Disordered Eating and Borderline Personality Features in Canadian Adolescents: A Longitudinal Study

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Abstract

The longitudinal relationship between borderline personality features, disordered eating behaviour, and the role of impulsivity were examined using a sample of 643 Canadian adolescents from the McMaster Teen Study. Participants were assessed annually, beginning in Grade 7 until Grade 12.Using path analysis, the results suggest that higher symptoms of impulsivity increase an adolescent's risk of engaging in disordered eating behaviour, as well as developing borderline personality features in later years. Results also showed a bidirectional relationship between these variables, whereby borderline personality features and disordered eating influence one another throughout time. As well, disordered eating appeared as an antecedent for borderline personality features. The findings highlight the importance for clinicians to be aware of the high comorbidity of disordered eating, borderline personality features, and impulsivity, and that early interventions that target impulsivity and problematic eating behaviour may mitigate the risk of future borderline personality features. Clinical implications, limitations, and future directions are discussed.

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General Introduction

Borderline Personality Disorder (BPD) is a clinical disorder characterized by "a pervasive pattern of instability of interpersonal relationships, self-image, and affects, and marked impulsivity" (American Psychiatric Association [APA], 2013, p.663). BPD is a serious psychiatric disorder that is rarely diagnosed on its own. Indeed, BPD is highly comorbid with mood disorders, other personality disorders, substance abuse disorders, and of relevance to my study, eating disorders (Tomko, Trull, Wood, & Sher, 2014). Given that treatment for other psychological disorders is associated with poorer outcomes if an individual also has BPD, this kind of comorbidity may be particularly burdensome (Paris, 2009).

Eating disorders such as anorexia nervosa, bulimia nervosa, and binge eating disorder are generally defined as "maladaptive attitudes and behaviors around eating, weight, and body image" and they are diagnosed in approximately 2% of the general population (APA, 2013). Individuals with this diagnosis may suffer various negative outcomes, both related and unrelated to food consumption. Eating disorders and BPD share several common personality features, risks, symptoms, and consequences (APA, 2013; Cassin & von Ranson, 2005; Mills, Weinheimer, Polivy, & Herman, 2018). Although both of these disorders are generally diagnosed in adulthood, researchers have consistently found that borderline personality features and disordered eating behaviour begin to appear in adolescence (Cohen, Crawford, Johnson, & Kasen, 2005; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011; Vaillancourt et al., 2014). Despite these findings, there is little research that explores the temporal sequence between borderline personality features and disordered eating in adolescents. For example, it has not yet been examined, using an adolescent population, if borderline personality features appear at an earlier age than disordered eating, and if individuals with these features are at a higher risk of engaging in disordered eating behaviour later in life.

To explore the relation between disordered eating and borderline personality features, I examined the temporal relation between borderline personality features and disordered eating in adolescents in a large community sample of Canadian adolescents. I also examined the potential role of impulsivity, which is associated with both disorders (APA, 2013). The examination of

these three variables allowed me to examine whether borderline personality features precede disordered eating, or vice versa. Clarification and a deeper understanding of this relation have important implications for prevention and early targeted intervention of both disorders.

The thesis is organized as follows: I begin by discussing developmental psychopathology and adolescence followed by personality and psychopathology. This is relevant to the current thesis as understanding these concepts help highlight the complexities of adolescent psychopathology and support why this is a critical time period to study. Next, I discuss the concepts of disordered eating behaviour, borderline personality features, and impulsivity, and their current relation in the literature. Following this, I describe the participants, procedure, and statistical approach of the current study. Finally, I present the results, followed by a discussion and clinical implications.

Theoretical Background

Developmental Psychopathology

For years, developmental psychopathologists have suggested that there are a number of different factors that may contribute to the adaptive and maladaptive outcomes in any one individual (Cicchetti & Rogosch, 1996). Furthermore, they have argued that these factors and their contributions vary among each individual and that there are a multitude of pathways that these maladaptive and/or adaptive types of behaviour can manifest in people (Cicchetti, 1993). Two such concepts that help describe this idea are equifinality and multifinality.

Equifinality refers to the idea that there are several different developmental pathways that can lead to the same outcome (Cicchetti, 1996; Cicchetti & Rogosch, 1996; Schaffer, 2006). For example, two individuals who are diagnosed with an eating disorder at the age of 20 may have had significantly different lives in terms of genetic makeup, environment, education, interests, socioeconomic status, and relationships. Multifinality refers to the idea that individuals with similar early profiles do not necessarily end up with the same outcome (Cicchetti, 1996; Cicchetti & Rogosch, 1996; Schaffer, 2006). For example, two individuals with early disordered eating problems, high levels of impulsivity, and exposure to child maltreatment, may in adulthood, end up with different diagnoses. In other words, it should not be assumed that a particular life event (or mental health profile) will lead to the same outcome as another individual who experienced the same event. Two individuals that appear to be on the same developmental pathway may make different choices throughout their lives that can lead them to

develop very different patterns of adaptation or maladaptation later in life (Cicchetti & Rogosch, 1996; Rutter, 1989). Therefore, it is important to expand research to examine and understand the different starting points and ending points of different variables over time.

When endeavouring to understand the properties of psychopathology, one must first understand normative human development (Cicchetti, 1993). Understanding normal development is essential to make sense of abnormalities or deviations from normal development, as this deeper understanding may further our knowledge of general pathology. This can be helpful to gain insight into the development of non-psychopathological outcomes, and the processes and mechanisms that differ or are the same between the two. Adolescence, characterized as a lengthy transition phase where an individual is no longer a child but not yet an adult, is particularly important phase to understand (Cicchetti & Rogosch, 2002), as it is a time when pathologies and maladaptive behaviour begin to emerge (APA, 2013). Consideration of normative adolescent development is critical when studying psychopathology. This is because even before a psychopathological disorder emerges, certain developmental pathways may lead to a failure (i.e., an adaptation compromise in normal development) that increases one's risk of developing a given disorder (Cicchetti & Rogosch, 2002).

Adolescence

Adolescence is a particularly pertinent time to examine the differences between normal and abnormal development. There is currently no standard definition of adolescence as there are several factors used to operationalize this period of life, causing it to vary slightly depending on what factor one chooses to emphasize (e.g., psychological, physical, social, cognitive development, as well as age; Curtis, 2015). For the purpose of consistency throughout my thesis, I use the American Psychological Association's (2002) definition of adolescence as any individual between the ages of 10-18.

During adolescence, individuals undergo several important transition points in their development that have a strong impact on various aspects of their lives. According to Schaffer (2006), a transition point is the choice that confronts an individual throughout their development where several alternative pathways may have been followed; each possible choice may result in a total alteration of life circumstances. For example, when an adolescent is deciding whether to stay at home for university or to move away to a different city, both of these decisions will result in very different life paths depending on which route they take. Further, adolescence is a period

of time when individuals go through many significant changes (i.e., physical, cognitive, and emotion changes; APA, 2002), and it is associated with a more egalitarian relationship between the adolescent and his/her parents, which differs from their relationship in childhood (Morris & Steinberg, 2001). Cognitively, adolescents increase their knowledge and intellectual capacity tremendously during this phase, which is a key component in psychological development. In Piaget's theory of cognitive development, formal operational thinking, the final stage of development, occurs in early adolescence (Piaget, 1972). During this time, adolescents develop the ability to think about abstract concepts, logically test hypotheses, and give way to new cognitive structures (Cattel, Cattell, & Johns, 1984). According to Erikson (1968), adolescence is a transitional phase where adolescents search for a sense of self and personal identity, through an intense exploration of personal values, beliefs, and goals, whereby sifting through life choices and trying out new possibilities helps form their identities (see also Arnett, 2013). Presumably, such changes can impact their development in very different ways, both adaptive and maladaptive (Curtis, 2015).

As adolescence is a time when individuals undergo so many changes, when examining pathologies that emerge during this time, it is important to consider how these changes impact one another over time. It is thus undesirable to limit research to only one particular time point, as changes in one year of development may affect changes in the subsequent year. Further, it is uncommon to find a direct causal link between an early characteristic and/or life event and a future outcome (Schaffer, 2006). The impact of any event or experience in an individual's life must be viewed in the context of their life before and after that event, hence the importance of longitudinal research. For example, two children who are currently going through the aforementioned transition phases in adolescence who developed anxious attachment early in life may have completely different outcomes later in life. One of them may go on to develop an anxiety disorder due to being unable to manage the new responsibilities and demands of the period of adolescence, whereas the other may manage quite well and not develop an anxiety disorder (Cicchetti & Rogosh, 2002; Schaffer, 2006). Research that repeatedly assesses individuals over the course of several years is important because it allows various factors to be examined as well as their impact on one another over time, as well as their effect on an individual's development. Research that simply jumps from an early age to a later age is limited because other factors, such as personality development, that influence change may go unnoticed,

ignoring other relevant links involved in one's development (Schaffer, 2006; White & Arzi, 2005).

Personality and Psychopathology

Personality refers to the specific ways an individual thinks, feels, behaves, and relates to others (APA, 2019). There are several theories about the development, stability, and change of personality in humans. Some argue that personality development is not complete until the late 20s (Halverson, 1994) and others have argued that the level of continuity in personality remains relatively high throughout childhood and adolescence, despite the many ongoing changes during this time (Fruyt & Bartel, 2006). When it comes to the relationship between personality and psychopathology, there are several different ways they influence the other. They can influence the presentation or appearance of one another (i.e., a pathoplastic relationship), they can share a common etiology (i.e., a spectrum relationship), and they may have a mutually causal relationship in the development or etiology (Tackett, 2006; Widiger, 2011). These theories are all difficult to test methodologically, as they require longitudinal research which assesses an individual's personality before the onset of a disorder (Tackett, 2006).

The pathoplastic relationship can be bidirectional. This means that the development of psychopathology can influence pre-existing personality traits. For example, assessing a client's personality during an intake assessment may not reflect the individual's true personality. People who are very depressed or anxious may not give an accurate description of their usual ways of thinking, feeling, and acting, and it is only when their mood is effectively treated that an accurate personality assessment can be conducted (Widiger, 2011). The scar hypothesis takes this one step further by suggesting that the development of psychopathology may alter an individual's personality permanently, causing changes to personality later in life (Tackett, 2006). However, given the stability of personality over time, it is also possible that a person's personality traits would impact the development and/or maintenance of psychological disorders (Gomez & Corr, 2014). For example, individuals that are low on conscientiousness and high on impulsivity are prone to developing bulimia nervosa and binge eating disorder (Widiger, 2011). The pathoplastic relationship has also been referred to as the exacerbation hypothesis, which suggests that pre-existing personality traits may influence the manifestation of psychopathology, altering its course, severity, presentation, and prognosis (Tackett, 2006).

The spectrum relationship assumes that personality and psychopathology exist along a common spectrum rather than being two distinct entities. Thus, personality disorders may be viewed as maladaptive personality traits, and some personality disorders could actually be considered as the early onset of other psychiatric disorders (Samuel & Widiger, 2008; Widiger, 2011). Finally, an individual who has a severe mental disorder may find that certain personality traits have been altered following the onset of this disorder. For example, having several panic attacks may heighten an individual's dependent personality traits because of the fear of having another attack. Conversely, personality traits may also have an important etiological role in the development of psychopathology; dependent personality traits have been shown to increase a person's risk of developing depressive disorders (Widiger, 2011). Also referred to as the vulnerability hypothesis, which suggests that certain personality traits predispose individuals to certain psychopathologies under certain circumstance (Tackett, 2006).

Disentangling the temporal relationship between personality and psychopathology is a challenging task. Adolescence represents a critical period of transitional phases (Schaffer, 2006), and is when many behavioural, physical, and emotional changes and maladaptive behaviour, (such as disordered eating) emerge (Cicchetti & Rogosh, 2002; Widiger, 2011). It is important to empirically examine this time period in order to better understand the chronological relationship between personality and psychopathology. By using an adolescent sample with a longitudinal design, I am better able to understand which personality traits (such as borderline personality features) predict maladaptive behaviour (such as disordered eating), and vice versa. This new information is critical for implementing effective prevention and intervention programs targeting at risk youth, in order to lessen their susceptibility to develop clinical disorders.

Literature Review

Eating Disorders

Eating disorders can affect one's mood and thoughts and may cause irritability, poor memory and concentration, increased anxiety, low self-esteem, depression, difficulty sleeping, and loss of interest in hobbies and friends (APA, 2013). Studies have shown that individuals with eating disorders tend to experience significantly elevated mortality rates and are at a higher risk of substance abuse, suicidality, role impairment, and other psychiatric problems (Arcelus, Mitchell, Wales, & Nielsen, 2011; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). For example, researchers studying a sample of 1620 American college students found that those

diagnosed as having eating disorders demonstrated poorer academic performance as compared to their non-diagnosed peers (Hoerr, Bokram, Lugo, Bivins, & Keas, 2013). In the same sample, Hoerr et al. (2013) found that 4.5% of women and 1.4% of men reported undergoing professional treatment for an eating disorder or had already received treatment in adolescence when entering their first year of college. Despite eating disorders being more common in girls and women (APA, 2013), eating disorders are also present in boys and men. Sweeting et al. (2015) examined data on prevalence rates of eating disorders among males in web-based information, scientific literature, and newspaper articles. They found that male prevalence rates were inconsistent in both academic and non-academic literature, and in both clinical and community samples. These conflicting results suggest that although eating disorders are evidently present in boys and men, there is a need for more research for this population. Accordingly, data were collected for girls and boys in my study.

Individuals with eating disorders often struggle with self-esteem issues. They evaluate themselves based on their body shape and weight in ways that are typically more negative and harsh when compared to individuals without an eating disorder (APA, 2013). Moreover, research suggests there may be a strong link between being teased about one's weight in adolescence (insults, cruel comments, disparaging and/or sexist remarks) and body dissatisfaction in adulthood. This association is stronger in children and adolescents as compared to adults, and stronger in females than males (Menzel et al., 2010). For example, Menzel et al. (2010) found that girls were teased more than boys and were also more bothered by the teasing. Such findings may help in understanding why disordered eating is more common among girls, given that they are more bothered by the teasing (see review by Vaillancourt, 2013).

The majority of research on eating disorders uses adult samples. This can be problematic given that disordered eating behaviour begins much earlier in life, before an individual meets the clinical threshold for a diagnosis. The lack of research focus on early-life identification of disordered eating behaviour makes it difficult to identify behaviour or traits that may put an individual at risk from moving into the clinical range of a diagnosed eating disorder (Miller et al., 2008). Further, there is evidence that engaging individuals in clinical research at a younger age is beneficial in that it may lead to early identification of eating disorders, which has been shown to link to better treatment outcomes (Haley, Hedberg, Leman, 2010). Accordingly, in the

present study disordered eating behaviour was measured beginning in early adolescence, in order to capture its early development.

Disordered eating differs from an eating disorder in that an individual engaging in disordered eating behaviour may not meet the clinical threshold for a diagnosable eating disorder, despite engaging in irregular and abnormal eating behaviour. In order to meet the clinical threshold for anorexia nervosa, an individual must have persistent behaviour that interfere with maintaining an adequate weight for health (restricting food, misuse of diuretics, etc.); a powerful fear of gaining weight or becoming fat; disturbances in how the individual experiences their weight and/or shape; and the individual does not fully understand the seriousness of their condition. Bulimia nervosa is characterized by recurring episodes of food restriction followed by binge eating; recurring behaviour that follows bingeing to compensate for the food intake and prevent weight gain; negative evaluation of the individual's weight and shape. Finally, binge eating disorder is characterized by recurrent episodes of eating large quantities of food then experiencing shame, distress or guilt afterward (see the DSM-5, APA, 2013).

Disordered eating behaviour includes fasting or skipping meals, intentional vomiting after eating, and using diet pills or amphetamines (Croll, Neumark-Sztainer, Story, & Ireland, 2002). Disordered eating behaviour is common in youth; unrealistic and unsafe cultural ideals of body image affect young populations and promote negative views of their own figures, increasing the desire to engage in unsafe behaviour to lower one's body weight (Janssen, 2012). Croll et al. (2002) found that within a population of 80,000 adolescents in grades 9-12, disordered eating behaviour was reported by over one-half of girls and one-third of boys. This suggests that although clinically diagnosed eating disorders are relatively rare, a large number of adolescents engage in eating behaviour harmful to their health that may not necessarily reach threshold for diagnosis (APA, 2013; Lee & Vaillancourt, 2018).

Indeed, a growing body of evidence has suggested that like eating disorders, disordered eating behaviour is associated with negative outcomes for youth. For example, in a 5-year longitudinal study of Canadian adolescents, Lee and Vaillancourt (2018) found that disordered eating behaviour was followed by depressed symptoms the following year, at every yearly assessment during the 5 years of the study (i.e., disordered eating in year 1 was followed by depressive symptoms in year 2). If an individual does not undergo treatment for disordered

eating or receive some kind of intervention, it is likely that their symptoms will worsen, increasing the possibility of developing a clinical eating disorder. Neumark-Sztainer et al. (2011) conducted a 10-year longitudinal study tracking dieting and disordered eating behaviour in a population-based sample of 2,287 young adults, ranging from 12-15 years old at baseline. Their findings indicated that the prevalence of disordered eating and dieting remained constant, or increased, from adolescence to young adulthood. Furthermore, individuals who engaged in disordered eating behaviour during adolescence were at an increased risk of engaging in this type of behaviour 10 years later. Although Neumark-Sztainer et al. (2011) showed the increased risk of disordered eating behaviour from adolescence to adulthood, a limitation to their study design is that their participants were only measured twice, at baseline and then 10 years later. The issue with not collecting measurements at more frequent time points (i.e., every year or two years, rather than waiting a decade) is that the study may fail to capture a third variable that may influence participants' behaviour. Rates of attrition may also be higher since participants' contact information is generally not tracked annually, so shorter time intervals allow for more regular and consistent contact (Neumark-Sztainer et al., 2011). To account for this limitation, data for my study were collected annually with the objective of identifying and accounting for notable changes in participants' lives that may affect disordered eating behaviour.

Although one specific cause of eating disorders has not been identified, there are several risk factors that increase the likelihood an individual may move from experiencing disordered eating behaviour to meeting the threshold for a diagnosable eating disorder. Youth often struggle to develop accurate representations of their weight status as compared to their actual weight levels (Duncan, Duncan, & Schofield, 2011). This means that they may already have a pre-existing distorted view of their physical appearance in terms of weight and as mentioned, this can lead to engaging in disordered eating behaviour (Menzel et al., 2013; Vaillancourt, 2013). Haley, Hedberg, and Leman (2010) collected survey data from over 16,000 11th grade students in Oregon and found that being overweight, or simply at risk of becoming overweight, increased the chances of an individual engaging in disordered eating behaviour. This kind of research highlights the need to examine early risk factors and developmental pathways in order to better understand the factors that contribute to disordered eating before this issue persists throughout one's life, leading to further negative consequences. Another known risk factor is personality traits. Cassin and Ranson (2005) completed a meta-analysis reviewing literature between 1994

and 2004 and found that certain personality traits have been associated with the development and maintenance of eating disorders. In particular, perfectionism, negative emotionality, low cooperativeness, sensation seeking, impulsivity, and novelty seeking were highly correlated with the development and maintenance of eating disorders. Many of the personality traits associated with increased disordered eating behaviour are also traits of borderline personality disorder (BPD), which is a personality disorder often comorbid with eating disorders (APA, 2013; Cassin & von Ranson, 2005).

Borderline Personality Disorder

As mentioned, BPD is characterized by "a pervasive pattern of instability of interpersonal relationships, self-image, and affects, and marked impulsivity, beginning in early adulthood" (APA, 2013, p.663). The marked impulsivity must be present in 5 out of the 9 contexts listed in the Diagnostic Statistical Manual 5 (DSM 5), such as recurrent suicidal behaviour, gestures, threats, or self-mutilating behaviour; frantic efforts to avoid imagined or real abandonment; and chronic feelings of emptiness. In clinical samples, around 10% of all outpatients meet criteria for BPD, and this number increases to 20% for inpatients (APA, 2013). Although these rates are lower in community samples, Tomko, Trull, Wood, and Sher (2014) found that in a representative sample of 34,481 American adults, 2.7% met diagnostic criteria for BPD. Of these individuals, BPD was found more often in women than in men, as well as in people with a lower income, individuals who were separated or divorced, and people under 30 years old. BPD has been found to negatively impact psychological, family and social functioning, and increase the changes of mood fluctuations, deliberate self-harm, suicidal behaviour, and disturbed relationships (APA, 2013; Skodol et al., 2002). Although the tendencies of instability and impulsiveness associated with BPD tend to be chronic, individuals that take part in therapeutic interventions tend to experience improvement regarding these symptoms within the first year of therapy (APA, 2013).

Common comorbid disorders with BPD include substance abuse disorders, mood disorders, post-traumatic stress disorder, other personality disorders, and of relevance to the present study, eating disorders (APA, 2013). Genetic influence accounts for a large proportion of variability in the etiology of BPD. For instance, having a relative with a psychiatric disorder from the neurotic spectrum has been identified as one of the most important risk factors of BPD, in addition to anxiety disorders, depression, and suicidality in the family (Bandelow et al., 2005).

Typically, an individual with BPD will have several family members who display very intense emotions or temperament, and will often report having grown up in chaotic family environments such as growing up in foster care and separation from parents/caretakers (Bandelow et al., 2005). The majority of research on BPD focuses on clinical samples rather than community samples (Mills et al., 2018). Although this research is helpful, it is important to study community samples when attempting to structure prevention and intervention programs in youth because at-risk individuals may not yet be in the clinical range, and are therefore excluded from the literature when only clinical samples are used. It is easier to prevent psychological issues from developing in the first place than attempting to intervene once the symptoms have progressed to a point of major impairment, which makes it essential to study borderline personality features in childhood (Vernon, 2011).

There has been some controversy surrounding the diagnosis of BPD in adolescence, as interpersonal difficulties and identity problems are typical during this developmental phase, and can sometimes be difficult to distinguish from features of personality disorders (APA, 2013; Paris, 2009; Glenn & Klonsky, 2013). Despite the controversy, research on borderline personality features (symptoms of BPD) in children has suggested that they are in fact present during childhood and, more commonly, in adolescence (Cohen, Crawford, Johnson, & Kasen, 2005; Vaillancourt et al., 2014). Borderline personality features include, but are not limited to, recurrent suicidal behaviour, chronic feelings of emptiness, frantic efforts to avoid real or imagined abandonment, and impulsivity in at least two areas that are potentially damaging such as spending, binge-eating, or sex (APA, 2013). Although BPD is typically diagnosed in adulthood, research shows that adolescents as young as 12-14 years old can be diagnosed with a high degree of confidence (Glenn & Klonsky, 2013; Sharp et al., 2011). Miller, Muehlemkamp, and Jacobson (2008) conducted a literature review of BPD in adolescence and found that there is a subgroup of individuals for whom the diagnosis remains stable from adolescence into adulthood, and another subgroup that moves in and out of the diagnosis. They conclude that a formal assessment of BPD in adolescence would be beneficial for these individuals in order to receive proper treatment for BPD symptomology before entering adulthood. Research on borderline personality features in adolescents is needed in order to identify factors that may increase an individual's risk of developing clinical BPD, and to be able to implement proper interventions targeting these risk factors.

In a longitudinal study, Vaillancourt et al. (2014) found that borderline personality features at age 14 were predicted by childhood symptoms of depression and childhood relational aggression for boys, and predicted by symptoms of depression, ADHD, and physical and relational aggression for girls. In another longitudinal study, Cramer (2016) examined childhood personality traits as precursors of adult BPD and found that the personality traits that best predicted adult BPD features were impulsivity and nonconformity/aggression. Considering the role of impulsivity in the development of BPD features and eating disorders (APA, 2013), impulsivity was examined in the present study (discussed below). Most of the research surrounding BPD has been done using cross-sectional or correlational methods (Cassin & Von Ranson, 2005). Although the research findings are informative, longitudinal studies like the two aforementioned are needed to be able to estimate the predictive relationships of borderline personality features and other risk factors (Steward et al., 2017; Mills et al., 2018).

Eating Disorders and Borderline Personality Disorder

As mentioned, eating disorders and BPD share several similarities with one another. In a clinical sample, Godt (2008) evaluated 545 patients with clinically diagnosed eating disorders for personality disorder symptoms. Results indicated that 30% of individuals diagnosed with an eating disorder met criteria for a personality disorder, with 6.2% meeting diagnostic criteria for BPD. A meta-analysis looking at personality traits and eating disorders by Cassin and von Ranson (2005) found that 21% of people with bulimia nervosa, 9% of people with binge eating disorder, and 3% of people with anorexia nervosa had BPD. It is not uncommon that individuals with one disorder also have a diagnosis of the other. For this reason, I recognize the importance of researching the temporal relation of features of both disorders in adolescence in order to determine which features emerge first and to examine how these two psychiatric problems are associated over time. The goal is to better understand the relation between both disorders, ultimately aiming to reduce the prevalence rates of the clinical disorders later in life by targeting the earliest problematic behaviour first during treatment.

Comorbidity of eating disorders and BPD has been associated with several negative consequences, including stronger distortions in eating attitudes, higher frequency of hospitalizations, both non-suicidal self-harm and suicidal self-harm, as well as poorer treatment outcomes than individuals with only one of these disorders (Navarro-Haro, Wessman, Botella, & Garcia-Palacios, 2015). Chen, Brown, Harned, and Linehan (2009) found that individuals with

BPD and a current eating disorder were at a much higher risk of both suicidal and non-suicidal self-harm than those without the additional diagnosis of an eating disorder. These findings illustrate the importance of examining features of both disorders in adolescence before individuals develop clinical diagnoses and their negative consequences.

Individuals diagnosed with BPD or eating disorders also share several common risk factors. Both groups have been found to show some genetic predispositions, are more likely to have been abused or neglected (including physical, sexual, and emotional), are at higher risks of substance abuse, and have higher rates of mood and anxiety disorders (Haley et al., 2010; Steward et al., 2017; Zanarini et al., 1997), and have higher rates of impulsivity. Harmful behaviour related to disordered eating and borderline personality features can be partially explained by impulsivity, characterized by the lack of forethought and a failure to consider risks and consequences before acting (Fahy & Eisler, 1993).

Impulsivity, Eating Disorders, and Borderline Personality Disorder

Individuals diagnosed with eating disorders and BPD both score high on measures of impulsivity (Cassin, & von Ranson, 2005). In general, impulsivity is defined as fast, premature, thoughtless or disinhibited behaviour that often leads to negative consequences (Havik et al., 2012). One of the criteria for diagnosing an individual with BPD is that this person must demonstrate "impulsivity in at least two areas that are potentially self-damaging (e.g., spending, sex, substance abuse, reckless driving, binge eating)" (APA, 2013, p. 663). Binging behaviour, present in anorexia-nervosa (binge eating-purging subtype), bulimia nervosa, and binge eating disorder, is driven by emotional states and impulsivity traits (Steward et al., 2017). This means that individuals with anorexia nervosa, who restrict their food intake, tend to experience the opposite of impulsivity, disproportionate self-control, whereas bingeing behaviour is associated with higher impulsivity.

Impulsive individuals with BPD may engage in disordered eating behaviour without thinking about the potential consequences associated with their actions. Ambwani (2009) conducted a study looking at the changes in emotions post-food consumption. Results suggested that after watching a sad video, women scoring higher on borderline personality features also scored higher on negative affect than those who scored low on borderline personality features. After the video, some individuals received food while others did not. For the group of individuals scoring higher on borderline personality features, eating food lowered their feelings

of sadness significantly (made them less sad), and the more food they ate the more their sadness lowered. According to these findings, women with borderline personality features may be at an elevated risk for developing binge-eating problems. Furthermore, consuming larger quantities of food appears to have a significant effect on alleviating negative mood, specifically sadness. Of course, a temporal relation cannot be confirmed as this was not a longitudinal study, so it remains unknown as to which came first: borderline personality features or disordered eating behaviour.

Research Objectives

The longitudinal links between disordered eating and borderline personality features in a large, representative sample of adolescence in a Canadian city were examined. To the best of my knowledge, no published study has examined the temporal relation between disordered eating and borderline personality features in a community sample of adolescence this large (643 participants) and over this many assessment periods (6 time points). The current study was guided by the following research objectives:

1. Explore the temporal sequence between disordered eating behaviour and borderline personality features.
2. Explore the role of impulsivity in the relation between borderline personality features and disordered eating behaviour.

Finally, I predicted that there would be a concurrent relation within time between disordered eating behaviour and borderline personality features, meaning they would be correlated at every time point. I also predicted that borderline personality features would be associated with future disordered eating behaviour. This is based on the assumption that borderline personality features tend to emerge earlier than disorder eating behaviour (Keenan et al., 2010; Micali, Hagberg, Peterson, & Treasure, 2013) and because personality disorders in general tend to be stable as they represent fixed yet aberrant personality traits (APA, 2013). Finally, I predict that the relation between borderline personality features and eating disorders will be explained via impulsivity, a core feature of both disorders (APA, 2013; Crowell, Beauchaine, & Linehan, 2009). Given that there are large sex differences in eating disorders and BPD (i.e., girls more affected than boys; APA, 2013) and impulsivity (boys more impulsive than girls; Weinstein & Dannon, 2015), sex differences were controlled for statistically.

Methodology

Participants and Procedure

This study drew data from the McMaster Teen Study- an ongoing longitudinal study in which data collection began in the spring of 2008. Participants were recruited from a random sample of 51 schools within a large Southern Ontario Public School Board in the city of Hamilton. In each of the randomly selected schools, all Grade 5 classrooms were approached for recruitment and asked if they wanted to participate in the study. From the recruitment process, 875 participants agreed to participate in the study and 703 actually participated.

In the spring of each year, parents provided consent for their child's participation in a student survey, their own participation in a phone interview, and access to Ontario Student Records (e.g., grade reports). University ethics approval was also obtained at each time point. Students with parental consent also provided assent for their survey data to be used. Students were in grade 5 (age 10) when data collection began but the current study will begin in grade 7 (age 13) as data on disordered eating were not available prior to grade 7. The sample for the current study includes 643 participants (due to attrition occurring between Time 1 and Time 5; 53.8% girls, 46.2% boys) from Time 3 (grade 7) to Time 8 (grade 12). Demographic information was filled out by each participant, as well as by their parents. On average for each time point, participants were predominantly white (76.2%) and middle-class, which is consistent with the demographic characteristics of the region from which participants were recruited.

At Time 1 students completed paper/pencil surveys in their classrooms and then data collection was completed in the privacy of students' homes with the option of completing either a paper/pencil or online version in the following years. Every year in the study, a trained research assistant conducted a phone interview with a parent of the participant. For families who did not have access to a telephone, a paper-pencil survey was provided. Participants were compensated for their participation in the study by receiving gift cards, which increased in value each year (ranging from $10 to $50). Moreover, participants who completed their completed survey within 2 weeks were entered for a prize draw for an iPod touch (Grades 8 and 9) or an iPad mini (Grades 10, 11, and 12) with 4 winners per year. For complete details on the McMaster Teen Study see Vaillancourt, Brittain, McDougall, and Duku (2013).

Measures

Disordered eating behaviour and borderline personality features were measured using self-report, and impulsivity was measured with the use of parent-reports. Parent-reports have

been shown to be superior to youth reports for assessing impulsive behaviour in youth (Li, Su, & Geng, 2015), whereas youth self-reports have been more reliable when it comes to reporting their own problem behaviour such as borderline personality features and disordered eating (Verhulst, & van der Ende, 1992), reporting more problems than their parents did about them.

Disordered Eating Behaviour. The Short Screen for Eating Disorders (SSED; Miller & Boyle, 2009) was originally piloted with 400 students aged 10-17 years old attending 5 Hamilton schools. To identify provisional thresholds for classifying eating disorders on the SSED, it was titrated against the Eating Disorder Examination Questionnaire (EDE-Q). As a continuous measure (risk index), the SSED had an internal consistency reliability of .81. As a screening instrument, the SSED exhibited 83-97% sensitivity and specificity in predicting cases vs. non-cases; it also showed evidence that a short 7-item version could approximate the same accuracy. Administering the SSED to a small sample of adolescent patients (n=14) attending an outpatient pediatric eating disorders clinic, researchers observed 100% sensitivity (13/13) and specificity (1/1) for classifying eating disorders based on the community threshold. In the current study, the SSED was completed by participants annually beginning in grade 7 (T3). The scale has 12 items in which participants responded to on a 5-point scale (0=never; 1=a few times last month; 2=once a week; 3=2-4 times every week; 4=almost every day). Sample items include "How often did you avoid (or refuse) to eat?"; "How often did you eat in secret?"; "How often did you vomit on purpose after eating?". Mean scores were used where higher scores related to greater frequency of disordered eating behaviour. The internal consistency for the SSED in the present study was good at each time point (α range= .71-.82).

Borderline Personality Features. The Borderline Personality Features Scale for Children (BPFS-C) was developed to examine the developmental precursors of Borderline Personality Disorder (Crick, Murray-Close, & Woods, 2005). The BPF-C was developed with a sample of children grade 4-6 (Crick et al., 2005) and was later validated for ages 8-18 (Sharp et al., 2010). The scale consists of 24 items rated on a Likert-type scale with responses ranging from 1 (*not at all true*) to 5 (*always true*). Sample items include "My feelings are very strong. For instance, when I get mad, I get really, really mad. When I get happy, I get really, really, happy" and "I worry that people I care about will leave and not come back" (Vaillancourt et al., 2014). Data were collected annually from grade 8 to grade 12. Mean scores were used where

higher scores related to greater levels of borderline features. The internal consistency for the BPFS-C in the present study was high at each time point (α range= .90-.92).

Impulsivity. Impulsivity was assessed using parent reports from The Brief Child and Family Phone Interview (BCFPI-3), which was originally developed using children 6-12 years old and adolescents 13-18 years old with internal consistency being high for both age groups and boys and girls (Cunningham, Boyle, Hong, Pettingill, & Bohaychuk, 2009). Parents were asked to answer three items about whether their child "is impulsive, acts without stopping to think", "jumps from one activity to another", and "fidgets", and were given three options to choose from: never, sometimes, or often. Fidgeting, the lack of thinking before acting, and spontaneity are all items frequently used to measure impulsivity (Acheson et al., 2016; Sleddens, Kremers, De Vries, & Thijs, 2013). Data were collected from parents annually between grade 5 to grade 12 (inclusive) and for this study, data from grade 7 to grade 12 was used. The internal consistency for these three items in the present study was good (α range= .68-.77).

Covariates. Ethnicity, household income, and parental education were used as control variables because low socioeconomic status has been linked to higher mental health problems (Reiss, 2013). Participants' biological sex was also controlled for, as disordered eating and borderline personality features are more common in females than in males (APA, 2013), and impulsivity is more common in males than in females (Weinstein & Dannon, 2015). Household income was assessed in grade 7, grade 9, and grade 11, and the average of the three incomes was used. Household income was assessed using an 8-point scale (1= less than 20,000, 2= between 20,000 and 30,000, 3= between 30,000 and 40,000; 4= between 40,000 and 50,000; 5= between 50,000 and 60,000; 6= between 60,000 and 70,000; 7= between 70,000 and 80,000; 8= more than 80,000). Parental education was assessed in grade 5 and grade 11, and was assessed using a 5 point scale (1= did not complete high school; 2= completed high school; 3= college diploma or trades certificate; 4= university undergraduate degree; 5= university graduate degree). Data on race/ethnicity were collected based on a combination of parent and student reports, and participants' sex were collected in grade 5 through the use of self-reports and verified using parent reports.

Data Analyses

Prior to conducting the primary analysis, data were screened for missing data and assumptions using Statistical Package for the Social Sciences (SPSS), version 24. Next,

developmental cascade models using path analysis with maximum likelihood robust (MLR) estimation were examined in Mplus, version 8.1 (Muthén & Muthén, 2008). Developmental cascades refer to the cumulative impact of many interactions and transactions occurring in a system over time (Masten & Cicchetti, 2010). They are based on the premise that a child's functioning in one area of life will have an impact on their functioning in other areas of their development. Developmental cascades therefore require longitudinal data with repeated assessments of multiple domains, and are able to test for the direction of effects and identify whether relations are direct and unidirectional or bidirectional, or indirect through a moderating pathway and/or other variables (Masten & Cicchetti, 2010).

To test the model fit of our cascade model, I performed a series of nested models and assessed for statistical fit at each step. The comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) were used to assess model fit; the χ_2 test of significance is reported but was not used as a measure of absolute model fit given its sensitivity to large samples (Kline, 2005). All future models include the parameters estimated in the previous model (see Vaillancourt et al., 2013). The final model was identified by the model with the best statistical fit that was most parsimonious (Masten et al., 2005). Once the final model was identified, follow-up analyses to investigate the effects of control variables were performed (Masten et al., 2005; Vaillancourt et al., 2013). The Akaike information criterion (AIC) was then used to compare the control model to the original model, where a lower value with a change of >10 represented a significantly better fit (Kline, 2016).

Results

Missing Data Analysis

Using SPSS I conducted a Missing Completely at Random (MCAR) test and found that my data were not missing completely at random ($\chi2$=3702.955, *df*= 3140, *p*=.00). To determine whether there were significant differences between individuals in the analytic sample (participants in my study=643) compared to individuals in the nonanalytic sample (all participants in Time 1=703), I performed a series of $\chi2$ tests and independent sample t tests. In comparison to the nonanalytic sample, participants in the analytic sample were more likely to be White ($\chi2$=22.948, *df*= 1, *p*=.00), were more likely to have a higher household income (t(767)=-6.336, p=.00), and parents with higher levels of education (t(805)=-7.355, p=.00). There were no gender differences between individuals in the analytic sample and those in the nonanalytic

sample (χ2=.993, *df*= 1, *p*=.319). I further explored the differences at each time point and found that variables had 25.6% missing data on average for all variables across all time points (min=11.5, max=32.5). There were very few differences between those with missing data and those with reported data. For those variables with differences, on average, participants who had missing data for one measure scored higher on other measures than those who reported data (e.g. those with missing data at T3 for disordered eating behaviour also scored higher on borderline personality features). As mentioned, full information maximum likelihood estimation accounted for missing data in the analysis. Total number of participants for all three measures at each time point is reported in Table 1.

Descriptive Statistics

The descriptive statistics for all study variables are presented in Table 1, and bivariate correlations are presented in Table 2. All significant correlations showed a positive relationship. All correlations between impulsivity and borderline personality features were statistically significant. Disordered eating was significantly correlated with impulsivity at several time points, with the following exceptions: impulsivity in both grades 7 and 8 with disordered eating in grades 9 through 11 respectively; impulsivity in grade 9 with disordered eating in grades 9 and 11; and impulsivity in grade 10 with disordered eating in grade 9. Correlations between disordered eating and borderline personality features were statistically significant at each time point.

Developmental Path Models

Model fit statistics for each step are found in Table 3. The final path model had good fit, χ^2= 170.578, *df*= 67, *p*= .000; CFI = .980; RMSEA = 0.049 (90% CI = .040-.058); SRMR = 0.033 (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, disordered eating was concurrently related with borderline personality features; impulsivity was also concurrently related with borderline personality features at each time point. Disordered eating was concurrently related with impulsivity in grades 7, 8, 10, 11, and 12. In Model 2 across time stability paths were added and resulted in significantly better fit. All variables showed stability over time.

Cross-lagged paths between disordered eating, borderline personality features, and impulsivity were added in Model 3, which resulted in a significantly better fit than Model 2.

There were several significant cross-lagged paths over time. From grade 9 to grade 10 and from grade 10 to grade 11 there were significant positive cross-lagged effects from borderline personality features to impulsivity. From grade 8 to grade 9, grade 10 to grade 11, and grade 11 to grade 12, there were significant cross-lagged effects from borderline personality features to disordered eating. From grade 11 to grade 12 there was a significant positive cross-lagged effect from impulsivity to disordered eating, and in grade 7 to grade 8 there was a significant positive cross-lagged effect from impulsivity to borderline personality features. Finally, from grade 7 to grade 8, grade 8 to grade 9, and grade 9 to grade 10, there was a significant positive cross-lagged effect from disordered eating to borderline personality features. In Model 4, the two year stability paths were included, which resulted in significantly better fit than Model 3. All two year stability paths were significant with the exception of disordered eating from grade 7 to grade 9.

Model 5 included the addition of the covariates: gender, ethnicity, parental income, and parental education. The model still had a good fit, $\chi_2 = 219.036$, $df = 118$, $p = .000$; CFI = .981; RMSEA = 0.036 (90% CI = .029-.044); SRMR = 0.036. However, the AIC in the original model without covariates (5767.455) was significantly lower than the AIC in the model with covariates (11464.604), indicating that the original model had significantly better fit than the covariate model. The original model also had fewer parameters (103) than the covariate model (134), indicating a more parsimonious model. The original model (Model 4) was thus retained as the final model (Figure 1).

Indirect effects. Given the significant cross-lagged pathways, I tested four indirect effects using bootstrap confidence intervals (N = 5000; with 95% confidence): from grade 7 impulsivity to grade 9 disordered eating through grade 8 borderline personality features, from grade 8 disordered eating to grade 10 impulsivity through grade 9 borderline personality features, from grade 9 disordered eating to grade 11 impulsivity through grade 10 borderline personality features, and from grade 10 borderline personality features to grade 12 disordered eating through grade 11 impulsivity. Only one indirect effect was found to be significant; a positive significant effect from grade 7 impulsivity to grade 9 disordered eating through grade 8 borderline personality features, M=.037, 95% CI [.004,.023].

Discussion

The purpose of this study was to examine the links between borderline personality features, disordered eating behaviour, and role of impulsivity, in order to better understand the

cause, diathesis, development, prognosis, and treatment of such disorders. To do this, I built a developmental cascade model using disordered eating behaviour, borderline personality features, and markers of impulsivity across five years of development in adolescence using both adolescents' self-reports and parent-reports.

Pathway between Borderline Personality Features and Impulsivity

As predicted, impulsivity was concurrently related with borderline personality features at each time point. As previously mentioned, impulsivity is one of the criteria for a diagnosis of BPD (APA, 2013) so it is not surprising I found these two variables consistently related to one another. Further, impulsivity and borderline personality features were significantly correlated with one another between each time point. For example, impulsivity in grade 7 was significantly correlated with borderline personality features in grades 7 through grade 12. This positive correlation means that an individual with high impulsivity in grade 7 will likely also show higher levels of borderline personality features every year until the end of high school. This provides evidence for a strong relationship between the two variables.

The one year and two year stability paths were significant for impulsivity and borderline personality features at each time point. This suggests that impulsivity and borderline personality features remain stable over time throughout adolescence. This finding is consistent with that of Links, Heslegrave, and Reekum (1999), who found that in patients with a diagnosis of BPD, impulsivity remained stable after a seven year follow up. Although their sample consisted of patients 18 years and older, the stability they observed is consistent with our findings, perhaps indicating that such stability persists from adolescence into adulthood.

Consistent with literature showing that personality traits may impact the development of psychological disorders (Gomez & Corr, 2014), I also found that impulsivity in grade 7 predicted borderline personality features in grade 8. Again, this finding was not surprising given that research examining the relationship between personality traits and BPD consistently shows that impulsivity during childhood is predictive of borderline personality features (Zanarini, Frankenburg, Hennen, Reich, & Silk, 2006). Although this finding was not replicated in future time points, it is possible that if data from earlier time points were available I would have found this predictive relationship in earlier years. Another possible explanation for impulsivity predicting borderline personality features only in early adolescence may be due to the development of the prefrontal cortex during this time. As the prefrontal cortex further develops

in early adolescence, ones decision-making abilities increase whereas impulsivity decreases (Romer, 2010). Therefore, as impulsivity decreases with age it would no longer act as a strong enough predictor of borderline personality features in subsequent years.

Interestingly, from grade 9 to grade 10 and from grade 10 to grade 11, borderline personality features predicted impulsivity. This pathway supports the theory that mental disorders can enhance personality traits, further supporting the bidirectionality of pathoplastic relationships, where psychopathology and personality traits can enhance the appearance of one another (Widiger, 2011). Although inconsistent with findings of Links, Heslegrave, and Reekum (1999) who found that high impulsivity predicts BPD 7 years later, it is possible that this difference is due to methodological differences. My study used an adolescent community sample studied annually, whereas their participants came from an adult clinical sample and data were collected after a 2 year follow up and then after 7 years. Additionally, my study used independent reporters and Links, Heslegrave, and Reekum (1999) used self-reports. Perhaps impulsivity in earlier years is predictive of borderline personality features, and then borderline personality features enhance impulsivity, creating a circular relationship over time.

Pathway between Disordered Eating and Impulsivity

The pathway for disordered eating and impulsivity showed less predictability than each of these variables with borderline personality features. However, impulsivity and disordered eating were concurrently related in grade 7 and in grade 11, and impulsivity predicted disordered eating from grade 11 to grade 12. Despite not finding additional pathways between these two variables, there were still many significant correlations between them in grades 7 through grade 12. For example, grade 7, grade 8, and grade 12 disordered eating was significantly correlated with impulsivity at each time point. This means that in general, individuals scoring higher on impulsivity also engaged in greater disordered eating behaviour, and vice versa.

Impulsivity did not predict disordered eating behaviour at each time point, except for in grade 11 to grade 12. One reason that could explain the absence of statistically significant pathways is that only certain types of disordered eating behaviour are characterized by impulsivity. Disordered eating behaviour that restricts food intake, such as the restriction of food intake in anorexia nervosa, restrictive type, is not characterized by impulsivity, but instead by high levels of personal control and restraint (Sansone & Sansone, 2013). Conversely, purging behaviour, which is associated with anorexia nervosa binge-eating purging subtype and bulimia

nervosa, is in fact characterized with high levels of impulsivity (Hoffman et al., 2012; Sansone & Sansone, 2013). In the present study, I did not separate between restrictive and impulsive eating behaviour, so it is possible that the lack of significant predictive pathways is due to the restrictive behaviour accounting for a large enough percentage of the variability of the disordered eating behaviour. Perhaps if I would have only asked about impulsive eating behaviour, or separated items based on disordered eating type, I may have found that impulsivity acts as a stronger predictive link for behaviour in line with purging. Favaro et al. (2005) found that impulsivity was significantly associated with purging and not binge eating, which was also replicated by Hoffman et al. (2012). Further research is needed to examine the temporal relationship between disordered eating behaviour related to impulsivity in adolescence.

Pathway between Disordered Eating and Borderline Personality Features

Consistent with the literature, borderline personality features were concurrently related to disordered eating behaviour at each time point. Comorbidity between the two disorders has been repeatedly found in other studies, so this finding was expected (Cassin and von Ranson, 2005; Godt, 2008). As anticipated, borderline personality features predicted disordered eating behaviour from grade 8 to grade 9, grade 10 to grade 11, and grade 11 to grade 12. This means that throughout high school, with the exception of grade 9 to grade 10, individuals scoring higher on borderline personality features in one year engaged in more frequent disordered eating behaviour in the next. These results have been replicated in other studies which also found that borderline personality features predict disordered eating, however our research is unique as it uses an adolescent population in a community sample (Hoffman et al., 2012; Sansone & Sansone, 2011). Despite not finding a significant pathway from grade 9 to grade 10, both variables are significantly correlated during this time, which means there may be a possible hidden variable that mediated individual responses in this year that was not accounted for. As well, the lack of significant pathway from grade 9 to grade 10 could be due to not having enough variance to pick up smaller effects.

Certain features of BPD, such as impulsivity, self-harm behaviour, chronic feelings of emptiness, and inappropriate anger, have been shown to shape the development of eating pathology (Sansone & Sansone, 2011). For example, as previously mentioned, impulsivity is associated with behaviour such as self-induced vomiting, the abuse of laxatives, or the abuse of diuretics. Conversely, the act of binging where one over eats may be a way of alleviating one's

chronic feelings of emptiness, another feature of BPD. Further, Laye-Gindhu and Schonert-Reihl (2005) found that adolescents, particularly girls, considered disordered eating as a method of self-harming. Given these examples, it is clear why somebody with pre-existing borderline personality features may be at risk of engaging disordered eating behaviour (Sansone & Sansone, 2011).

Interestingly, this relationship seems to be bidirectional as disordered eating predicted borderline personality features in earlier years. This was true for grade 7 to grade 8, grade 8 to grade 9, and grade 9 to grade 10. Although at first this finding appears to be inconsistent with previous research showing that personality features precede the development of disordered eating behaviour (Keenan et al., 2010; Micali, Hagberg, Peterson, & Treasure, 2013), this could be due to the fact that disordered eating behaviour was measured prior to borderline personality features and data prior to grade 8 for borderline personality features was not available. However, new research by Lee and Vaillancourt (2018) found that disordered eating repeatedly manifested as an antecedent to depressive symptoms throughout adolescence in a non-clinical sample, which also shows disordered eating appearing prior to other symptoms. This kind of relationship is consistent with our findings that disordered eating behaviour preceded borderline personality features from grades 7 to grade 10, annually. Given the inconsistency in the literature, future research should further examine these relationships and aim to replicate or disconfirm findings.

This bidirectional relationship again supports the pathoplastic theory of personality traits and psychopathology; they can both have an effect on one another (Widiger, 2011). Just as individuals with borderline personality features may develop disordered eating behaviour, the opposite may also be true. As mentioned previously, certain disordered eating behaviour, such as binge eating, may satisfy an individual's emotional and physical emptiness (Sansone & Sansone, 2011). If effective, the next time this individual feels emotional emptiness, or sadness, they may use food as a coping mechanism. This pattern was found by Ambwani (2009) who found that after watching a sad video, eating larger amount of chocolate ameliorated relative feelings of sadness, but only in individuals with higher borderline personality features. Laye-Gindhu and Schonert-Reihl (2005) found that the most common emotions leading up to a self-harming incident were anger, depression, loneliness and frustration, whereas guilt, shame, and disgust followed self-harm. Although these findings do not confirm a predictive relationship, they do

demonstrate how disordered eating and emotions can both precede and follow one another, creating a bidirectional relationship where one variable affects the other.

Indirect Effects

A significant indirect effect was found from grade 7 impulsivity to grade 9 disordered eating through grade 8 borderline personality features. This suggests that impulsivity only leads to disordered eating through its relation with borderline personality features. Temporally, this indirect effect is consistent with literature that shows personality features developing prior to disordered eating behaviour (Keenan et al., 2010; Micali, Hagberg, Peterson, & Treasure, 2013). Although this indirect effect was only found once in my model, this finding may not be completely spurious. It is possible that impulsivity on its own does not predict disordered eating behaviour, but that it has to be enhanced by other factors, such as borderline personality features, to become problematic (Sansone & Sansone, 2013). The lack of research and replication means that this explanation is only speculation at this point, and further research is needed.

Limitations and Future Directions

There are some limitations that should be considered when interpreting these results. First, our measure of disordered eating was general and did not allow us to examine specific types of disorders. There is strong evidence that impulsivity is only related to certain types of disordered eating behaviour, such as purging, and not to others, such as restricting food intake, so it is possible that I would have obtained different results had I used a measure of disordered eating behaviour that is disorder specific (Sansone & Sansone, 2011). For this same reason, the pathway found from impulsivity to disordered eating may reflect a spurious finding; the pathway only occurred from grade 11 to grade 12, and was not replicated at earlier time points, highlighting the need for caution. Future research is thus needed to better clarify the complex relations between impulsivity and disordered eating.

Further, our data collection for disordered eating began in grade 7 and borderline personality features in grade 8. As the much of research on the topic has shown, personality features tend to emerge before disordered eating behaviour (Keenan et al., 2010; Micali, Hagberg, Peterson, & Treasure, 2013; Sansone & Sansone, 2011). Therefore, it remains unknown if the pathways found from disordered eating to borderline personality features in grade 7 were preceded by borderline features, as data collection for this began in the next year. Although impulsivity is a diagnostic criteria of both disorders which may appear to be circular, it

is important to note that impulsivity in my thesis was measured as a personality trait and not as a psychiatric trait. Moreover, impulsivity was parent reported. However, to better understand the temporal relations between borderline personality features and disordered eating, researchers would benefit from measuring both personality traits and disordered eating behaviour at an earlier age to disentangle the underlying processes of change.

It is important to note the role of complex trauma (developmentally adverse trauma such as maltreatment, prolonged family violence, torture or exploitation; Ford & Courtois, 2014) in personality development, which was not measured in this study. Research suggests that childhood trauma increases an individual's vulnerability to develop BPD later in life (Cattane, Rossi, Lanfredi, & Cattaneo, 2017). It also suggests that emotional abuse, physical neglect, and sexual abuse are significant predictors of eating psychopathology (Kong & Bernstein, 2009). Future research should recognize complex trauma in childhood for individuals with borderline personality features and disordered eating, and explore the impact that it may have on development.

Additionally, new research suggests that disordered eating behaviour precedes the development of mental health difficulties (Lee & Vaillancourt, 2018), consistent with our findings of disordered eating behaviour predicting borderline personality features. Given the inconsistency in the literature, future research should further examine these relationships longitudinally and aim to replicate our findings, using large adolescent samples.

Clinical Implications

For the most part, the findings from the present study are consistent with the literature suggesting the bidirectional relationship between disordered eating and borderline personality features, and the influence of impulsivity for both. Consistent with our results is the finding that impulsivity is an antecedent for borderline personality features, and eventually the diagnosis of the clinical disorder (Links, Helsegrave, & van Reeku, 1999). Impulsivity has also been found to be the most important differentiating feature between persistent and remitted BPD, whereby individuals with lowered impulsivity eventually scored lower on borderline personality features, suggesting that treatment of impulsivity, with the use of medication and/or psychotherapy (Grant & Leppink, 2015), may impact the course of BPD (Links, Helsegrave, & van Reekum, 1999). Furthermore, as found by our significant indirect effect from impulsivity to disordered eating

through borderline personality features, the treatment of impulsivity may be associated with lower disordered eating behaviour in future years.

The consistent concurrent relationship found between disordered eating and borderline personality features throughout adolescence is clinically important. Individuals presenting with features of one of these factors ought to be assessed for the other, given that a future comorbid diagnosis of both BPD and an eating disorder increases one's risk of suicidality and self-injurious behaviour (Chen, Brown, Harned, Linehan, 2009). Therefore, targeting at-risk youth and implementing prevention programs in an effort to prevent symptoms from turning into a clinical disorder is beneficial and necessary.

When compared with prevention programs for a universal population, prevention programs for at-risk youth specifically have been more effective, strengthening the importance of screening to identify these individuals. Teaching youth healthy weight loss strategies and putting them in appropriate prevention programs at an early stage may prevent their disordered eating behaviour from developing into a clinical eating disorder (Haley et al., 2010). This is essential as well-timed and targeted interventions have the potential to interrupt negative developmental cascades and promote positive ones (Masten & Cicchetti, 2010). Ideally, these interventions should target negative attitudes, promote healthy weight control behaviour, and contain an element of self-compassion, which can reduce symptoms of disordered eating and other psychopathological symptoms (Braun, Park, Gorin, 2016; MacBeth, Gumley, 2012; Stice, Shaw, 2004). This may include things such as promoting positive self-image and body image, and promoting the acceptance of a broad range of appearances (APA, 2002), which are protective factors that decrease an individual's likelihood of developing the clinical disorders (Croll et al., 2002).

When working with an adolescent population there are several important factors to be aware of. Firstly, it is important for clinicians to attend to the perception of adolescents. For example, when asking adolescents about self-harming behaviour it is important to give room for the adolescent to indicate what they consider as self-harming, such as disordered eating, since the perspective of an adult may not accurately reflect the actual experience and perception of the adolescent (Laye-Gindhu and Schonert-Reihl, 2005). Given that the first-line treatment for BPD is psychotherapy (Paris, 2009), it is important for clinicians to recognize that working with an adolescent may require more time than with an adult. It may take several sessions of non

judgmental listening to establish the trust needed for a particular adolescent to share with an adult what he/she is thinking and feeling (APA, 2002), especially when discussing behaviour such as self-harm which is often associated with feelings of shame and guilt (Laye-Gindhu & Schonert-Reihl, 2005).

Conclusion

The purpose of my thesis was to examine the relationship between borderline personality features, disordered eating behaviour, and impulsivity. Indeed, my longitudinal examination of these relationships using a large, Canadian community sample of adolescents, illustrated the strength and direction of change over time between these three variables. Specifically, my findings suggest that high impulsivity may significantly increase an adolescent's risk of engaging in disordered eating behaviour, as well as developing borderline personality features in later years. It is important to note the bidirectional relationship between these variables, whereby borderline personality features and disordered eating seem to influence one another throughout time, and disordered eating appearing as an antecedent for borderline personality features. The findings highlight the importance for clinicians to be aware of the high comorbidity of disordered eating, borderline personality features, and impulsivity, and that early interventions that target impulsivity and problematic eating behaviour may mitigate the risk of future borderline personality features.

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Table 1

Descriptive Statistics for Study Variables

	Possible range		Total		
	Min	Max	*M*	*SD*	N
Impulsivity					
Grade 7	0	2	0.60	0.53	569
Grade 8	0	2	0.59	0.51	515
Grade 9	0	2	0.55	0.50	491
Grade 10	0	2	0.55	0.51	467
Grade 11	0	2	0.57	0.54	449
Grade 12	0	2	0.57	0.51	451
Disordered Eating					
Grade 7	0	4	0.21	0.26	545
Grade 8	0	4	0.22	0.32	509
Grade 9	0	4	0.27	0.37	486
Grade 10	0	4	0.30	0.41	449
Grade 11	0	4	0.29	0.37	434
Grade 12	0	4	0.29	0.32	448
Borderline Personality Features					
Grade 8	0	4	1.26	0.60	508
Grade 9	0	4	1.28	0.63	484
Grade 10	0	4	1.33	0.64	448
Grade 11	0	4	1.31	0.63	434
Grade 12	0	4	1.33	0.65	448

Table 2

Bivariate Correlations among Impulsivity, Disordered Eating, and Borderline Personality Features

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
IMP																	
1.G7	-	.710**	.663**	.646**	.610**	.564**	.135**	.132**	.076	.078	.057	.126*	.221**	.201**	.170**	.128*	.150**
2.G8		-	.710**	.640**	.625**	.602**	.162**	.128**	.082	.075	.073	.148**	.277**	.189**	.201**	.196**	.191**
3.G9			-	.689**	.656**	.641**	.107*	.107*	.054	.122*	.044	.103*	.243**	.236**	.241**	.201**	.212**
4.G10				-	.701**	.653**	.113*	.189**	.091	.111*	.118*	.188**	.271**	.253**	.284**	.259**	.224**
5.G11					-	.716**	.115*	.132**	.103*	.164**	.152**	.243**	.278**	.258**	.319**	.302**	.286**
6.G12						-	.140**	.183**	.138**	.150**	.129**	.166**	.322**	.276**	.308**	.262**	.279**
DE																	
7.G7							-	.562**	.444**	.417**	.414**	.377**	.439**	.372**	.314**	.302**	.306**
8.G8								-	.604**	.558**	.559**	.491**	.553**	.446**	.403**	.381**	.320**
9.G9									-	.719**	.639**	.529**	.449**	.564**	.510**	.450**	.426**
10.G10										-	.696**	.630**	.365**	.471**	.598**	.456**	.437**
11.G11											-	.692**	.370**	.451**	.496**	.553**	.410**
12.G12												-	.372**	.412**	.495**	.479**	.507**
BPF																	
13.G8													-	.699**	.587**	.594**	.546**
14.G9														-	.735**	.691**	.660**
15.G10															-	.779**	.724**
16.G11																-	.789**
17.G12																	-

Note. DE = Disordered Eating; BPF = Borderline Personality Features; IMP = Impulsivity.
*$p < .05$. **$p < .01$.

Table 3

Model Fit Statistics

	$\chi 2$	*df*	*p*	RMSEA (90% CI)	SRMR	CFI	TLI	AIC
Model 1: Within time covariance	4337.535	120	0.000	0.234 (0.228-0.240) *p*= 0.000	0.365	0.196	0.089	9828.412
Model 2: Within time covariances and across-time stability	734.884	106	0.000	0.096 (0.090-0.103) *p*=0.000	0.170	0.877	0.846	6253.761
Model 3: Within time covariances, across time stability, and cross-lagged DE, BPF and IMP	493.943	78	0.000	0.091 (0.083-0.099) *p*=0.000	0.086	0.921	0.863	6068.820
Model 4: Within time covariances, across time stability, cross-lags, and two year stability	170.578	67	0.000	0.049 (0.040-0.058) *p*=0.554	0.033	0.980	0.960	5767.455
Model 5: Within time covariances, across time stability, cross-lags, two year stability, and controls	219.036	118	0.000	0.036 (0.029-0.044) *p*=0.999	0.036	0.981	0.967	11464.604

Note. DE = Disordered Eating; BPF = Borderline Personality Features; IMP = Impulsivity.

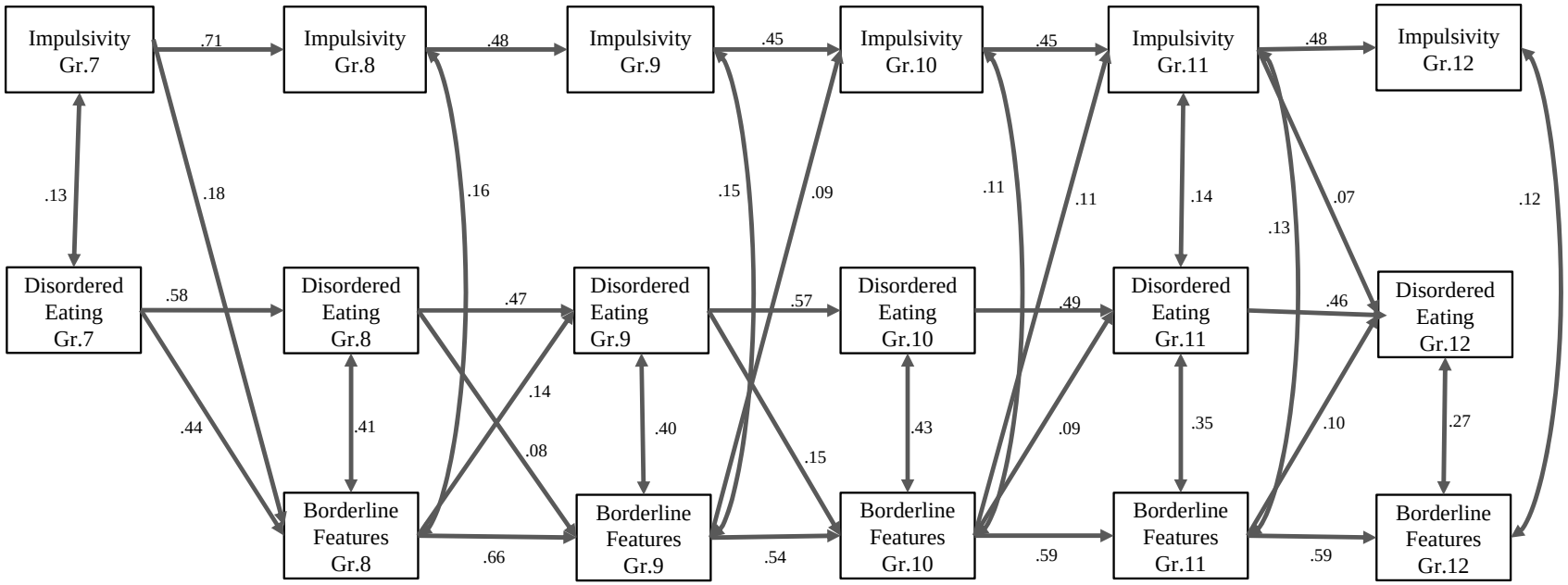

Figure 1. Model of Impulsivity, Disordered Eating and Borderline Personality Features from Grade 7 to 12.
Note. Values represent standardized coefficients or correlations. Only coefficients which are statistically significant at the $p < .05$ level are presented. Non-significant parameters, control variables, and stability paths across two years are not displayed for ease of presentation