

CHILDHOOD PRECURSORS OF ADULT TRAIT INCOMPLETENESS

A Thesis Submitted to the Committee of Graduate Studies in Partial Fulfillment of the Requirements for the Degree of the Master of Science in the Faculty of Arts and Science

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Abstract

Childhood Precursors of Adult Trait Incompleteness

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Previous research has suggested that childhood sensory sensitivity may predict adult obsessive compulsive (OC) behaviours. To date, however, research has not addressed how the separate dimensions – harm avoidance and incompleteness - may influence this relationship or *why* it exists. The current study used a retrospective design to test a) if sensory sensitivity in childhood predicts trait incompleteness in adulthood, as well as b) if emotion regulation variables mediate this relationship. Questionnaires pertaining to OC dimensions and childhood anxieties were completed independently by 172 undergraduate participants and their primary childhood caregiver. Results showed a linear relationship between sensory sensitivity in childhood and incompleteness in adults. Emotion regulation variables failed to mediate this relationship, although a trend for mediation was present. Additionally, exploratory analysis found perfectionism in childhood to be a predictor of trait incompleteness but not harm avoidance, whereas physical anxieties predicted harm avoidance and not incompleteness. Results are discussed in the context of clinical and theoretical implications.

Keywords: Obsessive Compulsive Disorder, Sensory Sensitivity, Incompleteness, Harm Avoidance, Distress Tolerance, Symmetry

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Introduction

Obsessive Compulsive Disorder (OCD) is defined by *The Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association [APA], 2013) as intrusive unwanted thoughts (obsessions) that cause significant distress or anxiety, which are accompanied by obsessive compulsive (OC) behaviours or rituals (compulsions) performed in order to prevent, deter, or reduce the distress caused by the intrusive thoughts. Traditionally when using the DSM system, OCD is seen as categorical, that is the disorder is either present or not. However, OC behaviours are now widely accepted as existing on a continuum of severity and are expressed not only as a clinical disorder, but also as behaviours and tendencies within the general population (Ghisi, Chiri, Machetti, Sanavo & Sica, 2010). A much greater percentage of the population has subclinical OC symptoms, with only 2-3% of the population having clinical OCD (Abramowitz et al., 2014). Thus, researchers have a difficult time collecting clinical samples and often employ analogue samples such as college or university students, to study OC phenomena (Abramowitz et al., 2014, García-Soriano, Belloch, Morillo, & Clark, 2011). The use of analogue samples has been demonstrated as a valid way to research OC phenomena, which permits a cost effective and convenient way to collect data (Abramowitz et al., 2014; García-Soriano, Belloch, Morillo, & Clark, 2011). The ability to use analogue samples has allowed for a myriad of research on OC behaviours in the general population. Despite the extensive literature related to OCD and OC behaviours, a reliable way of classifying the perplexing diversity of OC symptoms has still eluded researchers and clinicians.

OCD has been traditionally classified by the overt behaviours the individual displayed (e.g., washing, ordering, hoarding, checking, or symmetry). However, not all of the behaviours are compatible with prevailing explanatory models of anxiety associated with OCD. For example, an individual may wash an object to avoid possible harm caused by contamination, or they may wash an object to keep it perfect or pristine. In contrast to the theory proposed by Salkovskis (1999), which describes anxiety related to OCD as caused by the catastrophic misinterpretation of intrusive thoughts, some individuals are motivated by a need to decrease their distress related to something not being ‘just right’ or perfect (Summerfeldt, 2004). Therefore, a new way of classifying OCD has been suggested based on the motivations behind the OC behaviours, rather than the overt behaviours themselves (Rasmussen & Eisen, 1992; Summerfeldt, 2004; Summerfeldt, Kloosterman, Antony & Swinson, 2014). Two core OC dimensions have been proposed: *harm avoidance* and *incompleteness*. Harm avoidance is characterized by anxious apprehension and exaggerated avoidance of threat, showing marked similarity to features of anxiety disorders. Incompleteness, in contrast, is thought to be specific to OC phenomena and is characterized by a persistent sense of dissatisfaction about the adequacy of one’s actions or perceptions (i.e., they are “not just right”) and the need to offset this. As these dimensions are on a continuum of severity and exist within the general population they can be considered personality traits which motivate an individual to behave in a certain way across a variety of situations (Rasmussen & Eisen, 1992).

The two core trait dimensions – harm avoidance and incompleteness – have increasingly been demonstrated to be separate constructs in both clinical and non-clinical populations (Summerfeldt, Kloosterman, Antony, & Swinson 2004; Ecker & Gonner,

2008; Summerfeldt, Kloosterman, Antony, & Swinson, 2014). For example, behaviours such as symmetry, arranging and ordering, are unique predictors of incompleteness, but not of harm avoidance (Ecker & Gonner, 2011; Gillis, 2013). Behaviours such as contamination/washing on the other hand are most commonly associated with harm avoidance (Ecker & Gonner, 2008). In addition, Gillis (2013) found that the two dimensions presented with different emotion regulation profiles. Those with harm avoidance had a profile of low emotional awareness, while those with incompleteness had increased emotional awareness. Thus, incompleteness and harm avoidance are two trait dimensions which serve to motivate different OC behaviours and present with different affect profiles.

Research surrounding anxiety and OCD has been studied extensively, but less is known about incompleteness and related constructs. The previous approach to classifying OCD based on behaviours and a unidimensional approach to the construct has proven to be too simplistic. There is a need for the development of further research into the dimension of trait incompleteness.

Incompleteness

Incompleteness is described as an inability to extinguish feelings of imperfection or not just right experiences, resulting in the continued use of compulsions in an attempt to attain feelings of perfection (Summerfeldt, 2004). Rather than feelings of anxiety described by individuals with harm avoidance, individuals with incompleteness describe discomfort, tension or unsettling feelings when things are not “perfect”. For example, Cogle, Jacobsen, Fitch and Lee (2013) used an in vivo situation task to elicit feelings of incompleteness in a sample of students. During these tasks individuals were shown a desk

covered with objects in disarray and asked to score both their discomfort from seeing the unorganized table and their need to arrange the objects. Individuals who had an increased urge to arrange the objects were motivated by feelings of distress, not anxiety. These unsettling feelings can manifest themselves across every sensory modality, including, auditory, gustatory, tactile sensations, visual, olfactory, and even cognitions (Summerfeldt, 2004). Accordingly, trait incompleteness has also been described as a need for sensory perfectionism (Summerfeldt, 2004).

Compulsions in individuals with incompleteness are used as a way to minimize distress when things are 'not just right'. The most commonly associated compulsions with incompleteness are symmetry, checking, ordering, and arranging (Cogle, Jacobsen, Fitch, & Lee, 2013). For instance, Ecker and Goner (2008) tested the hypothesis that different symptom dimensions (compulsions, checking, symmetry/ordering, obsessions, etc.) were associated with different OC dimensions in a clinical sample of OCD patients. They determined that symmetry/ordering behaviours consistently predict incompleteness but never predict harm avoidance. Similar results have been found in non-clinical samples, where individuals with higher levels of incompleteness are more likely to participate in symmetry behaviours, such as ordering and arranging (Cogle et al., 2013). A study by Pietrefesa and Coles (2009) using a non-clinical sample attempted to assess the distinctiveness of the two dimensions. They found differences between the dimensions including incompleteness having a unique relationship with perfectionism, symmetry and ordering behaviours. In a more recent study, Summerfeldt et al. (2015) used a series of images to judge an individual's preference for symmetry, and measured their level of incompleteness. They found that individuals with increased levels of

incompleteness had an increased preference for symmetry over those with lower levels of incompleteness.

Preferences and behaviours toward symmetry and sameness are found distributed throughout the general population (Radomsky & Rachman, 2004). Most individuals have some symmetry and sameness tendencies. For example, some individuals are particular about how their books are ordered on a shelf or how objects are aligned on their desk. In fact, a preference for symmetry is so ingrained in humans that we even judge beauty based on facial symmetry; the more symmetrical the face, the more beautiful a person is considered (Komori, Kawamura & Ishihara, 2009). Even in ancient history sculptures were depicted with perfect proportions, called the Golden Ratio, because this was seen as more beautiful. However, sometimes the need for symmetry is so intense it becomes impairing. An excessive need for symmetry and its impairing effects is most dramatically seen in individuals with OCD (Ecker & Goner, 2008; Leckman et al., 1997). Summerfeldt (2004), for example, describes a case study of an individual diagnosed with OCD who had an excessive need for order and symmetry. This preference for symmetry/order resulted in behaviours that took significant time and caused significant distress in the individual's daily life. Summerfeldt (2004) concluded that the motivation behind these behaviours was not a need to reduce anxiety or possible harm to themselves or others, but instead was a need for things to be 'just right' or 'perfect'.

To date, research on incompleteness has been mainly limited to how it presents itself in adulthood. The development and etiology of incompleteness warrants further exploration. The temperament and personality traits associated with OC behaviours, such as anxiety or perfectionism are relatively stable and often visible at a young age (Ivarsson

& Winge-Westhom, 2004). Thus, there is reason to believe that precursors to core OC dimensions may emerge early in life and show stability over time. For instance, Coles, Hart and Schofield (2012) investigated retrospectively the development of OCD, asking participants to report symptoms nine years before the onset of their OCD. Results indicated the symptom onset of OCD is gradual, starting in childhood and continuing into adulthood. Specifically, Coles et al. (2012) found the symptoms of anxiety, intolerance of uncertainty, perfectionism and increased distress preceded the onset of clinical levels of OCD in adulthood.

One precursor that has been gaining growing attention is sensory sensitivity. Lewin et al. (2015) investigated the relationship of sensory sensitivity in children with OCD. The authors found children with greater sensory sensitivity presented with increased compulsions related to symmetry, ritualization of eating and contamination¹. From this finding they suggest that sensory sensitivity should be further investigated with respect to stability over time and its relationship with early onset OCD. In another study, Dar et al. (2012) asked individuals to retrospectively report on sensory sensitivity as a child as well as current OC behaviours. The researchers found that those who reported increased sensory sensitivity in childhood reported greater OC behaviours in adulthood. Taken together, these studies suggest sensory sensitivity may be a key symptom in the onset of OC behaviours in childhood, which may continue into adulthood.

While Dar et al. (2012) supports the theory that sensory sensitivity is a childhood precursor of OCD, they fail to consider how the two separate dimensions may better explain this relationship. The separation of the two dimensions has been increasingly

¹ Contamination in this case refers to concerns of contact with different pollutions or dirty substances which may elicit an avoidance response.

supported within the adult literature, and should be further investigated in childhood (Summerfeldt et al., 2014; Pietrefesa & Coles, 2009). In particular, because of its connection with sensory perfectionism, incompleteness may develop from sensory sensitivities in childhood and deserves further exploration. Additionally, the authors have failed to assess *why* sensory sensitivity does not dissipate but continues into adulthood. Research surrounding the development of mental health disorders has implicated the inability to regulate negative emotions as a vulnerability for the development and maintenance of disorders (Carthy et al., 2010ab; Gross, 1998). A recent study by Gillis (2013) has suggested that the emotion regulation variable of *distress tolerance* (the ability to handle negative emotions) and emotional clarity were uniquely related to incompleteness.

The limitations of the current research and the need for further research in the development of incompleteness and its precursors warrants further exploration. In the current study we aim to investigate possible precursors to trait incompleteness such as sensory sensitivity, as well as the possible emotion regulation variables that may explain why sensory sensitivity continues from childhood into adulthood.

Emotional Competency

The literature on emotional competency is one of the fastest growing areas in research (Gross, 2013; DeSteno, Gross, & Kubzansky, 2013), with vast differences in who is studied (i.e., age and culture) as well as the psychopathologies investigated (Attention-Deficit Hyperactivity Disorder [ADHD], OCD, eating disorders, substance abuse; Aldao & Dixon-Gordon, 2014; Aldao, Nolen-Hoeksema & Schweizer, 2010). Due to this increased interest, gains in knowledge related to emotional competency have been

dramatic. For instance, it has been implicated as a trans-diagnostic variable and has been linked to the development and maintenance of many different psychopathologies (Berking & Wupperman, 2012). Some of these psychopathologies incorporate into their definitions an ability to regulate emotions as a quintessential characteristic of the disorder, such as personality disorders (Gross, 2013). Other psychopathologies may include it as a possible symptom which may or may not be present, such as ADHD (Gross, 2013). From this we can ascertain that emotional competency is a key construct that spans a large area in mental health.

Emotional competency is defined by Saarni (1999) as self-efficacy in our ability to manage our emotions in different situations. Becoming emotionally competent is rooted in social context and involves the development of many different skills, such as *emotion regulation*, *emotional awareness*, and *emotional acceptance* (Saarni, 1999). According to Lane and Schwartz (1987), these skills develop throughout an individual's early life. Without this development an individual cannot hope to successfully regulate and identify his/her emotions. In addition to this, an individual's social relationships will suffer, as well as their ability to handle negative emotions such as, sadness, worry or anxiety. Thus, the development of emotional competency is critical to an individual's mental health (Lane & Schwartz, 1987).

According to Gross (1998), emotions are response tendencies that arise from emotional cues in our environment; they are short lived, and can be modified through different strategies. Gross (1998) proposed the Emotion Generative Model, in which he describes the process of emotion regulation, which allows individuals to alter their response tendencies via several different mechanisms. Through one or a combination of

behavioural, experiential and/or physiological processes the individual is able to modify the response tendency, and express a different emotional response. The ability to modify a response tendency requires specific emotion regulation strategies that an individual develops through experience (Gross, 1998). Some of these regulation strategies are adaptive and some are considered maladaptive. Adaptive strategies, including problem solving, and reappraisal, are those that successfully decrease emotional distress (Gross, 1998). Maladaptive strategies, such as avoidance or distraction, are those that do not solve emotional distress successfully, or may make it worse. The use of rigid patterns of maladaptive emotion regulation skills is often seen in individuals who have not developed emotional competency (Lougheed & Hollenstein, 2012).

In addition to emotion regulation, another skill that must be developed for emotional competency is emotional awareness - - the ability to detect and identify different emotions as they are generated (Lane & Schwartz, 1987). Identifying emotions correctly allows for a better understanding of emotions, which results in better regulation of emotions. A healthy ability to detect and understand emotions is necessary for emotional competency, and greater social functioning. In fact, leadership and team work in the workplace has been shown to be improved when employees are taught greater emotional awareness and regulation (Ashkanasy, & Dasborough, 2003). In contrast, when an individual has poor emotional awareness this can lead to poor acceptance of emotion. Acceptance of emotions involves the acknowledgement of your emotions as they are, not trying to change or suppress them, even if it is distressing (Campbell-Sillis, Barlow, Brown & Hoffman, 2006). When individuals cannot accept their own emotions, they often use maladaptive strategies in an attempt to decrease the negative emotions they are

experiencing. Unfortunately, the use of these strategies is rarely successful in decreasing negative emotions and in some cases can even intensify the emotion (Gross, 1998). These intense emotions may cause difficulty controlling impulses resulting in the engagement of certain behaviours, such as use of compulsions found in OCD (Gratz & Gomer, 2003; Cogle, Timpano, Fitch & Hawkins, 2011). Increasingly in the literature there has been focus on poor emotion regulation as a mechanism for maladaptive behaviours and related psychopathologies including anxiety disorders, OCD, depression, personality disorders.

Emotional Competency and OCD. To date, research on OCD and emotional competency is limited. However, the work that exists suggests that those with OC behaviours struggle with varying aspects of key emotional skills. For example, a study by Summerfeldt and colleagues (2011) investigated the role of emotional intelligence in anxiety related disorders. Their results showed that individuals with the anxiety disorders investigated (which included an OCD sample) had lower scores on the emotional intelligence subscales of *stress management* and *adaptability*. This suggests a reduced ability to handle negative emotions, and an inability to change how they think about those negative emotions, may be present in individuals with OCD. In another study using an analogue OCD sample, Stern et al. (2014) demonstrated that compared to the control group, the analogue sample had considerably poorer emotional understanding, and more reactivity of their emotions. In addition, they found OC symptomology increased when individuals had increased reactivity to both negative and positive emotions. The authors indicated that the increased OC symptomology (i.e., compulsions) serves as a way to avoid specific emotions. This results in less experience with those emotions, perhaps causing the individual to eventually fear both positive and negative emotions. Fergus and

Bardeen (2014) also investigated different emotional variables and OC symptoms. They found that individuals with OC symptoms had difficulty inhibiting impulsive behaviours when experiencing negative emotions. In addition, those with increased OC symptoms had poor emotion regulation but had a heightened awareness of their emotions. The authors suggested that high emotional awareness combined with low emotional clarity may cause the use of poor emotion regulation strategies, resulting in poor impulse control.

Although most of the self-report literature suggests individuals with OCD have poor emotional competency, experimental designs have not been so conclusive. Kang, Namkoong, Yhung, and Joo Kim (2012) conducted a study looking at the ability of individuals to identify both non-ambiguous and ambiguous faces. Using both a control group and a clinical OCD group they found that individuals with OCD had poor recognition of the non-ambiguous faces when compared to the control group. In contrast, Young-Shin et al (2013), found no difference between controls and a clinical sample in the ability to identify different facial expressions. These inconclusive results may be the result of defining OCD as a unidimensional construct.

Emotional Competency and Incompleteness. Recent research suggests the ambiguity of the previous research may be because the two motivational dimensions, harm avoidance and incompleteness, have different emotional competency profiles. A study by Gillis (2013) investigated whether emotion regulation skills differed between the two dimensions. Her results, using a non-clinical sample, found increased emotional awareness present in individuals with incompleteness. This was in direct contrast to harm avoidance which demonstrated poor emotional awareness. In addition, although, poor

regulation skills were common in both dimensions, incompleteness had a profile of low distress tolerance and low impulse control. This implies that individuals who have incompleteness are very aware of their emotions but cannot handle the negative feelings, and are thus unable to control their behaviour when they experience these feelings.

Distress Tolerance

Distress tolerance is defined as the perceived or actual ability to manage negative emotions (Leyro, Zvolensky & Amit, 2010). It involves aspects in both cognitive appraisal, as well as emotion regulation. Cognitive skills, such as appraisal, are key to the concept of distress tolerance. In addition, the ability to change the way you think about a negative emotion (i.e., reappraisal) and emotion regulation skills also play an integral role in an individual's ability to handle distress (Cogle et al., 2011). For example, an individual must first conduct an appraisal of the emotional variables in order to assess whether they believe they can handle the negative emotion associated with the situation. Once the emotion has been assessed an individual may use adaptive or maladaptive skills depending on the perceived ability to handle the negative emotion. There has been considerable interest in distress tolerance because it seems to be a common factor in the development and maintenance of many different mental health disorders. Research has linked low distress tolerance to many different psychopathologies including but not limited to: anxiety, OCD, substance abuse disorders, and personality disorders (Zvolensky, Vujanovic, Berstein, & Leyro, 2010).

Low distress tolerance results in a maladaptive cycle that is maintained through negative reinforcement. Trafton and Gifford (2011) describe low distress tolerance as the inability to inhibit immediate negative reinforcement. The inability to inhibit immediate

negative reinforcement leads to the use of maladaptive emotion regulation strategies because they, a) have a smaller cognitive load than more complex emotion regulation strategies, and b) are instantly gratifying (Leyro et al., 2010). For example, those who have low distress tolerance may use avoidance when exposed to a distressing stimuli to immediately decrease their distress (Simons & Gaher, 2005). Because these strategies are immediately gratifying in the short term, they are reinforced, solidifying them as reoccurring behaviours. Over time these reoccurring behaviours may become more severe and lead to the development of a mental health problems. This maladaptive cycle has been suggested as a mechanism for the development and maintenance of many different psychopathologies (Leyro et al., 2015).

Distress Tolerance and Incompleteness. Significant distress caused by intrusive thoughts and obsessions is one of the key symptoms of a diagnosis of OCD (APA, 2013). It is no surprise then that the relationship between OC behaviours and distress tolerance has been well documented. For example, Macatee, Capron, Schmidt and Cogle (2013) used a clinical sample of OCD out patients to demonstrate the relationship between OC behaviours and distress tolerance. They found that as an individual's distress tolerance increased the number of daily obsessions decreased. From this they concluded that distress tolerance may be related to the number of obsessions an individual experience. In support of this finding, Macatee and colleagues (2013), conducted a second study using a non-clinical sample and found the same results even after controlling for other significant stressors. A study by Twohig, Hays and Masuda (2006) looked at four different patients with different obsessions ranging from, checking, hoarding, to excessive need for cleanliness. Participants took part in in an eight-week treatment using Acceptance and

Commitment Therapy (ACT) for their OC behaviours. Through the use of ACT, the researchers were able to show that increased distress tolerance resulted in fewer compulsions due to obsessions, and an overall greater ability to manage negative emotions related to intrusive thoughts. In another study, again using a non-clinical sample of university students, Coughle, Timpano and Goetz (2012) found that low distress tolerance, and poor impulse control, predicted increased OC behaviours. These findings taken together suggest that the inability to accept and handle emotions, coupled with poor impulse control, may cause individuals to engage in OC behaviours to decrease negative emotions. Thus, we can surmise that distress intolerance is a key component in the maintenance of both compulsions and obsessions found in individuals with OCD.

To date, research looking at the separate dimension of incompleteness in conjunction with distress tolerance has been severely limited due to incompleteness being a relatively new construct. After a comprehensive literature review only a few articles could be found specifically related to incompleteness and distress tolerance. Over a series of three studies Coughle, Timpano, Fitch and Hawkins (2011), collected evidence suggesting that obsessions in a non-clinical sample, were related to lower distress tolerance. Of particular interest is the finding that after controlling for a variety of OC beliefs and symptoms, the only remaining association with distress tolerance was perfectionism and ordering symptoms. Building on this, a recent study looking at the emotion regulation differences between harm avoidance and incompleteness found that increased distress tolerance is negatively correlated with both incompleteness and harm avoidance - - making it a key factor in OCD (Gillis, 2013). Specifically, Gillis (2013)

found that the emotion regulation variables most strongly linked with incompleteness were low distress tolerance and poor impulse control.

Sensory Sensitivity

Developing an operational definition of sensory related experiences has been difficult due to the abundance of different terms within the literature. A recent meta-analysis by Schaaf and colleagues (2015) highlighted the multitude of different terms associated with sensory experiences (i.e., sensory sensitivity, sensory hypersensitivity, enhanced perception, sensation avoiding, sensation seeking, sensory integration). For the purposes of this paper we will refer to sensory related experiences as *sensory sensitivity*. Sensory sensitivity is characterized as a hyper-awareness of one or more sensory channels which causes the individual distress (Rogers & Luby, 2011). This can include any of the sensory modalities (i.e., taste, smell, sound, texture, or visual sensitivity). Most evident in early childhood, it can be considered normal for a child to experience sensitivity to different sensory modalities on a relatively small scale (a clothing tag causing discomfort, or the texture of food being displeasing; Carter, Ben-Sasson, Briggs-Gowan, 2011; Rogers & Luby, 2011). For most children the hypersensitivity is temporary and as they mature they will gradually transition out of this phase. However, when it is severely distressing and interferes with daily tasks, it may become more pervasive and impairing and continue into adulthood (Rogers & Luby, 2011).

Children with sensory sensitivity often use maladaptive coping skills to deal with their distress (Jerome & Liss, 2005). Because maladaptive skills are not effective at decreasing distress, they may perpetuate into different maladaptive behaviours, such as compulsions seen in OCD. In accordance with this, sensory sensitivity has been related to

both externalizing and internalizing disorders, including Attention Deficit Hyperactive Disorder (ADHD), OCD and different anxiety disorders (Dunn & Bennett, 2002; Dar, Kahn, & Carmeli 2012; Hofmann & Bitran, 2007). The most common disorder associated with difficulties in sensory processing is Autism Spectrum Disorder (ASD). In individuals with ASD sensory sensitivity often does not dissipate, but instead their sensitivities seem to increase as they progress into adulthood (Ben-Basson et al, 2008). The significant distress caused by sensory sensitivity has caused some researchers to suggest it be considered a diagnostic category in the DSM, called Sensory Over-Responsivity Disorder (SOR; Rogers & Luby, 2011). Although SOR was not added to the *DSM-5*, studies supporting SOR have shown that heightened sensory sensitivity is present at a young age and seems to be relatively stable over time (Ben-Sasson, Carter, Briggs-Gowan, 2010).

Sensory Sensitivity and Incompleteness. Sensory experiences have been suggested as a key concept related to OCD (Silva Prado et al., 2008). One of the first to describe this relationship was Miguel and colleagues (1997); they observed through the use of a clinical OCD and Gilles de la Tourette's syndrome sample that sensory phenomena preceded the onset of repetitive behaviours. From this Miguel et al. (1997) defined sensory phenomena as a negative subjective experience preceding the immediate onset and continuation of different OC related behaviours. More recently, Ferrao et al. (2011) have corroborated these results, investigating sensory phenomena in relation to repetitive behaviours in a clinical OCD sample. Their results showed that sensory phenomena specifically predicted different OC behaviours such as symmetry, ordering, and washing. In addition, the authors also found a significant number of individuals who

reported sensory phenomena had ‘not just right’ experiences. It is important to note, that although sensory phenomena and sensory sensitivity share similarities, they are not identical constructs.

Increasingly there has been interest in OC symptoms and their relationship to sensory sensitivity in childhood. For instance, in a series of case studies, Hazen et al. (2008) describe children who present with severe sensory sensitivity (e.g., distress caused by certain fabrics, textures, and sounds) and use a variety of obsessive behaviours. Hazen et al. (2008) concluded from their observations that obsessions may be a way of coping with the distress caused by sensory sensitivity. In another study using a self-report retrospective method, Dar, Kahn, and Carmeli (2012) measured both oral and tactile sensitivity in conjunction with OCD to determine if previous sensory sensitivity predicted current OC symptoms. Results showed that hypersensitivity to oral and tactile stimuli in childhood predicted OC symptoms in adulthood, even after controlling for the presence of anxiety. This could indicate that sensory sensitivity may precede the onset of OC symptoms or behaviours.

The specific distinction between sensory sensitivity and the two OC dimensions in the literature is currently limited to a few studies. A pilot study in our lab suggested sensory sensitivity in a non-clinical sample predicted incompleteness but not harm avoidance (Summerfeldt & MacKenzie, 2003). A related construct to incompleteness that has been measured in relation to sensory sensitivity is symmetry behaviours. Summers, Fitch, and Cogle (2014) conducted a more recent study using in vivo tasks across different sensory modalities (i.e., tactile, visual and auditory), while assessing the relationship with not just right experiences and OCD. The tasks included looking at a

cluttered table (visual), putting on an oversized coat improperly, and wiping their hand with a moist cloth (tactile), and listening to a song out of tune (auditory). After completing the task participants were asked to rate their discomfort. The results indicated that increased discomfort with sensory stimuli was associated with not just right experiences and specific OC symptoms of ordering, arranging, and checking, including aspects of perfectionism. The authors suggest that increased sensory sensitivity may elicit these behaviours when a predisposed individual is exposed to a stimulus that causes significant distress. In another study, Taylor and colleagues (2014) investigated whether sensory sensitivity to auditory and tactile stimuli predicted increased OC behaviours and symptoms. The results indicated that increased sensory sensitivity predicted greater OC symptoms (e.g., symmetry behaviours) and phenomena (e.g., incompleteness), even after controlling for other psychopathology. However, because this body of research is limited, further research is needed in this area.

Current Study

Preliminary research has suggested that sensory sensitivities in childhood may predict OC behaviours in adults (Dar et al., 2012). However, this research used a self-report retrospective method to investigate the extent to which childhood sensory sensitivities may be related to OC behaviours in adulthood (Dar et al., 2012). The current study aimed to improve on this methodology by independently measuring sensory sensitivity using both observer and self-report measures, thus removing possible self-report bias and recall. In addition, to date no research has looked at how the separate OC dimensions influence this relationship, or *why* sensory sensitivity may continue into adulthood. The present study sought to address these limitations by, a) looking at sensory

sensitivity as a precursor to trait incompleteness and its behaviours rather than OC behaviours in general, as well as b) investigating the influence of distress tolerance as a possible mechanism for why sensory sensitivity may continue from childhood into adulthood.

As an extension to the aforementioned questions, the current study also sought to investigate some of the adult equivalent variables. The present research supports the notion that symmetry behaviours may arise from distress caused by sensory sensitivity in adults. In the study by Taylor et al. (2014) they found sensory sensitivity was a correlate of incompleteness in adults, however they failed to assess how trait incompleteness may influence the relationship between sensory sensitivity and symmetry behaviours. In the current study we aimed to address this limitation by evaluating whether the dimension of trait incompleteness motivates the use of symmetry behaviours. There were three basic research questions to explore.

Hypothesis 1a. Based on the literature discussed above we know that temperament and personality traits related to OCD are present and stable from a young age (Ivarsson & Winge-Westhom, 2004). However, precursors to the OC dimensions are not well understood. If we consider incompleteness as a personality trait that crystallizes in early adulthood, there must be behaviours or events that came before the crystallization. Given that previous studies have shown that sensory sensitivity in childhood is related to OC behaviours in adulthood (Dar et al., 2012), we would like to replicate this finding. More specifically, we would like to clarify this relationship by showing sensory sensitivity in childhood is related to trait incompleteness and related behaviours. Thus, I postulate that increased sensory sensitivity in childhood has a direct

linear relationship with incompleteness in adulthood. In this model we are proposing that sensory sensitivity is a childhood precursor that directly relates to the adult trait of incompleteness.

Hypothesis 1b. Building on the first hypothesis, if it is found to be correct, there must be some sort of mechanism for which sensory sensitivity continues into adulthood, and manifests itself in different behaviours. One possible explanation is low distress tolerance. According to the literature on sensory sensitivity, an increased level of distress can cause an individual to participate in negative emotion regulation skills, resulting in behaviours that are impairing or negative for the individual (Jerome & Liss, 2005). Thus, it may be that low distress tolerance accounts (fully or partially) for the relationship between sensory sensitivity in childhood and trait incompleteness in adulthood. Therefore, I postulated that distress intolerance will mediate the relationship between sensory sensitivity in childhood and trait incompleteness in adulthood.

Hypothesis 2. If the relationship between sensory sensitivity and incompleteness is valid, I hypothesized that incompleteness may serve as a mechanism for symmetry behaviours to arise when an individual is distressed due to sensory sensitivity. To test this, incompleteness will serve as a mediator between sensory sensitivity and symmetry behaviours. In confirmatory factor analysis done on incompleteness and harm avoidance, incompleteness has always been a unique predictor of symmetry behaviours (Ecker & Gonner, 2011). Given that sensory sensitivity and incompleteness have been shown to be related in previous pilot work (Mackenzie, 2004), it may be that incompleteness accounts (fully or partially) for the relationship between sensory sensitivity and symmetry

behaviours. Therefore, I postulated that incompleteness will mediate the relationship between sensory sensitivity and symmetry behaviours in adults.

Method

Data Collection

In order to be eligible to participate in the study individuals must have been enrolled at Trent University during data collection. The use of a non-clinical sample has been shown to be a valid way of measuring OC behaviours and traits because they exist along a continuum and can be seen and studied within the general population (Burns, Formea, Keortge, & Sternberger, 1995; Radomsky & Rachman, 2004). Participants were recruited via a recruitment advertisement posted on the university's Research Participant Pool (See Appendix A). Through these advertisements participants were able to sign up for a time slot available during the week to participate in a lab setting.

Participants

Participants included undergraduate students who were enrolled at Trent University, during both the summer and fall semesters. In order to limit the time that parents had to remember, individuals were asked to be 24 years or younger (this fits within the time-frame to complete four years of university).

Demographics for the sample were similar to previous samples collected at Trent University. The final sample, following data cleaning, consisted of 172 participants (155 women, 17 men) with a mean age of 20.06 ± 1.17 . The majority were Caucasian (88%), single (58%) and in their first (59%) or second (31%) year of university.

Procedure

Part 1: In-Session. When participants arrived in the lab they were welcomed and given a general description of the study. They were reminded that they were responsible for coordinating this project with the participating primary caregiver. In addition, they were asked if they would be interested in participating in a second study that would only involve an additional measure sent to the primary caregiver. They were then provided with two copies of the consent form (see Appendix B) and given the opportunity for any questions and/or clarification. One consent form was signed and returned, and the other consent form was for them to keep for their records. Participants were asked to consent to a) completing the questionnaire, and b) having a questionnaire package be sent to their primary caregiver. Once consent was obtained, participants were provided with the self-report questionnaire package (see Appendix C), consisting of a parent contact sheet, a demographic sheet, (documenting participant age, gender identity, marital status, ethnicity, and level of study) and the measures described below. Upon completion of the questionnaire package, students were given a written debriefing form (see Appendix D), given the opportunity to ask questions/discuss the study, and received a final copy of the study's findings via email. Part I took approximately 35 minutes to complete.

Part II: Parent-Ratings. Within a few days after the completion of Part I, the parent package was mailed to the participating primary care giver. This package consisted of two consent forms (one to keep, and one to return), a letter of introduction, the study measures, and a feedback form (see Appendix E). A return-addressed and stamped envelope was also provided for the primary caregiver. Part II took approximately 40 minutes to complete. If the package had not been returned within three

weeks students were notified of the need to return the parent package. They were notified a maximum of three times. Once confirmation is given from the student that the package has been sent, students received two credits in compensation, worth two percent towards the current course they were enrolled in.

Measures

Demographics. Participants reported their date of birth, gender, marital status, ethnicity, and current level of university study.

Self-Report Measures.

Distress Tolerance Scale (DTS). The DTS (Simons & Gaher, 2005) is a 15-item self-report questionnaire developed to measure an individual's perceived ability to tolerate emotional distress. The DTS includes four different factors: Tolerance, Appraisal, Absorption and Regulation (Simons & Gaher 2005). Tolerance is an individual's ability to handle being distressed or upset, Appraisal involves the evaluation of the emotional experience, Absorption is the amount of attention given to the negative emotion and Regulation involves the use of regulation strategies (Simons & Gaher, 2005). Individuals completing the scale are asked to rate from 1 (*Strongly agree*) to 5 (*Strongly disagree*) their feelings about being distressed. Examples for items on the DTS include; "Feeling distressed or upset is unbearable to me" (Tolerance), "I can tolerate being distressed" (Appraisal), "My feelings of distress are so intense that they completely take over (Absorption), and "I'll do anything to avoid feeling distressed or upset" (Regulation). Lower scores indicate a better tolerance of distress, while higher scores indicate a lower tolerance of distress. The DTS has been shown to have good internal

consistency and validity (Simons & Gaher, 2005). In the current sample, DTS also showed good internal consistency ($\alpha = .84$).

Symmetry, Ordering and Arranging Questionnaire (SOAQ). The SOAQ (Radomsky & Rachman, 2004) is a 20 item self-report measure assessing symmetry and ordering behaviours, and beliefs. An example of an item included in the SOAQ is “It is essential that I arrange my clothing in a particular and specific way”. Participants are asked to indicate how much they agree with each statement ranging from 0 (*Not at all*) to 4 (*Extremely*), with higher scores indicating a greater preference for symmetry. The SOAQ has been found to have both good validity as well as test-retest reliability (Radomsky & Rachman, 2004). Cronbach’s alpha demonstrated good internal consistency ($\alpha = .96$).

Obsessive-Compulsive Trait Core Dimensions Questionnaire (OC-TCDQ). The OC-TCDQ (Summerfeldt, Kloosterman, Parker, Antony & Swinson, 2001) is a 20-item self-report measure that assesses the two motivational dimensions of OCD via two subscales - - incompleteness and harm avoidance. Fears related to harm to others or themselves as well as feelings of anxiety are related to the harm avoidance subscale, while incompleteness measures when an individual feels like things are not just right, or perfect. Each subscale has a total of 10 items, and each item is rated on a 5-point scale with items ranging from 1 (*Never*) to 5 (*Always*). If an individual scores higher on one subscale this indicates a higher level of that motivational dimension in the individual. An example of an item from the harm avoidance subscale is “Even if harm is very unlikely, I feel the need to prevent it at any cost”, and an example from the incompleteness subscale is “I am bothered by the sense that things are imperfect (such as belongings, ideas, or

tasks to be done”. The OC-TDQ has been shown to have both good validity and reliability among undergraduate participants (Summerfeldt et al., 2001). It showed similar good internal consistency in the current data set ($\alpha = .91$).

Adolescent/Adult Sensory Profile (AASP). The AASP (Brown & Dunn, 2002) is a 60 item self-report questionnaire that assesses sensory problems on four different quadrants: Sensory avoiding, sensitivity, sensory seeking and low registration. An example question would be “I am distracted if there is a lot of noise around”. Scores are recorded on a 5-point Likert scale for each item and range from 1 (*Never*) to 5 (*Always*). Internal consistency and validity have been found to be acceptable (Dunn, 2001). Using the current data Cronbach’s alpha also showed acceptable internal consistency ($\alpha = .76$).

Parent Report Measures.

Symmetry, Ordering and Arranging Questionnaire (SOAQ). Observer report on child symmetry ordering and arranging behaviours. See above.

Multidimensional Anxiety Scales for Children (MASC-2). The MASC-2 (March, 2004) is a 59-item parent report scale measuring symptoms related to anxiety disorders in children. Item scores range from 1 (*Never True*) to 4 (*Often True*). The scale has 5 different subscales consisting of separation anxiety/phobias, social anxiety, obsessions and compulsions, physical symptoms/anxieties and harm avoidance which is split into subscales of anxious coping and perfectionism. When completed the MASC-2 gives a total score which is the overall extent of symptoms of anxiety, and then scores for each subscale. An example of an item from the MASC-2 is “My child worried about other people laughing at him/her”. The MASC-2 has demonstrated good internal validity and

reliability (March, 2004). Cronbach's alpha using the current data showed that we had good internal consistency for the measure ($\alpha = .92$).

Sensory Profile. The Sensory Profile is a 39 item measurement of childhood sensory sensitivity which was created for the purposes of this study and similar studies. It is composed of selected items from two widely used sensory scales. Items were chosen based on a) inter-rater reliability on their relatedness to the OC profile, and b) an assessment of face validity indicating that these were 1) overt enough behaviours that they'd be reliably observed plus recalled by parents, 2) "normal" enough that they would not bias parent's report of them, and 3) selection of more robust items based upon a literature review for measures. The primary caregiver completes the questionnaire based on how often their child displays a certain behaviour. An example question would be "Displayed unusual need for touching certain toys, surfaces, or textures (for example, constantly touching objects)". Scores are recorded on a 5-point Likert scale for each item and range from 0 (*Never*) to 4 (*Always*). Cronbach's alpha showed that there was good internal consistency ($\alpha = .91$).

Results

Data Screening

Once data collection was completed the data set consisted of 181 participants. Of these participants, 6 did not have parent data and were therefore dropped from the data set. The data was then screened for accuracy of data entry, out of range scores, and reasonable means and standard deviations.

Self-reported data means and standard deviations were compared to normative data if available, if not, it was compared to a previous study done with a similar

population. For the most part the means and standard deviations from self-report collected data reflected the means and standard deviations of the norms and previous data collected (Table 1a). The two core dimensions of OC behaviours, incompleteness and harm avoidance were similar to previous samples using undergraduates (Gillis, 2013; Gillis et al., 2011). The SOAQ was higher than a previous normative sample collected by Radomsky and Rachman (2004; $M = 18.8$, $SD = 16$), however, it was similar to a sample from Gillis (2013); this result may be reflecting the difference between undergraduate samples and a general populations sample. The adult/adolescent sensory profile (AASP) norms are based on individuals without disabilities. They include cut score ranges for each of the subscales which match onto different classifications: much more than most, more than most, similar to most, less similar, and much less similar. All of the subscales except; Low Regulation fell within the classification similar to most, Low Regulation fell into more than most, but was just over the cut score range (Brown & Dunn, 2006).

Insert Table 1a here

Observer reported data was also compared to norms if available (Table 1b). The Multidimensional Anxiety Scale for Children (MASC) reflected higher norms than previously reported by March, Sullivan and Parker (1999). This may be an artifact of the current state of the student (higher anxiety scores), influencing the primary caregiver's reported data. There were no norms or previous studies using the Sensory Profile or observer reports of the SOAQ.

Insert Table 1b here

No data was missing a significant amount from one or more scales. Because there was such little missing data, data was replaced specific to each person's mean score on each scale, so as to have the most accurate replacement for each individual.

The data set was analyzed for univariate and multivariate outliers. Univariate outliers were identified using boxplots, and distribution graphs. A score was considered a univariate outlier if it was flagged as significant, however in order to conserve variance, outliers would be dealt with using transformations. After transformations three univariate outliers were removed. Mahalanobis' distance was used to identify multivariate outliers. No cases exceeded the critical value. The final sample consisted of 172 participants.

Assumptions

Normality was assessed using visual cues (histograms and Q-Q plots) as well as standardized skewness and kurtosis; this was obtained by dividing skewness or kurtosis by its standard error values. A variable was identified as being significantly skewed, or having significant kurtosis, if the standardized value was over the acceptable value of +/- 3.29 (Field, 2013, p.184). The variable was then transformed using first the most conservative (square root) for moderately skewed variables, and then a more liberal transformation (log10), for more substantially skewed variables. Variables were transformed in order to correct for outliers and skewness; transformations were seen as successful if they dealt with outliers and improved skewness (Tabachnik & Fidell, 1996, pg. 82). Although some measures continued to deviate from normality, all of the

transformations significantly improved normality of the measures as well as the outliers previously mentioned (Table 2).

Insert Table 2 here

According to Field (2013, pg. 168), when normality is not met for some variables it is important to realize this might introduce biases depending on which test is being used. Specifically, for regressions heteroscedasticity may become an issue, therefore it is important to test that the residuals are normally distributed. Heteroscedasticity was assessed during regression analyses by looking at residuals plots (Z_{pred} vs. Z_{resid}). For each hierarchical multiple regression analysis, the residual plots appeared to be satisfactorily distributed.

Bivariate correlations were used to check multicollinearity and singularity; these are not considered a problem if none of the correlations approach $r = .9$ (Tabachnick and Fidel 1996, pg. 89). When assessing multicollinearity and singularity only total scales or their subscales were analyzed to avoid singularity among scales. No correlation exceeded $r = .9$. Tolerance was also assessed during regression analyses as another way to test multicollinearity. A tolerance value below $r = .2$ may suggest a problem with multicollinearity (Field, 2013, p.325). No tolerance values were below $r = .2$, therefore tolerance was deemed acceptable and multicollinearity a non-issue.

Correlations

Self-Report Correlations. In order to determine the relationships between the self-reported variables, bivariate correlations were conducted (Table 3). INC and HA were significantly correlated at $r = .45, p < .001$. Although they are separate constructs,

this relatively high correlation has been demonstrated consistently throughout the literature (Summerfeldt, Kloosterman, Antony & Swinson, 2014). INC and HA were both related to all OC symmetry variable (as measured by SOAQ), behaviour variables (DTS) and sensory variables (as measured by AASP), except the sensory variable SensSeek. SensSeek was negatively associated with HA but not found to be significantly related to INC. The OC symmetry and behaviour variables, SOAQ, and DTS were positively correlated with each other. However, not all of the subscales of DTS were significantly related to the symmetry variables. The subscale Regulation did not correlate with SOAQ; SOAQ additionally, did not have significant relationships with Tolerance and Absorption. These variables showed small to medium effects with most of the AASP subscales. There was a unique negative relationship between SenSeek, as well as LowReg, which was significantly related to SOAQ and DTS. As was expected, INC had a stronger relationship with SOAQ than HA ($r = .72, p < .001$ vs. $r = .49, p < .001$).

Insert Table 3 here

Observer Report Correlations. As shown in Table 4 the observer reported variables of symmetry ($_{lg}PSOAQ$) and sensory sensitivity ($_{sq}Sptot$) were significantly correlated, $r = .41, p < .001$ as was hypothesized. $_{sq}Sptot$ also demonstrated positive correlations with all of the MASC subscales.

Insert Table 4 here

Between Subjects Correlations. To address the relationship between distress tolerances, sensory sensitivity in childhood and incompleteness, bivariate correlations were conducted (Table 5). Sensory Sensitivity in childhood ($_{sq}Sptot$), was positively correlated with INC in adulthood ($r = .23, p < .01$) as was hypothesized. DTS was also significantly correlated with $_{sq}Sptot$, as well as its two subscales (App and Abs). Observer reported sensory sensitivity ($_{sq}Sptot$) was not found to be significantly related to Sensory Sensitivity in adults. Observer reported SOAQ, was significantly correlated with self-reported SOAQ ($r = .39, p < .01$).

The MASC was correlated with INC in order to determine whether specific anxieties were related to incompleteness in adulthood. INC positively correlated with the MASC variables perfectionism (PER), Obsessive Compulsive symptoms ($_{1g}OC$) physical symptoms ($_{1g}PHY$) and separation anxiety ($_{sq}SEP$). HA was positively correlated with the MASC variables $_{1g}PHY$ and $_{1g}OC$. Each of the MASC variables was positively correlated with each other.

Insert Table 5 here

Mediation Models

There are three conditions specified by Baron and Kenny (1986) to determine if mediation takes place. The first condition is a significant relationship between the IV and the mediator, and the second condition is a significant relationship between the IV and the DV. Both of these conditions can be assessed through bivariate correlations. The final condition consists of a significant relationship between the mediator and the DV. In the final condition, a bivariate correlation cannot be used because these variables may be

related due to the shared variance with the IV. A hierarchical regression where the IV is controlled for is one way to assess this relationship. In the hierarchical regression the coefficient for the mediator should be significant, and the coefficient of the IV should decrease from step 1 to step 2, to determine if mediation is present. A Sobel's test is conducted if all of the conditions are met, in order to determine if the decrease in the IV coefficient is significant (Sobel, 1982, as cited in Baron & Kenny, 1986).

Distress Tolerance Model. To test the hypothesis that distress tolerance (DTS) would mediate the relationship between childhood sensory sensitivity and incompleteness in adulthood a mediation model was tested. The first two conditions were met (Baron & Kenny, 1986); all pathways between variables were significant (Table 5). A hierarchical regression was run to test the final condition (Table 6). R was significantly different from zero at the end of each step. After Step 2 with the IV in the equation $R^2 = .11$, $F(2,170) = 10.39$, $p < .001$. $sqSP_{tot}$ was entered in the first step and significantly predicted INC ($R^2 = .05$, $p < .01$). When DTS was added in step 2 the relationship between DTS and INC was significant, $sr(170) = .23$, $p < .01$ and DTS accounted for an additional 6% of variance. The effect of $sqSP_{tot}$ on INC was reduced when DTS was entered into the equation; the standardized regression coefficient for INC changed from .23 to .19 and semi partial correlations changed from .23 to .19 (see Figure 1). Because all of the conditions were met Sobel's test was run. The effect of $sqSP_{tot}$ and INC was not significantly reduced when DTS was entered into the analysis ($Z = 1.77$, ns.), although it was approaching significance $p = .08$. Therefore, the relationship between sensory sensitivity and incompleteness was not mediated by DTS. For this reason, the additional subscales of DTS significantly related to $sqSP_{tot}$ were assessed for possible mediation.

Insert Table 6 and Figure 1 here

Absorption as a Mediator. For the mediation of the relationship between childhood sensory sensitivity and adult incompleteness using absorption (Abs) as a mediator the first two conditions were met (Baron & Kenny, 1986); all pathways between variables were significant (Table 5). A hierarchical regression was run to test the final condition (Table 7). R was significantly different from zero at the end of each step. After Step 2, with the IV in the equation $R^2 = .09$, $F(2,170) = 8.35$, $p < .001$. $sqSP_{tot}$ was entered in the first step and significantly predicted INC ($R^2 = .05$, $p < .01$). When Abs was added in step 2 the relationship between Abs and INC was significant, $sr(170) = .20$, $p < .01$ and Abs accounted for an additional 4% of variance. The effect of $sqSP_{tot}$ on INC was reduced when Abs was entered into the equation; the standardized regression coefficient for INC changed from .23 to .19 and semi partial correlations changed from .23 to .20 (see Figure 2). Because all of the conditions were met Sobel's test was run. However, the effect of $sqSP_{tot}$ and INC was not significantly reduced when Abs was entered into the analysis ($Z = 1.76$, ns.), although it was approaching significance $p = .08$. Therefore, the relationship between sensory sensitivity and incompleteness was not mediated by difficulties absorbing specific emotions.

Insert Table 7 and Figure 2 here

Reappraisal as a Mediator. A third mediation was conducted using reappraisal (App) as a mediator instead of absorption. In this analysis the first two conditions were met (Baron & Kenny, 1986); all pathways between variables were significant (Table 5).

A hierarchical regression was run to test the final condition (Table 8). R was significantly different from zero at the end of each step. Including the IV in step 2, $R^2 = .13$, $F(2, 170) = 12.42$, $p < .001$. When $_{sq}Sptot$ was entered in the first step it significantly predicted INC ($R^2 = .05$, $p < .01$). When App was added in step 2 the relationship between App and INC was significant $sr(170) = .28$, $p < .001$, and App accounted for an additional 8% of the variance. When entering App into the equation the effect of $_{sq}Sptot$ on INC was reduced, the standardized regression coefficient for INC changed from .23 to .19 and the semi partial correlation changed from .23 to .19 (see Figure 3). Because all of the conditions were met, Sobel's test was used, however it showed that the relationship between $_{sq}Sptot$ and INC was not significantly reduced by App ($Z = 1.77$, ns), although it was approaching significance ($p = .08$). Therefore, the relationship between sensory sensitivity and incompleteness was not mediated by difficulties in reappraising emotions.

Insert Table 8 and Figure 3 here

Forward Regression. A forward regression was performed on DTS, Abs, and App for INC in order to determine the more salient predictor (Table 9). App was the only variable that predicted INC, accounting for 9.5% of the variance ($F [1, 171] = 17.80$, $p < .001$). None of the other variables reached significance. In summary, App is the most salient predictor of INC; none of the other variables added to the model.

Insert Table 9

Incompleteness Model. Two mediation models were conducted in order to determine if INC significantly mediates the relationship between adult sensory sensitivity and symmetry behaviours. The two models consisted of the self-report and observer reported SOAQ scores

Self-Reported SOAQ Scores. For the mediation of the relationship between adult sensory sensitivity (SensSens) and self-reported symmetry (SOAQ) using INC as a mediator, the first conditions were met (Baron & Kenny, 1986); all pathways between variables were significant (Table 3). A hierarchical regression was run to test the final condition (Table 10). R was significantly different from zero at the end of each step. After Step 2, with the IV in the equation $R^2 = .52$, $F(2,170) = 93.65$, $p < .001$. In the first step SensSens significantly predicted SOAQ ($R^2 = .11$, $p < .001$). When INC was added in step 2 the relationship between INC and SOAQ was significant, $sr(170) = .68$, $p < .001$, and INC accounted for an additional 42% of the variance. The effect of SensSens on SOAQ was reduced when INC was entered into the analysis; the standardized regression coefficient changed from .33 to .10 and the semi partial correlation changed from .33 to .14 (see Figure 4). Because all of the conditions were met Sobel's test was conducted; it was determined that the relationship between SensSens and SOAQ was significantly reduced when INC was entered into the analysis ($Z = 4.30$, $p < .001$). Therefore, the relationship between sensory sensitivity and self-reported symmetry behaviours was significantly mediated by INC.

Insert Table 10 and Figure 4 here

In order to account for the relationship between INC and HA an additional hierarchical regression was conducted entering HA into the model (Table 11). R was significantly different from zero at the end of each step. After Step 3, with all the variables in the equation $R^2 = .54$, $F(3,169) = 65.63$, $p < .001$. HA contributed significantly to the model, $F(1, 171) = 11.77$, $p < .01$ and accounted for 6.5% of variance. In step 2 SensSens contributed significantly to the model accounting for an additional 5.9% of the variance, with a significant R^2 change, $F(2, 170) = 11.94$, $p < .001$. In the final step the relationship between INC and SOAQ was significant, $sr(169) = .69$, $p < .001$. The effect of SensSens on SOAQ was reduced when INC was entered into the equation. The standardized regression coefficient changed from .27 to .14, and the semi partial correlation changed from .25 to .19. The standardized regression for HA changed from .25 to -.14, thus a negative suppression effect had taken place (see Figure 5). This suggests the variance between HA and INC is greater than the variance between HA and SOAQ. Because all of the conditions were met Sobel's test was conducted; it was determined that the relationship between SensSens and SOAQ was significantly reduced when controlling for HA and INC was entered into the analysis ($Z = 2.24$, $p < .05$). Therefore, the relationship between sensory sensitivity and self-reported symmetry behaviours is significantly mediated by INC, even after controlling for HA.

Insert Table 11 and Figure 5 here

Observer reported SOAQ Scores. A second analysis was done using observer rated symmetry ($igPSOAQ$) instead of self-reported symmetry (Baron & Kenny, 1986); all pathways between variables were significant (Table 5). A hierarchical regression was

run to test the final condition (Table 12). As before R was significantly different from zero at the end of each step. After Step 2, with the IV in the equation $R^2 = .15$, $F(2, 170) = 14.77$, $p < .001$. SensSens was entered in the first step and significantly predicted $\lg\text{SOAQ}$ ($R^2 = .024$, $p < .05$). When INC was added in step 2 the relationship between INC and $\lg\text{PSOAQ}$ was significant, $sr(170) = .36$, $p < .001$, and INC accounted for an additional 13% of variance. The effect of SensSens on $\lg\text{PSOAQ}$ was reduced when INC was entered into the equation; the standardized regression coefficient changed from .15 to .03 and the semi partial correlation changed from .15 to .03 (see Figure 6). Therefore, all of the conditions for mediation were met (Baron & Kenny, 1986). Sobel's test was used to determine if the relationship between SensSens and $\lg\text{PSOAQ}$ was significantly reduced when INC was entered as a mediator. It was found to be a significant mediator ($Z = 3.52$, $p < .001$). Therefore, the relationship between sensory sensitivity and observer report symmetry was significantly mediated by INC.

Insert Table 12 and Figure 6 here

In order to account for the relationship between INC and HA an additional hierarchical regression was conducted entering HA into the model (Table 11). After Step 3, with all the variables in the equation $R^2 = .15$, $F(3,169) = 10.09$, $p < .001$. HA contributed significantly to the model, $F(1, 171) = 9.88$, $p < .01$ and accounted for 4.9% of variance. In step 2 SensSens did not significantly add to the model accounting for only .3% of the variance, with a non-significant R^2 change, $F(2, 170) = 5.24$, $p < .01$. In the final step the relationship between INC and $\lg\text{PSOAQ}$ was significant, $sr(169) = .32$, $p < .001$. The effect of SensSens on $\lg\text{PSOAQ}$ was reduced with INC was entered into the

equation. The standardized regression coefficient changed from .07 to .01, and the semi partial correlation changed from .06 to .01. Because SensSens did not significantly predict $1gPSOAQ$ when HA was entered into the model we cannot say that INC mediated the relationship. A summary of the results can be seen in Table 13.

Insert Table 13 here

Extreme Groups Analyses

Mean Differences for High and Low Incompleteness. Main analysis variables were assessed to determine if mean differences exist when assessing extreme groups in incompleteness. For these analyses extreme groups were created using a tertile-split of self-reported incompleteness, with the upper and lower groups becoming high and low levels of incompleteness respectively. This extreme group method has been previously used when assessing incompleteness in a study by Kloosterman et al. (2013). Other variables were examined after to see if any additional differences existed.

Observer Reported Variables. The childhood observer variables $sqSPtot$, $1gPSOAQ$ and the MASC subscales: PER, AC, $1gPHYS$, $sqSEP$ and $1gOC$ were run using independent t-tests assessing differences in high and low levels of incompleteness. All of the variables except for $sqSPtot$ did not violate the assumption of homogeneity of variance, therefore analysis for $sqSPtot$ will be interpreted using equal variance not assumed, while the remainder will be interpreted using equal variances assumed. Table 14 shows the results of the analysis. Both $1gPSOAQ$ and $1gOC$ showed significant differences between high and low levels of incompleteness even after Bonferroni corrections (to control for inflation of type 1 error). In summary, individuals with higher

levels of incompleteness showed more obsessive compulsive symptoms in childhood, while lower levels of incompleteness showed less obsessive compulsive symptoms. On average those with more symmetry behaviours have higher levels of incompleteness, while those with lower levels of incompleteness show less symmetry behaviours.

Additional observer variables were analysed using Bonferroni correction to correct for Type 1 error inflation. No significant differences were found after Bonferroni corrections (Table 14).

Insert Table 14 here

Self-Report Variables. The adult self-reported variables SensSens, SOAQ, DTS and its subscales: App, and Abs were run using independent t-tests assessing mean differences in high and low levels for incompleteness. All the variables except for SOAQ did not violate the assumption of homogeneity of variance, therefore analysis for SOAQ will be interpreted using unequal variances, while the remainder will be interpreted using equal variances assumed. Table 15 shows the results of the analysis. All of the variables showed significantly higher scores in the high INC group before Bonferroni corrections. After the correction, DTS and Abs lost significance.

Additional observer variables were analysed using Bonferroni correction. Significant differences were found for the variable SensAv. It showed significantly higher means for high incompleteness compared to low incompleteness (Table 15).

Insert Table 15 here

Predicting Incompleteness Group Membership

A logistic regression was performed to further examine the relationship between selected childhood anxiety predictors, adult predictors and high and low levels of incompleteness. There are fewer assumptions for logistic regression, specifically normality is not an issue, and thus this was seen as a possible method for determining group membership. Additionally, differences could be assessed while controlling for HA.

Childhood predictor variables. The MASC variables $lgOC$, $lgPHY$, PER and AC , as well as $sqSptot$ were entered into Block 1, resulting in a significant test of the block, $\chi^2(5, N = 121) = 17.55, p < .01$, indicating that the childhood predictors significantly added to the prediction of group membership. The Hosmer and Lemeshow test statistic indicated good fit, $\chi^2(8, N = 121) = 7.92, p = .44$. The model was able to correctly classify 58% of those in the Low INC group and 66% of those in the High INC group, with an overall successful prediction rate of 62%. Only OC was a significant predictor. The odds ratio for OC was 493.85. Results can be seen in Table 16.

Insert Table 16 here

To account for the relationship between HA and INC, an additional logistic regression analysis was run with HA entered in the first block and childhood anxiety variables (as measured by the MASC), and sensory sensitivity entered in the second block. At Block 1, with HA entered, the model was statistically significant, $\chi^2(1, N = 121) = 23.85, p < .001$, indicating that HA contributed to prediction of group membership. The Hosmer and Lemeshow test statistic did indicate good fit, $\chi^2(7, N = 121) = 7.24, p = .41$. The model was able to correctly classify 67% of those in the low

INC group and 72% of those in the high INC group, with an overall successful prediction rate of 69%. The logistic regression coefficients, Wald χ^2 , odds ratio and 95% confidence intervals (CI) for the predictors can be found in Table 17. The odds ratio of 1.14 indicated that with a one-unit increase in HA, the odds of being in the high INC group would be .14 times more; that is as HA increases, one is more likely to be in the high INC group.

The MASC variables $lgOC$, $lgPHY$, PER and AC, as well as $sqSptot$ were entered into Block 2, resulting in a non-significant test of the block, $\chi^2(5, N = 121) = 9.07$, ns, and a negligible increase in the overall model coefficient, $\chi^2(6, N = 121) = 32.92$, $p < .001$; this indicates the childhood predictors did not add to the prediction of group membership, and significant prediction of INC group membership was due to the shared variance between HA and INC. The Hosmer and Lemeshow test statistic indicated good fit, $\chi^2(8, N = 121) = 7.59$, $p = .48$. The model was able to correctly classify 70% of those in the Low INC group and 75% of those in the High INC group, with an overall successful prediction rate of 73%. HA remained a significant predictor. The odds ratio for HA was 1.12, indicating that for every one-unit increase in HA the odds of being in the high INC group would be .12 times more. A summary of results can be seen in Table 17.

Insert Table 17 here

Adult predictor variables. SensSens, DTS and its subscales App and Abs were entered into a logistic regression, resulting in a significant test of the block, $\chi^2(4, N = 121) = 22.18$, $p < .001$; this indicates the adult predictors added to the prediction of group membership. The Hosmer and Lemeshow test statistic indicated good fit, $\chi^2(4, N = 121) = 6.78$, $p = .56$. The model was able to correctly classify 60% of those in the low INC

group and 67% of those in the high INC group, with an overall successful prediction rate of 64%. The logistic regression coefficients, Wald χ^2 , odds ratio and 95% confidence intervals (CI) for the predictors can be found in Table 18. Both App and SensSens were significant predictors. The odds ratio for App was 5.57, indicating the odds of being in the high INC group was 5.57 times more likely. The odds ratio for SensSens was 1.07, indicating that for every one-unit increase in SensSens the odds of being in the high INC would be .07 times more.

Insert Table 18 here

To account for the relationship between HA and INC, a logistic regression analysis was run with HA entered in the first block and childhood anxiety variables as measured by MASC, and SensSens were entered in the second block. At Block 1, with HA entered, the model was statistically significant, $\chi^2(1, N = 121) = 23.85, p < .001$, indicating that HA contributed to prediction of group membership. The Hosmer and Lemeshow test statistic did indicate good fit, $\chi^2(7, N = 121) = 7.24, p = .41$. The model was able to correctly classify 67% of those in the Low INC group and 72% of those in the High INC group, with an overall successful prediction rate of 69%. The logistic regression coefficients, Wald χ^2 , odds ratio and 95% confidence intervals (CI) for the predictors can be found in Table 17. The odds ratio of 1.14 indicated that with a one-unit increase in HA, the odds of being in the High INC group would be .14 times higher; that is as HA increases, one is more likely to be in the high INC group.

SensSens, DTS and its subscales App and Abs were entered into Block 2, resulting in a non-significant test of the block, $\chi^2(4, N = 121) = 8.72, ns$, and a negligible

increase in the overall model coefficient, $\chi^2(5, N = 121) = 32.57, p < .001$; this indicates that the adult predictors did not add to the prediction of group membership, and the significant prediction of INC group membership was due to the shared variance between HA and INC. The Hosmer and Lemeshow test statistic indicated good fit, $\chi^2(8, N = 121) = 4.03, p = .86$. The model was able to correctly classify 67% of those in the low INC group and 78% of those in the high INC group, with an overall successful prediction rate of 73%. Even though the model was not significant, App was a significant predictor in addition to HA. The odds ratio for HA was similar to the previous block, 1.11; and the odds ratio for App was 4.87, indicating that for every one-unit increase in App, it is almost five times more likely to be incorporated into the high INC group. A summary of results can be found in table 19.

Insert Table 19 here

Childhood Profile Analyses

Although no hypotheses were made on childhood precursors beyond sensory sensitivity, the relationship between MASC variables and INC and HA warranted additional analysing. A hierarchical multiple regression was performed to assess whether perfectionism anxiety in childhood predicts incompleteness in adults, above and beyond harm avoidance and childhood anxiety variables.

Childhood Anxiety predicting Harm Avoidance. The independent variables INC, and PER were entered at Step 1 followed by AC and \lg PHYS at step 2, predicting HA. After step 2, with all the variables entered in the equation $R^2 = .24, F(4, 168) = 13.49, p < .001$. At step 1 INC and PER contributed 21% of the variance, with INC

reaching significance ($R^2 = .21, p < .001$). $igPHYS$ which was entered at step 2, was also observed to be significant, $sr(168) = .20, p < .01$, accounting for an additional 3.9% of variance. In summary, adults with HA are more likely to have anxieties related to physical symptoms, regardless of other childhood anxieties and their current level of INC. A summary of the findings is in Table 20.

Insert Table 20 here

Childhood Anxiety predicting Incompleteness. The independent variables HA, AC, and $igPHYS$ were entered at Step 1 followed by PER at step 2, predicting INC. After step 2, with all the variables in the equation $R^2 = .25, F(4, 168) = 13.91, p < .001$. At step 1 HA and childhood anxiety variables contributed 21% of variance, with HA reaching significance ($R^2 = .21, p < .001$). PER, which was entered at Step 2, was also observed to be significant, $sr(168) = .22, p < .01$, accounting for an additional 3.9% of the variance. In summary, adults with incompleteness are more likely to have been children who had anxiety related to perfectionism, regardless of other childhood anxieties and their current level of harm avoidance. A summary of the findings is in Table 21.

Insert Table 21 here

Discussion

Incompleteness and harm avoidance are increasingly being recognized as two core dimensions related to OCD, but there is still much to be learned about the nature of, and mechanisms involved in this relationship (Summerfeldt, Kloosterman, Antony & Swinson, 2014). Harm avoidance is characterized by anxious apprehension and the use of

avoidance as a coping mechanism and is thus compatible with prevailing explanatory models of anxiety and its disorders (Ecker & Gonner, 2008). However, to date considerably less is known about the dimension of incompleteness. Although recent research has established that incompleteness is distinct from harm avoidance and that it plays a role in OC behaviours in adulthood, there has been little research on incompleteness in childhood. This is a topic warranting attention, as OC behaviours often have their onset early in life. The main objective of the present study was to investigate potential childhood precursors of incompleteness and how they may crystallize into adult traits and behaviours. To do this we analyzed data acquired using adult participants' self-report as well as retrospective (to childhood) observer-reports from the participants' primary caregiver.

The first goal of this study was to test for a direct relationship between parent-rated sensory sensitivity in childhood and self-reported incompleteness in adults. Such a relationship would provide support for the hypothesis that sensory sensitivity in childhood may be a critical precursor of incompleteness in adults. Previous research has suggested that there is a link between OC behaviours and increased reactivity toward sensory experiences in adults (Summers, Fitch & Cogle, 2014; Taylor et al., 2014); however, to date no one has examined how the different OC dimensions may affect this relationship. The second goal of our study was to investigate plausible mechanisms for the relationship between childhood sensory sensitivity and incompleteness in adults. Difficulties with distress tolerance may account for why sensory sensitivity continues from childhood into adulthood and may manifest as different OC behaviours. By examining distress tolerance as a mediator we were able to explore this relationship. The

third goal of the study was to investigate whether the presence of trait incompleteness explains why individuals who are distressed – due to sensory sensitivity – may participate in symmetry behaviours. This would be the first time a specific dimension related to OC behaviours was used to explain the relationship between sensory sensitivity and symmetry behaviours; both self and observer report of sensory sensitivity would be used. In addition to the specified research questions, several exploratory analyses were used to investigate the roles played by related variables. One such analysis included examining the differentiation of the two OC dimensions in childhood according to their association with divergent manifest symptoms and behaviours profiles - anxiety versus perfectionism.

The central hypotheses were partially supported, and this was also dependent upon the source of the data: adult self-reports and retrospective parent-reports yielded slightly different results. In general, sensory sensitivity and incompleteness were significantly related; however, distress tolerance did not significantly mediate the relationship between the two variables, and incompleteness did serve to mediate the relationship between sensory sensitivity and symmetry behaviours. In addition, several unanticipated but conceptually meaningful findings emerged, most markedly the exclusive associations, respectively, of harm avoidance with childhood anxiety symptoms, and of incompleteness with childhood perfectionism symptoms.

Incompleteness

Sensory Sensitivity in Childhood. We hypothesized that OC behaviours related to incompleteness in adults may develop from problems with sensory sensitivity in childhood. This hypothesis was supported. A small but statistically significant

relationship was found between parent-rated sensory sensitivity in childhood and incompleteness in adulthood. The fragility of this effect may be due to the retrospective nature of the study, to under reporting by parents, or to the difficulty of measuring sensory sensitivity in childhood (Schaaf & Lane, 2015). However, the relationship between self-reported sensory sensitivity and incompleteness was only slightly greater than the parent report.

This result is congruent with a growing body of empirical evidence that there is a link between OC symptoms and sensory sensitivity (Dar et al., 2012; Hazen et al., 2008; Taylor et al., 2014; Summers, Fitch & Cogle, 2014; Lewin et al., 2015). Some of this evidence has been found in child samples, for instance, children displaying increased sensory sensitivity have been found to be more likely to participate in OCD-related ritualistic behaviours, such as ordering and arranging, when exposed to distressing stimuli (Lewin et al., 2015; Hazen et al., 2008). Comparable findings have been reported with nonclinical adult samples (Taylor et al., 2014; Summers et al., 2014), indicating that increased sensory sensitivity in adults may result in an individual participating in specific OC behaviours (i.e., symmetry behaviours). However, to our knowledge only one published study has demonstrated a link between childhood sensory sensitivity and adult OC behaviours. Dar, Kahn and Carmeli (2012) used self-report and a retrospective design to assess increased sensory sensitivity in childhood and OC symptoms in adulthood in a non-clinical sample. Adult participants were asked to report on their own childhood as well as current (i.e., adult) behaviours. The researchers found childhood sensitivity to oral and tactile stimuli predicted greater OC symptoms in adulthood. The present study addressed a major limitation of the exclusively self-report methods used by Dar et al.,

(2012). By using independent raters to report retrospectively on childhood sensory sensitivity we were able to lessen the influence of common method variance and confounds related to retrospective self-report. In addition to this methodological strength, this is the first research to suggest childhood sensory sensitivity can be differentially related to OC-related core dimensions in adulthood, specifically to incompleteness. Taken together with previous research, the present study's results indicate that children with increased sensory sensitivity are more likely to engage in ritualistic behaviours, which if not addressed may solidify into more cross-situationally stable traits in adulthood, such as incompleteness.

Distress Tolerance as a Mediator. Our finding that sensory sensitivity in childhood is indeed related to adult incompleteness and OC behaviours, does not shed any light on *why* the relationship exists. To better understand this, it is necessary to consider the mediating roles played by other variables. One trans-diagnostic variable with potential explanatory value is distress tolerance. The construct of distress tolerance has two dimensions: cognitive appraisal, evaluation of whether an event or stimuli is negative, and emotion regulation, the ability to manage or change the negative perception of that stimulus (Coughe et al., 2011). Contrary to expectation, our results indicated that distress tolerance did not significantly mediate this relationship, even though it did reliably decrease the relationship between sensory sensitivity and incompleteness. It must be noted, however, that these conclusions reflect analyses using Sobel's test, which is a very conservative statistic when assessing the significance of mediation (Mackinnon, Warsi, & Dwyer, 1995). Thus it is plausible that with a larger sample and more power, the mediation pattern observed here would attain significance. For the present, we can

conclude that there was a trend for distress tolerance to mediate this relationship. A finding consistent with research which has shown distress tolerance as a predictor of OC-related traits and behaviours (Cogle et al., 2011, Cogle et al., 2012), including incompleteness (Gillis, 2013). The fragility of the effect, however, suggests that additional environmental and emotion regulation variables likely also play significant roles.

Distress tolerance has been described as a negative reinforcement variable (Zvolensky, Bernstein & Vujanovic, 2011). Individuals with low distress tolerance are posited to be more likely to give into behaviours to decrease felt distress. For instance, such an individual, experiencing distress following an obsession, would be more likely to avoid the stimuli that might trigger an obsession (i.e., active avoidance) or engage in compulsive rituals (i.e., passive avoidance). The use of avoidance, in this example, is then negatively reinforced leading the individual to be more likely to use avoidance as a coping mechanism again (McGuire et al., 2012; McGuire, Lewin & Storch, 2014). In the present study there was a trend suggesting that children who experience significant distress related to sensory sensitivities may use OC behaviours to reduce this distress. The effectiveness of OC behaviours in decreasing an individual's distress would render them self-perpetuating, and more likely to continue into adulthood (Cogle et al., 2011).

Since distress tolerance is a variable with both cognitive appraisal and emotion regulation aspects, it is operationalized with a variety of subdomains. Two of the most salient in the present study were *difficulties with reappraisal and appraisal*, and *total absorption of negative emotions*. Appraisal and reappraisal are advanced emotion regulation responses which allow the individual to restructure how a negative experience

is construed, rendering it less negative or more manageable (Gross, 1998). Difficulties with reappraisal result in the perpetuation, and often escalation, of negative emotional states (Gross, 1998). Absorption of negative emotions refers to the experience of being so overwhelmed by negative emotions that one is unable to think about anything else, and is therefore unable to engage in more adaptive regulation strategies (Gross, 1998). Both of these dimensions of distress intolerance are plausible mechanisms for the relationship between sensory sensitivity and incompleteness. However, analyses of the current study's data found that reappraisal/appraisal was the only significant predictor of incompleteness scores; it was therefore used as an plausible mediator for the relationship.

As with the mediation analysis of distress tolerance as a global variable, there was a notable trend, albeit not statistically significant, for reappraisal/appraisal to partly account for the relationship between sensory sensitivity and incompleteness. This finding, though not robust, is conceptually meaningful. Several studies have shown that an inability to reappraise at a young age leads to increased psychopathology in adulthood (Campbell-Sills, & Barlow, 2007; Nolen-Hoeksema, 2012; Jacob, Suveg, & Whitehead, 2013; Carthy, Horesh, Apter & Gross, 2010, Carthy Horesh, Apter, Edge & Gross, 2010). The results are also consistent with other recent research with a nonclinical sample, which used the same scale as the one used here to investigate whether distress tolerance mediated the relationship between sensory sensitivity and different psychopathologies (depression, anxiety and stress). Brindle, Moudling, Bakker, and Nadeljkovia (2015) found that reappraisal was the foremost predictor of a variety of psychopathologies, and also partially mediated the relationship between sensory sensitivity and psychopathologies. These findings, in combination with those of the present study

suggest that difficulties reappraising negative emotions related to sensory sensitivity may play a key role in the relationship often found between sensory sensitivity and OC behaviours. With regard to our research question, distress tolerance and specifically appraisal/reappraisal, may play a role in the continuation of childhood sensory sensitivity into adulthood. It must be kept in mind however, that there are likely other variables that also contribute.

Incompleteness as a Mediator. Several studies have suggested that OC symmetry behaviours may be used to alleviate distress caused by sensory sensitivity in nonclinical samples (Summers, Fitch & Cogle, 2014; Taylor et al., 2014). We hypothesized that incompleteness may motivate individuals to use symmetry behaviours to alleviate distress, that is, it is a mediator of this link. Our hypothesis was supported. Incompleteness entirely mediated the relationship regardless of whether symmetry behaviours were parent-rated or self-reported. This analysis of the motivation behind the behaviour expands on the understanding of why these behaviours occur when individuals are exposed to sensory stimuli. Trait incompleteness has been described as a form of *sensory perfectionism* (Coles et al., 2005; Summerfeldt et al., 2014). Symmetry-related behaviours, such as ordering, arranging, and aligning, may allow the individual to fulfil the need for sensory perfectionism, thereby reinforcing the behaviour and in doing so increasing the likelihood that it will be used again. Individuals high in trait incompleteness appear to use symmetry behaviours as a way to reduce the distress caused by sensory sensitivity.

In examining this possibility, it is important to take into account the known overlap between incompleteness and harm avoidance. Thus, to account for this overlap

harm avoidance was controlled statistically. The previous mediation relationship held even when harm avoidance was accounted for, however this was only true for self-reported symmetry scores. Moreover, and interestingly, the positive correlation between harm avoidance and symmetry behaviours became negative when incompleteness was incorporated into the equation. This is suggestive of a negative suppression effect (Tabachnick & Fidell, 2007). In this case the negative suppression is likely because the amount of shared variance between incompleteness and harm avoidance was larger than that between harm avoidance and symmetry behaviours. This would result in incompleteness “drawing” all of the variance (Tabachnick & Fidell, 2007). Shared variance between harm avoidance and incompleteness is well-recognized in non-clinical samples. This could be due to shared method variance (Summerfeldt et al., 2014; Taylor et al., 2014), as well as the over-arching influence of neuroticism or “compulsivity” as higher-order variables predictive of OC behaviours (Summerfeldt et al., 2014). What remains after the overlapping variance is removed, approximates the “true” or actual relationship between symmetry behaviours and the different motivations.

These findings suggest individuals high in harm avoidance alone are not likely to engage in symmetry behaviours but rather other OC behaviours (e.g., washing, checking), whereas those high in incompleteness are more likely to engage in symmetry related behaviours. This finding supports our hypothesis, and is also consistent with existing research showing differential relationships between the two core dimensions and OC symptom profiles, with incompleteness uniquely related to symmetry-related OC symptoms (Pietrefesa & Coles, 2009; Ecker & Gönner, 2008; Summerfeldt, 2004). This research highlights the importance of looking at the motivations behind OC behaviours to

better understand why the behaviour is conducted. By understanding the underlying motivation more effective treatments can be used in individuals with OCD. Future research should attempt to replicate these findings in clinical samples.

Extreme Group Analysis

Nonclinical analogue samples, characterized according to scores on measures of OC-related behaviours, are widely accepted as a valid way of studying OCD and its causes and correlates (Abramowitz et al., 2014). In addition to their practical benefits, analogue samples allow for the examination of OC behaviours without many of the confounds seen in clinical OCD, which is a severe mental disorder often comorbid with depression and anxiety disorders, and associated with severe life impairment (Abramowitz, et al., 2014). Accordingly, in the current study we thought it useful to re-examine some of our key research questions with data from a subset of extreme-scoring participants (i.e., with high versus low levels of incompleteness). Both childhood and adult variables were examined.

In childhood, OC and symmetry behaviours were the foremost predictors of group membership, suggesting that individuals higher in incompleteness may exhibit symmetry and OC behaviours at a young age. This is consistent with clinical samples in which children with OCD demonstrate a need for order, and structure and often participate in OC behaviours (Evans et al., 1997; Lewin et al., 2015). However, our results improved upon this research by assessing incompleteness in conjunction with specific behaviours in childhood, thereby furthering our understanding of the dimension. It is important to note that in the extreme groups analysis we did not find sensory sensitivity to be a predictor of group membership. There are several reasons which may explain this result. The self-

report data showed a fragile relationship between incompleteness and sensory sensitivity, and retrospective data can sometimes result in weaker relationships between variables. As well, measuring sensory sensitivity in childhood has some limitations (Schaaf & Lane, 2015). For instance, many of the measures used to quantify sensory sensitivity rely on observer report, which does not allow for insight into an individual's internal thoughts and feelings. This lack of insight may cause the observer to underestimate the extent to which a child is affected by sensory sensitivity. The relationship here was fairly fragile to begin with and problematic methodology could have resulted in the loss of significance.

In the adult variables, the foremost predictors of group membership included: sensory sensitivity, symmetry behaviours, and difficulties with appraisal/reappraisal. This is consistent with the current literature surrounding incompleteness and related OC behaviours, as well as what was found in other parts of this study. In clinical samples, symmetry behaviours are consistently seen as the most common manifested expression of incompleteness (Ecker & Gonner, 2008). In very recent research, sensory sensitivity was associated with behaviours related to incompleteness (i.e., symmetry behaviours, ordering and arranging; Taylor et al., 2014; Summers et al., 2014). Our results here support these findings, suggesting that individuals higher in incompleteness may present with sensory sensitivity which results in different OC behaviours. When looking at the distress tolerance domains, reappraisal/appraisal was the only variable associated with higher levels of incompleteness; this is consistent with our finding in the mediation analysis that reappraisal was the most salient predictor of the distress tolerance scales. The clinical literature surrounding emotion regulation also supports this finding, as reappraisal has been noted as a significant variable in the maintenance of different

psychopathologies (Campbell-Sills & Barlow, 2007; Nolen-Hoeksema, 2012; Jacob et al., 2013; Carthy et al., 2010, Carthy, Horesh, Apter, & Gross, 2010). This suggests that those individuals with increased levels of incompleteness may struggle with the ability to reappraise negative emotions, leading to the maintenance of their OC behaviours.

It is important to note however, that when harm avoidance was added to both the childhood and the adult extreme group analysis, harm avoidance became the foremost predictor for greater levels of incompleteness, and none of the other variables reached significance. Due to the nature of a logistic regression, the large overlapping variance between incompleteness and harm avoidance may not have allowed for the weaker associated variables to reach significance. An alternative explanation may be that the variables are not unique to one dimension but rather the underlying shared variance between the two dimensions. Thus, the variables may be more related to common factors such as, neuroticism, which is predictive of OC behaviours (Summerfedlt et al., 2014). Future research is needed to determine the true relationship with each dimension and these variables.

Childhood Profiles

The overarching research question for this thesis was whether the two core dimensions have specific childhood profiles. Through exploratory analysis, using the MASC, we uncovered two unique profiles associated with each dimension. The MASC measures anxiety related symptoms (e.g., physical, perfectionism, separation and general anxieties) through parental observations. From the analysis of the MASC domains in childhood, two unique symptom profiles emerged; physical anxieties predicting harm avoidance and perfectionism predicting incompleteness.

Harm avoidance, as mentioned previously, is characterized by anxious apprehension and is congruent with prevailing explanatory models of anxiety (Summerfeldt et al., 2014; Ecker & Gonner, 2008). That is, when an individual is anxious or fearful of a stimulus they will avoid it, which in turn decreases their anxiety. The decrease in anxiety then reinforces avoidance as a useful coping mechanism, making the individual more likely to avoid the stimuli again. Using the MASC we found that physical anxieties in childhood predicted harm avoidance in adulthood; no other variables predicted harm avoidance. Physical anxieties related to the MASC include: difficulty breathing, increased heartbeat, sweaty palms and dizziness. Incompleteness, in contrast, was associated with a completely different profile characterized by perfectionism in childhood. Perfectionism as measured by the MASC is exhibited through a need for order, following rules and general structure in life.

The childhood profile associated with harm avoidance warrants particular discussion, given how consistent it is with the observation that autonomic arousal is common in children with internalizing disorders (Kagan & Snidman, 1999; Boyce et al., 2001; Pine et al., 1998). Research on internalizing disorders in children, such as anxiety, has shown that they react with increased autonomic arousal, such as elevated heart rate and/or sweaty palms, to anxiety provoking stimuli (Boyce et al., 2001; Pine et al., 1998). Other research has found higher reactivity to stimuli, as reported by parents, as an early indicator for adult anxiety disorders (Kagan & Snidman, 1999; Rettew, Doyle, Kwan, Stanger & Hudziak, 2006). Cloninger (1986) proposed that if children perceive increased reactivity as negative and an experience they cannot manage this may cause the child to avoid the situations/stimuli, resulting in the perpetuation of fear related to these stimuli. If

not addressed, this behaviour may extend to other stimuli and develop into anxiety disorders or other psychopathologies (Cloninger, 1986). It is important to note that not all children who display these characteristics develop an anxiety disorder and there are likely other factors to be considered (Kagan & Snidman, 1999). Indeed, another study looking at childhood negative reactivity and the development of anxiety disorders found that only when negative reactivity was extreme did it predict anxiety disorders in adulthood. The researchers suggested other mechanisms should be assessed to help explain this relationship (Lonigan, Vasey, Phillips, & Hazen, 2004).

The current study's mediation analysis with distress tolerance and reappraisal, in the context of the extant research, may help explain why some children with these characteristics develop anxiety, and why others do not. Future research should assess the validity of reappraisal or distress tolerance as a possible mediator of the link between increased reactivity and the development of anxiety disorders. Gross' theory regarding reappraisal as an effective way of decreasing negative emotions and current literature in this area supports this idea. For instance, Carthy et al. (2010) found that anxious children were less likely to use reappraisal as an emotion regulation strategy. From this they suggest that the ability to reappraise may be a critical protection factor in the development and maintenance of anxiety disorders. Therefore, the physical symptoms associated with harm avoidance in our study, may indicate that harm avoidance has a similar developmental trajectory to anxiety disorders. This supports the theory of harm avoidance being more related to traditional anxiety models, even in childhood.

In contrast to harm avoidance, the childhood profile associated with incompleteness aligns well with what is known about how perfectionism manifests itself

in childhood. Although little research has examined perfectionism in children, a conceptually similar construct which has been documented in childhood is the need for order and structure (Robyn & Hinkley, 1998). Most of the research in this area focuses on the influence of parents and parenting style on the development of childhood perfectionism (Frost, Lahart, & Rosenblate, 1991; Ablard & Parker, 1997), thus focusing more upon social pressures, rather than personal need, for perfectionism. To date, there is very little research looking at children and their own personal need for perfectionism. This may be in part because perfectionism is an internal motivation and researchers have focused on the external behaviours related to perfectionism because they are easier to quantify reliably, particularly in children. A seemingly overlapping behaviour that has been well documented in childhood is *ritualism*. Ritualism in childhood is often measured with the Childhood Routines Inventory (CRI), which has highly similar items to the perfectionism subscale seen in the MASC (i.e., measuring need for order, structure, and following rules). Several studies have found a link between childhood ritualism and OCD (Leonard et al., 1990; Evans et al., 1997; Dar et al., 2008). In a study by Leonard and colleagues (1990), researchers retrospectively asked parents to report on their child's level of ritualism, using a control sample and clinical sample of individuals with OCD. They found parents of adults with OCD reported greater ritualism in childhood than those without OCD. Dar and colleagues (2012) found similar results using a nonclinical sample. Another study by Evans et al., (1997) found that ritualism in childhood, as measured by the CRI, was related to a need for things to be 'just right' in a variety of different sensory domains. This parallels how researchers have described incompleteness in adulthood, that is, individuals with incompleteness have a strong desire for things to be

'just right' across all sensory modalities (Summerfeldt et al., 2014). According to Evans et al. (1997), this ritualism seems to be a part of normal development, and unless extreme, lessens as the child grows older. The decrease of these ritualistic behaviours over time in some individuals, but not others, may be similar to the dissipation/continuation of sensory sensitivity proposed in the current study. As seen in the current study, poor distress tolerance or reappraisal/appraisal may be a plausible reason these behaviours are continuing into adulthood and developing into OC behaviours related to incompleteness as the child matures. Future research should assess emotion regulation variables as possible mediators. Our findings expand and improve current research by associating perfectionism to the specific core dimension of incompleteness rather than generalizing it to OCD as a unidimensional construct. Further research is needed to explore this finding.

The development of OC behaviours in childhood has been implied as dichotomous before, with repetitive behaviours having earlier onset than just right behaviours (Evans et al., 1997). The results from the current research supports the heterogeneity of early expression of OC-related behaviours in childhood. However, research has cautioned against the dichotomization of OC behaviours. Drawing upon the work of Summerfeldt et al. (2014) and Krueger et al. (2005) on dimensional models of psychopathology, we should look at them as traits on a continuum which may predict certain behaviours rather than discrete categories. This is the first research to look at the expression of behaviours in childhood, in relation to the specific core dimensions, and further research is needed to replicate these findings.

General Conclusions

This research is the first to look at childhood precursors in relation to the different OC motivational core dimensions. Increasingly, OCD research has recognized these two dimensions as distinct entities in adulthood, but much less research has been focused on these dimensions in childhood. This is an area warranting attention because the two core dimensions may have unique profiles in childhood, as well as different developmental pathways.

Problems with sensory integration are common in young children, although the difficulties are usually resolved as the child matures. For some children, however, the problems continue into adulthood and increase in severity leading to the use of different behaviours to decrease the resulting distress (Rogers & Luby, 2011). These different behaviours may develop as the child gets older into more circumscribed pathologies, such as OCD symptoms or behaviours. The present study supports this model by finding a direct linear relationship between sensory sensitivity in childhood and incompleteness in adulthood. One explanation for why it may not disappear with maturation but rather continue into adulthood, seems to be partially offered by distress tolerance and difficulties with emotion regulation, specifically appraisal and reappraisal. Individuals who have difficulty with these emotion regulation competencies may not feel they are adequately equipped to manage the distress caused by sensory sensitivity, leading to the use of different OC behaviours to reduce their distress. However, this result was not robust in the current study, and should be interpreted with caution. Future research with an enriched sample containing participants scoring higher in the variables of interest

(e.g., incompleteness), similar to clinically significant scores, may result in more robust findings.

Research has suggested that in adults, symmetry behaviours emerge to decrease distress caused by a sensitivity to sensory stimuli (Summers, Fitch & Cogle, 2014), however the mechanism for why these symmetry behaviours arise is unknown. The current study indicates that incompleteness, and not harm avoidance, serves as the motivation for symmetry behaviours to be adopted when an individual is feeling distressed due to sensory sensitivity. This is in line with previous research demonstrating different symptom profiles associated with each dimension. For example, harm avoidance seems to be related to behaviours such as contamination/washing, while research on incompleteness has found stronger relationships to symmetry, ordering and arranging behaviours (Summerfeldt, 2004; Summerfeldt et al., 2014; Pietrefesa, & Coles, 2009; Ecker & Gonner, 2008, Kloosterman et al., 2013; Ecker, Kuepfer, & Gonner, 2014). Thus, this research further supports the separation of the two dimensions by demonstrating different symptom profiles.

The most important overarching finding of the present study is that the two core dimensions are associated with distinct childhood symptom profiles. Harm avoidance presents itself as physical anxieties in childhood, which validates its conceptualization as a trait vulnerability factor for anxiety and anxiety disorders (Summerfeldt, 2004). This result is congruent with the increased autonomic arousal often seen in children, which may lead to the development of anxiety disorders in adulthood. In contrast, incompleteness was unrelated to physical anxieties and shows a very different childhood profile of perfectionism, which seems to be an internal representation of the ritualistic

behaviours often seen in childhood. These ritualistic behaviours are often described as part of normal development; however more severe levels of ritualism have been correlated with adult levels of OCD. Therefore, they may represent a unique developmental pathway to incompleteness in adulthood. Future research should look at mediator or moderator variables to explain why these behaviours persist into adulthood for some children. These findings are preliminary; more research must be done to replicate these findings.

Limitations and Future Directions

Although this study adds both to the body of literature on OC experiences and their motivations, there are several limitations that need to be acknowledged. The data were reliant on retrospective reports from the students' primary caregivers, and this method can be criticized for having several potential confounds. However, retrospective research is not uncommon and is used when more ideal (e.g., prospective longitudinal) methods are not viable (de Alvrenga et al., 2012; Lewin et al., 2015; Anderluh, Tchanturia, Rabe-Hesketh & Treasures, 2003; Coles, et al. 2012; Summers, Fitch, & Cogle, 2014). For instance, Lewin et al. (2015) asked parents to retrospectively report on childhood sensory over-responsivity in childhood, and Dar et al. (2012) collected retrospective self-reports of sensory sensitivity from adults with OCD. Previous research has also shown that retrospective studies have similar results to their longitudinal counterparts (Donsaldson & Grant-Vallone, 2002). One specific concern for the current study is the effect of parent's current perceptions of their children on their retrospective reports. It is plausible that if the adult child is currently very perfectionistic, the parent may selectively recall similar traits in childhood. However, the lack of a relationship

between parent-reported and self-reported sensory sensitivity suggests the parents were not overly influenced by their current perceptions. Future research should consider conducting prospective longitudinal studies assessing similar variables.

Another limitation was our use of self and observer report questionnaires. Self-report questionnaires are prone to limitations associated with self-perception (Campbell & Fiske, 1959; Donaldson, Thomas, & Graham, 2002; Graham, Collins, Donaldson, & Hansen, 1993; Schwartz, 1999; Stone & May, 2002; Abernathy, 2015). The most common limitations are social desirability and recall errors (Moorman, & Podsakoff, 1992; Zerbe & Paulhus, 1987; Abernathy, 2015). Social desirability may result in an individual underreporting on items that are perceived as not acceptable, and over reporting on items that are acceptable. Recall errors are individual differences in recall abilities, and biases affecting the accuracy of an individual's memory. These biases may not be independent of the individual's current adult perception of themselves. Self-report alone allows us to identify internal processes, such as motivations or desires. In contrast, observer report questionnaires allow researchers to gain access to a different perspective from self-report questionnaires. However, by changing the perspective we are no longer able to identify an individual's internal processes. Thus, it is suggested that both observer report and self-report questionnaires be used in tandem in order to get the clearest picture of the questions at hand (Abernathy, 2015). In this study we measured symmetry behaviours using both methods of reporting. Our results showed a medium effect size when looking at the correlation between the two methods, suggesting substantial interrater consistency.

Primary caregiver's attributes were not measured for any dimension as we did not want parent self-report to influence parent rating of children. For example, it was plausible that a parent's self-report of their own parallel attributes, like incompleteness, might serve to prime the parents to respond a certain way. Since we did not measure any parental variables, we were unable to assess how parental characteristics or parenting styles may influence their child's OC motivations and/or perfectionistic tendencies. Ideally, variables such as parental incompleteness, and parenting style may be assessed to determine their influence on a child's incompleteness and/or sensory sensitivity. Future research examining these variables may be able to gain a greater understanding of how the different dimensions develop from childhood into adulthood.

Recent research has highlighted issues such as inconsistent measures and observer report as weaknesses of measuring sensory sensitivity in childhood (Schaaf & Lane, 2015). As mentioned previously, by using observer report questionnaires we are unable to identify internal processes of the individual. For example, the parent raters in our study were only able to witness overt behavioural manifestations of sensory sensitivity, and must infer from this the inner life of the child. This could lead to underestimating the level of sensory sensitivity a child may experience. In addition to this, Schaaf and Lane (2015) conducted a meta-analysis on the uses of sensory sensitivity within current literature and found inconsistencies with the language and the measures used. With such inconsistencies it is difficult to compare research within the field. Due to these issues the researchers suggested using a measure that best suits the current cohort being researched. In alignment with this recommendation, the measure used in our study was derived by selecting a combination of questions which were judged to be most salient for OC

behaviours from two validated measures. Future research should look at the benefits of experimental methods of measuring sensory sensitivity (e.g., Real-time performance measures or approach avoidance tasks) as well as solidifying a universal measure/language of sensory sensitivity.

We found a significant relationship between self-reported sensory sensitivity and symmetry behaviours in adults, however we were unable to replicate this finding with parent-rated sensory sensitivity and symmetry behaviours in adults. There are a few reasons why this may have occurred. The first reason is that the relationship simply does not exist. However, we did find a relationship with self-reported sensory sensitivity and symmetry behaviours. Thus, a second option may be related to the instruments used. As mentioned previously there is no gold standard for measuring sensory sensitivity in childhood. The current measure may not have been sensitive enough to capture sensory sensitivity in childhood, especially for retrospective reports. Another explanation may be in part because the behaviours related to OCD are often idiosyncratic (Rachman, 1997). In fact, the Yale-Brown Obsessive Compulsive Scale (YBOCS) does not determine OCD diagnosis based on the number of symptoms, but rather the severity (Goodman et al., 1989). Thus, the global score of the current scale may have masked the severity of some individual's symptoms if they did not score high on all of the items. Future research should look into using measures that cater to the idiosyncratic nature of OC behaviours.

The data for this study was collected for convenience in an undergraduate population at Trent University. Convenience samples are often not generalizable because they reflect a unique subset of the population. For instance, individuals who attend university are often higher functioning than those who do not, and consequently may

exhibit more adaptive perfectionism rather than maladaptive perfectionism (Enns, Cox, Sareen & Freeman, 2001). However, our results showed a subset of our sample had increased pathological levels of perfectionism in childhood as measured by the MASC. The MASC measures pathological levels of anxiety symptoms that may continue into adulthood, had we measured perfectionism in adults we may have seen a similar subset of individuals with maladaptive perfectionism. Future research should attempt to replicate these findings in other samples as well as in clinical samples.

In addition to the previous suggestions future research is needed to replicate the childhood profiles found using the MASC, particularly using longitudinal research. This would allow for differences in the developmental pathways to be examined, while controlling for different factors. For instance, environmental factors such as parenting style may influence the way these constructs develop. Future research should also look further at perfectionism in childhood. Although the similar construct of ritualism has been studied extensively in childhood, the lack of research in perfectionism during childhood is something that needs to be addressed.

With regard to incompleteness and harm avoidance, more research is needed investigating the differential association with the two dimensions and childhood sensory sensitivity. To date, there has been no longitudinal research on the two core dimensions and sensory sensitivity. By looking at this relationship longitudinally we could partial out variables which might obscure their true relationship. One obscuring variable that has been mentioned in previous research is neuroticism (Summerfeldt et al., 2014). According to Summerfeldt et al. (2014), neuroticism may be a variable that explains the large overlap consistently seen when assessing the two dimensions. By accounting for

neuroticism we may better understand the relationship between sensory sensitivity and the different dimensions. As this is preliminary research, replication is key to determine if the connections found here are not due to the unique population.

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Table 1a

Descriptive Statistics for Self-Report Measures

Scale	Valid <i>N</i>	Possible Range	Actual Range	<i>M</i>	<i>SD</i>
DTS	172	1-5	1-5	2.83	.69
SOAQ	172	0-80	0-73	25.89	18.62
LowReg	172	15-75	20-61	36.76	7.53
SensSeek	172	15-75	23-71	49.91	8.14
SensSens	172	15-75	16-58	39.64	8.14
SensAv	172	15-75	22-61	38.55	7.72
INC	172	10-50	14-47	30.80	7.29
HA	172	10-50	10-44	27.51	7.34

Note. Means displayed here are from untransformed variables. DTS = Distress Tolerance Scale; SOAQ = Symmetry Ordering and Arranging Questionnaire; Adolescent/Adult Sensory Profile Subscales (LowReg = Low registration, SensSeek = Sensation seeking, SensSens = Sensory sensitivity, SensAv = Sensation avoiding); INC = Incompleteness; HA = Harm Avoidance

Table 1b

Descriptive Statistics for Observer Report Measures

Scale	Valid <i>N</i>	Possible Range	Actual Range	<i>M</i>	<i>SD</i>
SPtot	172	0-156	0-73	16.92	13.12
PSOAQ	172	0-80	0-63	10.85	13.80
MASC	172	39-156	55-135	82.91	12.03

Note. Means displayed are from untransformed variables. SPtot = Sensory Profile Total;

PSOAQ = Observer reported Symmetry Ordering and Arranging Questionnaire; MASC =

Multidimensional Anxiety Scale for Children

Table 2

Skewness and Kurtosis Ratios of Transformed Variables

Variable	Transformation	New Variable	Z Skewness	Z Kurtosis
MASC SEP	Square root	sqSep	2.49	.51
MASC OC	Log 10	lgOC	6.48	6.85
MASC SA	Log 10	lgSA	3.03	1.79
MASC PHYS	Log 10	lgPHYS	4.57	2.36
PSOAQ	Log 10	lgPSOAQ	.62	-3.00
SPtot	Square Root	sqSPtot	2.39	.19

Note. MASC = Multidimensional Anxiety Scale for Children; MASC Subscales (MASC Sep = Separation Anxiety, MASC OC = Obsessive Compulsive behaviours, MASC SA = Social Anxiety, MASC PHYS = Physical anxieties); PSOAQ = Observer report Symmetry Ordering and Arranging Questionnaire; SPtot = Sensory Profile

Table 3

Correlations between Self-Report Variables

Variable	DTS	App	Abs	Tol	Reg	SOAQ	LowReg	SenSeek	SensSens	SenAv	INC
App	.73***										
Abs	.86***	.58***									
Tol	.82***	.47***	.60***								
Reg	.85***	.62***	.62***	.56***							
SOAQ	.18*	.25**	.14	.13	.13						
LowReg	.25**	.29***	.16*	.18*	.23**	.16*					
SenSeek	-.12	-.01	-.11	-.22**	-.01	.04	-.04				
SensSens	.30***	.22**	.23**	.27***	.26**	.33***	.53***	-.39***			
SenAv	.29***	.25**	.24**	.26**	.21**	.26***	.38***	-.40***	.65***		
INC	.27***	.31***	.23**	.18*	.27***	.72***	.16*	-.07	.33***	.30***	
HA	.49***	.43***	.37***	.42*	.49***	.25***	.29***	-.26**	.43***	.40***	.45***

Note. DTS = Distress Tolerance Scale; DTS Subscales (App = Reappraisal/Appraisal Difficulties; Abs = Difficulties with Absorption of Emotions; Tol = Tolerance for Negative Emotions; Reg = Emotion Regulation) SOAQ = Symmetry Ordering and Arranging

Questionnaire; Adolescent/Adult Sensory Profile Subscales (LowReg = Low Registration, SenSeek = Sensory Seeking, SensSens = Sensory Sensitivity, SensAv = Sensory Avoidance) INC = Incompleteness; HA = Harm Avoidance

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

Table 4

Correlations between Observer Report Variables

Variable	sqSPtot	lgOC	lgPHYS	sqSEP	PER	AC	lgSA	MASC
lgOC	.61***							
lgPHYS	.45***	.50***						
sqSEP	.49***	.41***	.49***					
PER	.24**	.29***	.24**	.31***				
AC	.22**	.28***	.29***	.28***	.36***			
lgSA	.32***	.39***	.85***	.29***	.28***	.34***		
MASC	.52***	.53***	.79***	.74***	.56***	.48***	.63***	
lgPSOAQ	.41***	.42***	.23**	.27***	.17*	.08	.27***	.25**

Note. sqSPtot = Sensory Profile; MASC = Multidimensional Anxiety Scale for Children;

MASC Subscales (lgOC = Obsession and Compulsions, lgPHYS = Physical Anxieties,

sqSEP = Separation Anxiety, PER = Perfectionism, AC = Anxious coping, lgSA = Social

Anxiety) lgPSOAQ = Observer reported Symmetry Arranging and Ordering

Questionnaire

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

Table 5

Correlations between Self-Report and Observer Report Variables

Variable	Observer Report								
	sqSPtot	lgOC	lgPHY	sqSEP	PER	AC	lgSA	MASC	lgPSOAQ
Self-report									
DTS	.16*	.17*	.12	.09	.05	-.03	.10	.10	.10
App	.15*	.19*	.11	.10	.08	.06	.08	.11	.07
Abs	.18*	.19*	.14	.07	.03	-.02	.13	.10	.11
Tol	.09	.10	.07	.12	.05	-.03	.09	.07	.06
Reg	.12	.11	.09	.02	.02	-.09	.04	.05	.11
SOAQ	.14	.22**	.03	.10	.16*	.06	.06	.17	.39***
LowReg	.06	.14	.07	.05	.01	.07	.08	.06	.01
SenSeek	.00	.02	-.13	-.11	-.07	-.10	-.13	-.17*	-.08
SensSens	.11	.15*	.22**	.18*	.07	.07	.20**	.20**	.15*
SenAv	.10	.19*	.27***	.19*	.16*	.12	.27***	.27***	.17*
INC	.23*	.32***	.15*	.24**	.27***	.13	.16*	.26**	.39***
HA	.26*	.31***	.26**	.24**	.13	.14	.22**	.27***	.23**

Note. Observer Report Variables: sqSPtot = Sensory Profile; MASC = Multidimensional

Anxiety Scale for Children; MASC Subscales (lgOC = Obsessions and Compulsions,

lgPHY = Physical Anxieties, sqSEP = Separation Anxiety, PER = Perfectionism, AC =

Anxious Coping) lgPSOAQ = Observer reported Symmetry Arranging and Ordering

Questionnaire

Self-Report Variables: DTS = Distress Tolerance Scale; DTS Subscales (App = Difficulties with Reappraisal, Abs = Difficulties with Absorption, Tol = Difficulties tolerating negative emotions, Reg = Difficulties regulating emotions) SOAQ = Symmetry Ordering and Arranging Questionnaire; Adolescent/Adult Sensory Profile Subscales (LowReg = Low Registration, SenSeek = Sensory Seeking, SensSens = Sensory Sensitivity, SensAv = Sensory Avoidance) INC = Incompleteness; HA = Harm Avoidance

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

Table 6

Hierarchical Multiple Regression of DTS and $_{sq}SP_{tot}$ on INC (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	Adj R ²	R ² change	B	SE B	<i>B</i>
0									
1	$_{sq}SP_{tot}$	.23*	.23	.05*	.05		1.05	.35	.23**
2	$_{sq}SP_{tot}$	.19*	.33	.11**	.10	.06**	.88	.34	.19*
	DTS	.25**					2.55	.77	.24**

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. DTS = Distress Tolerance Scale; $_{sq}SP_{tot}$ = Sensory Profile; INC = Incompleteness

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

Table 7

Hierarchical Multiple Regression of Abs and $_{sq}SP_{tot}$ on INC (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	AdjR ²	R ² change	B	SE B	<i>B</i>
0									
1	$_{sq}SP_{tot}$	.23**	.23	.05*	.05		1.05	.35	.23**
2	$_{sq}SP_{tot}$	.20*	.30	.09**	.08	.04**	.89	.35	.19*
	Abs	.20**					1.58	.59	.20**

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. Abs = Difficulties with Absorption Subscale of Distress Tolerance Scale;

$_{sq}SP_{tot}$ = Sensory Profile; INC = Incompleteness

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

Table 8

Hierarchical Multiple Regression of App and sqSPtot on INC (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	AdjR ²	R ² change	B	SE B	β
0									
1	sqSPtot	.23***	.23	.05**	.05		1.05	.35	.23**
2	sqSPtot	.19*	.32	.13***	.12	.08***	.86	.34	.19*
	App	.28***					3.82	.99	.28***

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. App = Difficulties with Reappraisal Subscale of Distress Tolerance Scale;

sqSPtot = Sensory Profile; INC = Incompleteness

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

Table 9

Forward Regression with DTS, App and Abs predicting INC (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	AdjR ²	B	SE B	β
0								
1	App	.31***	.31***	.10	.09	4.20	1.0	.31***

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. DTS = Distress Tolerance Scale, Abs = Absorption subscale of DTS, App = Appraisal subscale of DTS

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

Table 10

Hierarchical Multiple Regression of SensSens and INC on Self-Reported SOAQ (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	AdjR ²	R ² change	B	SE B	<i>B</i>
0									
1	SensSens	.33***	.33***	.11	.10		.75	.17	.33***
2	SensSens	.14	.73***	.52	.52	.42***	.23	.13	.10
	INC	.68***					1.75	.14	.69***

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. SensSens = Sensory Sensitivity subscale of the Adult/Adolescent Sensory Profile; INC = Incompleteness; SOAQ = Symmetry Ordering and Arranging Questionnaire

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

Table 11

Hierarchical Multiple Regression of SensSens and INC on Self-Report SOAQ controlling for HA (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	AdjR ²	R ² change	B	SE B	<i>B</i>
0									
1	HA	.25	.25**	.07	.06		.65	.19	.25**
2	HA	.13	.35***	.12	.11	.06**	.35	.20	.14
	SensSens	.25**					.61	.18	.27**
3	HA	-.17*	.74***	.54	.53	.42***	-.36	.16	-.14*
	SensSens	.19*					.33	.13	.14*
	INC	.69***					1.88	.15	.73***

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. HA = Harm avoidance; SensSens = Sensory Sensitivity subscale of the Adult/Adolescent Sensory Profile; INC = Incompleteness; SOAQ = Symmetry Ordering and Arranging Questionnaire

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

Table 12

*Hierarchical Multiple Regression of SensSens and INC on Observer Reported _{lg}PSOAQ**(N=172)*

Step	Variable Entered	<i>sr</i>	R	R ²	AdjR ²	R ² change	B	SE B	β
0									
1	SensSens	.15*	.15*	.02	.02		.01	.00	.15*
2	SensSens	.03	.39***	.15	.14	.13***	.00	.00	.03
	INC	.36***					.02	.00	.38***

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. SensSens = Sensory Sensitivity subscale of the Adult/Adolescent Sensory Profile; INC = Incompleteness; _{lg}PSOAQ = Observer reported Symmetry Ordering and Arranging Questionnaire

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

Table 13

Hierarchical Multiple Regression of SensSens and INC on Observer-Reported lg PSOAQ controlling for HA (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	AdjR ²	R ² change	B	SE B	<i>B</i>
0									
1	HA	.23**	.23**	.06	.05		.01	.00	.23**
2	HA	.19**	.24**	.06	.05	.00	.01	.01	.21**
	SensSens	.06					.00	.00	.07
3	HA	.07	.39***	.15	.14	.09***	-.00	.01	.07
	SensSens	.01					.00	.00	.01
	INC	.32***					.02	.01	.35***

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. HA = Harm avoidance; SensSens = Sensory Sensitivity subscale of the Adult/Adolescent Sensory Profile; INC = Incompleteness; lg PSOAQ = Observer Reported Symmetry Ordering and Arranging Questionnaire

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

Table 14

Independent T-tests between Observer Reported Variables and High and Low Levels of Incompleteness

Variable	Incompleteness				t-statistic	P value
	Low		High			
	M	SD	M	SD		
_{lg} PSOAQ	.67	.37	1.05	.41	5.36	.00 [#]
PER	11.49	1.94	12.46	1.95	2.76	.01
_{lg} OC	1.41	.07	1.48	.12	3.81	.00 [#]
_{sq} SEP	3.26	.34	3.36	.38	1.46	Ns.
_{lg} SA	1.02	.09	1.05	.10	1.46	Ns.
_{lg} PHY	1.28	.08	1.31	.10	1.75	Ns.
AC	12.46	2.12	13.19	2.21	1.85	Ns.
_{sq} SPtot	3.49	1.50	4.25	1.62	2.67	.01

Note. _{lg}PSOAQ = Observer reported Symmetry Ordering and Arranging Questionnaire; MASC Subscales (PER = Perfectionism, _{lg}OC = Obsessions and Compulsions, _{sq}SEP = Separation Anxiety, _{lg}SA = Social Anxiety, _{lg}PHY = Physical Anxieties, AC = Anxious Coping); _{sq}SPtot = Sensory Profile;

[#]significant with Bonferonni adjustment

Table 15

Independent T-tests between Self-Reported Variables and High and Low Levels of Incompleteness

Variable	Incompleteness				t-statistic	P value
	Low		High			
	M	SD	M	SD		
SOAQ	12.18	11.28	40.92	16.92	11.10	.00 [#]
App	2.78	.47	3.13	.50	3.96	.00 [#]
Abs	2.61	.87	3.05	.88	2.79	.01
Reg	2.27	.87	2.63	.97	2.11	.04
Tol	2.78	1.05	3.06	.95	1.54	Ns
DTS	2.61	.68	2.97	.71	2.81	.01
SensSens	37.14	8.36	41.94	7.30	3.37	.00 [#]
SensAv	35.73	7.09	40.72	8.01	3.60	.00 [#]
SenSeek	50.43	8.53	49.92	9.34	.31	Ns
LowReg	35.54	8.18	37.39	7.03	1.34	Ns

Note. SOAQ = Symmetry Ordering and Arranging Questionnaire; DTS = Distress

Tolerance Scale; DTS Subscales (App = Reappraisal/Appraisal Difficulties, Abs =

Difficulties with Absorption, Reg = Emotion Regulation, Tol = Difficulties Tolerating

Emotions); Adolescent/Adult Sensory Profile Subscales (SensSens = Sensory Sensitivity,

SensAv = Sensory Avoidance, SenSeek = Sensory Seeking, LowReg = Low Registration)

[#] significant with Bonferonni adjustment

Table 16

Logistic Regression Predicting High INC Group Membership from Childhood Variables

Predictor	B	Wald χ^2	Odds Ratio	95% CI for Odds Ratio	
				Lower	Upper
_{lg} OC	6.20*	4.67*	493.85	1.78	137102.78
_{lg} PHY	-.32	.014	.73	.00	135.82
PER	.14	1.72	1.16	.93	1.43
AC	.08	.69	1.09	.90	1.31
_{sq} SPtot	.06	.14	1.07	.77	1.48
Intercept	-11.41*	6.08*			

Note. B = unstandardized coefficient; CI = confidence interval. INC = Incompleteness;

MASC Subscales (_{lg}OC = Obsessions and Compulsions, _{lg}PHY = Physical Anxieties,

PER = Perfectionism, AC = Anxious Coping) _{sq}SPtot = Sensory Profile

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

Table 17

Logistic Regression Predicting High INC Group Membership from HA entered at Step 1 and Childhood Variables entered at Step 2

Step	Predictor	B	Wald χ^2	Odds Ratio	95% CI for Odds Ratio	
					Lower	Upper
1	HA	.13***	19.00***	1.14	1.07	1.21
	Intercept	-3.37***	16.92***			
2	HA	.11***	13.03***	1.12	1.05	1.19
	lgOC	4.74	2.30	114.62	.25	52522.59
	lgPHY	-1.72	.32	.18	.00	66.04
	PER	.16	1.80	1.17	.93	1.47
	AC	.09	.66	1.09	.89	1.34
	sqSPtot	.04	.06	1.05	.74	1.49
	Intercept	10.68*	4.73*			

Note. B = unstandardized coefficient; CI = confidence interval. INC = Incompleteness;

HA = Harm Avoidance; MASC Subscales (lgOC = Obsessions and Compulsions, lgPHY

= Physical Anxieties, PER = Perfectionistic, AC = Anxious Coping); sqSPtot = Sensory

Profile

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

Table 18

Logistic Regression Predicting High INC Group Membership from Self-Report Variables

Predictor	B	Wald	Odds Ratio	95% CI for Odds Ratio	
				Lower	Upper
Abs	.47	.83	1.59	.583	4.36
App	1.72**	7.43**	5.57	1.62	19.12
DTS	-.95	1.53	.363	.087	1.74
SensSens	.07*	5.95*	1.07	1.01	1.13
Intercept	-6.35**	15.99***			

Note. B = unstandardized coefficient; CI = confidence interval. INC = Incompleteness;

DTS = Distress Tolerance Scale; DTS Subscales (Abs = Difficulties with Absorption,

App = Difficulties with reappraisal); SensSens = Sensory Sensitivity subscale of the

Adolescent/Adult Sensory Profile

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

Table 19

Logistic Regression Predicting High INC Group Membership from HA entered at Step 1 and Self-Report Variables entered at Step 2

Step	Predictor	B	Wald	Odds Ratio	95% CI for Odds Ratio	
					Lower	Upper
1	HA	.13***	19.00***	1.14	1.07	1.21
	Intercept	-3.37***	16.92***			
2	HA	.11**	9.39**	1.11	1.04	1.19
	Abs	.61	1.25	1.83	.63	5.29
	App	1.58*	5.59*	4.87	1.31	18.11
	DTS	-1.46	3.08	.23	.05	1.19
	SensSens	.04	2.06	1.04	.98	1.11
	Intercept	-6.80***	16.56***			

Note. B = unstandardized coefficient; CI = confidence interval. INC = Incompleteness;

HA = Harm Avoidance; DTS = Distress Tolerance Scale; DTS Subscales (Abs =

Difficulties with Absorption, App = Difficulties with reappraisal); SensSens = Sensory

Sensitivity Scale of Adolescent/Adult Sensory Profile

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

Table 20

Hierarchical Multiple Regression of Childhood Anxiety variables on HA (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	Adj R ²	R ² change	B	SE B	β
0									
1	INC	.44***	.45***	.21	.20	.21***	.46	.07	.45
	PER	.01					.03	.27	.01
2	INC	.43***	.49***	.24	.23	.04*	.44	.05	.52
	PER	-.05					-.20	.23	-.03
	AC	.04					.11	.24	.04
	_{lg} PHYS	.20**					14.70	5.54	.19

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. HA = Harm Avoidance; _{lg}PHYS = Physical Subscale of the MASC; AC = Anxious Coping Subscale of MASC, Per = Perfectionism Subscale of the MASC

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

Table 21

Hierarchical Multiple Regression of Childhood Anxiety variables on INC (N=172)

Step	Variable Entered	<i>sr</i>	R	R ²	AdjR ²	R ² change	B	SE B	β
0									
1	HA	.43***	.46***	.21	.20	.21***	.44	.07	.44
	lgPHYS	-.02					1.45	5.62	.02
	AC	-.07					.20	.23	.06
2	HA	.43***	.50**	.25	.23	.04**	.43	.07	.54
	lgPHYS	-.02					-1.61	5.59	-.02
	AC	.02					.05	.23	.01
	Per	.22**					.80	.27	.21

Note. *sr* = semi-partial correlations. B = unstandardized coefficient, β = standardized coefficient. HA = Harm Avoidance; lgPHYS = Physical Subscale of the MASC; AC = Anxious Coping Subscale of MASC, Per = Perfectionism Subscale of the MASC

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

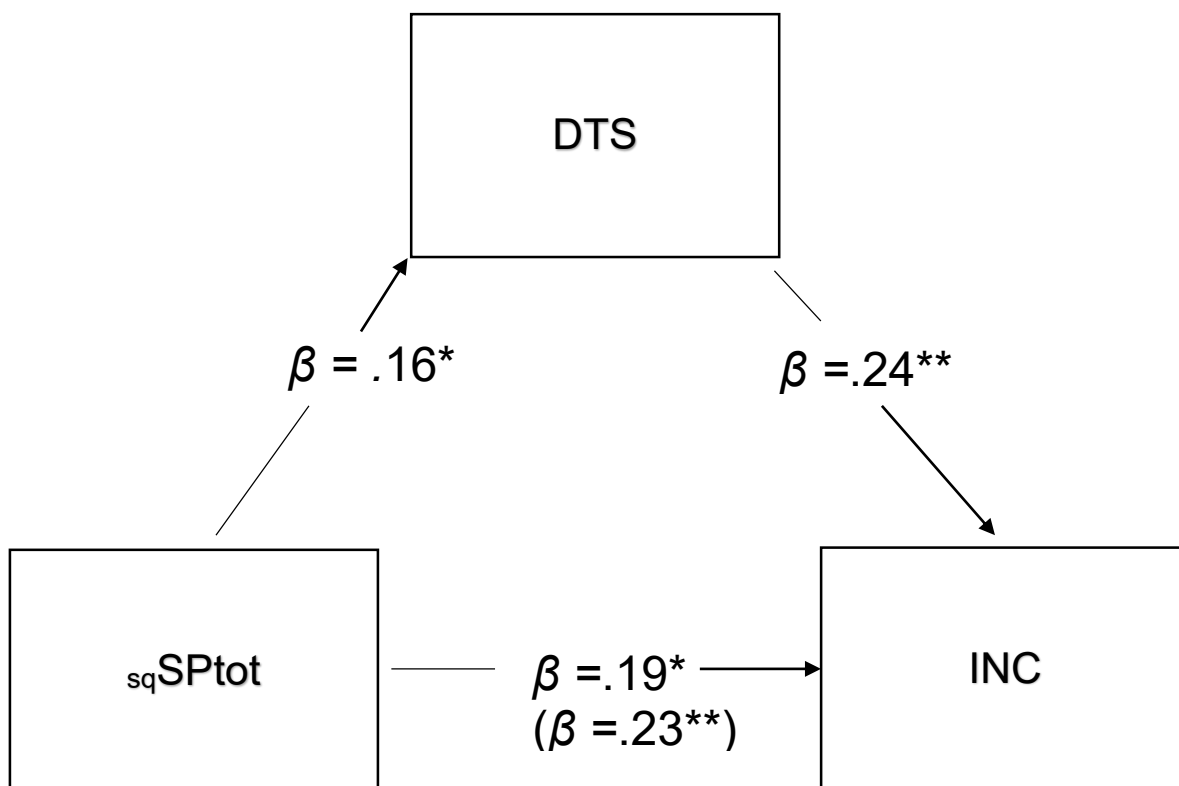


Figure 1. Standardized regression coefficients for the relationship between childhood sensory sensitivity, and incompleteness as mediated by distress tolerance. Brackets indicate coefficient between $_{sq}SP_{tot}$ and INC without DTS entered into the equation.

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

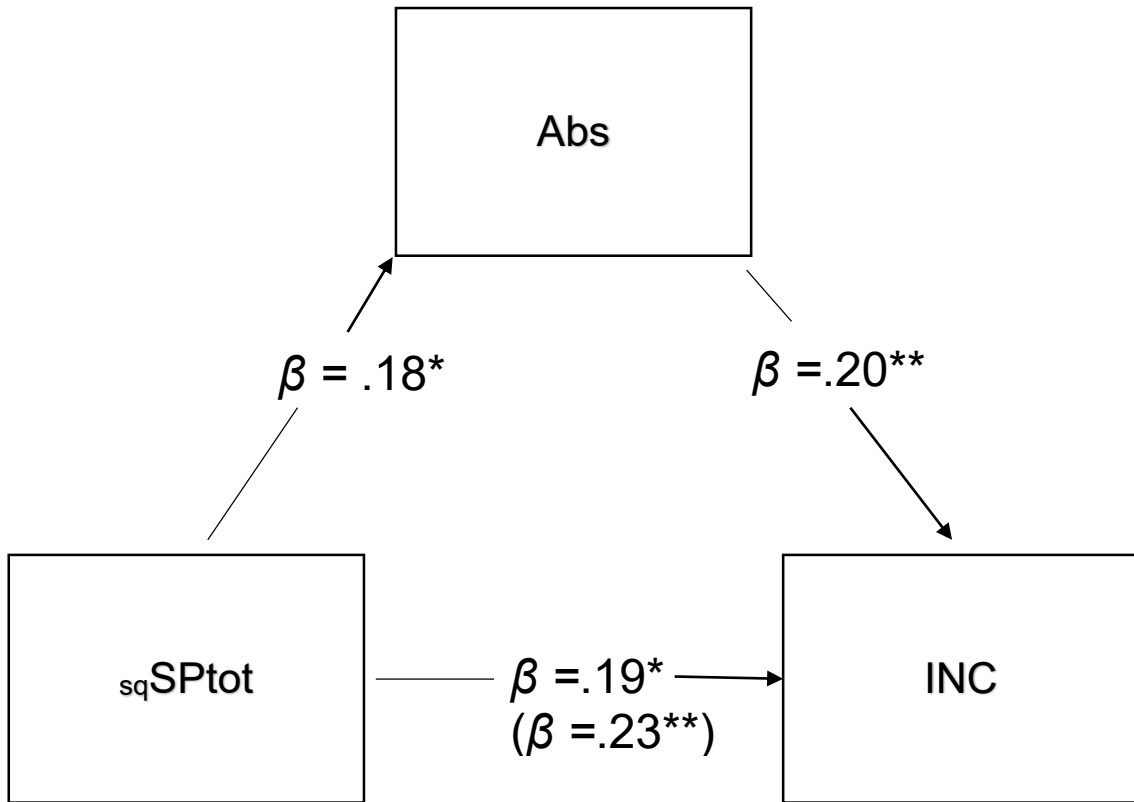


Figure 2. Standardized regression coefficients for the relationship between childhood sensory sensitivity, and incompleteness as mediated by difficulties with absorption. Brackets indicate coefficient between $sqSPtot$ and INC without Abs entered into the equation.

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

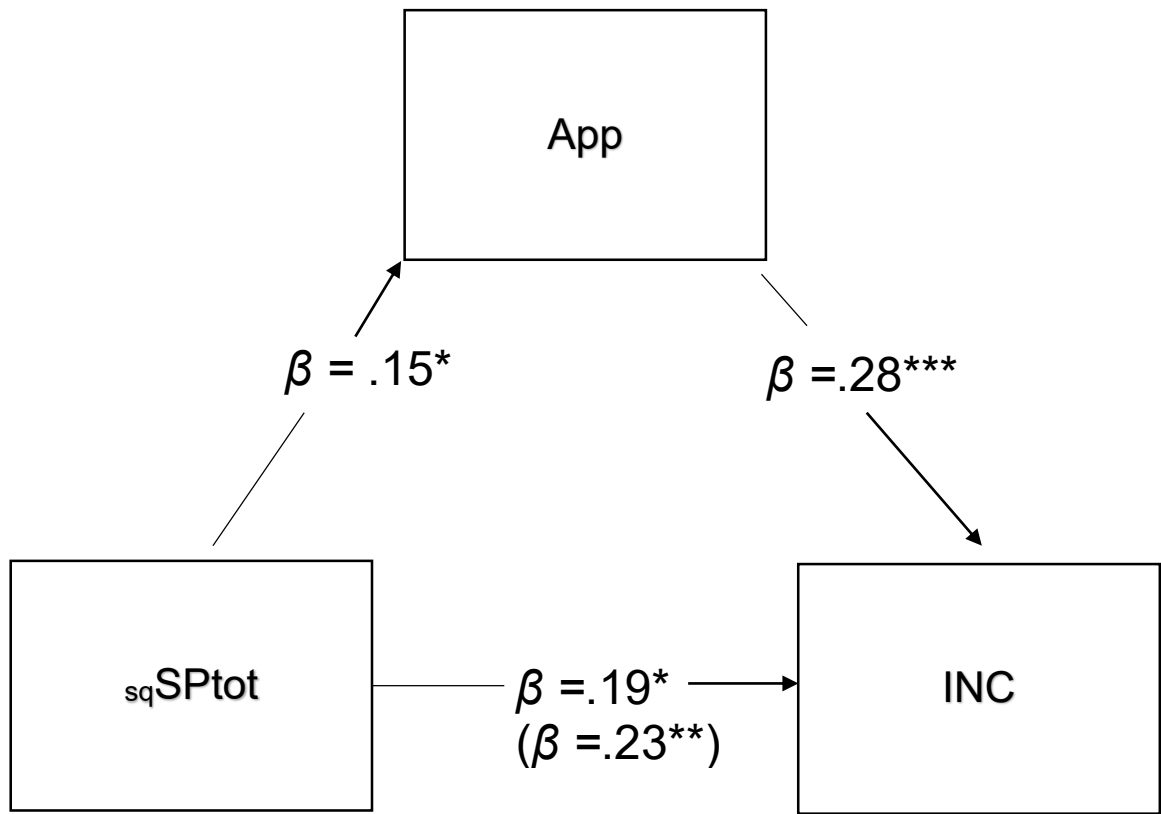


Figure 3. Standardized regression coefficients for the relationship between childhood sensory sensitivity, and incompleteness as mediated by distress tolerance. Brackets indicate coefficient between $sqSP_{tot}$ and INC without App entered into the equation.

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

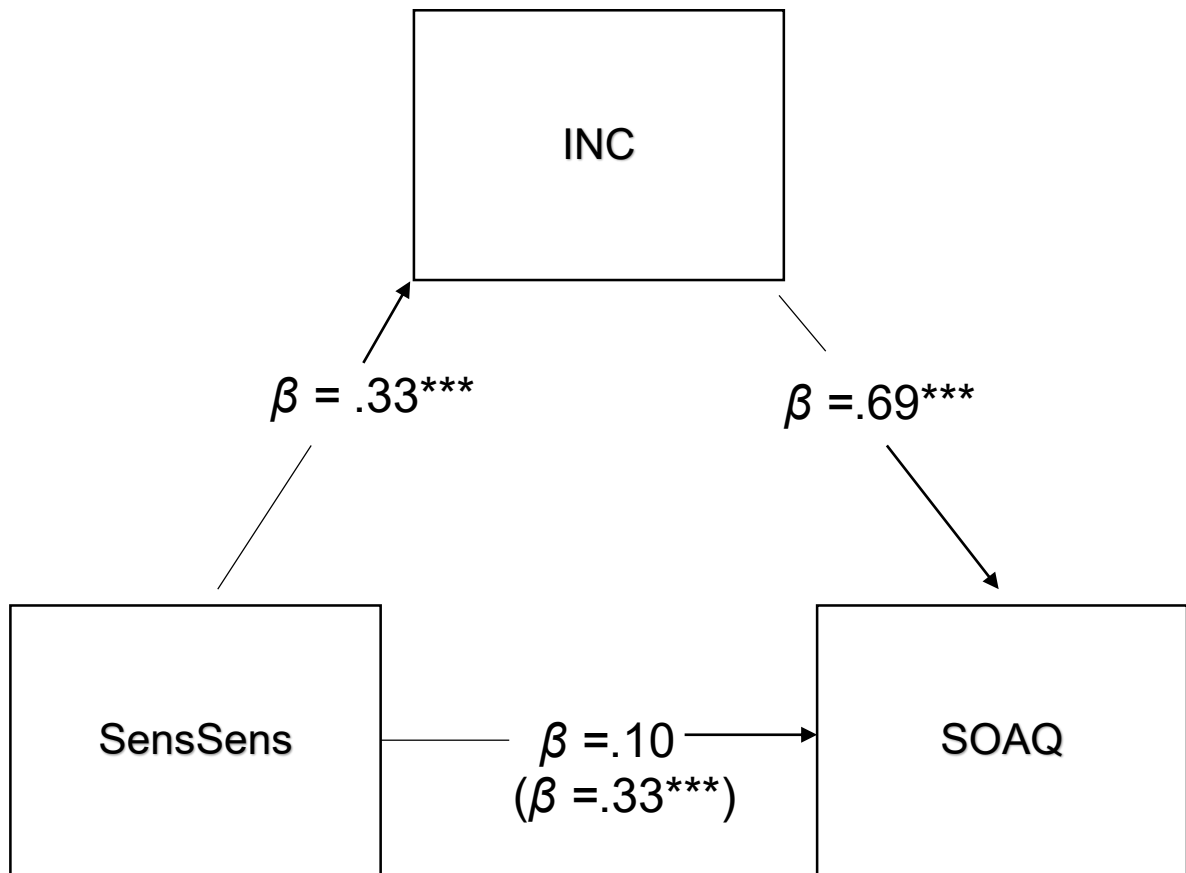


Figure 4. Standardized regression coefficients for the relationship between self-reported sensory sensitivity and symmetry behaviours as mediated by incompleteness. Brackets indicate coefficient between SensSens and SOAQ without INC entered into the equation.

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

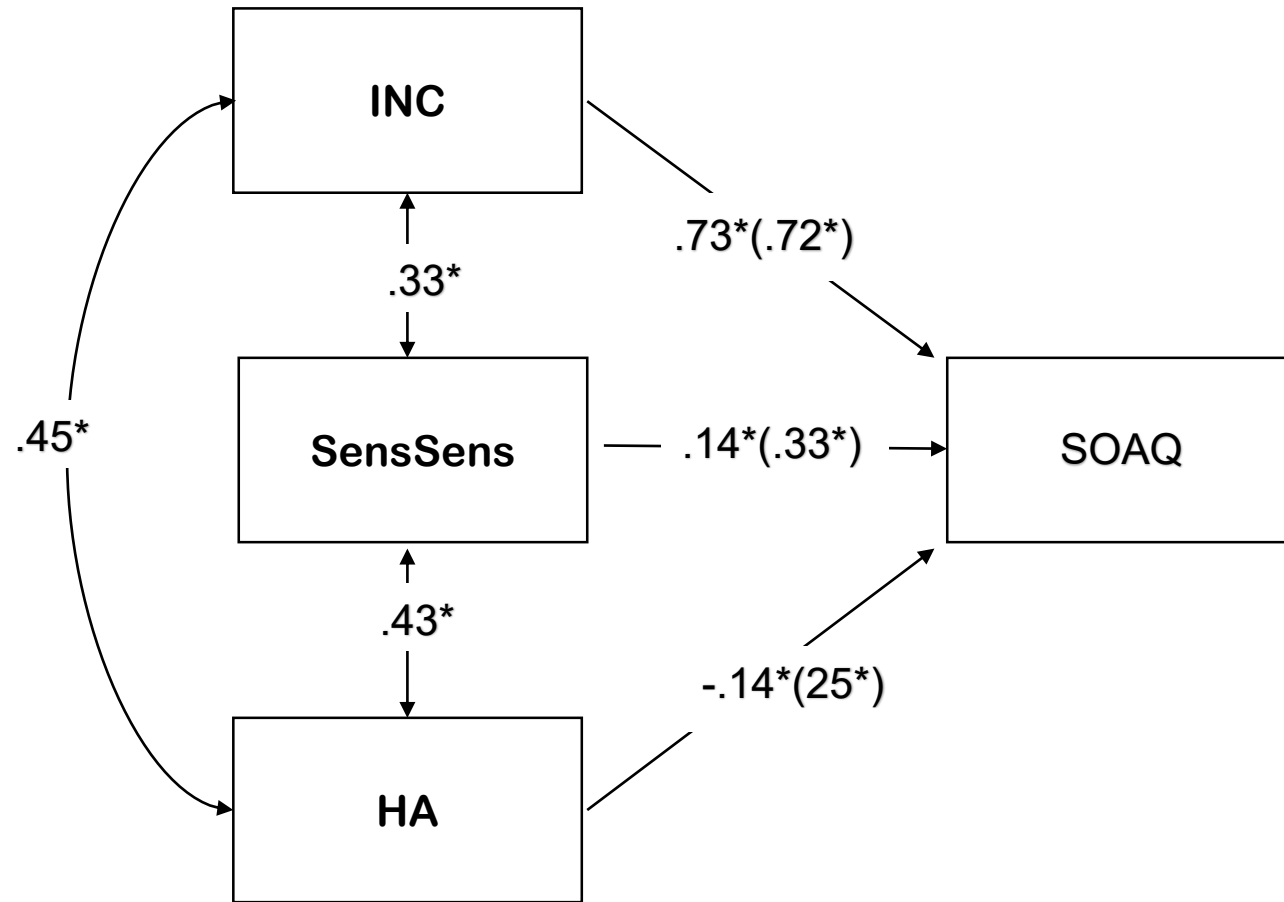


Figure 5. Standardized regression coefficients for the relationship between sensory sensitivity and symmetry behaviours as mediated by incompleteness when controlling for HA. Brackets indicate coefficient between SensSens and SYM without INC or HA entered into the equation.

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

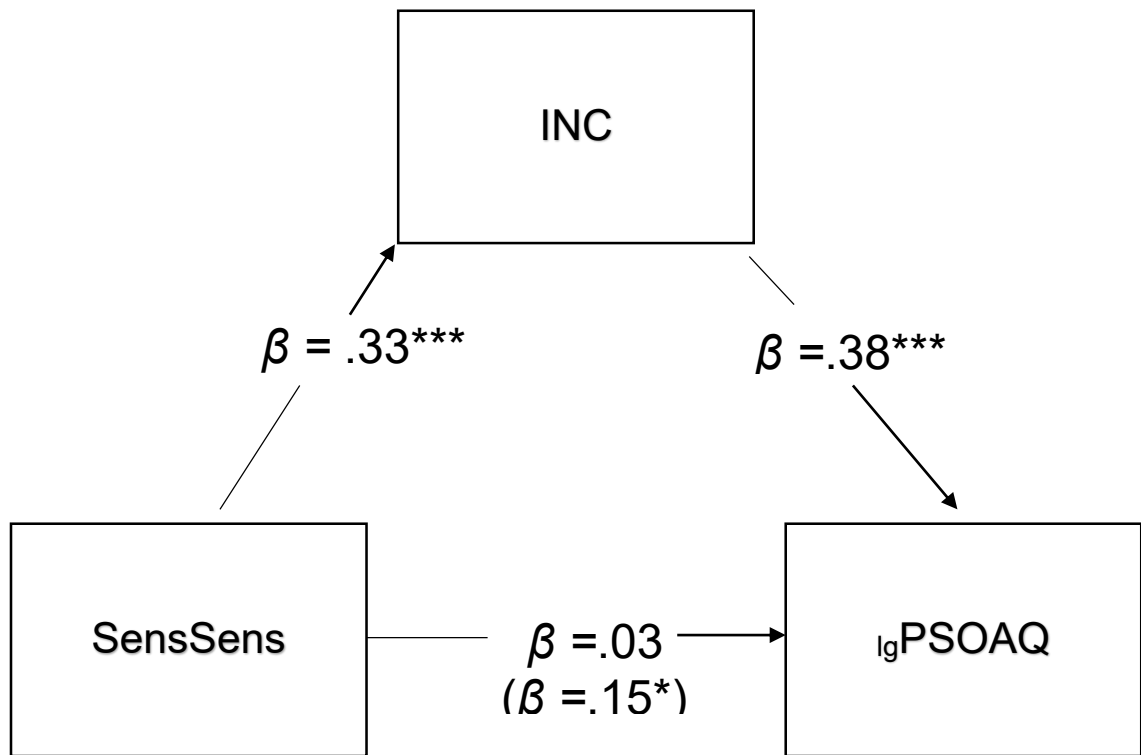


Figure 6. Standardized regression coefficients for the relationship between sensory sensitivity and observer reported symmetry behaviours as mediated by incompleteness. Brackets indicate coefficient between SensSens and \lg PSOAQ without INC entered into the equation.

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

Appendix A

CHILDHOOD PRECURSORS OF ADULT PERSONALITY

We are looking for university students to complete a study on the relationship between childhood tendencies and behaviour, and adult personality. Participation involves both you and your parent! Your part will involve two things: a) a visit to our research lab in the Life & Health Sciences building where you will complete a questionnaire package about your personality, behaviour, and emotions, which takes about 35 minutes, and b) coordinating with your parent that they agree to be asked to complete questionnaires about your personality and behaviour as a child (about age 7 – 11). They do not have to come into the lab, as their questionnaire package will be mailed to them. Their questionnaire package takes about 40 minutes and is returned by mail. Detailed feedback and an opportunity for discussion will be provided. For full participation you will receive 2 lab research credits in an eligible summer-term Psychology course. This study has been approved by the Research Ethics Board of Trent University. If you would like to learn more or sign up for a lab session please contact Laura Kennedy in the psychology department (laurakennedy@trentu.ca) or sign up for a time slot via SONA site. Research Coordinator: Laura Kennedy Primary Investigator & Supervisor: Professor Laura J. Summerfeldt

Appendix B
Student Participant Consent Form

I have been invited to participate in a study on the relationship between personality in adulthood and its precursors in childhood. The **principal investigator** is Dr. Laura Summerfeldt; the **study coordinator** is Laura Kennedy. This study has been reviewed and received ethical approval by Trent University's Research Ethics Board.

The **primary purpose** of this research is to help us better understand how several typical childhood tendencies and experiences may be associated with personality in adulthood.

I understand that the **procedure** of this study will involve me and my primary childhood caregiver each completing a package of pencil-and-paper measures, regarding aspects of my behaviour and experiences in childhood. My role in the study will be to complete a questionnaire package myself (about 35 minutes), as well as to coordinate my parent's participation (their questionnaires take about 40 minutes). I am aware that at the end of my participation I will receive more detailed information about the specific objectives of the study.

I understand that participation poses no **risk** to me. Regarding personal **benefits**, I understand that upon completion of all components of this study I will receive 2 hours of research credit in my eligible summer term Psychology course. Aside from this, there will be no direct personal benefit from participating. However, the information obtained through my participation should lead to a better understanding of how certain personality traits and behaviours in childhood may affect adult personality.

I understand that all information that is obtained from me during the course of this research is completely **confidential** and will not be shared with anyone who is not a member of the research team. My name will be known to the researchers for the purpose

of the mail-out to my parent and for coordination of this research. However, my name will not remain on the questionnaire package when it is returned to the researchers. All information will be identified by a research identification number in a password-protected encrypted computer file. My name and my parent's name will not appear in this file. In accordance with disciplinary practice, raw data will be kept for 8 years. Although the results of this study may be published, they will be reported in a way that makes it impossible to identify individual participants. As such, my specific scores (from either my own or my parent's responses) will not be made available to me, nor will my parent's though a general report of the study's findings will be made available to me if I would like it.

I have read and understood the preceding description, have had the procedures explained to me, and have satisfactorily had answered any questions I might have. I give my **consent** to participate in this study with the understanding that I am **free to withdraw** at any time. I understand that withdrawal will not affect my future opportunities for research participation. However, I will only receive research credit for that part of the study I have completed, pro-rated to the nearest $\frac{1}{2}$ hour (e.g., 1 credit for the self-report session only). If I withdraw, any data collected to that point will be destroyed.

If I have any questions after today, I may contact Dr. Laura Summerfeldt at 748-1011 ext. 1526, email: lsummerfeldt@trentu.ca or Laura Kennedy at laurakennedy@trentu.ca. I may also contact the Chair of the Trent University Research Ethics Board through Karen Mauro (Regulatory Compliance Officer) at 748-1011 ext. 7896, email: kmauro@trentu.ca. I have been provided with a copy of this form for my records.

(Please print) Participant's Signature Date

YES I would like to be notified about opportunities to participate in future studies on this topic:

Your email: _____

Appendix C



DEPARTMENT OF PSYCHOLOGY
 Childhood Precursors of Adult Personality
**Contact Information for Primary Childhood
 Caregiver**

(Note: This information will not be part of your research data)

Important:

By completing this you are confirming that you have requested and received approval from your parent for his/her willingness to be contacted and asked to participate.

Please print clearly.

Your Name:

First	Last
-------	------

Your Primary Childhood Caregiver's **Name:**

Title (Ms/Miss/Mrs/Mr)	First	Last
------------------------	-------	------

This person's **relationship** to you (e.g., mother):

Your Primary Childhood Caregiver's **Address:**

Street Address(Apartment number if relevant)

Street Address continued

City	Province
	Postal Code

Your Primary Childhood Caregiver's **Email** (if known)

**Childhood Precursors of Adult
Personality
2014**

Please put a checkmark ☑ ☒ beside the option which best describes you:

1. Your date of birth:

____/____/____ day month year

2. Gender Identity:

- Male
 Female
 Other

3. Marital Status:

- Single
 Dating/Engage
 Married
 Common-law
 Separated/
 Divorce
 Widow/Widower

For Office Use Only:
 (please leave blank)

Study ID: _____

4. Ethnicity:

- African/Black
 Asian/Pacific Islander
 Caucasian/White
 Hispanic/Latin
 Native American/Inuit
 Other
 specify: _____

5. Current level of university

- 1st year student
 2nd year student
 3rd year student
 4th year or more student
 graduate student

SAMPLE ITEMS FROM: Depression Anxiety and Stress Scale

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of time
- 3 Applied to me very much, or most of the time

1 I found it hard to wind down	0	1	2	3
2 I was aware of dryness of my mouth	0	1	2	3
3 I couldn't seem to experience any positive feeling at all	0	1	2	3
4 I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5 I found it difficult to work up the initiative to do things	0	1	2	3

SAMPLE ITEMS FROM: Distress Tolerance Questionnaire

Please rate each item by selecting one of the five answers for each question. Please answer each statement by circling the number for the option that best applies to you.

1 = "Strongly Disagree" ↔ 5 = "Strongly Agree"

	Strongly Disagree	Mildly Disagree	Feel Neutral	Mildly Agree	Strongly Agree
1. Feeling distressed or upset is unbearable to me.	1	2	3	4	5
2. When I feel distressed or upset, all I can think about is how bad I feel.	1	2	3	4	5
3. I can't handle feeling distressed or upset.	1	2	3	4	5
4. My feelings of distress are so intense that they completely take over.	1	2	3	4	5
5. There's nothing worse than feeling distressed or upset.	1	2	3	4	5

**SAMPLE ITEMS FROM: Symmetry Ordering and Arranging
Questionnaire**

Please circle a number from 0 to 4 to indicate how much you agree with each statement:

	Not at all	Slightly	Moderately	Very
1. I feel upset if my furniture or other possessions are not always in exactly the same position.	0	1	2	3
2. Other people think I spend too much time ordering and arranging my belongings.	0	1	2	3
3. It is essential that I arrange my clothing in a particular and specific way.	0	1	2	3
4. I am more at ease when my belongings are "just right".	0	1	2	3
5. I must keep my papers, receipts, documents, etc. organized according to a specific set of rules.	0	1	2	3

SAMPLE ITEMS FROM: Difficulty with Emotion Regulation Scale

Please indicate how often the following 36 statements apply to you by writing the appropriate number from the scale above (0 – 4) in the box alongside each item.

Put a checkmark under the most applicable rating. Use the following rating scale:

0 = Almost Never 1 = Sometimes 2 = About ½ the Time
3 = Most of the Time 4 = Almost Always

		0	1	2	3	4
1.	I am clear about my feelings					
2.	I pay attention to how I feel					
3.	I experience my emotions as overwhelming and out of control					
4.	I have no idea how I am feeling					
5.	I have difficulty making sense out of my feelings					

SAMPLE ITEMS FROM: Personal Need for Structure Questionnaire

Please read each of the following statements and decide how much you agree with each according to your attitudes, beliefs and experiences. It is important for you to know that there are no “right” or “wrong” answers. People are different, and we are interested in how you feel.

Please respond according to the following 6-point scale.

1 = strongly disagree

2 = moderately disagree

3 = slightly disagree

4 = slightly agree

5 = moderately agree

6 = strongly agree

	Disagree ↔ Agree					
	Strongly	Moderately	Slightly	Slightly	Moderately	Strongly
1. It upsets me to go into a situation without knowing what I can expect from it	1	2	3	4	5	6
2. I'm not bothered by things that interrupt my daily routine.	1	2	3	4	5	6
3. I enjoy having a clear and structured mode of life.	1	2	3	4	5	6
4. I like to have a place for everything and everything in its place.	1	2	3	4	5	6

SAMPLE ITEMS FROM: Adolescent/Adult Sensory Profile

Please rate the frequency with which you perform the following behaviours using the rating scale below.

1 = almost never	2= seldom	3=occasionally	4=frequently	5 = almost always
-------------------------	------------------	-----------------------	---------------------	--------------------------

- | | | | | | | |
|----|---|---|---|---|---|---|
| 1. | I leave or move to another section when I smell a strong odor in a store (for example, bath products, candles, perfumes). | 1 | 2 | 3 | 4 | 5 |
| 2. | I add spice to my food. | 1 | 2 | 3 | 4 | 5 |
| 3. | I don't smell things that other people say they smell. | 1 | 2 | 3 | 4 | 5 |
| 4. | I enjoy being close to people who wear perfume or cologne. | 1 | 2 | 3 | 4 | 5 |
| 5. | I only eat familiar foods. | 1 | 2 | 3 | 4 | 5 |
| 6. | Many foods taste bland to me (in other words, food tastes plain or does not have a lot of flavor). | 1 | 2 | 3 | 4 | 5 |

**SAMPLE ITEMS FROM: Obsessive Compulsive Trait
Dimensions Questionnaire**

Please read each statement and decide how the statement applies to how you typically think, feel, and act.

- If the statement never applies, circle **N**.
- If the statement rarely applies, circle **R**.
- If the statement sometimes applies, circle **S**.
- If the statement frequently applies, circle **F**.
- If the statement always applies, circle **A**

Give your own opinion of yourself. Be sure to answer every statement. Erase completely any answer you wish to change. Begin with the first statement and respond to every statement.

- | | | | | | |
|--|---|---|---|---|---|
| 1. I get a sense of apprehension, as though something bad might happen or may have already happened. | N | R | S | F | A |
| 2. I feel I must do things in a “set way”, though I might have difficulty putting that set way into words. | N | R | S | F | A |
| 3. Even if harm is very unlikely I feel the need to prevent it at any cost. | N | R | S | F | A |
| 4. I am bothered by the sense that things are imperfect (such as belongings, ideas, or tasks to be done). | N | R | S | F | A |
| 5. There are things that I am afraid might happen if I don’t take certain steps to prevent them. | N | R | S | F | A |

You have now completed the study questionnaire package. Thank you!

Please hand this in to the study coordinator.

Appendix D

Debriefing and Further Information for Students

When doing studies about people's behaviour, it is very important that people in the study not be told all of the predictions of the study in advance. Knowing this information can cause biases in how people respond, and therefore invalidate any information we gather. This debriefing sheet has been designed to fully explain our ideas now that the study has been completed.

The research you participated in has two purposes: 1) to better understand a newly recognized personality trait – “Incompleteness” – a form of trait perfectionism characterized by high personal standards for things being “just right” (e.g., one's performance, the way things look or sound) and a frequent sense of internal dissatisfaction that they're not, and 2) to better understand how this trait may appear early in one's life, in the form of childhood traits, behaviours, and habits. Based on existing research, in this study we sought to find out whether levels of this trait might be linked with such typical childhood behaviours as preference for sameness in day-to-day activities, perfectionism, anxiety, and strategies for coping with emotion. Although these childhood behaviours are well recognized, very little is known about their link with specific personality characteristics later in adulthood.

You were invited to participate in this study because we wished to include individuals from every level of a range of scores on a measure of trait Incompleteness. The reason why we requested the participation of your parent is because relying on self-reports, from adults, of their recollected childhood experiences is highly unreliable. Reasons for this include the biasing effects of more recent self-perceived traits and experiences, cognitive limitations of children, and retrospective memory inaccuracies. One solution is to obtain

retrospective -ratings of the adult from the individual most familiar with his/her behaviour as a child: the person's primary caregiver.

Important: So as not to invalidate our findings, we ask please that you postpone discussing these questionnaires or ideas with your parent until he or she has completed the study.

The results of this study will allow us to further our understanding of a) Incompleteness and b) childhood precursors of incompleteness specifically, and of personality traits in general. Incompleteness is a unique form of perfectionism that is as yet not well understood. As such, the results of this work may have considerable impact for personality theorists, and also for psychologists doing interventions with people who have such high levels of perfectionism that it is causing problems in their day-to-day life. If you would like to know more about perfectionism, the following is a useful list of books and articles:

Antony, M.M., & Swinson, R.P. (1998). *When perfect isn't good enough: Strategies for coping with perfectionism*. Oakland, CA: New Harbinger.

Blatt, S.J. (1995). The destructiveness of perfectionism: Implications for the treatment of depression. *American Psychologist*, 50, 1003-1020.

Burns, D.D. (1980). The perfectionist's script for self-defeat. *Psychology Today*, November, 34-51.

Ramirez-Basco, M. (1999). *Never good enough: Freeing yourself from the chains of perfectionism*. New York: Simon & Schuster.

Ramirez-Basco, M. (1999). *Never good enough: Freeing yourself from the chains of perfectionism*. New York: Simon & Schuster.

Thank you again for your willingness to participate.

Advances in research are due to people like you.

Appendix E



Childhood Precursors of Adult Personality Study Letter of Introduction & Instructions

Dear _____

You are invited to participate in a study on the relationship between personality features in adulthood and temperament and behavioural precursors in childhood. This study is being conducted through the Department of Psychology at Trent University.

Your son or daughter _____ has consented to have us contact you in order to learn more about their temperament and behaviours in childhood, and how these may affect adult personality.

Important: The questionnaires in this package are designed to measure your recollection of your son or daughter's tendencies and behaviour in childhood, so please answer the questions for the time period when your son or daughter was elementary-school age (between the ages of about 7 and 11).

This package of questionnaires will take you approximately 40 minutes to complete. Please do not feel that you must finish in one sitting. If it is more convenient to fill them out over a couple of sittings, please do so.

There are no "right" or "wrong" answers and no "good" or "bad" choices. Please answer openly and honestly by indicating how your child actually was and not how you would like him or her to be seen. There is no time limit, but work quickly and respond with the first answer that comes to mind.

INSTRUCTIONS

1. Please read and sign the consent form. An extra consent form (on coloured paper) is enclosed for you to keep.
2. Please answer each and every question. Even if you are unsure of how to answer, please choose one answer that best describes what you think. Note: It is essential that only you, not your child, complete these questionnaires.
3. Please check to make sure you have not missed any items or pages. Note that these questions are printed on both sides of the paper.

4. Please seal the signed consent form and the completed questionnaires in the addressed stamped envelope. This is to be returned to us by mail, please.
5. You may then read and keep the "Parent Participant Feedback Sheet".

If you have any questions after today, you may contact Dr. Laura Summerfeldt at 748-1011 ext. 1526, email: lsummerfeldt@trentu.ca or Laura Kennedy at laurakennedy@trentu.ca. You may also contact the Chair of the Trent University Research Ethics Board through Karen Mauro (Regulatory Compliance Officer) at 748-1011 ext. 7896, email: kmauro@trentu.ca

Thank you very much for your participation,

Laura Kennedy

M.Sc. Candidate and Research Coordinator

Childhood Precursors of Adult Personality (Parent) 2014

The following are some basic demographic questions.

Please put a checkmark ✓ beside the option which best describes you:

1. Your date of birth:

____/____/____

day month year

2. Gender:

Male

Female

3. Marital Status:

Single

Married

Common-law

Separated/Divorced

Widow/Widower

4. Ethnicity:

African/Black

Asian/Pacific Islander

Caucasian/White

Hispanic/Latino

Native American/Inuit

Other specify: _____

5. Your Relationship to Child:

Mother

Father

Grandparent

Other: specify _____

For Office Use Only:

(please leave blank)

Study ID: _____



Childhood Precursors of Adult Personality Parent Participant Feedback Sheet

When doing studies about people's behaviour, it is very important that people in the study not be told all of the predictions of the study in advance. Knowing this information can cause biases in how people respond, and therefore invalidate any information we gather. This information sheet has been designed to fully explain our ideas now that the study has been completed.

The research you participated in has two purposes: 1) to better understand a newly recognized personality trait – “Incompleteness” – a form of trait perfectionism characterized by high personal standards for things being “just right” (e.g., one's performance, the way things look or sound) and a frequent sense of internal dissatisfaction that they're not, and 2) to better understand how this trait may appear early in one's life, in the form of childhood traits, behaviours, and habits. Based on existing research, in this study we sought to find out whether levels of this trait might be linked with such typical childhood behaviours as preference for sameness in day-to-day activities, perfectionism, anxiety, and strategies for coping with emotions. Although these childhood behaviours are well recognized, very little is known about their link with specific personality characteristics later in adulthood.

Your child was invited to participate in this study because we wished to include individuals from every level of a range of scores on a measure of trait Incompleteness. The reason why we requested the participation of a parent is because relying solely on self-reports, from adults, of their recollected childhood experiences can be unreliable. Reasons for this include the biasing effects of more recent self-perceived traits and experiences, intellectual limitations of children, and retrospective memory inaccuracies. One solution is to obtain ratings of the adult from the individual most familiar with his/her behaviour as a child: the person's primary caregiver.

The results of this study will allow us to further our understanding of a) Incompleteness and b) childhood precursors of incompleteness specifically, and of personality traits in general

Incompleteness is a unique form of perfectionism that is as yet not well understood. As such, the results of this work may have considerable impact for personality theorists, and also for psychologists doing interventions with people who have such high levels of perfectionism that it is causing problems in their day-to-day life.

If you would like to know more about perfectionism, the following is a useful list of books and articles:

- Antony, M.M., & Swinson, R.P. (1998). *When perfect isn't good enough: Strategies for coping with perfectionism*. Oakland, CA: New Harbinger.
- Burns, D.D. (1980). The perfectionist's script for self-defeat. *Psychology Today*, November, 34-51.
- Ramirez-Basco, M. (1999). *Never good enough: Freeing yourself from the chains of perfectionism*. New York: Simon & Schuster.

*Thank you so much for your willingness to participate.
Advances in research happen due to the contributions of
people like you.*

SAMPLE ITEMS FROM: Multidimensional Anxiety Scale for Children

This questionnaire asks how a child can think, feel, or act. For each item, please circle the number that indicates how much you feel the statement applied to your child between the ages of about 7 and 11.

Use the following guide:

1=Never True 2=Rarely True 3 = Sometimes True 4=Often True

- | | | | | |
|---|---|---|---|---|
| 1. My child felt tense or uptight. | 1 | 2 | 3 | 4 |
| 2. My child usually asked permission. | 1 | 2 | 3 | 4 |
| 3. My child worried about other people laughing at him/her. | 1 | 2 | 3 | 4 |
| 4. My child got scared when his/her parents went away. | 1 | 2 | 3 | 4 |
| 5. My child kept his/her eyes open for danger. | 1 | 2 | 3 | 4 |

.Please check to make sure all items in this section have been answered

SAMPLE ITEMS FROM: Sensory Profile

Below is a list of common childhood habits and behaviours. Please rate each item according to how often your child displayed this behaviour (between the ages of about 7 and 11).

Put a checkmark under the most applicable rating. Use the following rating scale:

0 = Never 1 = Seldom 2 = Occasionally 3 = Frequently 4 = Always

		0	1	2	3	4
1	Had trouble completing tasks when the radio was on	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Was distracted or has trouble functioning if there was a lot of noise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Couldn't work with background noise (for example fan, refrigerator)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Expressed discomfort with or avoided bright lights (for example, hid from sunlight through window in car)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Became frustrated when trying to find objects in competing backgrounds (for example, a cluttered drawer)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please check to make sure all items in this section have been answered

SAMPLE ITEMS FROM: Emotion Regulation Checklist

This questionnaire describes common ways children cope with emotions.

Please rate each item according to how often your child displayed this behaviour (between the ages of about 7 and 11).

Circle the best number, with 1 = Rarely/Never like this child to 4 = Almost always like this child.

	Rarely or Never	Some- times	Often	Almost Always
1. Was a cheerful child.	1	2	3	4
2. Exhibited wide mood swings (his/her emotional state was difficult to anticipate because s/he moved quickly from a positive to negative mood).	1	2	3	4
3. Responded positively to neutral or friendly overtures by adults.	1	2	3	4
4. Transitioned well from one activity to another; didn't become angry, anxious, distressed or overly excited when moving from one activity to another.	1	2	3	4
5. Could recover quickly from upset or distress (doesn't pout or remain sullen, anxious or sad after emotionally distressing events).	1	2	3	4

SAMPLE ITEMS FROM: Junior Temperament and Character Inventory

In this questionnaire, you will find statements people might use to describe their attitudes, opinions, interests, and other personal feelings.

Each statement can be answered TRUE or FALSE. Read the statement and CIRCLE which choice best described your child (between the ages of about 7 and 11). Please answer every statement, even if you are not completely sure of the answer. Read each statement carefully, but don't spend too much time deciding on an answer.

Try to describe the way your child usually or generally acted and felt between the ages of about 7 and 11. Make sure not to describe just how they are feeling right now.

		TRUE	FALSE
1.	My child had less energy and got tired more quickly than most children.	T	F
2.	My child lost his/her temper more easily than other children.	T	F
3.	My child tried harder than other kids in school (spent more time on homework, practising sports or	T	F
4.	My child often needed naps or extra rest periods because he/she got tired easily.	T	F
5.	Even when my child had plenty of money, he/she would rather save it than spend it on him/herself.	T	F

Please check to make sure all items in this section have been answered

SAMPLE ITEMS FROM: Symmetry Ordering and Arranging Questionnaire

This survey is different. It asks you to consider your child **now** (as an **adult**). Please circle a number from 0 to 4 to indicate how much you agree with each statement.

With regard to my child now , as an adult	Not at all	Slightly	Moderately	Very	Extremely
1. My child seems upset if their furniture or other possessions are not always in exactly the same	0	1	2	3	4
2. Other people think my child spends too much time ordering and arranging their belongings.	0	1	2	3	4
3. It seems essential that my child arranges their clothing in a particular and specific way.	0	1	2	3	4
4. My child seems more at ease when his/her belongings are "just right".	0	1	2	3	4
5. My child must keep papers, receipts, documents, etc. organized according to a specific set of rules.	0	1	2	3	4