Symptoms of Attention Deficit Hyperactivity Disorder and Perfectionism in Youth: A Multi-Informant Perspective

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Abstract

Attention-deficit/hyperactivity disorder (ADHD) is a prevalent and chronic issue among youth. Establishing links between psychological disorders, such as ADHD, and personality constructs provides valuable information relative to understanding vulnerabilities, development, prognosis, and treatment outcomes. With an increasing awareness of the maladaptive nature of perfectionism, it is important to expand the evaluation of personality and ADHD to include perfectionism. The current study examined the potential relations between perfectionism and ADHD symptoms in a sample of 574 youth from the McMaster Teen Study from Grade 7 to Grade 12. Using path analysis, results indicated that ADHD symptoms predicted decreases in self-oriented perfectionism at every time point with one exception (Grade 11 to 12). Findings for the relation between socially prescribed perfectionism and ADHD symptoms were mixed; although socially prescribed perfectionism predicted ADHD symptoms at one time point, ADHD symptoms predicted decreases in socially prescribed perfectionism the following year. Clinical implications, limitations, and future directions are discussed.

Table of Contents

List of Tables

List of Figures

Symptoms of Attention Deficit Hyperactivity Disorder and Perfectionism in Youth: A Multi-Informant Perspective

General Introduction

Attention-deficit/hyperactivity disorder (ADHD) is one of the most commonly diagnosed disorders among children (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007), with a worldwide prevalence rate of approximately 5% among youth (American Psychiatric Association [APA], 2013). ADHD is a neurodevelopmental disorder characterized by a persistent pattern of inattention, hyperactivity, and/or impulsivity beginning in early childhood, interfering with adaptive functioning and development (APA, 2013). Across development, ADHD is associated with greater risk for impairments in academic functioning, such as lower academic achievement, higher school suspensions and expulsion rates, as well as poor social relationships, aggression, substance abuse, and an elevated risk for depression and anxiety (Davids & Gastpar, 2005; Fischer, Barkley, Smallish, & Fletcher, 2002; Hartley, 1999; Molina & Pelham, 2003). ADHD tends to be chronic in nature, persisting into adolescence in up to three-quarters of children clinically diagnosed with ADHD, where half of the same cases will continue to experience impairing symptoms into adulthood (Biederman, Petty, Clarke, Lomedico, & Faraone,2011; Davids & Gastpar, 2005).

Establishing links between personality traits and psychological disorders, such as ADHD, has long been understood as important in examining the cause, diathesis, development, prognosis, and treatment of such disorders (Gomez & Corr, 2014). Indeed, there is a growing body of research on the personality correlates of ADHD, as well as current theoretical models linking ADHD to personality (Martel, Goth-Owen, et al., 2010; Martel, von Eye, & Nigg, 2010). One personality trait that has received little attention in ADHD research is perfectionism. Despite a lack of studies where the relation between ADHD and perfectionism were assessed, some researchers have found a positive correlation between these two variables (Conners, Sitarenios, Parker & Epstein, 1998; Graber, Brooks-Gunn, Paikoff, & Warren, 1994; Humphrey, Storch, & Geffken, 2007). Furthermore, other researchers provided evidence that personality traits impact the longitudinal course of ADHD (Miller, Miller, Newcorn & Halperin, 2008). Therefore, it is worthy to examine if perfectionism plays a role in the development and/or maintenance of ADHD symptoms.

The research described in this thesis examined the relation between ADHD symptoms and multi-dimensional perfectionism, specifically self-oriented perfectionism and socially prescribed perfectionism. The thesis is organized as follows: I will first discuss personality structure across development, including the general stability and changeability of personality over time. Reviewing personality development and stability is relevant to the current thesis in that it pertains to better understanding the directionality of the relation between ADHD symptoms and perfectionism. An overview of ADHD and perfectionism is provided, along with an overview of how each construct is related to the Five Factor Model of personality. The potential processes used to explain the relation between personality and psychopathology are explored. In the ensuing section (Methods), the participants, procedures of data collection, measures, and statistical approach are described. The study findings are then described (Results), followed by a discussion providing potential explanations for the study findings. Clinical implications are discussed at the end.

Personality Structure

Beginning in infancy, individuals show differences in behaviour, emotions and thoughts. These individual differences in characteristics have historically been referred to as temperament in young children and personality in adolescence and adulthood. However, more recent research suggests that the notion of personality can be used to classify individual differences in young children as well (Caspi & Shiner, 2006). Specifically, researchers have found evidence that individual differences among children can also be categorized using the Five-Factor Model of personality, where by the school-age years, children's personality shares the same structure as adult personality (Caspi & Shiner, 2006; Mervielde, De Clercq, De Fruyt, & Van Leeuwen, 2005).

The Five-Factor Model is the leading model used to describe individual differences, stating that individual differences in traits can be described using five major factors: Conscientiousness, Extraversion, Neuroticism, Agreeableness, and Openness (Costa & McCrae, 1992; Goldberg, 1990). Each of the five factors are viewed as bipolar dimensions. Conscientiousness captures the degree of persistence and motivation in goal directed behaviour. Extraversion refers to sociability, where individuals high on Extraversion tend to enjoy the company of others. Neuroticism is characterized by negative emotionality, and tends to be characterized by being tense, emotionally unstable, and prone to distress. Agreeableness refers to

one's ability to get along with others, and the degree to which one avoids conflict and seeks a harmonious lifestyle. Last, Openness is best characterized by having broad interests, creativity, and being imaginative, where as the name suggests individuals higher on Openness tend to be more open to new experiences and ideas (McCrae & Costa, 1987).

Support for the Five-Factor Model has emerged from lexical approaches, studying the structure of natural language and its everyday use in describing personality (Goldberg, 1990). According to the lexical hypothesis guiding this approach, language may provide sets of attributes that people, who use that language, find important and helpful in their interactions with others. Through the use of dictionaries from numerous countries, factor analyses of adjectives have resulted in five broad traits indicative of the Big Five (Caspi & Shiner, 2006). Support for this model also emerged from factor analyses of personality studies and measures; factor analyses of questionnaires used to measure a broad range of individual differences, even those that were not designed to assess the Big Five, yield the five factors represented through the Five-Factor Model (McCrae & Costa, 1987). Moreover, several researchers have examined multiple personality questionnaires and models at once, and have provided evidence for the same personality structure proposed by the Five-Factor model, where various models can be integrated into the Five-Factor Model's hierarchical structure (McCrae & Costa, 1987; McCrae, Costa, & Busch, 1986).

The strong empirical basis of the Five Factor Model has thus provided a framework for both developing and testing hypotheses, allowing for a greater understanding of the personality correlates of psychopathology. Indeed, a recent meta-analysis on the relation between the Five Factor Model and psychopathology found that clinical disorders are typically related to higher levels of Neuroticism, low Conscientiousness, low Agreeableness, and low Extraversion (Malouff, Thorsteinsson & Schutte, 2005). Furthermore, another meta-analysis summarized the relations between personality disorders and the Five Factor Model of personality, finding that most personality disorders are characterized by high levels of Neuroticism and low Agreeableness, whereas Extraversion and Conscientiousness differentially predicted specific personality disorders (Saulsman & Page, 2005). In terms of the current study, ADHD and multi-dimensional perfectionism appear to be associated with similar dimensions of the Five Factor Model of personality; specifically, both constructs demonstrate strong associations with Neuroticism and Conscientiousness (DePauw & Mervielde, 2011; Gomez & Corr, 2014; Stoeber,

Otto & Dalbert, 2009). Given the overlap in associations between ADHD and perfectionism, the Five Factor Model was used to both guide and better explain the potential overlap between the constructs of interest.

Personality Development

Historically, personality development was divided in two separate perspectives: the essentialist perspective, which focused solely on genetic factors, and the contextualist perspective, which focused on environmental factors underlying developmental processes (Neyer & Asendorpf, 2001). The role of genes has been supported through the use of twin studies, where the role of genes accounts for roughly 50% of the variance seen in personality development and stability (Fruyt & Bartel, 2006). Indeed, the Five-Factor model attributes developmental changes to intrinsic maturation, referring to biological maturation and the aging process as determining personality development (McCrae & Costa, 2008). The growth of knowledge and intellectual capacity in adolescence is also a key component of psychological development. Support for this view can be found in Piaget's theory of cognitive development (Piaget, 1983); the final stage of development, formal operational thinking, occurs in early adolescence, giving way to new cognitive structures that can be evidenced by increasing performance on intelligence tests (Cattell, Cattell, & Johns, 1984). Maturation in terms of personality development can also be viewed as a process towards higher stages of thinking and feeling, which has been documented as normative increases in moral judgment (Rest, 1979) and ego development (Westenberg et al., 1998).

Recent research supports a gene by environment perspective, focusing instead on a transactional perspective of personality development (Roberts, Wood, & Caspi, 2008). Developmental theorists often view puberty as a significant stage for personality development, involving changing social influences and expectations. For example, Erickson (1950, 1968) highlights adolescence as a transitional phase, identifying adolescence as a second individuation stage where change is likely to occur. Similarly, behavioural theories state that learning processes in adolescence are embedded in new social environments, such as changing peer relationships. Moreover, Piaget's (1983) aforementioned theory of cognitive development also has environmental implications, whereby adolescents newly acquired cognitive structures impact the way in which they interact with their environment. Other theories, such as Cloninger's theory of character development, emphasize different life stages in which an individual must master

each life stage prior to moving toward a more advanced level of development (Cloninger, Svrakic, & Przybeck, 1993).

Stability of Personality

Interestingly, many of these theories highlight changes in adolescence, reflecting discontinuities in development. This raises an important question in terms of the stability of personality, as well as whether or not personality can change beyond a developmental standpoint. Personality traits demonstrate high levels of consistency across the lifespan and across differing types of personality consistency (e.g., rank-order consistency, mean-level consistency, and individual level changes; Fruyt & Bartel 2006; Roberts & Del Vecchio, 2000). Even in childhood and adolescence, a time characterized by change, the level of continuity in personality is relatively high (Fruyt & Bartel, 2006).

There are five mechanisms that have been shown and/or hypothesized to impact trait consistency: environment, genetics, psychological make-up, person-environment interactions, and identity structure (Roberts & Del Vecchio, 2000). First, one's environment, and specifically living in a stable and consistent environment, is hypothesized to result in greater consistency in personality traits (Glen, 1980). Stability in one's environment is hypothesized to lead to fewer novel experiences, thus limiting the need to adapt to environmental demands (Glen, 1980; Tyler & Schuller, 1991). Second, genetics are also thought to play a role in trait consistency, where estimates from twin studies range up to 80% of personality consistency being attributable to genetic influences (McGue, Bacon, & Lykken, 1993).

Third, one's psychological make-up, referring to their cognitive structures, is argued to facilitate consistency. For example, psychological structures such as resiliency predict personality consistency in children over time, where more resilient children tend to demonstrate greater consistency over time (Asendorpf & Van Aken, 1991). Fourth, the person by environment interaction, otherwise known as "goodness of fit" (Thomas & Chess, 1977), refers to when the expectations and demands in one's environment matches one's own capacities and characteristics. Goodness of fit may lead to greater consistency in the transition from childhood to adulthood by facilitating the maintenance and stability of behaviour patterns. Last, having a strong sense of identity, or a consolidated identity, would facilitate consistency in that it allows for greater self-awareness and evaluation. Indeed, a strong sense of identity has previously been

linked to concepts related to consistency, such as psychological well-being and adjustment (Helson, Stewart & Ostrove, 1995).

Despite not being discussed as a potential mechanism, it is possible that psychological disorders, such as ADHD, could impact the changeability and consistency of personality traits. This is consistent with the scar hypothesis, suggesting that the development of psychopathology can influence pre-existing personality, resulting in changes later in life (Tackett, 2006). However, given the stability of personality over time, it is also possible that one's personality traits would impact the development and/or maintenance of psychological disorders (Gomez & Corr, 2014). The ability to collect large amounts of information using a large sample size, as is seen in quantitative methods, would thus provide a starting point in exploring the complex relations at hand between psychological disorders and personality, providing an objective framework in which results can be generalized.

Literature Review

ADHD

The DSM-5 shifted away from the use of symptom ADHD subtypes and replaced them with presentation specifiers (APA, 2013). The term subtypes implies multiple, distinct diseases with unique presentations and outcomes among ADHD, whereas the literature suggests significant overlap exists between the presentation styles of ADHD (Sibley, Waxmonsky, Robb, & Pelham, 2013). The use of presentation specifiers thus allows for a better representation of the heterogeneity of the disorder. According to the DSM 5 (APA, 2013), ADHD is characterized by three different presentation specifiers: inattentive presentation, hyperactive/impulsive presentation, and the combined presentation. Inattention refers to an individual wandering off task, being disorganized, and having difficulty staying on task, where the behaviour is not a result of a lack of understanding or defiance. Hyperactivity refers to inappropriate and excessive motor activity, such as fidgeting or tapping. In adolescence and adulthood, this may be expressed as extreme restlessness. Impulsivity refers to making decisions or taking quick action with little planning, often carrying the potential for harm to the individual. Impulsivity may also manifest as social intrusiveness, where the individual excessively interrupts others. The level of symptoms occurring within each presentation specifier must be inconsistent and/or excessive relative to the individual's age and developmental level (APA, 2013).

In clinical populations, the combined inattentive/hyperactive is the most prevalent specifier (~ 60%), followed by the inattentive specifier (~ 30%), with the hyperactive/impulsive specifier being the least prevalent (~ 7-9%; Faraone, Biederman, Weber, & Russell, 1998; Jung Kim et al., 2017; Wilens et al., 2009). Although hyperactivity is the most common manifestation of ADHD among preschool-aged children, inattention becomes more prominent with age, with hyperactivity becoming less common in adolescence, manifesting instead as fidgeting or inner restlessness (APA, 2013).

Youth with ADHD are more likely to be male, with boys being three times more likely to receive a diagnosis of ADHD relative to girls (APA, 2013). However, girls with ADHD are more likely to present with inattentive features, exhibiting less disruptive behaviour relative to boys with ADHD (Achenbach, 1991; Gaub & Carlson, 1997; Gershon, 2002; Skogli, Teicher, Andersen, Hovik, & Oie, 2013). Furthermore, up to 75% of youth with ADHD will have at least one other psychiatric disorder; boys with ADHD are more likely to have externalizing disorders (e.g., conduct disorder), whereas girls with ADHD are more likely to have internalizing disorders (e.g., depression and anxiety) and greater intellectual impairment compared to typically developing youth (Gaub & Carlson, 1997; Gershon, 2002). Comorbid disorders, such as depression and anxiety, may be more problematic for girls with ADHD than for boys (Gershon, 2002).

Historically, theoretical models of ADHD have been largely single pathway models, implicating a core deficit in either cognitive functioning (e.g., executive functions; Barkley, 1997) or motivation (e.g., an intolerance of delayed rewards; Sonuga-Barke, Taylor, Sembi, & Smith, 1992). However, these models generally fail to capture the heterogeneity of ADHD, which can help to make sense of previous contradictory findings in the literature (Nigg et al., 2005; Sonuga-Barke, 2002; Sonuga-Barke, 2003). Multiple pathway models have thus been proposed to better account for the heterogeneity in ADHD, implicating deficits in both executive control (i.e., “top-down”) and motivational (i.e., “bottom-up”) processes (Gomez & Corr, 2014; Martel et al., 2010; Sonuga-Barke, 2003). Top-down processes refer to goal-directed, resource-demanding, and planful behaviour; whereas bottom-up processes include affective responses that are influenced by immediate incentives (Martel et al., 2010). Researchers suggests that deficits in both top-down and bottom-up processes are implicated across presentation specifiers of ADHD (Gomez & Corr, 2014).

Longitudinal research of children with ADHD reveals the persistence of ADHD into adolescence and adulthood (Biederman et al., 2011; Biederman, Petty, O'Connor, Hyder & Faraone, 2012). Among both girls and boys with ADHD, up to 76% of youth demonstrate some evidence of continuity into adulthood, with 35% of youth continuing to meet full criteria for ADHD into adulthood (Biederman et al., 2011). Although some individuals experience a decrease in symptoms with age, many are persistently subsyndromal; despite no longer meeting criteria for a diagnosis, they continue to experience symptoms and impairment (Biederman et al., 2011). Therefore, most youth will continue to experience ADHD in some form throughout the lifespan.

Personality Traits and ADHD

Given the stability and persistence of ADHD symptoms from childhood into adulthood, there has been a growing interest in studying the personality correlates of this disorder. Indeed, there has been interest in examining the relations between ADHD and major dimensions of personality, such as those embodied in the Five Factor Model (Conscientiousness, Agreeableness, Neuroticism, Openness to Experience, and Extraversion; Costa & McCrae, 1992; Goldberg, 1990). Collectively, these personality dimensions appear to account for substantial amounts of variability in ADHD symptoms, with significant positive associations with Neuroticism, and negative associations with Conscientiousness and Agreeableness contributing to ADHD symptoms (DePauw & Mervielde, 2011; Gomez & Corr, 2014; Martel, Nigg, & Lucas, 2008; Parker, Majeski, & Collin, 2004). Specifically, the presence of maladaptive personality traits independently contributes to greater risk for externalizing and internalizing problems, placing youth with ADHD at greater risk for emotional and behavioural problems (DePauw & Mervielde, 2011).

The relations between personality dimensions and ADHD symptoms appears to differ in magnitude for the inattentive and hyperactive/impulsive presentation specifiers; despite being associated with the same personality dimensions (Gomez & Corr, 2014). For example, the association for Conscientiousness and Neuroticism are generally stronger for inattention than they are for hyperactivity/impulsivity; whereas the association for Agreeableness is stronger for hyperactivity/impulsivity relative to inattention (DePauw & Mervielde, 2011; Gomez & Corr, 2014; Parker et al., 2004). Despite Neuroticism being correlated with both presentation styles of ADHD, it can be speculated that the stronger link between Neuroticism and inattention would

result in a hyper-reactivity to environmental demands and stressors, interfering with an individual's ability to make use of available resources, thus leading to greater interference with attention (Gomez & Corr, 2014). Moreover, Neuroticism and Conscientiousness have been found to account for 41% of the variability in the inattention presentation of ADHD, whereas they only appear to account for 26% of the variability for the hyperactivity/impulsivity presentation specifier (Parker et al., 2004).

With the DSM-5's recent shift away from subtypes to specifiers (APA, 2013), paired with the prevalence rates of the combined type of ADHD (~60%; Faraone et al., 1998; Jung Kim et al., 2017; Wilens et al., 2009), the merit of examining the combined specifier of ADHD rather than separating them is highlighted. Furthermore, despite differences in magnitude of the associations between ADHD and personality mentioned previously, findings show that the differing specifiers are not only highly correlated, but are also associated with the same personality dimensions (Gomez & Corr, 2014). The current study will thus focus on the combined specifier of ADHD.

Researchers suggests that personality structure impacts the degree to which ADHD symptoms persist into adolescence (Miller, Miller, Newcorn, & Halperin, 2008; Nigg et al., 2002; Parker, et al., 2004). Specifically, youth with persistent ADHD experience higher levels of Neuroticism and lower levels of Agreeableness relative to those whose ADHD had remitted and control groups, where remitters did not demonstrate these same maladaptive personality characteristics. Although levels of Conscientiousness differed between controls and youth with ADHD, lower Conscientiousness was characteristic of both persisting and remitting ADHD (Miller et al., 2008). The presence or absence of these personality traits may be problematic for youth with ADHD due to their impact on social relationships (Eakin et al., 2004), educational/occupational outcomes, and overall success in adult life (Shiner, Masten, & Roberts, 2004). Therefore, current evidence supports the notion that personality characteristics are differentially related to the persistence and the childhood diagnosis of ADHD, outlining the importance of looking at the developmental course of ADHD and personality structure (Miller et al., 2008).

In terms of processes, there have been four hypotheses suggested to explain the relations between personality and psychopathologies, such as ADHD. First, the *vulnerability hypothesis* suggests that certain personality traits predispose individuals to certain psychopathologies under

certain circumstances (Gomez & Corr, 2014; Tackett, 2006). Second, the *spectrum hypothesis* suggests that personality traits and psychopathology exist on the same continuum, signifying a dimensional relationship between personality and psychopathology (Krueger & Tackett, 2003; Tackett, 2006). Third, the *pathoplastic/exacerbation hypothesis* suggests that pre-existing personality traits may influence the manifestation of psychopathology, altering its course, severity, presentation, and prognosis (Tackett, 2006). Finally, the *scar hypothesis* suggests that the development of psychopathology influences an individual's premorbid personality, causing changes in personality later in life (Tackett, 2006). Research to date corroborates the spectrum hypothesis (De Pauw & Mervielde, 2011; Gomez & Corr, 2014), and to a lesser degree the vulnerability hypothesis (Gomez & Corr, 2014) for the relations between personality and ADHD. However, previous studies have been largely cross-sectional in nature and thus the direction of association remains relatively unknown.

To date, researchers have primarily focused on the Five Factor Model of personality, reflecting an emphasis on a relatively narrow range of personality constructs despite compelling evidence for the important role of other personality traits and mental health difficulties (Parker et al., 2004). An example of one such personality trait is perfectionism, which is associated with a variety of psychopathologies such as depression, obsessive-compulsive disorder, and eating disorders (Flett & Hewitt, 2002). Furthermore, perfectionism is associated with similar personality dimensions as ADHD; specifically, perfectionism has strong associations with both lower levels of Conscientiousness and higher levels of Neuroticism (Stoeber, Otto, & Dalbert, 2009), both of which account for a significant amount of the variability in ADHD (Parker et al., 2004). The apparent overlap with these personality dimensions suggests that there may be a potential association between ADHD and perfectionism. The following section of this literature review focuses on perfectionism.

Perfectionism

Perfectionism is a multi-dimensional, maladaptive personality construct characterized by setting excessively high standards for oneself, accompanied by tendencies for overly self critical evaluations that results in negative self-evaluations (Flett & Hewitt, 2002; Shafran, Cooper, & Fairburn, 2002). The need to achieve unrealistic expectations, and the inability to do so, thus leads to significant distress and psychological impairment, resulting in various psychopathologies (Flett & Hewitt, 2002).

Based on the target of the perfectionistic concerns, perfectionistic behaviour, and perfectionistic strivings (Dunkley & Bankstein, 2000), perfectionism can be conceptualized into three different dimensions. First, a generalized concern or perception that others are imposing unrealistically high standards on the self and require them to be perfect is referred to as *socially-prescribed perfectionism* (Flett & Hewitt, 2002; Hewitt & Flett, 1991). These individuals feel like they cannot achieve the perfection being demanded of them, resulting in being highly self-critical, accompanied by strong negative reactions to both real and perceived failure (Hewitt & Flett, 1991). Socially-prescribed perfectionism is associated with many negative mental health outcomes, including depression, suicidal behaviour, and anxiety (Hewitt et al., 2002; Roxborough et al., 2012). These relations remain even after controlling for other known predictors of maladjustment, such as Neuroticism (Sherry & Hall, 2009). Socially-prescribed perfectionism has further been linked to anger and aggression, and is positively correlated with externally directed anger, and negatively correlated with anger suppression (Graber et al., 1994; Hewitt et al., 2002). Furthermore, socially-prescribed perfectionism has been associated with extensive social problems, as well as psychosomatic symptoms, such as stomach aches (Conners et al., 1998; Humphrey et al., 2007).

A second dimension of perfectionism, known as *self-oriented perfectionism*, is related to perfectionistic strivings that are coming from within the person. Specifically, individuals high on self-oriented perfectionism have unrealistically high personal standards, accompanied by being overly critical of the self, having a chronic concern for mistakes, the need for and pursuit of organization, as well as frequent doubts about their own actions (Hewitt & Flett, 1991). Self-oriented perfectionism therefore reflects an internally motivated form of perfectionism, whereas socially prescribed perfectionism reflects an externally motivated form. Self-oriented perfectionism has been linked to anxiety and depression (Hewitt et al., 2002); however, researchers have found that the relation to mental health outcomes is weaker for self-oriented perfectionism relative to socially-prescribed perfectionism (Asseraf & Vaillancourt, 2015; Hewitt et al., 1996). It is important to note that some research suggests that elevated levels of self-oriented perfectionism, specifically perfectionistic strivings, may have positive outcomes, suggesting a healthy and/or adaptive dimension of perfectionism (Stoeber & Otto, 2006). For example, experiencing high levels of perfectionistic strivings paired with low levels of perfectionistic concerns may lead to adaptive outcomes, such as higher self-determination,

academic satisfaction and goal progress, and general positive characteristics (Gaudreau & Thompson, 2010; Stoeber & Otto, 2006). However, these findings remain largely controversial, reflecting a source of dispute amongst perfectionism researchers.

Last, *other-oriented perfectionism* refers to being highly critical and/or harsh toward others, where an individual demands perfection from others (Hewitt & Flett, 1991). Other-oriented perfectionism is associated with Machiavellianism, psychopathy, narcissism, and social dominance, accompanied by severe interpersonal problems (Hewitt et al., 1991; Sherry, Gralnick, Hewitt, Sherry, & Flett, 2014; Stoeber, 2014; Stoeber, 2015). Overall, socially-prescribed perfectionism results in higher levels of maladjustment and greater psychopathology relative to self-oriented perfectionism and other-oriented perfectionism (Asseraf & Vaillancourt, 2015; Mills & Blankstein, 2000).

As mentioned previously, perfectionism is associated with similar Big Five personality dimensions as ADHD. Despite inconsistent results between perfectionism and Agreeableness, Openness, and Extraversion, consistent patterns of association have been found for Conscientiousness and Neuroticism. Specifically, Conscientiousness has consistently been found to be positively correlated with self-oriented perfectionism, whereas Neuroticism is positively correlated with socially-prescribed perfectionism (Stoeber et al., 2009). Given Conscientiousness is the trait capturing the degree of persistence and motivation in goal-directed behaviour (Costa & McCrae, 1992), it is unsurprising that self-oriented perfectionism, the dimension associated with perfectionistic strivings (Dunkley & Bankstein, 2000), would be positively correlated with conscientiousness. Indeed, Conscientiousness has been found to predict increases in self-oriented perfectionism over time, suggesting that Conscientiousness plays a developmental role in self-oriented perfectionism (Stoeber et al., 2009). Consequently, it is also unsurprising that individuals higher on Neuroticism, who are described as being tense, emotionally unstable, and prone to psychological distress (Costa & McCrae, 1992), would also experience elevated socially-prescribed perfectionism. In contrast, other-oriented perfectionism has not been found to be well-characterized by the Big Five personality traits (De Cuyper, Claes, Hermans, Pieters & Smits, 2015), and will thus not be examined in the current study.

Despite compelling evidence for the role of perfectionism in internalizing disorders, there is limited research examining the role of perfectionism with externalizing disorders, where there has yet to be a published paper directly exploring the relation between perfectionism and ADHD.

Given the overlap between ADHD and perfectionism on some of the Big Five personality traits, the lack of studies in this area reflects a significant gap in the literature. In the current study, I examined the associations between perfectionism and ADHD over time in youth.

The Associations Between ADHD and Perfectionism

It can be speculated that the strong negative reactions and negative emotionality associated with both ADHD and socially-prescribed perfectionism in particular may reflect a potential overlap and/or association between the constructs. The inner restlessness and impatience typical of youth with the hyperactivity specifier (APA, 2013), as well as the hyper-reactivity to environmental demands and stressors associated with the inattention specifier of ADHD (Gomez & Corr, 2014), may be a manifestation or by-product of socially-prescribed perfectionism.

Consistent with this notion, some studies have found a serendipitous relation between ADHD, specifically the hyperactivity specifier, and perfectionism (Conners et al., 1998; Graber et al., 1994; Humphrey et al., 2007). For example, when studying the association between ADHD and peer victimization, Humphrey et al. (2007) found a positive correlation between the hyperactivity presentation specifier of ADHD and perfectionism (r= .26). Similarly, a study by Graber, Brooks-Gunn, Paikoff, and Warren (1994) also found a positive correlation with hyperactivity and perfectionism (r= .24), despite the main objective of the study being predicting eating disorders in adolescent girls. However, both studies measured perfectionism as a unidimensional construct; the dominant trend in research in both adults and youth is to measure perfectionism as a multidimensional construct, as described previously, due to the different dimensions representing differential predictors of maladjustment and distress (Hewitt et al., 2002). Therefore, although these variables have been found to be correlated, there has yet to be a study specifically examining how a multidimensional perfectionism may be related to ADHD symptoms.

In contrast, not only are self-oriented perfectionism and ADHD specifiers, particularly the inattention specifier, conceptually different, they also have opposing relations with conscientiousness; conscientiousness is positively correlated and predictive of self-oriented perfectionism, but not socially-prescribed perfectionism (Stoeber et al., 2009), whereas low conscientiousness is characteristic of youth with ADHD (DePauw & Mervielde, 2011; Gomez & Corr, 2014; Martel et al., 2008; Miller et al., 2008; Parker et al., 2004). It could thus be hazarded

that self-oriented perfectionism may be negatively related to ADHD symptoms; however, there has yet to be any published studies examining this potential association, emphasizing the importance of clarifying the relation between ADHD and perfectionism.

Given the apparent association that has been found previously between ADHD and perfectionism (Conners et al., 1998; Graber et al., 1994; Humphrey et al., 2007), accompanied by the overlap in relations between the Big Five personality traits and both constructs, further investigation is needed to better explore the potential relations between ADHD symptoms and perfectionism. Furthermore, extant research suggests that personality traits impact the longitudinal course of ADHD (Miller et al., 2008), emphasizing the need to broaden the range of personality constructs being evaluated in ADHD to include perfectionism and examine how these factors relate across time.

Research Objectives

1. Establishing links between psychological disorders, such as ADHD, and personality constructs provides valuable information relative to understanding vulnerabilities, development, prognosis, and treatment outcomes. With an increasing awareness of the maladaptive nature of perfectionism, it is important to expand the evaluation of personality and ADHD to include perfectionism. In the current study, I examined the potential relations between perfectionism and ADHD symptoms.

Given the lack of published studies exploring the relations between ADHD symptoms and perfectionism, the current investigation was exploratory in nature. However, given the overlap in association between ADHD, socially-prescribed perfectionism and neuroticism, I predicted that socially-prescribed perfectionism would be positively correlated with ADHD symptoms; the strong negative reactions and negative emotionality typical of both constructs likely reflect a potential overlap. In contrast, the conceptual differences between self-oriented perfectionism and ADHD symptoms, and opposing relations with conscientiousness (DePauw & Mervielde, 2011; Martel et al., 2008; Miller et al., 2008; Parker et al., 2004; Stoeber et al., 2009) suggests that the two constructs would be negatively correlated. I thus predicted that self-oriented perfectionism would be negatively correlated with ADHD symptoms. Given the significant gender differences in ADHD symptoms (APA, 2013), gender was included as a control variable. Furthermore, because socioeconomically disadvantaged children are two to three times more likely to

experience mental health problems (Reiss, 2013), indicators of socioeconomic status, including parental income and parental education, were also controlled for.

Methodological Framework

The current investigation was guided by a positivist framework, which is based on the assumption that the world can be understood through observations and experimentation. Positivism advocates for modeling research in the social sciences on strategies used in natural sciences, developing an approach attempting to achieve reliable and concrete knowledge. Positivist methods and concepts include validity, reliability, objectivity, and generalizability (Glesne, 2016). Reliability refers to the consistency of research (O'Leary, 2014), whereas validity refers to the extent to which a measure captures the construct it is intended to measure (Seidman, 2013).

Within the positivist framework, there is underlying belief in the power of numbers, and their ability to represent the world accurately and with vigour (O'Leary, 2014). Research methods used include quantitative methods, such as surveys and interviews, used to gather large amounts of information on a large sample to best generalize findings. The use of quantitative research methods allows the research to remain objective, as well as access a large number of participants, allowing for comparisons by generating standardized, quantifiable, and empirical data.

Research on personality and psychopathology has largely been conducted using quantitative (DePauw & Mervielde, 2011; Martel, Nigg & Lucas, 2008; Miller et al., 2008; Parker et al., 2004), and at times qualitative methods (see Gomez, 2009 for a review). Although qualitative studies can provide important information in regards to the relations of ADHD and major personality dimensions (Gomez & Corr, 2014), the current research objectives are largely exploratory in nature, with the intention of identifying a potential relation between ADHD and perfectionism. Given the lack of research in this area, empirically identifying whether or not a relation exists between ADHD and perfectionism, using methods that can be generalized to the broader population, would be an ideal starting point for the literature. Furthermore, quantitative work would allow a more comprehensive and reliable understanding of how personality dimensions are related to ADHD, inattention, and hyperactivity/impulsivity, providing information not only as to whether a relation exists, but also on the potential direction of effects and magnitude of said effects (Gomez & Corr, 2014).

Methodology

Participants and Procedure

This study made use of a large, ongoing dataset, the *McMaster Teen Study*, a longitudinal study examining the relations between bullying, mental health, and academic achievement using a multi-method, multi-informant approach. Participants were recruited beginning in the Spring of 2008 from 51 randomly selected primary schools in a large Southern Ontario Public School Board when participants were in grade 5 (80% participation rate). Participants were predominantly White (71.4%) and middle-class, which is consistent with the demographic characteristics of the region from which participants were recruited.

A sample of 574 Canadian adolescents (55.7% of girls; 44.3% of boys) were assessed longitudinally across a six year period, following the sample from grade 7 (Time 3-T3) to grade 12 (Time 8-T8). Although data were collected from when youth were in grade 5, the current study used data beginning in grade 7 (Time 3), representing the time points when the measures of interest (perfectionism and ADHD symptoms) were both assessed.

Parental consent was obtained each year for their child's participation in a student survey, along with their own participation in a telephone interview. Students also provided assent each year for their participation in the study. Participants were compensated for their participation in the study, where upon completion of a paper questionnaire (students also had the option of an online questionnaire), youth were compensated with gift cards ranging from $10 to $35, depending on the year of the study. For more details on the McMaster Teen Study data collection, see as reported by Vaillancourt et al. (2013).

Measures

Perfectionism was measured by self-report, whereas ADHD was measured with the use of parent-reports. Although youth self-report contribute unique information in regards to internalizing disorders (Fontaine & Vaillancourt, 2017; Hope, Adams, Reynolds, Powers, Perez, & Kelley, 1999), they often struggle to identify ADHD symptoms; not only is self-reported ADHD weakly correlated with observed frequencies of behaviour, it also fails to provide any unique information beyond parent reports (Hope et al., 1999; Smith, Pelham, Gnagy, Molina, & Evans, 2000). Seeing as youth are often poor sources of information about ADHD symptoms, parent reports were used. In contrast, discrepancies often exist between youth self-report and parent-reports of internalizing problems (Fontaine & Vaillancourt, 2017), such as perfectionism,

where parents struggle to identify the presence of internalizing disorders in youth. Self-reports were thus used to examine perfectionism.

Attention Deficit Hyperactivity Disorder. ADHD symptoms were measured using the Brief Child and Family Phone Interview (BCFPI-3; Cunningham, Pettingill & Boyle, 2006). The BCFPI-3 is a 30 minute structured interview administered by phone with parents, adolescents, or teachers for youth 6 to 18 years old. For the current study, parent reports obtained through phone interviews were used. There were 6 items measuring ADHD symptoms in the BCFPI-3, rated on a 3-point Likert scale ranging from 1 (*Never*) to 3 (*Often*). The BCFPI-3 has a 3 item Regulating Attention subscale, assessing the inability to maintain attention, avoid distractions, and complete tasks (e.g. "Distractible, has trouble sticking to an activity"), as well as a Regulating Impulsivity and Activity Level subscale, with 3 items assessing the ability to regulate activity levels and impulsive responding (e.g. "Impulsive, acts without stopping to think" or "Fidgets"). The Regulating Attention subscale corresponds to the predominantly inattentive presentation specifier of ADHD, whereas the Regulating Impulsivity and Activity Level corresponds to the predominantly hyperactive/impulsive presentation specifier of ADHD. Further, the BCFPI-3 has a Regulating Attention, Impulsivity and Activity Level subscale, composed of the 6 previously mentioned items to correspond to youth with the combined type of ADHD, which was used for the current study. The internal consistency of the Regulating Attention, Impulsivity and Activity Level subscale of the BCFPI-3 for the McMaster Teen Study is high from Time 3 to Time 8 (α = .83-.87).

Perfectionism. Perfectionism was measured using the Child and Adolescent Perfectionism Scale (CAPS), a self-report measure completed by youth at each time point (Flett et al., 1997). This scale has 22 items, rated on a 5-point Likert scale ranging from 1 (*not at all true of me*) to 5 (*very true of me*) with higher scores indicating higher levels of perfectionism. The CAPS assesses both self-oriented perfectionism (e.g. "When I do something, it has to be perfect") and socially prescribed perfectionism (e.g. "Other people always expect me to be perfect"). The internal consistency for both the self-oriented subscale (α = .84 to .92) and the socially prescribed perfectionism subscale (α = .88-.92) of the CAPS is high from Time 3 to Time 8.

Covariates. Indicators of socioeconomic status, such as parental income and parental education, were compiled using parent-reports when youth were in grade 5 (Time 1). Parental

income was measured with categories ranging from less than $20,000 per year to more than $80,000 per year. Parental education was also assessed by measuring the highest level of education achieved using five categories: did not complete high school, completed high school, college diploma or trades certificate, undergraduate degree, or university graduate degree. Data on participants' gender were collected in grade 5 through the use of self-reports and verified using parent reports.

Data Analyses

Developmental cascade models using path analysis with maximum likelihood robust (MLR) estimation were used. Developmental cascades refer to the cumulative impact over the course of development occurring due to interactions across levels, domains and systems across time (Mastern & Cicchetti, 2010, p. 491). Cascade models are based on the premise that a child's functioning in one domain of life will have an impact on their functioning in other domains and/or areas of development. Developmental cascade models require longitudinal and repeated assessments across multiple domains, while controlling for stability within constructs as well as concurrent associations across domains. A significant advantage of this type of analysis is the ability to test for the direction of effects; cascade models can help to identify if relations are direct and unidirectional, direct and bidirectional, or indirect through various moderating pathway and/or variables (Masten & Cicchetti, 2010).

When testing the fit of a cascade model, a series of nested models are performed, where statistical fit between models is assessed at each step. All future models then include the parameters estimated in the previous model (see Vaillancourt et al., 2013). The final model is identified by the model with the best statistical fit that is most parsimonious (Masten et al., 2005). Follow-up analyses are then performed once the final model has been identified to investigate potential gender differences and effects of control variables (Masten et al., 2005; Vaillancourt et al., 2013). The Akaike information criterion (AIC) is then used to compare the control model to the original model, where a lower value with a change of >10 represents a significantly better fit (Kline, 2016).

Results

Descriptive Statistics

The descriptive statistics for all study variables are presented in Table 1, and bivariate correlations are presented in Table 2. All correlations between self-oriented perfectionism and

socially prescribed perfectionism were statistically significant. Self-oriented perfectionism was significantly negatively correlated with ADHD at several time points, with the following exceptions: self-oriented perfectionism in Grade 7 with ADHD in Grades 8 through 12; self-oriented perfectionism in Grade 8 with ADHD in Grades 10 to 12; and self-oriented perfectionism in Grade 9 with ADHD in Grades 9 and 11.Correlations between socially prescribed perfectionism and ADHD were only significant at 3 time points (i.e., socially prescribed perfectionism in Grade 10 with ADHD in Grades 10 and 11; and socially prescribed perfectionism in Grade 11 was negatively correlated with ADHD in grade 7).

Developmental Path Models

Model fit statistics for each step are found in Table 3. The final path model had good fit, $\chi^2 = 155.74$, $df = 78$, $p = .000$; CFI = .986; RMSEA = 0.042 (90% CI = .032-.051); SRMR = 0.030 (see Figure 1 for model with standardized estimates). Model 1 included the within-time covariances and had poor fit to the data. Within each time point, self-oriented perfectionism was concurrently related with socially-prescribed perfectionism, and negatively related with ADHD symptoms in Grades 7 and 12. Socially prescribed perfectionism was also concurrently related to ADHD symptoms in Grades 9 and 10. The across-time stability paths were added to Model 2, resulting in a significantly better fit. All variables showed stability across time.

In Model 3, the cross-lagged paths between self-oriented perfectionism, socially prescribed perfectionism, and ADHD symptoms were added, which resulted in a significantly better fit than Model 2. In Model 4, the two year stability paths were included, which was a significantly better fit than Model 3. All variables showed stability across two year paths. There were several significant cross-lagged paths across time. From Grade 7 to Grade 8, Grade 8 to Grade 9, Grade 9 to Grade 10, and Grade 10 to Grade 11, there were significant negative cross-lagged effects from ADHD symptoms to self-oriented perfectionism. From Grade 9 to Grade 10, there was a significant negative cross-lagged effect from self-oriented perfectionism to ADHD symptoms. There was an additional significant negative cross-lagged effect from Grade 10 ADHD symptoms to Grade 11 socially prescribed perfectionism. Significant positive cross-lagged effects were found from Grade 9 socially prescribed perfectionism to Grade 10 ADHD symptoms and from Grade 10 socially prescribed perfectionism to Grade 11 self-oriented perfectionism. Finally, there was a significant positive cross-lagged effect from Grade 11 self-oriented perfectionism to Grade 12 socially prescribed perfectionism.

Model 5 includes the addition of the covariates, gender, parental income and parental education. The model still had good fit, $\chi^2 = 154.25$, $df = 78$, $p = .000$; CFI = .987; RMSEA = 0.041 (90% CI = .032-.051); SRMR = 0.026. However, the AIC in the original model without covariates (12509.64) was significantly lower than the AIC in the model with covariates (16378.02), indicating that the original model had significantly better fit than the covariate model. The original model also had fewer parameters (111) than the covariate model (152), indicating a more parsimonious model. The original model (Model 4) was thus retained as the final model (Figure 1).

Discussion

Establishing links between personality traits and psychological disorders has long been understood as important in understanding the cause, diathesis, development, prognosis, and treatment of such disorders (Gomez & Corr, 2014). With an increasing awareness of the maladaptive nature of perfectionism, paired with growing evidence of personality correlates of ADHD, the purpose of the current study was thus to explore the relations between ADHD and a multidimensional perfectionism. To do this, I built a developmental cascade model using self-oriented perfectionism, socially prescribed perfectionism, and ADHD across six years of development in adolescence using both self reports and parent reports.

Pathway for Self-Oriented Perfectionism and ADHD

As predicted, self-oriented perfectionism was negatively associated with ADHD throughout development. Specifically, ADHD negatively predicted self-oriented perfectionism across four time points from Grades 7 to 11, highlighting a directional association starting in middle school and continuing across development until the end of high school. These findings are consistent with multiple pathway models of ADHD implicating deficits in executive control and motivational processing (e.g. Sonuga-Barke, 2003). Youth with ADHD would experience difficulty with “top-down” processes, such as goal-directed and planful behaviour (Gomez & Corr, 2014; Sonuga-Barke, 2003), as well as deficits in “bottom-up” processing, referring to motivational processes and affective responses that are influenced by immediate incentives (Martel et al., 2010). Multiple pathway models suggest that delaying gratification for youth with ADHD is extremely unpleasant and uncomfortable, leading to a motivation to escape and/or avoid delaying rewards (Sonuga-Barke, 2003). They further experience steeper delay discounting, where the longer they have to delay for an outcome/reward, the less valuable it

becomes, reflecting a bias towards immediate incentives (Tripp & Alsop, 2001; Wilson, Mitchell, Musser, Schmitt & Nigg, 2011). Their hyper-vigilance for environmental cues to escape or avoid delaying rewards and preference for immediate rewards, paired with an inability to maintain attention and work toward a desired goal, reflecting deficits in executive functioning, would further complicate goal-directed behaviour (Sonuga-Barke, 2003), making qualities characteristic of youth with self-oriented perfectionism extremely difficult.

Indeed, youth who are high on self-oriented perfectionism are highly motivated to be organized and to achieve their goals, where some researchers suggest perfectionism should be viewed from a motivational perspective (Stoeber, Damian & Madigan, 2018). Specifically, youth high on self-oriented perfectionism and perfectionistic strivings are approach-oriented; in terms of achievement goals, they often strive to do better than others as well as strive to master the task at hand (Stoeber, Damian & Madigan, 2018), while also demonstrating goal-drive persistence and strong reactivity to reinforcing stimuli (Stoeber, Corr, Smith & Sakloske, 2018). This motivation is intrinsic and characterized by higher degrees of self-determination, where their goals and standards for achieving said goals are part of the self (Stoeber, Damian & Madigan, 2018). They also experience higher behavioural inhibition system levels, which is aimed at avoiding punishment and suggests that they are prone to experiencing anxiety (Stoeber, Corr, Smith & Sakloske, 2018), highlighting the overlap between their motivations and information processing. Self-oriented perfectionism is guided by an evaluative mindset where the self is seen as either perfect or not, leading to chronic self-evaluation and a need to avoid failure (Flett, Hewitt, Nepon & Besser, 2018), suggesting hypersensitive executive functions. Therefore, the deficits in motivational processing that lead to a hypersensitivity among youth with ADHD to avoid delaying rewards contradicts the approach-oriented motivation typical of self-oriented perfectionism. Youth with ADHD further experience deficits in executive functioning, making it difficult to plan and be organized, whereas self-oriented perfectionists are overly concerned with planning, organization and persistence in achieving their goals, suggesting different underlying mechanisms in both emotional-motivational processing and executive functioning that would prevent youth with ADHD from developing self-oriented perfectionism.

The findings also lend preliminary support to the scar hypothesis, suggesting that the development of ADHD influences an individual's premorbid personality, causing changes in personality later in life (Tackett, 2006), ultimately leading to a decrease in self-oriented

perfectionism over time. Contrary to my findings, previous research on ADHD and other personality traits often corroborates the spectrum hypothesis (De Pauw & Mervielde, 2011; Gomez & Corr, 2014) and the vulnerability hypothesis (Gomez & Corr, 2014), making the current study the first to corroborate the scar hypothesis. This is likely a reflection of methodology; previous studies have been largely cross-sectional in nature, where the longitudinal design allowed me to better test the direction of association between ADHD symptoms and self-oriented perfectionism.

This finding is somewhat controversial, in that personality tends to show high levels of consistency and stability across the lifespan (Fruyt & Bartel, 2006; Roberts & DelVecchio, 2000). Although traits show relative stability and change often follows developmental patterns (e.g., increasing cognitive ability), Fruyt and Bartel (2006) suggest that a small percentage of people, ranging from 10-25%, experience change in their personality domains. For example, some researchers have supported both individual and population indexes of trait change, highlighting age and maturation, as well as social demands and experiences as indicators of change (Ashton & Lee, 2016; Costa & Fruyt, 2002; Roberts & Del Vecchio, 2000; Specht, Egloff, & Schmukle, 2011). Furthermore, selection and socialization effects have also been noted in mean-level personality change, where personality predicts the occurrence of major life events (e.g., marriage), but also changes as a result of experiencing said events (e.g., starting a first job; Specht et al., 2011). Indeed, consistency does not occur at a high enough level to infer a complete lack of change in personality (Roberts & Del Vecchio, 2000), where change can occur and appears to differently across the life course (Specht et al., 2011). Therefore, personality trait development may not be a debate of continuity versus change, but rather that continuity and change coexist (Caspi, Roberts, & Shiner, 2005). It could thus be speculated that psychopathology, such as ADHD symptoms, could in fact lead to subsequent changes in personality, such as self-oriented perfectionism.

Pathway for Socially Prescribed Perfectionism and ADHD

In contrast, findings for the relations between socially prescribed perfectionism and ADHD symptoms appear mixed. Despite Grade 9 socially prescribed perfectionism positively predicting ADHD symptoms in Grade 10, as well as being positively correlated in Grade 9 and 10, ADHD symptoms in Grade 10 went on to predict decreases in socially prescribed perfectionism in Grade 11. Socially prescribed perfectionism in Grade 9 predicting ADHD in

Grade 10 may also be explained by the multiple pathway model of ADHD; socially prescribed perfectionism is associated with a hyper-reactivity to negative reinforcing stimuli and a fear of failure, guided by an evaluative mindset viewing people (i.e. the self and others) and circumstances as either perfect or not based on their internalization of the standards, values and expectations of others (Flett, et al., 2018; Stoeber, Corr, Smith & Sakloske, 2018). This perfectionist mindset (Flett et al., 2018) would lead to a hypersensitivity to environmental demands and stressors, allocating attention to potentially threatening internal and/or external stimuli (Eysenck, Drakshan, Santos & Calvo, 2007). It can thus be speculated that these responses would interfere with both executive functions, such as attention and cognition, as well as motivational processes, ultimately contributing to difficulties with inattention, impulsivity, and hyperactivity.

These conjectures are consistent with attentional control theory, which links anxiety, which is closely related to socially prescribed perfectionism (Hewitt et al., 2002; Roxborough et al., 2012), with worrisome thoughts and threatening external stimuli (Eysenck et al., 2007). Attentional control theory suggests that such thoughts, such as chronic self-evaluation and fear of failure, interferes with one's ability to focus on the task at hand, limiting available resources to focus and perform, thus leading to inattention (Eysenck et al., 2007). Not only would these thoughts reduce attention for on-going tasks, they would further make youth hypervigilant to environmental stimuli, scanning their environment for threats. This hypervigilance may present itself as the inner restlessness and impatience typical of youth with ADHD, specifically older youth displaying hyperactivity symptoms of ADHD (APA, 2013). However, this pathway was only significant from Grade 9 to Grade 10, which may be a reflection of greater life stress for youth during their first year of high school. It is possible that perfectionistic concerns become exacerbated during this time as youth try to navigate a new social setting and school environment, thus leading to ADHD-like symptoms.

Limitations and Future Directions

Despite the findings being unique in identifying longitudinal links between self-oriented perfectionism, socially prescribed perfectionism and ADHD, there are some limitations to consider. First, although the use of cascade modelling allows us to examine the longitudinal and temporal sequencing of variables and is an important strength of the study, it does not allow us to draw true causal conclusions. For example, the use of a longitudinal design allowed my study to

provide preliminary support for the scar hypothesis for the relation between self-oriented perfectionism and ADHD symptoms. However, uncovering a scar explanation of personality and psychopathology requires gathering measures of personality prior to the onset of ADHD (Tackett, 2006). Future research on personality and ADHD would thus benefit from measuring personality traits, such as perfectionism, prior to the onset of psychopathology to better explore the underlying processes.

Second, the current study did not consider newer ways of conceptualizing perfectionism; to better account for potential positive impacts of perfectionism, specifically self-oriented perfectionism, some researchers have conceptualized perfectionism as perfectionistic strivings and perfectionistic concerns, where the impact of perfectionism is dependent on how the dimensions interact (Dunkley & Bankstein, 2000; Gaudreau & Thompson, 2012; Stoeber, Damian & Madigan, 2018). To better disentangle the maladaptive and adaptive nature of perfectionism future researchers would benefit from studying perfectionism in terms of perfectionistic strivings and perfectionistic concerns.

Third, the current study failed to control for other variables that may impact the association between ADHD and perfectionism. For example, I did not control for Conscientiousness, which plays a role in the development of self-oriented perfectionism, and may mediate the relation between self-oriented perfectionism and ADHD among youth. Further research suggests that age and source of participants may moderate pathways between personality and ADHD (Gomez & Corr, 2014), suggesting that the current study's participants being youth from a community sample may alter the magnitude of the relations found. Future research would benefit from exploring the relations between perfectionism and ADHD in clinical samples.

Lastly, the pathway found from socially prescribed perfectionism to ADHD symptoms may reflect a spurious finding; the pathway only occurred from Grade 9 to Grade 10, and was not replicated at later time points, highlighting the need for caution. Future research is thus needed to better clarify the complex relations existing between multidimensional perfectionism and ADHD symptoms.

Clinical Implications

The findings are consistent with a multiple pathway model of ADHD, suggesting deficits in both top-down and bottom-up processes. The findings are also consistent with a

multidimensional perfectionism in youth. Indeed, the differential associations found between ADHD symptoms and self-oriented perfectionism relative to socially prescribed perfectionism highlights the heterogeneity of both ADHD symptoms and perfectionism. The consistent pathway from ADHD symptoms to self-oriented perfectionism provides some support for how life experiences may potentially impact personality development. Clinicians should be mindful that despite being relatively stable, personality traits may be influenced and/or changeable for some people (Fruyt & Bartel, 2006; Roberts & Del Vecchio, 2000; Specht et al., 2011). The development of ADHD symptoms in children may reflect a life experience or alter social demands and/or expectations in a way that personality traits, like self-oriented perfectionism, become altered. It is thus important to keep in mind the interplay between personality structure and psychological disorders when considering treatment options for various clients. In contrast, the positive pathway from socially prescribed perfectionism to ADHD symptoms highlights a differential developmental pathway; clinicians should be mindful that the heterogeneous nature of perfectionism and ADHD symptoms means that the way in which the two constructs interact will differ, ultimately leading to different manifestations.

These differential associations suggest not only different developmental pathways, but also different treatment plans. For example, treating youth with symptoms of ADHD and low levels of self-oriented perfectionism would benefit by targeting deficits in top-down processes; ADHD treatments often make use of strategies aimed at compensating for top-down deficits, making use of calendars and agendas to assist in planful behaviours and organization skills. Treatment thus targets the same skill set and qualities that are characteristic of and come naturally for youth with self-oriented perfectionism. It is possible that the constant attempts to compensate for said deficits leads to changes in youths' emerging sense of their own success and/or failure at various developmental tasks, ultimately altering their cognitions and expectations of themselves. The by-product of a change in cognitions may manifest as increased perfectionistic strivings, resulting in positive and/or adaptive outcomes, where youth can develop organization skills and planful behaviours in a way that promotes healthy goal setting and expectations of the self.

However, clinicians should be mindful of the use of cognitive interventions with youth high on socially prescribed perfectionism and ADHD symptoms; the expectation for youth to succeed in making use of tools to assist in organization may result in the perception of the

therapy setting as another environment in which perfection is being demanded of them. Their inability to complete the task at hand or succeed in planful behaviour, which would be expected given their top-down deficits, may then be perceived as another failure, leading to further negative reactions in regards to the therapy setting. Furthermore, youth's failure in the therapy setting may be internalized, leading to further self criticism accompanied by negative reactions toward the self as well (Asseraf & Vaillancourt, 2015). Clinicians working with perfectionistic youth should therefore be mindful of the way treatment is being perceived by the client and of the goals they are setting; constantly setting expectations surrounding top-down processes, that would be extremely difficult and at times unattainable for youth with ADHD symptoms, could negatively impact not only the therapeutic relationship but also the therapy setting for the client.

Clinicians should be mindful of the way in which personality structure impacts the degree to which ADHD symptoms persistent into adolescence and adulthood. Personality structure can lead to greater persistence of ADHD symptoms (e.g., higher levels of Neuroticism and lower levels of Agreeableness; Miller et al., 2008), leading to greater impairment. The relations between perfectionism and ADHD symptoms, specifically socially prescribed perfectionism, may further complicate the developmental course of ADHD symptoms. The presence of perfectionism may impact social relationships, as well as educational outcomes for youth with ADHD symptoms (Eaken et al., 2004; Shiner et al., 2004), where treatment outcomes may benefit from providing supports within the school system.

The findings also caution that at some points in development, specifically in early high school when socially prescribed perfectionism and ADHD symptoms co-occur, treatment may become more difficult; perfectionism is negatively associated with help-seeking behaviour, acting as a barrier to treatment outcomes (Vernon, 2002). Indeed, perfectionism hinders the effectiveness of interventions (Blatt, 1995) as well as the usefulness of planning interventions (Powers, Koestner, & Topciu, 2005), where youth respond less well to treatment. Therefore, clinicians should be cautious of the extent to which the presence of perfectionism may be impacting treatment, being aware of the potential barrier it may pose to ADHD treatment. Early high school thus reflects a vulnerable time in development, highlighting a time frame that may exacerbate current difficulties or lead to new ones for youth, emphasizing the need for early intervention.

Conclusion

The findings were unique in identifying longitudinal links between self-oriented perfectionism, socially prescribed perfectionism, and ADHD, and is the first (of my knowledge) to empirically demonstrate these links. The findings provide preliminary support for the scar hypothesis for ADHD and self-oriented perfectionism, with ADHD symptoms predicting lower levels of self-oriented perfectionism beginning in middle school and continuing into the end of high school, suggesting that ADHD symptoms may alter the development of certain personality traits. The findings also provide some support for the attentional control theory in that difficulties with attention, impulsivity and hyperactivity, and thus indicators of ADHD symptoms, were potential outcomes and/or manifestations of socially prescribed perfectionism. The findings highlight the heterogenous nature of both ADHD symptoms and perfectionism, whereby understanding the complex relation between the two constructs provides insight into potential developmental pathways, as well as differing treatment options for youth.

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Table 1

Descriptive Statistics for Study Variables

	Possible range		Total	
	Min	Max	*M*	*SD*
Self-Oriented Perfectionism				
Grade 7	0	4	1.86	0.72
Grade 8	0	4	1.95	0.80
Grade 9	0	4	2.02	0.82
Grade 10	0	4	2.06	0.83
Grade 11	0	4	2.08	0.89
Grade 12	0	4	2.05	0.82
Socially Prescribed Perfectionism				
Grade 7	0	4	1.13	0.80
Grade 8	0	4	1.28	0.86
Grade 9	0	4	1.39	0.89
Grade 10	0	4	1.53	0.92
Grade 11	0	4	1.49	0.91
Grade 12	0	4	1.46	0.90
ADHD				
Grade 7	0	2	0.64	0.50
Grade 8	0	2	0.62	0.49
Grade 9	0	2	0.59	0.48
Grade 10	0	2	0.61	0.48
Grade 11	0	2	0.63	0.50
Grade 12	0	2	0.63	0.50

Table 2

Bivariate Correlations Among Self-Oriented Perfectionism, Socially Prescribed Perfectionism, and ADHD symptoms

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SOP																		
1.G7	-	.65**	.53**	.51**	.45**	.41**	.54**	.38**	.30**	.27**	.30**	.30**	-.09	-.02	-.06	-.03	-.03	.00
2.G8		-	.66**	.58**	.52**	.46**	.35**	.52**	.37**	.33**	.34**	.35**	-.18**	-.15**	-.12*	-.08	-.07	-.04
3.G9			-	.69**	.65**	.55**	.27**	.33**	.50**	.35**	.37**	.36**	-.12**	-.12**	-.08	-.13*	-.07	-.11*
4.G10				-	.75**	.67**	.21**	.28**	.36**	.50**	.40**	.44**	-.24**	-.15**	-.16**	-.16**	-.14**	-.13*
5.G11					-	.80**	.25**	.31**	.35**	.43**	.54**	.49**	-.23**	-.18**	-.19**	-.21**	-.20**	-.18**
6.G12						-	.25**	.30**	.32**	.41**	.45**	.55**	-.16**	-.14**	-.16**	-.19**	-.17**	-.18**
SPP																		
7.G7							-	.58**	.43**	.35**	.37**	.35**	.05	.06	.03	.07	.04	.07
8.G8								-	.58**	.48**	.49**	.50**	.02	.06	.07	.06	.07	.07
9.G9									-	.61**	.57**	.55**	-.01	.01	.08	.09	.06	.03
10.G10										-	.71**	.65**	-.03	.02	.07	.11*	.10*	.09
11.G11											-	.70**	-.15**	-.09	-.05	-.04	-.02	-.04
12.G12												-	-.06	-.04	-.02	-.02	-.02	-.03
ADHD																		
13.G7													-	.77**	.73**	.70**	.66**	.62**
14.G8														-	.77**	.70**	.69**	.65**
15.G9															-	.74**	.74**	.68**
16.G10																-	.78**	.72**
17.G11																	-	.77**
18.G12																		-

Note. SOP= Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; ADHD = Attention Deficit Hyperactivity Disorder.

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

Table 3

Model Fit Statistics

	$\chi 2$	*df*	*p*	RMSEA (90% CI)	SRMR	CFI	TLI	AIC
Model 1: Within time covariances	5018.35	135	0.000	0.251 (0.245-0.257) $p = 0.000$	0.338	0.171	0.060	17258.253
Model 2: Within time covariances and across-time stability	646.09	120	0.000	0.087 (0.081-0.094) $p = 0.000$	0.122	0.908	0.885	12915.989
Model 3: Within time covariances, across time stability, and cross-lagged SOP, SPP and ADHD	553.73	90	0.000	0.095 (0.087-0.102) $p = 0.000$	0.089	0.919	0.865	12883.635
Model 4: Within time covariances, across time stability, cross-lags, and two year stability	155.736	78	0.000	0.04 (0.032-0.051) $p = 0.924$	0.03	0.986	0.974	12509.638
Model 5: Within time covariances, across time stability, cross-lags, two year stability, and controls	154.247	78	0.000	0.041 (0.032-0.051) $p = 0.974$	0.026	0.987	0.967	16378.015

Note. SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; ADHD = Attention Deficit Hyperactivity Disorder.

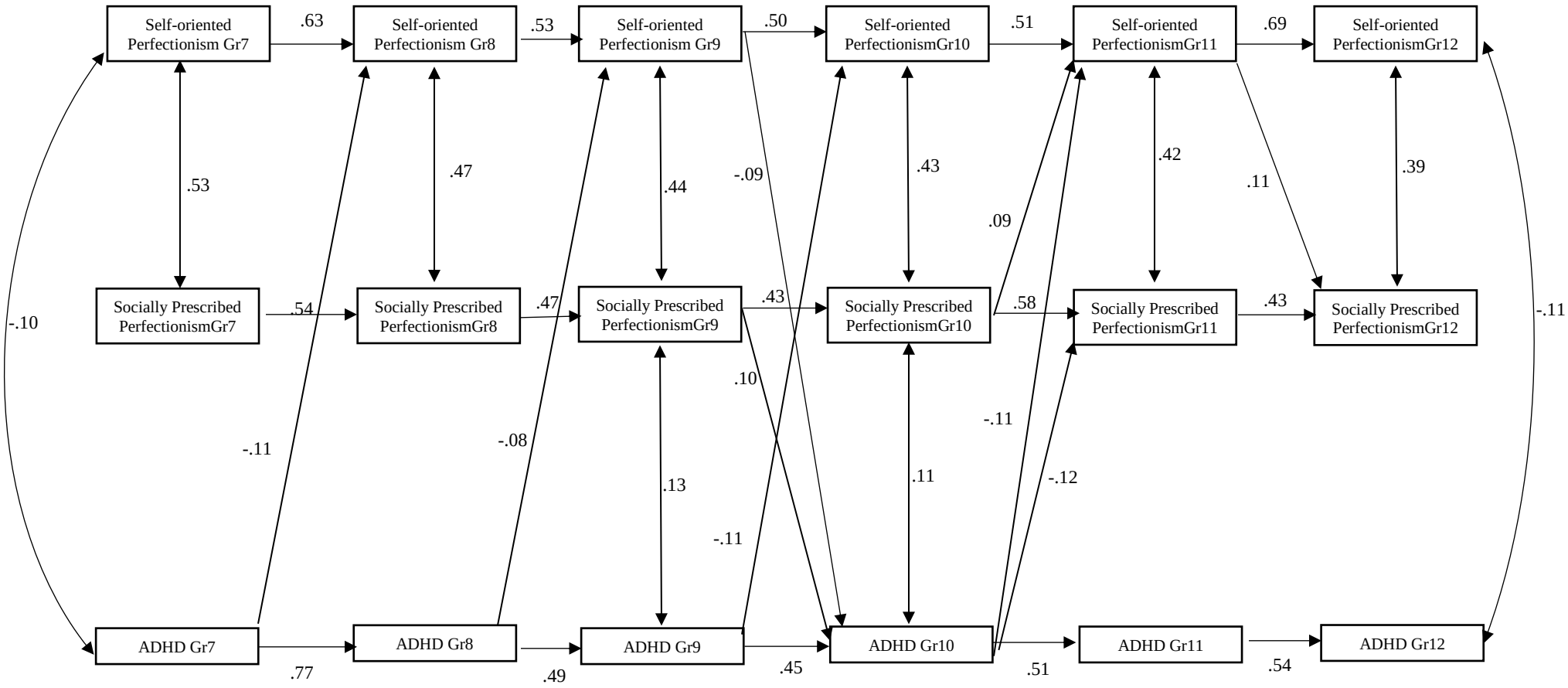

Figure 1. Model of Self Oriented Perfectionism, Socially Prescribed Perfectionism and ADHD symptoms from Grade 7 to 12.
Note. Values represent standardized coefficients or correlations. Only coefficients which are statistically significant at the $p < .05$ level are presented. Non-significant parameters, control variables, and stability paths across two years are not displayed for ease of presentation.