (as indicated by the Cold Pressor Task) and cognitive distress intolerance (as indicated by the Mirror-Tracing Persistence Task). In their associations with the Cold Pressor Task and the Mirror-Tracing Persistence Task, differential aspects are found across the five facet scales of the DIFF-S but not, notably, with the Breath-Holding Test. Study Four has investigated the position of the five facets of distress intolerance within the extant lexical and biological models of personality. The findings as to the exploratory factor analysis of the personality measures suggest five latent factors (similar to the five-factor model of personality) comprising neuroticism, extraversion, behavioural activation/openness to experience, agreeableness and conscientiousness. The score gained in relation to the neuroticism factor has been found to be central in predicting unique variance in regard to general distress intolerance and the majority of the distress

intolerance facets. Further distinctions have been found for different personality dimensions (notably in contrasting constructs representing low arousal and low appetitive motivation) predicting particular distress intolerance facets. Study Five has explored the theoretical and empirical accounts as to the five facets of distress intolerance within the executive functions. Here the findings suggested that there are no associations between general distress intolerance and directed attention, working memory and the attentional networks. However, in terms of the five facets of distress intolerance, directed attention and the attentional networks were found to be involved with differential aspects across these five facets of distress intolerance. Here intolerance of uncertainty is negatively associated with the alerting network. The intolerance of ambiguity and intolerance of negative emotion facets are negatively correlated with the orienting network. Intolerance of frustration is negatively associated with the executive control network and negatively associated with directed attention. Finally, Study Six has investigated, retrospectively, the relationships between the five facets of distress intolerance and the family of origin and parental bonding, with the findings revealing an emphasis on lower degrees of intimacy being given within dysfunctional family functioning, while a higher degree of overprotection is associated with the parental affectionless control style in terms of the associations with the five facets of distress intolerance. Despite the significant effects of both the family of origin and the parental bonding quadrants upon the five facets of distress intolerance, there are differential aspects across these five facets of distress intolerance.

Overall, these studies have advanced our understanding as to the conceptualisation measurement issues of distress intolerance and its relational networks.

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