

The Differential Influence of Personal Standards and Self-critical  
Perfectionism on Mental Health in Students Transitioning to University:  
A Longitudinal Analysis with Latent Growth Curve Trajectories

by

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## Abstract

The transition to university can be a stressful time for emerging adults. Perfectionism is a prevalent trait in university populations and has been associated with increased likelihood of mental health problems. A year-long longitudinal study was conducted to examine whether perfectionism negatively influenced mental health in students transitioning to university. Students (N=656) were recruited prior to university and followed up with at three time-points throughout the year (October, January, April). At each time-point participants completed surveys on perfectionism, depression, anxiety, physical symptoms and stress. Using latent growth curve analyses, self-critical perfectionism was found to predispose students to experience more stress, depression, physical symptoms and anxiety before beginning university and consequently throughout the school year. Contrary to our predictions, students higher in self-critical perfectionism reported stable (but not increased) stress and anxiety during the transition to university. Conversely, personal standards perfectionism was found to be related to decreased mental health scores at baseline. Self-critical perfectionism is a factor which predicts poor mental health adjustment in students transitioning to university.

Keywords: Perfectionism, Transition to University, Mental Health, Latent Growth Trajectories

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The differential influence of personal standards and self-critical perfectionism on mental health in students transitioning to university: A longitudinal analysis with latent growth curve trajectories

The transition to university can be a tumultuous time for many emerging adults. Many students experience high amounts of stress during their first academic year and this can lead to poor mental health outcomes (Dyson & Renk, 2006). In a survey on health in Canadian undergraduate students, 64.5% of students reported feeling extremely anxious and 44.4% reported an episode of depression so intense that they could not function over the past year (American College Health Association, 2016). However, only 11.4% of students reported seeking help for their mental health problems. How can we support students who do not seek help for these problems? One solution may be to determine what factors predispose individuals to poorer mental health during their transitional year to university. With an ability to identify at-risk students, better resources can be provided to promote well-being and success in new students.

When examining students' predispositions to experiencing problems in the transition to university, it is pertinent to study factors, like personality, that define an individual's typical behaviours. A trait that appears prevalently in highly motivated university populations and has been associated with increased likelihood of mental health problems is perfectionism (Hamilton & Schweitzer, 2000; Hewitt & Flett, 1991). Perfectionism is a multidimensional trait defined as an individual's desire to set excessively high standards for themselves (Burns, 1980). Perfectionism consists of a more adaptive and maladaptive facet. The more maladaptive facet of this trait, self-critical perfectionism, is comprised of the desire for high standards, but with cognitive biases fixated on concerns over mistakes, doubts about action, and harsh self-

evaluation (Dunkley & Blankstein, 2000; Frost, Marten, Lahart & Rosenblate, 1990). Personal standards perfectionism, on the other hand, is comprised of the desire for high standards with positive achievement striving, and without negative self-evaluation (Frost, Heimberg, Holt, Mattia & Neubauer, 1993). As students transition to university a large number of academic and environmental factors change. A perfectionist who desires excellent performance, but cannot meet their own high standards academically or socially, may be at higher risk of developing severe psychopathology in their first year. Despite the wealth of knowledge on mental health problems in university students, there are few studies that track mental health changes longitudinally over a student's first year. This research proposes that studying mental health changes over the entirety of a year can help identify whether students higher in perfectionism are an at-risk population for developing mental health problems during the transition to university. Specifically, it is expected that individuals higher in self-critical perfectionism will experience more mental health problems during this transition.

### **The Transition to University**

The transition to university is a unique developmental period. This transition is a time of increased independence, but also challenge. For many individuals this transition can be a period of immense growth and maturation (Lefkowitz, 2005). However, the initial transition to university can be a tumultuous time for many emerging adults. Beyond the increase in academic rigor in university, the social and environmental changes can also impact an individual's well-being (Beiter et al., 2015; Kantanis, 2000). This developmental period is distinct, because for many the transition from high school to university is when an individual must learn how to take care of themselves. Although these changes are normative, the increased need for growth and self-reliance may leave some students in distress. Multiple studies have found that as students

transition from high school into university they experience increased stress and psychological distress (Beiter et al., 2015; Cantor, Norem, Niedenthal, Langston, & Brower, 1987; Dyson & Renk, 2006; Fisher & Hood, 1987; see review Kitzrow, 2003). University students are at greater risk of mental illness than the general population and the demands for counselling services at many universities have increased drastically over the past few years (American College Health Association, 2015; Beiter et al., 2015). The current state of mental health in this population is startling, and moving forward, it is important to consider why university students are so distressed. Some students are able to adapt and cope successfully during the transition to university (Lefkowitz, 2005). Perhaps, by identifying what factors or challenges lead to increased distress in students during this transition, better resources can be provided to ensure that more students successfully transition into university.

In this research, adjustment to university will be examined by assessing mental health. Mental health is becoming a more serious issue across university campuses and it is a robust predictor of university adjustment. For example, a student's ability to manage stress is a better predictor of academic success than high school GPA (Parker, Summerfeldt, Hogan & Majeski, 2004). This provides evidence that successfully transitioning to university involves a combination of factors beyond intelligence. Additionally, as university contains a large number of new challenges beyond academics, it is important to acknowledge that success in university should be measured with variables beyond academic success. There are other variables which are better predictors of retention or successful completion of an undergraduate degree. For example, mental health problems are one of the most cited causes for university drop out (DeBerard, Spielmans & Julka, 2004). To help students transition successfully into university, more research

is needed on the trajectory of change of mental health during this time to understand what factors may lead to better or worse mental health outcomes.

There are a number of environmental, social, and academic changes that can occur during a student's transition to university. It is normative to experience some increase in mental health problems during this transitional period (and generally over time), but what factors may predispose students to experiencing detrimental health changes during this transition (Kitzrow, 2005)? Environmental and social factors have been shown to influence well-being in university students. Freshman students who experience more home sickness often report more psychological distress during the transition to university (Fisher & Hood, 1987). Students that struggle to make friends during their first year in university often report significantly lower well-being than students who are able to make friends (Rubin, Evans & Wilkinson, 2016). Additionally, increased social support from peers, but not family, predicts improved university adjustment (Friedlander, Reid, Shupak & Cribbie, 2007). Cognitive factors have also been shown to predict university adjustment. Students who experience decreases in self-esteem during their first-term in university report experiencing worse academic and social adjustment (Friedlander et al., 2007). Conversely, students with increased emotional intelligence and ability to cope with stress report better academic, social, and mental health adjustment during their first-year in university (Parker et al., 2004). In addition, the use of adaptive coping strategies, like problem focused coping in first year students was correlated with decreased stress (Dyson & Renk, 2006). There is a vast research on social, environmental, and cognitive factors that influence well-being and success during this transition. However, there is much less research on personality factors and how personality may predispose an individual to experiencing distress or success during this transitional period.

Personality defines an individual's typical behaviours and is relatively stable over time (McCrae & Costa, 1997). There are no "bad" personality traits, but rather some traits that could lead to a tendency to engage in more maladaptive behaviour. There is little research on the influence of personality on mental health adjustment during the transition to university. The one exception is research on neuroticism, which has been examined within this population.

Individuals higher in neuroticism tend to be more moody and anxious, and this trait predisposes students to experiencing more stress and psychological distress during the transition to university (Lu, 1994; Vollrath, 2000). Students higher in neuroticism often perceive their academic challenges as more stressful and are more likely to report elevated daily stress and more hassles throughout their university experience (Lu, 1994; Vollrath, 2000). As mental health problems have increased drastically over the past years, it is important to consider what other personality factors may put students at-risk of experiencing distress during this transition. Over the past three decades, perfectionism has increased drastically in college samples (Curran & Hill, 2017).

Perfectionism is a highly prevalent trait amongst university students and is a robust predictor of poor mental health outcomes (Frost et al., 1990; Hamilton & Schweitzer, 2000; Hewitt & Flett, 1991). There has yet to be a longitudinal study on the influence of multidimensional perfectionism on mental health during the transition to university while considering pre-university baseline mental health scores. The present research examines the influence of trait perfectionism throughout the transition to university. If perfectionism can be identified as maladaptive, then resources can be created to combat the deleterious influence of this highly prevalent trait in university students.

## **Perfectionism**

Perfectionism was once believed to be a unidimensional trait described as an individual's desire to strive for excessively high standards (Burns, 1980; Hollender 1965). Perfectionists were believed to harbour anxiety and develop psychopathologies due to their inability to attain the unrealistic standards they set for themselves (Pacht, 1984). Most early clinical work dealt with case studies of perfectionists and the trait was viewed as completely maladaptive and negative. The destructiveness of perfectionism was believed to stem from the extreme and dichotomous cognitions of perfectionists (Burns, 1980). For example, a perfectionist may conclude that they are a complete failure if on one test they received a B+. Burns (1980) believed that this black and white thinking pattern led perfectionists to engage excessively in "should" statements. The unrelenting pressure that a perfectionist should be smarter or should be kinder or should be better was believed to result in psychological and physiological distress. Indeed, perfectionism was shown to be related to numerous psychological disorders, including depression, alcoholism, obsessive-compulsive personality disorders, irritable bowel syndrome, and erectile dysfunction (Andreasen & Barduch, 1977; Quadland, 1980). However, these earliest definitions of perfectionism omit the acknowledgement that high achievement striving is a positive and valued skill. Society admires those who excel and strive for success. The eventual recognition and acceptance of the potential positive aspects of perfectionistic striving led to an evolved operationalization of perfectionism as a complex and multidimensional trait.

Currently, perfectionism is believed to be a multidimensional trait with more adaptive and more maladaptive facets (Dunkley, Zuroff & Blankstein, 2003; Frost, Marten, Lahart & Rosenblate, 1990; Hewitt & Flett, 1991). Frost and colleagues (1990) proposed five dimensions of perfectionism: concerns over mistakes, high personal standards, perception of parental

expectation, perception of high parental criticism, and doubting the quality of one's work. The latter three try to explain some of the etiology of perfectionism. For the purpose of this research we have focused on the facets of personal standards and concern over mistakes (i.e. self-critical) perfectionism. Personal standards perfectionism involves striving to achieve the extremely high standards and goals an individual has set for themselves (Blankstein & Dunkley, 2002; Frost et al., 1990). Self-critical perfectionism is often considered the more negative or maladaptive form of perfectionism. Individuals higher in self-critical perfectionism strive for excessively high standards, and report excessive concern over mistakes, fear of failure, and harsh self-evaluation (Dunkley & Blankstein, 2000). Self-critical perfectionism is correlated with neuroticism and inversely related to extraversion, conscientiousness, and agreeableness (Dunkley, Blankstein, Zuroff, Lecce & Hui, 2006; Dunkley, Blankstein & Berg, 2012). However, self-critical perfectionism is a distinct trait from neuroticism, and has a unique relation to depression (Dunkley et al., 2006). Self-critical perfectionism predicts depressive symptoms, even when controlling for neuroticism (Dunkley et al., 2006; Sherry et al., 2014). Individuals higher in self-critical perfectionism often describe themselves as formal, reserved, low in warmth, less exuberant or spirited, cynical, and low in altruism (Dunkley et al., 2006). Conversely, personal standard perfectionism is strongly correlated with conscientiousness and individuals high in personal standards perfectionism often describe themselves as dominant, assertive, highly active, open to ideas, competent, and achievement striving (Dunkley et al., 2006). Self-critical and personal standards perfectionism are moderately correlated (Bieling, Israeli & Anthony, 2004; Lo & Abbott, 2013). Even though these facets are correlated, they consistently are related to differing outcomes and are consistently defined as distinct facets of this trait.

In the early 90's, another definition and scale of measurement for multidimensional perfectionism was created (Hewitt & Flett, 1991). This definition of perfectionism focuses on this construct in a social context. Hewitt & Flett (1991) conceptualized the trait as dependent on whether the individual placed perfectionistic ideals upon themselves or others. This categorization still emphasizes the maladaptive nature of perfectionism but quantifies its varying pressures as stemming from the self versus from others. Self-oriented perfectionism is defined as self-directed and involves trying to achieve perfection and avoid failure (Hewitt & Flett, 1991). Other-oriented perfectionism is when individuals place high or exacting standards upon others (Hewitt & Flett, 1991). Other-oriented perfectionism was proposed to lead to interpersonal difficulties but has been shown to be related to effective leadership qualities (Hewitt & Flett, 1990). Socially prescribed perfectionism is the perceived need to achieve the standards and expectations others have set for you (Hewitt & Flett, 1991). Whereas self-oriented perfectionists show more internal motivation, socially prescribed perfectionists are more externally motivated due to most of their aspirations relating to pleasing others and avoiding punishment (Deci & Ryan, 1985). Although this definition of perfectionism is not the focus of the current research, it is important to discuss this conceptualization of the trait, because significant research has been done using this socially-defined measure of perfectionism.

Currently, there appears to be a consensus in the literature to define perfectionism in terms of personal standards and self-critical perfectionism (Dunkley et al., 2000; Dunkley et al., 2006; Dunkley et al., 2012; Milyavskaya et al., 2014; Sanislow, et al., 2006; Slaney et al., 2001; Stoeber & Otto, 2006; Stoeber, 2018). Factor analyses of multiple perfectionism measures consistently provide evidence that two distinct factors define perfectionism, and these measures coincide highly with the terms defined by personal standards and self-critical perfectionism

(Blankstien & Dunkley, 2002; Dunkley et al., 2006; Frost et al., 1993). Other terms have been used to describe these facets of perfectionism. For example, personal standards perfectionism is often used interchangeably with perfectionistic striving, while self-critical perfectionism is sometimes called evaluative concerns perfectionism or perfectionistic concern (Dunkley et al., 2006; Levine & Milyavskaya, 2018; Stoeber & Ott, 2006; Stoeber 2018). Although there are multiple terms in this literature, the equivalent terms have the same meaning.

It is important to understand the relationship between each conceptualization of perfectionism in order to understand the entirety of the literature. The facets of the socially defined measure of perfectionism (i.e. self-oriented, other-oriented and socially prescribed) correlate with both the self-critical and personal standards facets of perfectionism (Frost et al., 1993). The Frost Multidimensional Perfectionism Scale (FMPS) personal standards subscales load highly onto the Hewitt Multidimensional Perfectionism Scale (HMPS) self-oriented subscale, while the FMPS concern over mistake subscale and the HMPS socially prescribed subscale load highly on the self-critical factor (Bieling, Israeli, & Antony, 2004; Frost et al., 1993). This provides support that even though this literature may initially appear disconnected, it is actually quite cohesive; our definition of personal standards and self-critical perfectionism can be understood within the literature as a whole. Additionally, in a recent meta-analysis the socially-defined measure of perfectionism was not found to be a consistent predictor of outcomes across samples, where as personal standards and self-critical perfectionism were (Smith, Vidovic, Sherry, Stewart & Saklofske, 2018). This provides additional evidence that multidimensional perfectionism as defined by the facets, personal standards and self-critical perfectionism, may be more consistent and generalizable.

Within this literature with many definitions and scales, it is most appropriate to use a combination of measures to comprehensively understand this multidimensional trait. For the purpose of this research, we used a short form measure of the Revised Almost Perfect Scale (APS-R), Frost Multidimensional Perfectionism Scale (FMPS) and Depressive Experiences Questionnaire subscale on self-criticism (DEQ-SC6) as those subscales load highly onto latent factors representing self-critical and personal standards perfectionism (Burgess, Frost & DiBartolo, 2016). This combination of multiple perfectionism measures is common practice in this area of research (Dunkley & Blankstein, 2000; Dunkley et al., 2006; Stoeber & Janssen, 2011). Perfectionism is a multidimensional trait and our examination of personal standards and self-critical perfectionism will allow us to explore the unique relationship between perfectionism and mental health changes across the transition to university.

### **Perfectionism and Mental Illness**

Clinicians first described perfectionists as individuals who strove for high standards, were neurotic, and had increased likelihoods of developing psychological disorders (Burns, 1980; Pacht, 1984). The more maladaptive facet of perfectionism, self-critical perfectionism, has consistently been related to psychological distress (Enns & Cox, 1999; Hewitt & Flett, 1991; Hewitt, Flett & Ediger, 1996; Sherry et al., 2014). Initially through correlational research, perfectionism was found to be related to increased depression and anxiety (Hewitt & Flett, 1991). This provided some initial evidence for the maladaptive nature of this trait. This research was followed by a longitudinal study which examined individuals with a history of depression. Their research found that self-oriented perfectionists were more likely to be depressed at time 2 when they experienced increased achievement stress (Hewitt, Flett & Ediger, 1996). Individuals higher in perfectionism may be more likely to experience psychological distress due to the

increased pressure they place upon themselves to achieve high standards. Conversely, individuals higher in socially prescribed perfectionism experienced increased depressive symptoms independent of the number of stressors they reported (Hewitt et al., 1996). In parallel, Frost and colleagues also found a correlational relationship between the maladaptive facet of their conceptualization of perfectionism and psychological symptoms (Frost et al., 1990). They found that undergraduate students higher in self-critical (doubts about action and concerns over mistakes) perfectionism reported more depression and anxiety (Frost et al., 1990). Enns and Cox (1999) compared both scales of perfectionism (HMPS & FMSPS) and found that patients with depression scored highest on the socially prescribed and self-critical perfectionism subscales. One advantage of this research was that it used clinical samples to determine whether perfectionism was related to psychological disorders at a pathological level. Similar evidence has been found for clinical populations of patients with panic disorder, obsessive-compulsive disorder, eating disorders, and social phobia, who all score higher than non-clinical populations on the self-critical facets of perfectionism, specifically concern over mistakes and doubts about actions (Antony, Purdon, Huta & Swinson, 1998; Sassaroli et al., 2008). Taken together, this research provides evidence that perfectionism is strongly correlated with psychological distress within clinical and non-clinical populations.

The previous research does not examine whether perfectionism is the cause of depressive symptoms or a consequence of the cognitive biases one experiences during depression. With a longitudinal 12-month study of university students using cross-lagged path analyses it was found that self-critical perfectionism predicted increases in depressive symptoms, but depressive symptoms did not predict a change in self-critical perfectionism (Sherry et al., 2014). In this study, perfectionism was a cause of depressive symptoms, as opposed to a consequence of the

cognitive biases one experiences during depression. The relation between self-critical perfectionism and anxiety was different. Self-critical perfectionism was a concomitant of anxiety symptoms, not a predictor (Sherry et al., 2014). This warrants further review, and our research will examine whether self-critical perfectionism predicts the trajectory of change of anxiety across the year for first year undergraduate students while also considering mental health prior to beginning university. In addition, the aforementioned study did not examine personal standards perfectionism, as our research will.

From a developmental perspective, there have been few longitudinal studies which examine the influence of perfectionism on changes in mental health during emerging adulthood. A number of studies have focused on mental health changes during adolescence. These studies have found that high school students higher in self-critical and socially-prescribed perfectionism report increased depressive and anxiety symptoms across the school year (Damian, Negru-Subtirica, Stoeber & Baban, 2017; Einstein, Lovibond & Gaston, 2000; Herman, Wang, Trotter, Reinke & Ialongo, 2014; O'Connor, Rasmussen & Hawton, 2010; Soenens et al., 2008). Interestingly, in the study by Damian and colleagues (2017), self-critical perfectionism only predicted increases in anxiety symptoms for students aged 16-19 yrs. old, and not in adolescents aged 12-15. This provides evidence that perfectionism may be an especially detrimental trait during late adolescence and emerging adulthood. The current research tries to further these findings by examining perfectionism and mental health during the transition to university.

The notion of a more adaptive form of perfectionism has been controversial in the literature. In general, perfectionism is often conceived of as completely detrimental. However, personal standards perfectionism involves achievement striving without harsh self-evaluation and there is some evidence that this facet of perfectionism is not completely detrimental (Enns &

Cox, 1999; Frost et al., 1990; Stoeber & Otto, 2006; Damian et al., 2017). In a meta-analysis, personal standards perfectionism was found to be adaptive across studies and negatively correlated with distress and poor mental health outcomes (see review by Stoeber & Otto, 2006). Additionally, both trait and dispositional personal standards perfectionism are negatively related to depression and positively related to well-being (Levine & Milyavskaya, 2018). Personal standards perfectionism is also related to positive outcomes such as hope for success, motivation in school, and school achievement (Stoeber & Rambow, 2007). A longitudinal study found that across the school year students higher in personal standards perfectionism consistently reported more positive affect compared to those higher in self-critical perfectionism (Milyavskaya et al., 2014). Additionally, individuals higher in personal standards perfectionism were able to recover during breaks and experience more positive affect during those off periods, whereas self-critical perfectionists did not rebound from negative affectivity during those off times (Milyavskaya et al., 2014). However, that study examined affect as a measure of well-being and not mental health directly, so the influence of personal standards perfectionism on mental health is still in question. Together, this research suggests that personal standards perfectionism may be somewhat adaptive for students, as it is related to improved affect and less depressive symptoms.

Conversely, there is some research suggesting that personal standards perfectionism is unrelated to mental health outcomes (Bieling et al., 2004; Stoeber & Rambow, 2007; Damian et al., 2017). In one study, personal standards perfectionism was negatively related to depression, only when controlling for negative reactions to imperfection (Stoeber & Rambow, 2007). The literature provides some evidence that personal standards perfectionism may be adaptive, but perhaps this is conditional on other environmental or achievement factors. The interaction of perfectionism and achievement stress may be especially salient in the transition to university and

could be a factor which influences the adaptivity of this trait. Overall, personal standards perfectionism does not appear to be detrimental for mental health, but there has yet to be comprehensive longitudinal research which examines this.

In contrast, when it comes to eating disorders, perfectionism appears to be ubiquitously negative. Compared to other psychological disorders, only those with eating disorders reported higher levels of both personal standards and self-critical perfectionism (Bardone-Cone et al., 2007; Sassaroli et al., 2008). The clearly negative relation between personal standards perfectionism and eating disorders brings into question whether calling this trait adaptive is appropriate. Personal standards perfectionism has a differing relation with multiple outcome variables, and this research continues to explore the controversial question of whether it is appropriate to call this trait adaptive by examining how this trait influences mental health, especially from adolescence into emerging adulthood.

Perfectionism may also influence how individuals seek help and this may lead to increased distress in students higher in perfectionism. Only 11.4% of students seek counselling for mental health problems during their transition to university, and the tendency of highly perfectionistic students to seek help might be especially low (American College of Health, 2016). Consider that an individual who strives for perfection may be especially hesitant to present this vulnerability or seek help when in need. There has yet to be research examining whether individuals higher in perfectionism are less likely to seek support from family, friends, or university services. However, self-critical perfectionists are more likely to conceal negative personal information from family and friends because they are fearful that sharing failures may make them appear less perfect; this behaviour is called self-silencing (Kawamura & Frost, 2004; Flett, Besser, Hewitt & Davis, 2007). Self-silencing individuals keep their distress to themselves

so as to not burden their interpersonal relationships (Flett et al., 2007). A perfectionist may be less likely to ask for help out of fear of not looking perfect and this may lead to increased psychological distress for these individuals.

### **Perfectionism and Stress**

Beyond its influence on mental health, perfectionism has been related to more mild forms of stress and stress reactivity. University can be a stressful time for many. It is important to consider how perfectionism may influence stress reactivity during this especially vulnerable period. Simply, does perfectionism predispose individuals to experiencing more stress during the transition to university? Stress is a consistent and substantial predictor of adverse mental health outcomes (see review: Burke, Davis, Otte & Mohr, 2005). Examining how perfectionism influences the trajectory of change of stress in the transition to university may give some insight into how detrimental this trait could be for students. Few studies have explored whether personal standards and self-critical perfectionism differentially influence stress across the school year (Milyavskaya et al., 2014).

The relation between self-critical perfectionism and stress is pervasively negative. Stress is a mediator of the relation between self-critical perfectionism and depression (Dunkley, Blankstein, Halsall, Williams & Winkworth, 2000; Harris, Pepper & Maack, 2008; Hewitt & Dyck, 1986). Individuals higher in self-critical perfectionism are more likely to experience increased stress and this increased stress partially explains why these individuals are more vulnerable to experiencing mental illness (Dunkley et al., 2000). Self-critical perfectionism is also associated with higher levels of daily stress (Chang, Banks & Watkins, 2004). As individuals higher in self-critical perfectionism strive for high and unrealistic standards this increased self-imposed pressure in every aspect of one's life is likely to amount to greater daily

stress. In addition, individuals higher in self-critical perfectionism have increased emotional reactivity and negative affect after failure, loss of control, and criticism from others (Besser, Flett & Hewitt, 2004; Dunkley et al., 2012). The increased attention and reactivity to benign events may overtime lead to a compounding of daily stress into more serious mental health problems (Dunkley et al., 2006; Flett, Nepon, Hewitt & Fitzgerald, 2016). Additionally, students higher in perfectionism may be more likely to experience psychological distress when they do not meet the exacting standards they set for themselves (Accordino, Accordino & Slaney, 2000). Self-critical perfectionism is consistently related to increased stress and the present research examines how perfectionism influences stress during a period of particular vulnerability.

Conversely, students higher in personal standards perfectionism report less emotional reactivity and these individuals rebound from large stressors more quickly (Milyavskaya et al., 2014). Additionally, students higher in personal standards perfectionism report less stress at the beginning of the school week (Harvey et al., 2015). These students report greater autonomous motivation at the beginning of the week and the motivational attitude to “want to” pursue the challenges ahead may explain why these students experience less stress about beginning their week. In contrast, there is some evidence that personal standards perfectionism is related to increased stress (Dunkley et al., 2000). In a daily diary study, individuals higher in both self-critical and personal standards perfectionism reported more stressful events than individuals lower in perfectionism (Dunkley, Ma, Lee, Preacher & Zuroff, 2014). This increased stress was associated with more negative affect, sadness, and decreased positive affect for individuals higher in both personal standards and self-critical perfectionism (Dunkley et al., 2014). However, on days with less stressful events individuals higher in personal standards perfectionism reported greater positive affect compared to those lower in this trait (Dunkley et al., 2014). In addition,

individuals higher in personal standards perfectionism are more likely to engage in adaptive coping strategies to deal with their stressors and this can buffer against the severity of distress these individuals experience (Dunkley et al., 2000). Together, these studies provide evidence that personal standards perfectionism has a complex relation with stress and may be especially detrimental during very stressful times. Stress is a large contributor to psychological distress, and it is important to determine how perfectionism may differentially influence stress during a period of increased vulnerability, like during the transition to university.

### **Perfectionism and Physical Symptoms**

Mental illness can present in a variety of ways. Sometimes, an individual can present with somatic symptoms that are concomitant or caused by psychological distress (Burns, 1980). To measure mental health holistically throughout the transition to university, a measure for physical symptoms reporting was included. Examining physical symptoms throughout the year will allow this research to understand how both physical and psychological health change during this period of vulnerability. In past research perfectionism has been related to a number of somatic complaints such as headaches, migraines, chronic pain, asthma, erectile dysfunction, and irritable bowel syndrome (Burns, 1980; Pacht, 1984; Stout, 1984; VanHoudenhove, 1986). In a longitudinal study, perfectionism at the beginning of the academic year predicted greater physical symptom reporting at the end of the year even when accounting for health symptom reporting at baseline (Pritchard, Wilson & Yamnatz, 2007). However, all of the previous studies examined physical symptoms in relation to an outdated unidimensional measure of perfectionism.

The current research focuses on physical symptom reporting with a multidimensional definition of perfectionism. There have been few studies which examine health symptoms in

relation to multidimensional perfectionism. In one study with Iranian adults, self-critical perfectionism was related to reporting more physical symptoms and worse perceived health. In contrast, personal standards perfectionism was related to reporting fewer physical symptoms (Ofoghi & Besharat, 2010). However, in another study with Swedish adults, both facets of multidimensional perfectionism were positively correlated with somatic complaints such as headaches, insomnia, muscle tension, and daytime sleepiness (Saboonchi & Lundh, 2003). This provides some evidence that personal standards perfectionism could be detrimental, as it is related to reporting more health problems. There has yet to be research which examines the influence of multidimensional perfectionism on the trajectory of change of physical symptom reporting during a student's transition to university. As the transition to university can be a period of increased distress, examining how health changes may provide insight into how students are adapting to this transition and whether perfectionism is a predictor of increased physical and psychological distress.

### **The Present Research**

University populations often feel pressure to excel and this may incite perfectionistic ideals in students. The transition to university is often stressful and full of environmental and academic changes that may precipitate mental health problems (Dyson & Renk, 2006). The interaction between self-critical and personal standards perfectionism and psychological distress or illness was explored during this universally stressful transitional period. In addition, the controversial idea that personal standards perfectionism could be an adaptive trait during this transition has yet to be explored longitudinally. This multidimensional trait has yet to be examined comprehensively as a predictor of mental illness during the transition to university. Notably, this research considered mental health prior to the transition to university to examine

naturally how mental health changes during this period of increased vulnerability. The present research examines the influence of both self-critical and personal standards perfectionism on a holistic measure of mental health (depression, anxiety, stress and physical symptom reporting) during the transition to university.

The present study examines students longitudinally throughout their transition to university (August, October, January, April). Throughout the year students completed surveys on depression, anxiety, perceived stress and physical symptoms. Latent growth curve modelling is used to compare the adjustment of students higher in personal standards and self-critical perfectionism for depression, anxiety, stress and physical symptoms. Individuals higher in self-critical perfectionism are predicted to experience more adverse mental health (depression, anxiety, stress and physical symptoms) at baseline before starting university. Self-critical perfectionism is also predicted to be related to a greater increase in the trajectory of change of depression and stress during the transition to university. Due to mixed findings for the influence of self-critical perfectionism on anxiety during the transition to university (Sherry et al., 2014) and the lack of research on the influence of self-critical perfectionism on physical symptom reporting during this time, no confirmatory hypotheses have been made for these variables. This research also tests the controversial question of whether personal standards perfectionism had a protective or detrimental influence on mental health during this transition; due to the mixed findings of prior research, I do not have specific a-priori hypotheses, as alternate hypotheses are plausible. These hypotheses are preregistered on OSF:

[https://osf.io/qvzhm/?view\\_only=7fa5276591164e62bbc9c7c7afbd0e99](https://osf.io/qvzhm/?view_only=7fa5276591164e62bbc9c7c7afbd0e99).

## Methods

### Participants

Participants were 658 students ( $M_{age} = 17.98$ ,  $SD_{age} = 1.10$ , 27.7% male, 71.5% female, 0.8% other) entering university for the first time in Fall of 2016. Participants were recruited online through departmental emails from Carleton University, social media (Facebook & Reddit) and through advertisements in the frosh welcome packages to participate in a longitudinal study on the transition to university. At the initial time point, participants were excluded if they completed less than half of the survey. The time points of the study were late August prior to the beginning of school, October prior to the Fall reading week, early January, and April. At the second time-point, participants were 462 students (70.2% retention,  $M_{age} = 17.97$ ,  $SD_{age} = 1.15$ , 26% male, 73.4% female, 0.6% other). At the third time-point, participants were 427 students (64.9% retention,  $M_{age} = 17.97$ ,  $SD_{age} = 1.16$ , 24.4% male, 74.8% female, 0.8% other). At the final time-point, participants were 358 students (54.4% retention,  $M_{age} = 17.98$ ,  $SD_{age} = 1.17$ , 24.3% male, 75.1% female, 0.6% other).

### Procedure

Prior to taking part in the study, each participant was asked to read over and agree to the informed consent. Afterwards, each participant completed a series of demographic and motivation questions, followed by a series of questionnaires: a perfectionism scale, a Big-5 personality inventory, a depression scale, a resiliency scale, stress scales, a physical symptom checklist, a social support scale, a self efficacy scale, a survey on health behaviours (drinking,

smoking, exercise), identity questionnaires, and a coping scale<sup>1</sup>. At each subsequent time point participants completed questionnaires on depression, anxiety, stress, physical symptoms, identity, health behaviours, coping and social support. In addition, participants completed university adjustment measures at time-points 2-4, and a self-compassion measure at time-points 3 and 4. At the final time-point, participants completed measures on school motivation, perfectionism and personality again. At each time-point, participants were given a debriefing and entered in a draw for a chance to win \$100.

## Measures

**Self-critical Perfectionism.** A modified combination of the Depressive Experiences Scale – Self-criticism Six-Item Scale (DEQ – SC6), the Frost Multidimensional Perfectionism Scale (Frost- MPS) and the Revised Almost Perfect Scale (revised- APS) were used to measure the facet of self-critical perfectionism (Blatt, Afflitti & Quinlan, 1979; Frost et al., 1990; Slaney, Rice, Mobley, Trippi & Ashby, 2001; see Appendix A). These scales load highly onto the factor of self-critical perfectionism and have been used in previous research to measure this construct (Dunkley et al., 2006). The DEQ – SC6 has 6 items and participants will report how much they agree with a statement on a scale of 1 “Strongly Disagree” to 7 “Strongly Agree”. An example of a prompt from this scale includes “I tend to be very critical of myself”. The Frost-MPS has 5 items which measure self-criticism and participants report how much they agree with a statement on a scale of 1 “Strongly Disagree” to 5 “Strongly Agree” (this was later converted to a 7-point scale score by multiplying each term by 1.5 and subtracting 0.5). An example of a prompt from this scale includes “If I fail at work/ school, I am a failure as a person”. The revised-APS has 4

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<sup>1</sup> Note that some of the scales included in this research are not being used for the purpose of this thesis. Some of these scales were added for exploratory purposes (specifically: resiliency, self-efficacy, identity, coping, social support, and health behaviours).

items which measure self-criticism and participants report how much they agree with a statement on a scale of 1 “Strongly Disagree” to 7 “Strongly Agree”. An example of a prompt from this scale includes “I am hardly ever satisfied with my performance”. A self-critical perfectionism score was computed by combining the mean scores on the subscales. ( $\alpha_{T1} = .89$ ,  $\alpha_{T4} = .92$ )

**Personal Standards Perfectionism.** The Frost Multidimensional Perfectionism Scale (Frost- MPS) and the Revised Almost Perfect Scale (revised- APS) measured the facet of personal standards perfectionism (Frost et al., 1990; Slaney et al., 2001; see Appendix A). These scales load highly onto the factor of personal standards perfectionism and have been used in previous research to measure this (Dunkley et al., 2006). The Frost-MPS has 5 items which measure perfectionistic striving and participants report how much they agreed with a statement on a scale of 1 “Strongly Disagree” to 5 “Strongly Agree” (this was later converted to a 7-point scale score by multiplying each term by 1.5 and subtracting 0.5). An example of a prompt from this scale includes “I set higher goals than most people”. The revised-APS has 4 items which measure perfectionistic striving and participants report how much they agreed with a statement on a scale of 1 “Strongly Disagree” to 7 “Strongly Agree”. An example of a prompt from this scale includes “I expect the best from myself”. A personal standards perfectionism score was computed by combining mean scores on the subscales. ( $\alpha_{T1} = .89$ ,  $\alpha_{T4} = .93$ )

**Depression.** The Center for Epidemiological Studies Depression Scale Revised (CESD-R) was used to measure depression levels (Eaton, Smith, Ybarra, Muntaner & Tien, 2004; see Appendix B). The CESD-R has 20 items and participants report how often they have felt a certain way within the past week or so on a scale of 1 “Not at all or Less than one-day last week” to 5 “Nearly everyday for two weeks”. An example of a prompt for this scale is “my appetite was poor” or “nothing made me happy”. At time points 2-4 one item was removed from this

scale regarding suicidality at the university ethic's board request (the removed item stated "I wished I were dead"). An average was taken of all the responses to compute a depression score.

( $\alpha_{T1} = .93$ ,  $\alpha_{T2} = .93$ ,  $\alpha_{T3} = .95$ ,  $\alpha_{T4} = .95$ )

**Anxiety.** The Brief Symptom Inventory (BSI) was used to measure anxiety (Derogatis & Melisaratos, 1983; see Appendix C). The BSI has 6 items and participants rate how much they have been bothered by the symptom during the past week on a scale of 1 "Not at all" to 5 "Extremely. Example prompts from this scale include "nervousness or shakiness inside" or "feeling fearful". An average was taken of all the responses to compute an anxiety score. ( $\alpha_{T1} = .90$ ,  $\alpha_{T2} = .90$ ,  $\alpha_{T3} = .92$ ,  $\alpha_{T4} = .92$ )

**Stress.** The Perceived Stress Scale (PSS) and a Domain Specific Stress Scale was used to measure how stressed a participant is and in which area they have felt the most stress (Cohen, Kamarck & Mermelstein, 1983; See Appendix D). The PSS has 10 items and participants report how often they felt a certain way over the past month on a scale of 1 "Never" to 5 "Very Often". "Never" is coded as 1 and "Very Often" as 5. An example of a prompt from this scale is "In the last month, how often have you been angered because of things that were outside of your control". An average was taken of all the responses to compute a perceived stress term. (PSS:  $\alpha_{T1} = .88$ ,  $\alpha_{T2} = .89$ ,  $\alpha_{T3} = .89$ ,  $\alpha_{T4} = .88$ )

**Physical Symptoms.** The Physical Symptom Checklist (PSC) was used to measure symptomology over the past two weeks (Emmons, 1992; see Appendix E). The PSC has 9 items and participants report how often they experienced a symptom over the past two weeks on a scale of 1 "Never" to 5 "Very Often". An example of symptoms included in the scale were

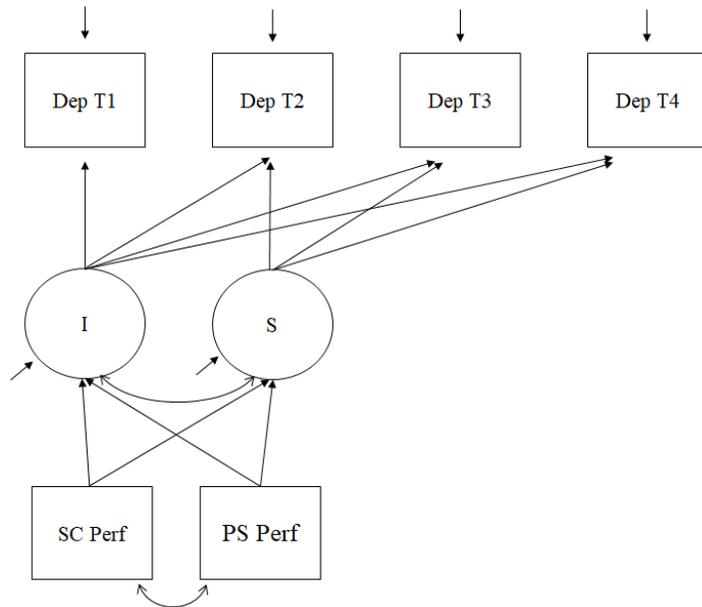
headaches, acne, and stomach pain. An average was taken of all the responses to compute a physical symptoms term. ( $\alpha_{T1} = .79$ ,  $\alpha_{T2} = .81$ ,  $\alpha_{T3} = .81$ ,  $\alpha_{T4} = .82$ )

**Neuroticism.** The Big-Five Inventory (BFI) was used to measure trait neuroticism at baseline (John, Naumann & Soto, 2008; see Appendix F). The BFI has 44 items of which 8 items measure trait neuroticism. Participants reported which characteristics applied to them on a scale of 1 “Disagree Strongly” to 5 “Agree Strongly”. Three-items were reverse coded, and then an average was taken of all the responses to compute a baseline neuroticism term. ( $\alpha_{T1} = .83$ )

### **Analytic Plan**

To examine the influence of perfectionism on mental health, latent growth curve modelling was done using MPlus software (Muthen & Muthen, 2015). First, missing data analysis was done to check whether data from follow-ups was missing systematically or not at random. MPlus accounts for missing data using the full information maximum likelihood (FIML) computation algorithm (Muthen & Muthen, 2015). First, for each dependent variable (depression, anxiety, stress, and physical symptoms) a model was built to examine the trajectory of change over the four time-points. For each variable, both linear and quadratic models were tested to determine which shape had the best fit. Once a model with adequate fit was found, both personal standards and self-critical perfectionism were entered into the model together as predictors. Both facets of perfectionism were entered simultaneously to account for the shared variance between these variables. All independent variables (i.e. depression, anxiety, stress, and physical symptoms) were examined in separate models to determine the unique influence of perfectionism on mental health during the transition to university. See Figure 1 below for the visual representation of the growth trajectory. For any significant relations between

perfectionism and slope, simple slope analyses were conducted to probe these effects at 1SD above and below the mean of perfectionism.



*Figure 1.* The theoretical model of the latent growth curve trajectory for depression across the four time-points with self-critical (SC) and personal standards (PS) perfectionism predicting the pattern of change of intercept and slope.

Note. This same model was run for anxiety, stress, and physical symptoms.

## Results

### Preliminary Analysis

Table 1 includes the mean and standard deviation of perfectionism and mental health across the transition to university. At Time 1, personal standards and self-critical perfectionism were moderately correlated ( $r = .33, p < .001, 95\%CI [.23, .42]$ )<sup>2</sup>. Tables 2 contains information

<sup>2</sup> There was no significant influence of the interaction of self-critical and personal standards perfectionism on mental health during the transition to university. For these results please see Appendix G.

on the correlation between mental health variables at each time-point. Across all time points the various mental health variables were significantly and strongly correlated ( $r = 0.51-0.75$ ).

Individuals who reported elevated scores in one mental health variable were more likely to report elevated scores for other mental health variables. Across time points there were no correlations between mental health variables that stood out as being especially strong or unique. For example, the correlation between depression and anxiety was not much greater than the correlation between stress and anxiety at any of the time points<sup>3</sup>.

Table 1

*Means and standard deviations for variables across various time-points during the transition to university.*

Variable	Time 1		Time 2		Time 3		Time 4	
	M	SD	M	SD	M	SD	M	SD
PSP	5.26	1.10	-	-	-	-	5.03	1.30
SCP	4.07	1.05	-	-	-	-	4.41	1.22
Dep	1.90	0.78	2.19	0.80	2.15	0.89	2.29	0.90
Anx	1.98	0.96	2.10	0.96	1.96	0.99	2.11	1.02
Stress	2.75	0.76	2.96	0.74	2.85	0.73	3.02	0.73
PSC	2.28	0.75	2.56	0.78	2.55	0.79	2.48	0.78

Note: PSP = Personal standards perfectionism, SCP = Self-critical perfectionism, Dep = Depression, Anx = Anxiety, PSC = Physical Symptoms

<sup>3</sup> Additionally, no mental health variables were more strongly correlated across time points (For example, depression time 1 and 2 vs depression time 3 and 4). For these correlation tables please see Appendix H

Table 2

*Correlations between mental health variables at times 1 through 4.*

	Anx T1/T2/T3/T4	PSS T1/T2/T3/T4	PSC T1/T2/T3/T4
Dep T1/T2/T3/T4	<b>.58/.72/.72/.72</b>	<b>.65/.61/.74/.75</b>	<b>.56/.75/.58/.62</b>
Anx T1/T2/T3/T4	-	<b>.63/.60/.65/.62</b>	<b>.60/.67/.62/.68</b>
PSS T1/T2/T3/T4	-	-	<b>.53/.51/.59/.56</b>

Note: PSP = Personal standards perfectionism, SCP = Self-critical perfectionism, Dep = Depression, Anx = Anxiety, PSS = Perceived stress, PSC = Physical Symptoms. Bolded items are significant  $p < .001$ . Time 1:  $N = 634$ , Time 2:  $N = 437$ , Time 3:  $N = 418$ , Time 4:  $N = 346$ .

### Missing Data

Attrition is normative during longitudinal research, and the overall attrition in this research was not greater than average for longitudinal research with this population type (Levine et al., 2017; Milyavskaya et al., 2014; Werner & Milyavskaya, 2017). However, attrition can be a concern when this drop out is systematic. For example, did every individual with elevated depression scores drop out from the first time-point to the next? To test whether there was evidence of data missing at random, a dichotomous missing variable was created at each time point. Then, the missing dichotomous variable was used as a dependent variable with the previous time points variables as predictors. In this analysis, there were no significant associations between a previous time-point variable predictor and the missingness variable. This would suggest the missing values are missing completely at random. This procedure was completed for each subsequent time point. Across time points, there were no significant

associations. This suggests that the data is missing completely at random, and that attrition in this research was not related to perfectionism or any mental health variable.

### Depression – LGM

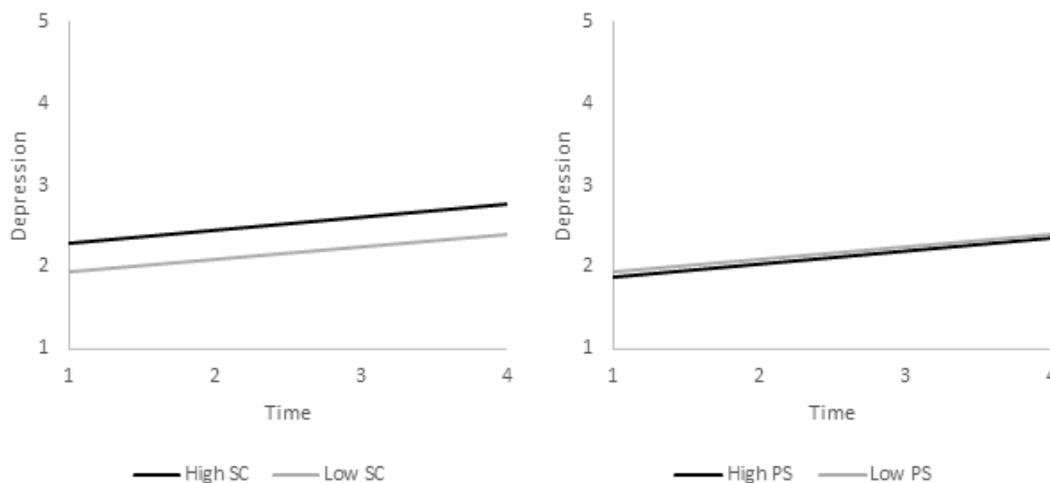
The primary concern of this research was to examine how perfectionism may influence mental health during the transition to university. First, a model was built to examine the trajectory of change of depression across the four-time points. This model had adequate fit;  $\chi^2 (5) = 36.748, p < .001^4$ , CFI = .963, RMSEA = .099[.07; .13], SRMR = .049. A quadratic growth curve model was also tested, but this model had significantly worse fit<sup>5</sup>. Depression increased in a linear pattern throughout a student's transition to university ( $b = .12, p < .001, 95\%CI [.09, .14]$ ). To test our main hypothesis, both self-critical and personal standards perfectionism were entered simultaneously as predictors into this model. The model which included perfectionism as a predictor also had good fit;  $\chi^2 (9) = 35.510, p < .001$ , CFI = .975, RMSEA = .067[.045; .091], SRMR = .032. As predicted, at baseline individuals higher in self-critical perfectionism reported elevated depression scores ( $b = .36, p < .001, 95\%CI [.31, .41]$ ). Conversely, at baseline personal standards perfectionism was negatively related to depression ( $b = -.06, p = .019, 95\%CI [-.11, -.01]$ ). Neither personal standards or self-critical perfectionism were related to the pattern of change of depression across the year (PSP:  $b = .02, p = .166, 95\%CI [-.01, .04]$ ; SCP:  $b = -.01, p = .445, 95\%CI [-.03, .01]$ ). Individuals higher in personal standards and self-critical perfectionism reported changes in mental health similar to those who reported moderate to low levels of this trait. The significantly higher baseline scores of depressive symptoms for those

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<sup>4</sup> Although a significant chi square test signifies a poor fit, for a sample this large, a chi square test is over powered and cannot accurately signify fit.

<sup>5</sup> Please see Appendix I which contains a table that compares AIC and BIC for linear and quadratic models for each dependent variable.

higher in self-critical perfectionism would mean that these individuals experienced significantly elevated depression scores compared to those lower in this trait.



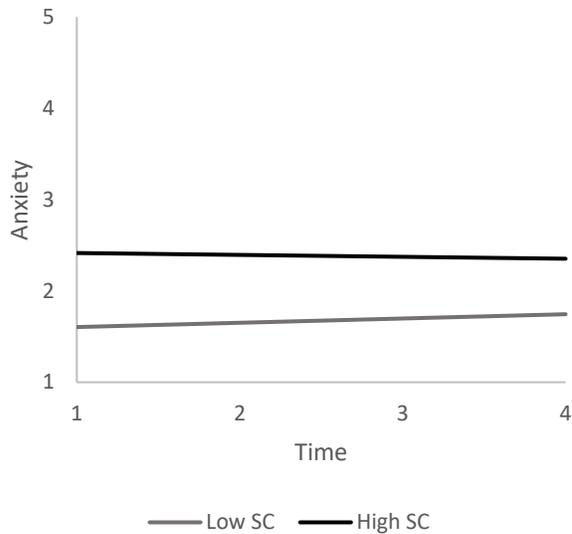
*Figure 2.* The plotted linear growth model for depression for those higher and lower in self-critical (SC) and personal standards (PS) perfectionism.

### Anxiety – LGM

This analytical procedure above was completed again to examine the influence of perfectionism on anxiety in the transition to university. First, a model was built to examine the trajectory of growth of anxiety across the four-time points. This model had adequate fit;  $\chi^2 (5) = 24.686$ ,  $p < .001$ , CFI = .974, RMSEA = .078[.049; .110], SRMR = .041. A quadratic growth curve model was also tested, but this model had significantly worse fit. Students did not report increased anxiety scores during the transition to university ( $b = .01$ ,  $p = .398$ , 95%CI [-.02, .04]). Next, both self-critical and personal standards perfectionism were entered as predictors into this model. The model with perfectionism as a predictor also had adequate fit;  $\chi^2 (9) = 26.684$ ,  $p =$

.0016, CFI = .981, RMSEA = .055[.031; .079], SRMR = .030. As predicted, at baseline individuals higher in self-critical perfectionism reported elevated anxiety ( $b = .40$ ,  $p < .001$ , 95%CI [.34, .46]). Personal standards perfectionism was not related to anxiety at baseline ( $b = -.06$ ,  $p = .073$ , 95%CI [-.12, .01]). Additionally, personal standards perfectionism did not predict the pattern of change of anxiety throughout the year ( $b = .02$ ,  $p = .109$ , 95%CI [-.01, .05]).

Individuals higher in personal standards perfectionism reported changes in mental health similar to those who reported moderate to low levels of this trait. Self-critical perfectionism negatively predicted the trajectory of change of anxiety across the year ( $b = -.03$ ,  $p = .047$ , 95%CI [-.06, -.01]). We used simple slopes analyses to examine this interaction (see Figure 3). Students higher in self-critical perfectionism did not report increased anxiety throughout the year (but reported continuously elevated levels of anxiety), whereas those lower in this trait reported increasing levels of anxiety throughout the year (+1SD:  $b = -.02$ ,  $p = .32$ ; -1SD:  $b = .05$ ,  $p = .03$ ).



*Figure 3.* The plotted interaction of simple slopes which represents the influence of self-critical perfectionism on mean centred anxiety scores throughout a student's transition to university.

Note. Low SC represents students one standard deviation below the mean self-critical perfectionism score, and high SC represents students one standard deviation above the mean for self-critical perfectionism scores.

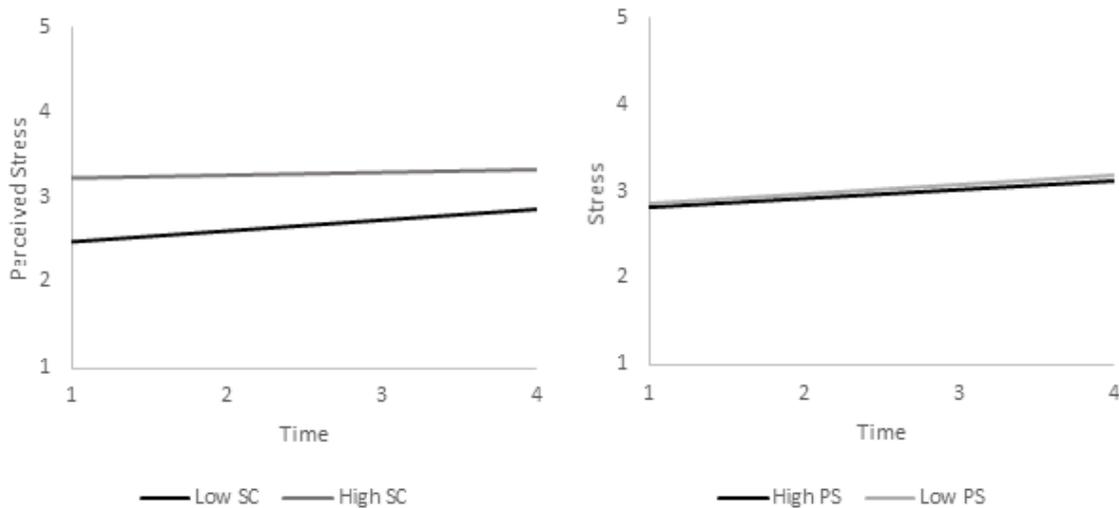
### Perceived Stress – LGM

First, a model was built to examine perceived across the four-time points. This model had adequate fit;  $\chi^2(5) = 32.860, p < .001, CFI = .959, RMSEA = .093[.064; .124], SRMR = .035$ . A quadratic growth curve model was also tested, but this model had significantly worse fit.

Perceived stress increased in a linear pattern throughout a student's transition to university ( $b = .08, p < .001, 95\%CI [.06, .10]$ ). Then to test the main hypothesis, both self-critical and personal standards perfectionism were entered simultaneously as predictors into this model. This model had good fit;  $\chi^2(9) = 38.282, p < .001, CFI = .968, RMSEA = .070[.048; .094], SRMR = .034$ .

As predicted, at baseline individuals higher in self-critical perfectionism reported elevated

perceived stress scores ( $b = .38, p < .001, 95\%CI [.33, .42]$ ). Conversely, at baseline personal standards perfectionism was negatively related to perceived stress ( $b = -.05, p = .03, 95\%CI [-.10, -.01]$ ). Additionally, personal standards perfectionism did not predict the pattern of change of stress throughout the year ( $b = .01, p = .803, 95\%CI [-.02, .02]$ ). Individuals higher in personal standards perfectionism reported changes in stress similar to those who reported moderate to low levels of this trait. Self-critical perfectionism was negatively related to the slope of perceived stress across the year ( $b = -.04, p < .001, 95\%CI [-.06, -.02]$ ). We used simple slopes analyses to examine this interaction (see Figure 4). Students higher in self-critical perfectionism did not report increased stress throughout the year (but reported continuously elevated levels of stress), whereas those lower in this trait reported elevated levels of stress throughout the year (+1SD:  $b = .03, p = .06$ ; -1SD:  $b = .13, p < .001$ ).



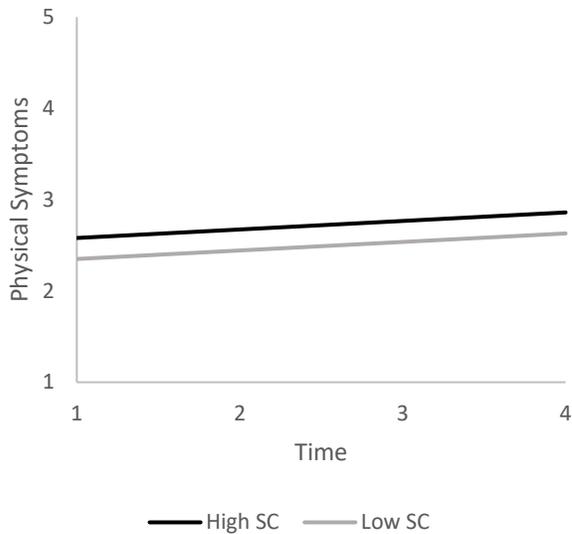
*Figure 4.* The plotted interaction of simple slopes which represents the influence of self-critical perfectionism on mean centered perceived stress scores throughout a student's transition to university.

Note. Low SC represents students one standard deviation below the mean self-critical perfectionism score, and high SC represents students one standard deviation above the mean for self-critical perfectionism scores. Additionally, the plotted linear growth model for perceived stress for those higher and lower in personal standards (PS) perfectionism.

### Physical Symptoms – LGM

Finally, this statistical procedure was repeated one more time with self-reported physical symptoms. First, a model was built to examine the trajectory of change of physical symptoms across the four-time points. This model had poor fit;  $\chi^2(5) = 83.899$ ,  $p < .001$ , CFI = .914, RMSEA = .157[.13; .19], SRMR = .049. A quadratic growth curve model was also tested, but this model had significantly worse fit. Physical symptom reporting increased in a linear pattern throughout a student's transition to university ( $b = .07$ ,  $p < .001$ , 95%CI [.04, .09]). To test our main hypothesis, both self-critical and personal standards perfectionism were entered

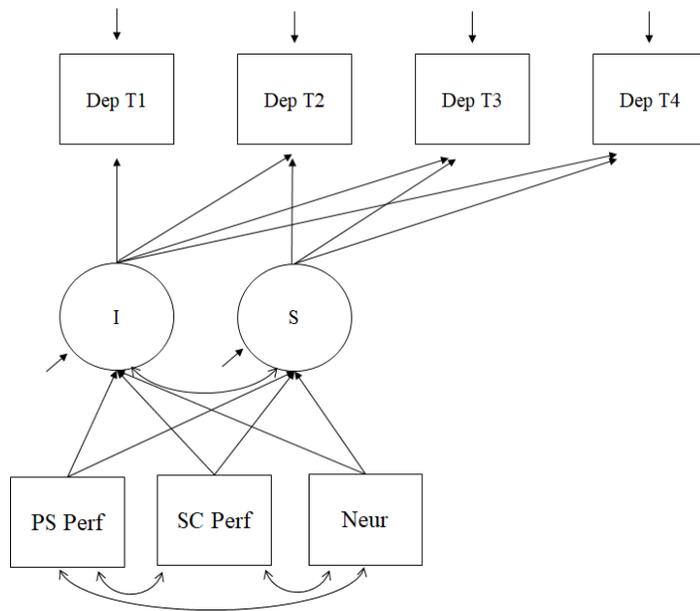
simultaneously as predictors into this model. The model which included perfectionism as a predictor also had adequate fit;  $\chi^2(9) = 83.481, p < .001, CFI = .924, RMSEA = .112[.09; .13], SRMR = .036$ . As predicted, at baseline individuals higher in self-critical perfectionism reported elevated physical symptoms scores ( $b = .23, p < .001, 95\%CI [.17, .28]$ ). Conversely, at baseline personal standards perfectionism was not related to physical symptoms ( $b = -.03, p = .211, 95\%CI [-.09, .02]$ ). Additionally, personal standards and self-critical perfectionism did not predict the pattern of change of physical symptom reporting throughout the year ( $b = .01, p = .299, 95\%CI [-.01, .03]$ ; SCP: ( $b = .01, p = .299, 95\%CI [-.01, .03]$ ). Individuals higher in personal standards and self-critical perfectionism reported changes in health similar to those who reported moderate to low levels of this trait. The significantly higher baseline reports of physical symptoms for those higher in self-critical perfectionism would mean that these individuals experienced significantly elevated physical symptom scores throughout the year compared to those lower in this trait.



*Figure 5.* The plotted linear growth model for physical symptoms for those higher and lower in self-critical (SC) perfectionism.

### Supplementary Analyses: Neuroticism

One large concern when studying self-critical perfectionism is distinguishing how this construct is different from neuroticism. To examine whether self-critical perfectionism was a unique factor which predicted mental health changes throughout the year, we decided to rerun the analyses while controlling for neuroticism. To control for neuroticism, trait neuroticism at Time 1 was added into the model as a predictor of intercept and slope of each dependent variable and correlated with both personal standards and self-critical perfectionism (Figure 6). In our sample self-critical perfectionism was strongly correlated with neuroticism ( $r(654) = .47, p < .001, 95\%CI [.39, .55]$ ). Conversely, personal standards perfectionism and neuroticism were only slightly correlated ( $r(654) = .07, p = .025, 95\%CI [.01, .14]$ ). If the results do not change when controlling for neuroticism this would provide evidence that self-critical perfectionism is a unique construct which influences mental health beyond trait neuroticism.



*Figure 6.* The theoretical model of the latent growth curve trajectory for depression across the four time-points with neuroticism, self-critical (SC) and personal standards (PS) perfectionism predicting the pattern of change of intercept and slope.

Note. This same model was run for anxiety, stress, and physical symptoms.

### **LGM – Controlling for Neuroticism**

When controlling for neuroticism, self-critical perfectionism still influenced mental health similarly during the transition to university. For a summary of the results please see Table 3 below. When controlling for neuroticism at time 1, self-critical perfectionism was positively related to depression, anxiety, stress and physical symptom reporting at baseline. Students higher in self-critical perfectionism reported more psychological distress before beginning university, even when controlling for trait neuroticism. Neuroticism was also positively related at depression, anxiety, stress and physical symptom reporting at baseline. Personal standards perfectionism was negatively related to depression at baseline, but not related to anxiety, stress or physical symptom reporting at baseline. Self-critical perfectionism was not related to the

trajectory of change of depression, anxiety or physical symptom reporting throughout the transition to university. Neuroticism was also not related to the trajectory of change of depression, anxiety or physical symptom reporting throughout the transition to university. Both self-critical perfectionism and neuroticism were negatively related to the trajectory of change of stress across the transition to university. Personal standards perfectionism was also not related to the trajectory of change of depression, anxiety or stress throughout the transition to university. The influence of self-critical perfectionism on mental health during the transition to university does not change when controlling for neuroticism and this provides evidence for the validity for this trait as a unique entity.

Table 3

*Intercept and slope values for LGM analyses while controlling for neuroticism across variables.*

	SC Perfectionism		Neuroticism		PS Perfectionism	
	Intercept b [95%CI]	Slope b [95%CI]	Intercept b [95%CI]	Slope b [95%CI]	Intercept b [95%CI]	Slope b [95%CI]
Dep	<b>.21</b> [.16, .26]	-.01 [-.04, .02]	<b>.36</b> [.29, .43]	-.01 [-.05, .03]	<b>-.05</b> [-.09, -.01]	.02 [-.01, .04]
Anx	<b>.19</b> [.13, .26]	-.02 [-.05, .01]	<b>.51</b> [.42, .59]	-.03 [-.07, .01]	-.04 [-.09, .02]	.02 [-.01, .05]
PSS	<b>.22</b> [.17, .27]	<b>-.03</b> [-.05, -.01]	<b>.40</b> [.34, .46]	<b>-.04</b> [-.07, -.01]	-.04 [-.08, .01]	.00 [-.02, .02]
PSC	<b>.08</b> [.03, .14]	.01 [-.02, .03]	<b>.35</b> [.27, .42]	-.02 [-.05, .01]	-.02 [-.07, .03]	.01 [-.01, .03]

Note: PSP = Personal standards perfectionism, SCP = Self-critical perfectionism, Dep = Depression, Anx = Anxiety, PSS = Perceived stress, PSC = Physical Symptoms. Bolded items are significant  $p < .05$ .

### Supplementary Analyses: Gender

Another concern when examining perfectionism within this population is how gender may additionally influence mental health. In Table 4 below, the average perfectionism and mental health scores at Time 1 for male and female students are displayed, as well as, t-tests which indicate whether these variables are significantly different. Males and females did not report significantly different perfectionism scores, but females reported significantly more depression, anxiety, stress and physical symptoms compared to males. To follow this up, latent growth curve models were rerun for males and females separately to determine if gender differentially influenced the relation between perfectionism and mental health trajectories. Note, the number of male participants is low (N = 182) and this may not adequately power the latent growth model analysis.

Table 4

*Means and standard deviations for Time 1 variables for males and females with t-tests of mean comparisons by gender.*

Variable	Male: Mean(SD)	Female: Mean(SD)	T	P
SCPT1	4.09(1.06)	4.05(1.11)	0.37	0.709
PSPT1	5.31(1.05)	5.24(1.04)	0.78	0.433
DepT1	1.70(0.73)	1.97(0.79)	<b>3.87</b>	<b>&lt;.001</b>
AnxT1	1.71(0.76)	2.08(1.00)	<b>4.47</b>	<b>&lt;.001</b>
PssT1	2.53(0.70)	2.83(0.79)	<b>4.57</b>	<b>&lt;.001</b>
PscT1	1.94(0.64)	2.41(0.74)	<b>7.44</b>	<b>&lt;.001</b>

Note: PSP = Personal standards perfectionism, SCP = Self-critical perfectionism, Dep = Depression, Anx = Anxiety, PSS = Perceived stress, PSC = Physical Symptoms. Bolded items are significant  $p < .001$

**LGM by Gender**

To determine if there were any gender differences for the influence of perfectionism on mental health during the transition to university, separate latent growth curve models were run for males and females. Note, the number of male participants is small and may not adequately power the latent growth curve analyses. In Table 5 below, the summary of the latent growth curve analyses by gender are included. There are a few gender differences that are explored in the sections below. Notably, some interactions of perfectionism and slope were significant for female students and not males.

Table 5

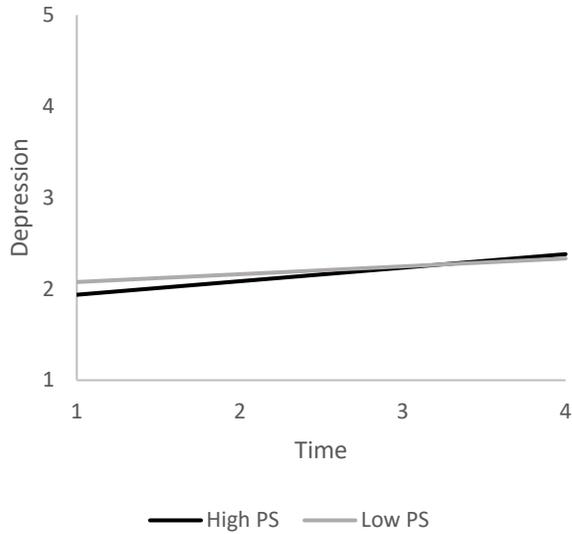
*Slope and intercept latent growth curve values for male and female participants across variables during the transition to university.*

			Dep	Anx	PSS	PSC
PS	Male	Intercept	-.04	-.05	-.02	-.04
		b [95%CI]	[-.13, .05]	[-.14, .05]	[-.11, .07]	[-.14, .05]
		Slope	-.03	-.02	-.01	-.01
	Female	b [95%CI]	[-.07, .01]	[-.07, .02]	[-.06, .03]	[-.05, .04]
		Intercept	<b>-.07</b>	-.04	<b>-.06</b>	-.02
		b [95%CI]	<b>[-.13, -.01]</b>	[-.12, .03]	<b>[-.12, -.01]</b>	[-.08, .04]
SC	Male	Slope	<b>.03</b>	.03	.01	.01
		b [95%CI]	<b> [.01, .06]</b>	[-.01, .06]	[-.02, .03]	[-.01, .03]
		Intercept	<b>.32</b>	<b>.30</b>	<b>.28</b>	<b>.16</b>
	Female	b [95%CI]	<b> [.23, .41]</b>	<b> [.21, .41]</b>	<b> [.19, .37]</b>	<b> [.07, .25]</b>
		Slope	.01	-.03	-.01	.01
		b [95%CI]	[-.03, .05]	[-.04, .05]	[-.02, .03]	[-.04, .05]
Female	Intercept	<b>.37</b>	<b>.42</b>	<b>.41</b>	<b>.24</b>	
	b [95%CI]	<b> [.32, .43]</b>	<b> [.35, .50]</b>	<b> [.36, .46]</b>	<b> [.18, .30]</b>	
	Slope	-.01	<b>-.04</b>	<b>-.05</b>	-.01	
		b [95%CI]	[-.04, .01]	<b>[-.07, -.01]</b>	<b>[-.07, -.02]</b>	[-.03, .02]

Note: PSP = Personal standards perfectionism, SCP = Self-critical perfectionism, Dep = Depression, Anx = Anxiety, PSS = Perceived stress, PSC = Physical Symptoms. Bolded items are significant  $p < .05$ .

### **Depression LGM by Gender**

When running the latent growth curve model by gender, for both males and females, self-critical perfectionism was positively related to depression at baseline. For females, personal standards perfectionism was negatively related to depression at baseline. However, for male students, personal standards perfectionism was unrelated to depression at baseline. For both males and females, self-critical perfectionism was not related to the trajectory of change of depression across the transition to university. For males, there was no relation between personal standards perfectionism and the trajectory of change of depression. Conversely, for females there was an influence of personal standards perfectionism on the trajectory of change of depression across the school year. We used simple slopes analyses to examine this interaction (see Figure 7). Both female students higher and lower in personal standards perfectionism reported increased depression scores across the school year, but female students higher in personal standards perfectionism reported lower depression scores at baseline but had a steeper increase in depression across the year (-1SD:  $b = .09, p < .001$ ; +1SD:  $b = .15, p < .001$ ).



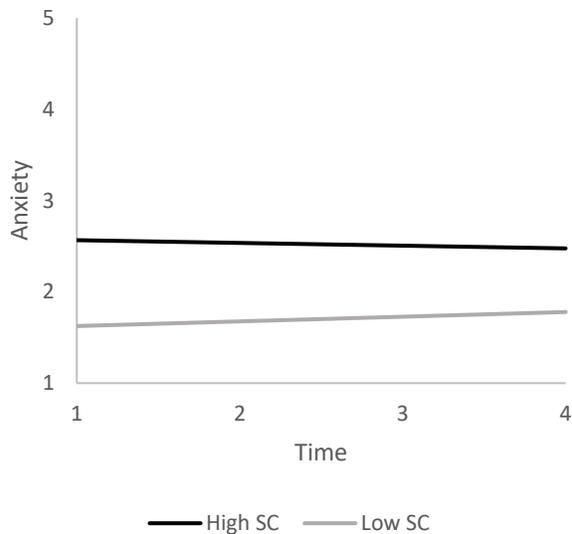
*Figure 7.* The plotted interaction of simple slopes for female students which represents the influence of personal standards perfectionism on depression scores throughout a student's transition to university.

Note. Low PS represents students one standard deviation below the mean personal standards perfectionism score, and high PS represents students one standard deviation above the mean for personal standards perfectionism scores.

### **Anxiety- LGM by Gender**

When running the latent growth curve model by gender, for both males and females, self-critical perfectionism was positively related to anxiety at baseline. For both male and female students, personal standards perfectionism was unrelated to depression at baseline. For both males and females, personal standards perfectionism was not related to the trajectory of change of anxiety across the year. For males, there was no relation between self-critical perfectionism and the trajectory of change of anxiety. Conversely, for females there was an influence of self-critical perfectionism on the trajectory of change of anxiety across the school year. We used

simple slopes analyses to examine this interaction (see Figure 8). When examining the simple slopes analyses the slopes were not significantly different (-1SD:  $b = .05$ ,  $p = .067$ ; +1SD:  $b = -.03$ ,  $p = .168$ ). Both female students higher and lower in self-critical perfectionism experienced changes in anxiety similarly during the transition to university.



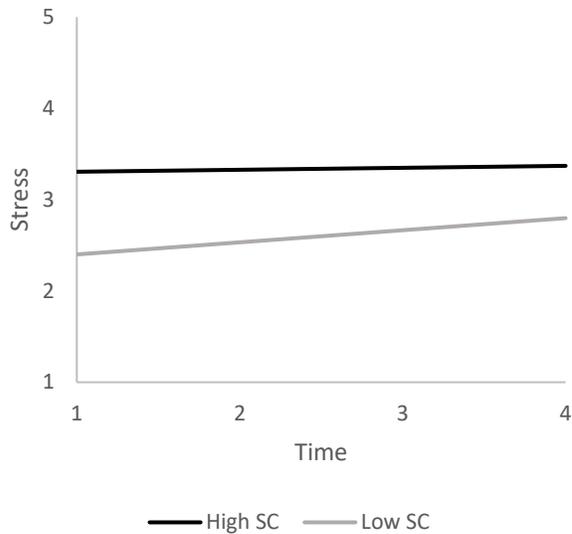
*Figure 8.* The plotted interaction of simple slopes which represents the influence of self-critical perfectionism on mean centred anxiety scores throughout a student's transition to university for female students.

Note. Low SC represents students one standard deviation below the mean self-critical perfectionism score, and high SC represents students one standard deviation above the mean for self-critical perfectionism scores.

### **Stress- LGM by Gender**

When running the latent growth curve model by gender, for both males and females, self-critical perfectionism was positively related to stress at baseline. For females, personal standards perfectionism was negatively related to stress at baseline. However, for male students, personal

standards perfectionism was unrelated to stress at baseline. For both males and females, personal standards perfectionism was not related to the trajectory of change of stress across the year. For males, there was no relation between self-critical perfectionism and the trajectory of change of stress. Conversely, for females there was an influence of self-critical perfectionism on the trajectory of change of stress across the school year. We used simple slopes analyses to examine this interaction (see Figure 9). Female students higher in self-critical perfectionism reported no change in stress scores across the school year, but higher stress scores at baseline. Female students lower in self-critical perfectionism reported increases in stress levels across the transition to university (-1SD:  $b = .13$ ,  $p < .001$ ; +1SD:  $b = .02$ ,  $p = .240$ ). However, students higher in self-critical perfectionism reported more stress than those lower in this trait throughout the transition to university.



*Figure 9.* The plotted interaction of simple slopes which represents the influence of self-critical perfectionism on mean centred stress scores throughout a student's transition to university for female students.

Note. Low SC represents students one standard deviation below the mean self-critical perfectionism score, and high SC represents students one standard deviation above the mean for self-critical perfectionism scores.

### **Physical Symptoms- LGM by Gender**

When running the latent growth curve model by gender, for both males and females, self-critical perfectionism was positively related to physical symptom reporting at baseline. For both male and female students, personal standards perfectionism was unrelated to physical symptom reporting at baseline. For both males and females, self-critical perfectionism was not related to the trajectory of change of physical symptom reporting across the year. For both males and females, personal standards perfectionism was not related to the trajectory of change of physical symptoms reporting across the year. There were no gender differences for the influence of perfectionism of physical symptom reporting during the transition to university.

## Discussion

As students strive for the perfect college experience it is important to consider how perfectionistic striving may influence mental health during this transitional period. The current research provides evidence that self-critical perfectionism is a factor which can put students at risk of experiencing greater psychological distress during their first year in university. Consistent with other research focusing on the transition to university, students reported worsened mental health during this transitional period. Depression, perceived stress, and physical symptoms all had positive, linear growth curve trajectories, suggesting that students experienced increased psychological distress throughout their first year. Over the past few decades mental health problems have increased drastically in university students (Kitzrow, 2003). As well, in the past three decades mean levels of perfectionistic striving in youth have increased (Curran & Hill, 2017). This research examined the influence of this prevalent and controversial trait on mental health during a student's first year in university. Self-critical perfectionism has been a robust predictor of depression, anxiety and stress in university populations (Frost et al., 1990; Sherry et al., 2014). Before beginning university students higher in self-critical perfectionism reported elevated depression, anxiety, physical symptoms and stress scores. Conversely, students higher in personal standards perfectionism reported less depression and stress at baseline. Additionally, personal standards perfectionism was not a significant predictor of the pattern of change of anxiety, depression, physical symptoms or stress during the transition to university. Personal standards perfectionism was neither beneficial nor detrimental for change in mental health over the school year but was protective at baseline. Our hypotheses for the influence of self-critical perfectionism on mental health during the transition to university were unsupported. Self-critical perfectionism was negatively related to the pattern of change of anxiety and stress across the

year. Contrary to our hypotheses, students higher in self-critical perfectionism did not report increases in stress and anxiety during the transition to university, but rather reported consistently high anxiety and stress scores throughout the year. Instead, those lower in this trait reported an increase in anxiety and stress throughout the year. In addition, self-critical perfectionism did not influence the pattern of change of depression or physical symptom reporting throughout the year. Individuals higher in self-critical perfectionism experienced increases in depression and physical symptoms similar to those lower in this trait. However, the elevated baseline scores that individuals higher in self-critical perfectionism experienced remained elevated throughout the year compared to those low to moderate in this trait. Taken together, these results lead us to conclude that self-critical perfectionism negatively impacts mental health during a student's transition to university.

A strength of this research is that students were recruited prior to beginning university, so our baseline scores reflect a measure of pre-university mental health. Few studies examining changes in mental health during the transition to university account for mental health prior to university. Additionally, the examination of change in health across the entire year allows for an observation of the dynamic nature of mental health and how perfectionism influences this over time. This study comprehensively examines multiple mental health variables and a multidimensional measure of perfectionism to fully examine the influence of this trait during this vulnerable period in emerging adulthood. These findings attest to the current state of mental health in university students and how detrimental perfectionism is for mental health during this difficult transitional period. Finally, the findings hold even when controlling for neuroticism. Neuroticism is highly correlated with self-critical perfectionism and influenced mental health similarly during the transition to university. However, our research shows that self-critical

perfectionism is a distinct trait from neuroticism, even though both traits share defining characteristics such as worry and self-doubt. This research provides evidence for the validity of self-critical perfectionism as a trait with a unique influence on health and mental health outcomes.

Personal standards perfectionism did not influence the trajectory of change of mental health scores throughout the year. Students higher in personal standards experienced increases in mental health problems similarly to those lower in this trait. However, when considering the lower baseline scores of those higher in personal standards perfectionism, this would mean these individuals also end the year with lower mental health scores compared to average. The notion of an adaptive form of perfectionism has been very controversial in the literature. Some research has found that personal standards perfectionism is adaptive, and buffers against mental health problems (Frost et al., 1990; Levine et al., 2017; Levine & Milyavskaya, 2018; Milyavskaya et al., 2014; Stoeber & Stoeber, 2006). Conversely, other research has found this trait to be unrelated or related to adverse outcomes (for example, increased risk of developing eating disorders; Bardone-Cone et al., 2007; Enns & Cox, 1999; Sassaroli et al., 2008). Although in this research, perfectionism did not buffer against increases in mental illness, individuals higher in personal standards perfectionism reported less mental health problems at baseline and therefore, subsequently across the year. Personal standards perfectionism was moderately correlated with self-critical perfectionism but uniquely related to outcome variables. This research provides evidence that personal standards perfectionism was not detrimental for mental health during this transitional period and may actually be beneficial in this population. Future research is needed to confirm this finding and to further explore how personal standards and self-critical perfectionism differ, and why they differentially relate to outcome variables.

Even within this research, the adaptivity of personal standards perfectionism is controversial. When examining gender differences, female students higher in personal standards perfectionism reported lower depression scores at baseline but had steeper increases in depression across the year compared to those lower in this trait. So, although this trait initially buffered against mental health problems for female students, it appears that by the end of their first year in university female students higher and lower in personal standards perfectionism reported the same level of depressive symptoms. This same effect was not seen in male students, but this may be because the number of male participants was small and the latent growth trajectories may not have been adequately powered. Additionally, this effect was not seen across other mental health variables. For female students higher in personal standards perfectionism this increased vulnerability to depression warrants further review. Rarely do longitudinal studies examining the influence of perfectionism on mental health in adolescence and emerging adulthood take into account gender beyond reporting its descriptive statistics or controlling for it (Damian et al., 2013; Sherry et al., 2014; Stoeber & Rambow, 2007). The findings of this research suggest that gender may be an important factor to consider when studying personal standards perfectionism. Perhaps, achievement stress mediates the relationship between personal standards perfectionism and depression. The current pressures placed upon women to “do it all” may partially lead to increased distress even in those who aim for positive achievement striving. This research brings into question the adaptivity of personal standards perfectionism, particularly given that for female students this elevated achievement striving may lead to distress over time. Further research is needed to further replicate and explore these findings.

Both personal standards and self-critical perfectionism were simultaneously examined in the latent growth curve models in this research. Therefore, the conclusions drawn from this

research are on the residuals of personal standards and self-critical perfectionism when the shared variance is partialled out (Hill, 2017). This may influence our interpretation of how perfectionism influences outcomes, especially for personal standards perfectionism. When partialling out some of the negative aspects that personal standards perfectionism shares with self-critical perfectionism, this trait has been found to be more adaptive than when studied alone (Hill, 2014). Currently in the literature, the analytic strategy to enter both facets of perfectionism together into an analysis is common practice and recommended (Stoeber & Gaudreau, 2016). In the present research, the correlation between personal standards and self-critical perfectionism was small ( $r = .33$ ) and the shared variance between these variables is also small (approximately 11%), so examining these variables in separate, as opposed to within the same model is likely to not change the results drastically. Additionally, in this research the interaction of self-critical and personal standards perfectionism was not significant across mental health variables. This provides evidence that these facets are independent and that in this research the findings were not due to a relation between the shared variance of both facets of perfectionism. As the conceptualization of perfectionism continues to evolve, it is important to consider how analytical strategies may alter our understanding of this trait and its influence on varying outcomes.

In this research, the influence of self-critical perfectionism on the trajectory of change of anxiety and stress across the school year was opposite to our hypothesis. In previous research, this maladaptive form of perfectionism has been a predictor of increased depression, but not anxiety (Sherry et al., 2014). In this research, those higher in self-critical perfectionism experienced no change in anxiety and stress throughout the school year. This was opposite to our hypothesis that those higher in self-critical perfectionism would experience increased mental health problems. Perhaps, individuals higher in self-critical perfectionism reported elevated but

stable scores throughout the year, because these individuals engage in unrelenting worry or fear of future outcomes. A cognitive bias which defines self-critical perfectionism is fear of future failure (Frost et al., 1990). So perhaps this stable but elevated stress and anxiety reflects the cyclical pattern of worry that those higher in self-critical perfectionism may experience. For example, a student higher in self-critical perfectionism may be worried about doing well on a test, and even if they do well on that test, they may immediately begin to worry about the next test or class or chapter of their life. For students higher in self-critical perfectionism there may always be something to worry about. This is consistent with research showing that students higher in self-critical perfectionism experienced no rebound in affect during time off (Milyavskaya et al., 2014). For an individual high in self-critical perfectionism, there is always a new worry to occupy the place of a previous one, even during time off. Consistent with this is research finding that self-critical perfectionism is highly consistent across varying life domains (Levine & Milyavskaya, 2018). As this highly self-critical attitude influences each important area of an individual's life it may result in an unrelenting feeling of stress and anxiety. So perhaps, even during time-off from academics there is a different area of one's life to enforce these self-imposed high standards, and this may translate to an elevated but stable expression of stress and anxiety across the entire year. Self-critical perfectionism is a trait defined mainly by its harsh self-evaluative cognitive biases, and perhaps the unrelenting fear of failure may lead those higher in self-critical perfectionism to experience elevated but stable stress and anxiety throughout this transitional period.

Conversely, as one strives for perfection it may become difficult to savour accomplishments or feelings of competence from success. Individuals higher in self-critical perfectionism may experience stable, but elevated anxiety and stress scores due to low feelings

of competence or self-efficacy. This is consistent with evidence that individuals higher in self-critical perfectionism are poorer at engaging in positive self-talk and reinforcement (Flett, Hewitt, Whelan & Martin, 2007). Lacking confidence and a general feeling that one is incapable of tackling the challenges ahead may make each new challenge that much more difficult. Additionally, individuals higher in self-critical perfectionism are more likely to attribute success to external sources (Levine, Werner, Capaldi & Milyavskaya, 2017). This research provides evidence that students higher in self-critical perfectionism are more likely to feel their progress is due to others or external factors. On the other hand, students higher in personal standards perfectionism are more likely to use the self-serving bias and attribute failure to external sources (Levine et al., 2017). It is more adaptive to consider ambiguous reasons for failure to be outside of one's self. This may suggest that those higher in self-critical perfectionism cannot acknowledge their own ability and that for these individuals, success is due to others or fleeting luck. Consider how difficult continued progress becomes when an individual lacks the self-concept to understand their own ability or worth. Self-critical perfectionism has been shown to be negatively correlated with self-efficacy (Stoeber, Hutchfield & Wood, 2008). This provides some preliminary evidence that those higher in self-critical perfectionism feel less confident in their ability. Perhaps, the combination of uncertainty in ability and striving for unrealistic standards would lead an individual higher in self-critical perfectionism to engage in constant and unrelenting worry, anxiety, and stress. There is little research examining whether lack of self-efficacy or self-worth mediates the relation between perfectionism and psychological distress over time and future research should examine how this cognitive bias may impact mental health for those high in perfectionism.

Alternatively, our analysis method may also influence the interpretation of these results. For this research we examined the influence of perfectionism on anxiety, stress, depression and physical symptoms to examine a comprehensive and holistic definition of mental health during first year university. However, when considering the precipitation of mental illness, it may also be important to examine a diathesis-stress model (Monroe & Simons, 1991). In this model, perfectionism would be considered to be a factor which predisposes individuals to experience psychological distress when there is an interaction of this trait with stress. So perhaps, our results are not as hypothesized because stress is also a predictor of mental illness, as opposed to an outcome as it is defined in this research. Some research has found that individuals higher in self-critical perfectionism experience increased daily stress and that the interaction of perfectionism and stress predicted increased depression (Dunkley et al., 2003; Flett, Hewitt, Blankstein & Mosher, 1995; Zuroff & Blatt, 2002). Additionally, the relation between perfectionism and distress is also mediated by stress and daily hassles (Dunkley et al., 2000). Individuals higher in self-critical perfectionism may be more sensitive to stress and perhaps this explains why these individuals are more vulnerable to experiencing mental illness. Taken together this may suggest that future research should examine a diathesis-stress model with perfectionism and how this may influence mental health during a period of particular vulnerability, like the transition to university.

Finally, these results may reflect a ceiling effect. Students higher in self-critical perfectionism at baseline reported significantly higher anxiety and stress scores. So, although an individual higher in self-critical perfectionism reported stable anxiety and stress scores as the year progressed, the growth or increase in these variables was limited by the much higher baseline scores that these individuals reported. The scores seem to reflect a non-clinical

elevation in these mental health variables. Although the mean trajectory of scores was nowhere near the top of the scale, it still reflects a ceiling effect of non-clinical distress and that a large majority of students reported experiencing distress fairly often. This is consistent with other research focusing on mental health in the transition to university; that individuals report elevated but not clinically significant levels of mental illness (Kitzrow, 2003). However, even these somewhat small differences in mental health represent much larger differences in well-being and daily-functioning. The current mean anxiety score for those higher in self-critical perfectionism is near a clinically meaningful range, and it is important to consider how vulnerable these individuals may be for developing a mental illness. Additionally, when examining by gender, the interaction of perfectionism and stress over time was only present for female students. However, this may be due to inadequate power when running latent growth curve models for only male students. Self-critical perfectionism is detrimental for students transitioning to university, and these findings may suggest that moving forward early intervention is needed to reduce self-critical perfectionism in students to improve their well-being.

### **Future Directions**

Self-critical perfectionism is a detrimental factor which predicts greater psychological distress in students transitioning to university. In the future, it is important to determine how to help students higher in self-critical perfectionism during this transitional period. Both personal standards and self-critical perfectionism are moderately correlated, but consistently related to unique outcomes (Stoeber & Stoeber, 2006; Stoeber 2018). Moving forward it is important to consider how the facets of this trait differ to determine how to effectively intervene on the negative impact of the maladaptive aspect of perfectionism on health.

A salient difference between both facets of this trait are the cognitive biases associated with self-critical perfectionism. Individuals higher in self-critical perfectionism strive for exceedingly high standards and engage in multiple cognitive biases such as concerns over mistakes, doubts about actions, self-criticism, fear of failure, as well as, ruminative and rigid thought patterns (Dunkley et al., 2000; Egan Piek, Dyck & Rees, 2007; Flett, Madorsky, Hewitt & Heisel, 2002; Frost et al., 1990; Levine & Milyavskaya, 2018). This may suggest that these cognitive distortions are primarily responsible for the negative influence of self-critical perfectionism on mental health. Imagine how much distress someone might feel if they constantly scrutinized every part of themselves and doubted everything they had done. For example, students higher in self-critical perfectionism in one area of their life (i.e. school) were also more likely to be high in self-critical perfectionism in other areas of their life (i.e. relationships, sports, and work) (Levine & Milyavskaya, 2018). The negative cognitions that define this trait must also be pervasive across every aspect of that individual's life then. The unrelenting pressure associated with this may partially explain why this trait is related to poorer mental health. Moving forward interventions which target these self-critical cognitive biases may be most effective for reducing detrimental outcomes for those higher in self-critical perfectionism.

Self-compassion may also be a promising antidote to reduce negative harsh self-evaluation in those higher in self-critical perfectionism. Self-compassion proposes that people should engage in self-kindness (showing oneself compassion), mindfulness (keeping emotions in balanced awareness), and common humanity (understanding one's mistakes as part of being human) (Neff, 2003). Students higher in self-compassion before beginning university reported less depressive symptoms during their transition to university (Terry, Leary & Mehta, 2013).

Additionally, self-compassion has been shown to reduce rumination and depressive symptoms, while increasing resilience and well-being in student samples (Mosewich, Crocker, Kowalski & Delongis, 2013; Smeets, Neff, Alberts & Peters, 2014). Self-compassion interventions have been shown to be especially effective in highly self-critical individuals (Kelly, Zuroff, Foa & Gilbert, 2008; Mosewich et al., 2013). All together, this provides evidence that self-compassion interventions may be an effective tool for reducing self-criticism and in turn poor well-being in those students higher in self-critical perfectionism.

Alternatively, maladaptive coping has also been shown to mediate the relationship between self-critical perfectionism and depression (Dunkley & Blankstein, 2000; Dunkley, Ma, Lee, Preacher & Zuroff, 2014). Consistently, individuals higher in self-critical perfectionism engage in more maladaptive coping strategies, like avoidant coping, self-blame, procrastination, denial, and mental and behavioural disengagement (Athulya, Sudhir & Phillip, 2016; Dunkley et al., 2000; Dunn, Whelton & Sharpe, 2006; Stoeber & Janssen, 2011; Kaap-Deeder et al., 2016). These maladaptive coping strategies seem to add rather than reduce psychological distress in individuals higher in self-critical perfectionism (Dunkley et al., 2000). In contrast, students higher in personal standards perfectionism are more likely to use approach coping strategies like problem solving or social support which are related to decreased psychological distress (Mofield, Peters & Chakraborti-Ghosh, 2016). The differential use of coping strategies may suggest that intervening upon coping could lead to better mental health outcomes for these individuals. In one study, students higher in self-critical perfectionism who used adaptive coping strategies, like positive reframing, were more satisfied at the end of the day (Stoeber & Janssen, 2011). This provides some evidence that self-critical perfectionism is malleable. So perhaps, an intervention which focuses on skills to promote adaptive coping strategies, like positive reframing or problem

focused coping, in those students higher in self-critical perfectionism may be effective at decreasing psychological distress in students transitioning to university (Flett et al., 1996; Stoeber & Jasser, 2011). Although both of these interventions appear promising they have yet to be empirically tested. Future research needs to focus more on how to improve well-being outcomes for students that engage in this maladaptive and highly prevalent trait.

An alternate future direction may be to examine how perfectionism interacts with environmental factors to influence health. For example, one of the most notable changes that occurs in the transition to university is a change in an individual's social environment. Social and peer changes can have a large impact on well-being during a student's first year in university (Friedlander et al., 2007; Parker et al., 2004; Rubins et al., 2016). Social support from peers and family may be a factor which could buffer against mental health problems for those students higher in perfectionism (Fredrick Demaray & Jenkins, 2016). There is some research on the relation between perfectionism and social support, but little research on this within the transition to university. How perfectionism differentially influences use of social support may partially explain differences in mental health outcomes during the transition to university. Individuals higher in perfectionism who perceive receiving less social support have an increased likelihood of experiencing psychological distress (Dunkley et al., 2000). Perhaps, individuals higher in self-critical perfectionism report less social support because they are more likely to be lonely and shy (Flett et al., 1996). This may be an especially salient factor when considering how individuals higher in self-critical perfectionism fare when initially trying to make friends during this transitional period. There are additional factors which may also disadvantage students higher in self-critical perfectionism during this transition. For example, individuals higher in self-critical perfectionism are more likely to be emotionally reactive, which can initially act to increase the

amount of social support they receive, but this intense reactivity may also isolate them during tough times (Barnett & Johnson, 2016). Within a middle school sample, students higher in personal standards perfectionism reported receiving more support from peers than students higher in self-critical perfectionism and non-perfectionists (Fredrick et al., 2016). Social support has yet to be comprehensively examined within university students higher in perfectionism and may be a factor which explains the differential relation of this trait with mental health outcomes. If lack of social support is identified as a factor which predicts increased psychological distress for students higher in self-critical perfectionism, then better resources and support groups could be put in place for these more vulnerable students.

### **Limitations**

One limitation of this research was attrition. Although attrition in longitudinal work is normative, it is important to consider that almost half of the participants did not complete every time-point. The overall attrition in this research was not greater than average for longitudinal research with this population type (Levine et al., 2017; Milyavskaya et al., 2014; Werner & Milyavskaya, 2017). As well, our statistical analysis, latent growth curve modelling, is a robust tool which accounts for missing data. Additionally, upon examination, there was no evidence of missing at random (MAR) data, suggesting the data was missing completely at random (MCAR). So, any concerns that individuals may have dropped out due to elevated scores in any mental health variable are mitigated.

An additional limitation is that this research focuses on a very specific population and these findings may not generalize beyond students in their first year of university. It would be difficult to conclude whether the observations within this population could even apply to more

senior undergraduate students. However, the transition to university is a particularly vulnerable time for mental health problems and research within this population is important for helping students better acclimatize to this transition. Especially, when considering that for students higher in perfectionism this transition might be especially difficult as the need for high standards increases, but the effort to attain those standards also increases drastically. This research did not examine whether the perceived added pressure that one experiences in university is a unique factor which explains why this transitional period might be especially hard for individuals higher in self-critical perfectionism. Future research is needed to examine what unique environmental factors may explain why this transition could be more difficult for students higher in perfectionism.

A measurement limitation to consider is that the DEQ-SC6 subscale was used as a measure of self-critical perfectionism. As this subscale is a part of a depressive experiences questionnaire, its items are oriented in relation to depression and the use of this measure as a predictor of depression may be misleading (McIntyre, Smith & Rimes, 2018). However, the self-critical subscale of the depressive experiences questionnaire does not directly ask about depression. Additionally, this subscale is often included as a measure of self-critical perfectionism and trait self-criticism (Dunkley et al., 2012; Kelly et al., 2008; Stoeber, 2018; Zurroff & Blatt, 2002). Within the perfectionism literature, the use of this subscale is common, but it may be somewhat inappropriate in research which examines depression. Within psychology, measurement issues and construct validity are large issues. Ultimately, our measurement of self-critical perfectionism is consistent with the literature, comprehensive, and predicts outcomes in a manner which is generally consistent with the literature. However,

moving forward researchers must consider how measurement items themselves may interact with outcomes.

Finally, there are a number of different perfectionism measures, and in this research three different measures were used to capture both the more adaptive and maladaptive facet of this trait. These measures are commonly used in combination for this type of research, but perhaps using a measure with every perfectionism scale would be more comprehensive (Dunkley et al., 2012; Stoeber, 2018). Additionally, there is a vast perfectionism literature and multiple conceptualizations of this trait. To improve generalizability of this work only the two highest order factors of perfectionism were examined (Stoeber, 2018). These higher order factors generally capture the multidimensional nature of perfectionism, but do not completely align with the socially-defined construct of perfectionism (Hewitt & Flett, 1991). To be as comprehensive as possible it may important to examine this research question with the socially-defined construct of perfectionism. However, the socially-defined perfectionism construct has been inconsistently related to outcome variables, and in a recent meta-analysis, this measure was found to not predict mental health (Smith et al., 2017). Although the socially-defined measure of perfectionism may explain some of how this trait is motivated, it may not be the most parsimonious definition of this construct. This research examined the most current and broadly used measure of perfectionism to determine how this detrimental trait influences mental health during this transitional period.

## **Conclusion**

Personal standards perfectionism may be a protective factor for students entering university, as these students reported experiencing less mental health problems at baseline and

throughout the year. Self-critical perfectionism was a factor which predisposed students to experience more stress, depression, physical symptoms and anxiety before beginning university and consequently throughout the school year. Future research should focus on identifying students higher in self-critical perfectionism prior to university and intervening on this trait early to help improve mental health for these individuals.

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## Appendix A

## Perfectionism Scales: DEQ-SC6, FMPS &amp; APS

DEQ – SC6

Listed below are a number of statements concerning personal characteristics and traits. Read each item and decide whether you agree or disagree and to what extent. If you strongly agree, circle 7; if you strongly disagree, circle 1; if you feel somewhere in between, circle any one of the numbers between 1 and 7. The midpoint, if you are neutral or undecided, is 4.

Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

1. I often find that I don't live up to my own standards or ideals.
2. There is a considerable difference between how I am now and how I would like to be.
3. I tend not to be satisfied with what I have.
4. I have a difficult time accepting weaknesses in myself.
5. I tend to be very critical of myself.
6. I very frequently compare myself to standards or goals.

□ Copyright: Sidney J. Blatt, Ph.D., Joseph P. D'Afflitti, Ph.D., Donald M. Quinlan, Ph.D., 1979.

FROST – MPS

Listed below are a number of statements concerning personal characteristics and traits. Read each item and decide whether you agree or disagree, and to what extent. If you strongly disagree, circle 1; if you strongly agree, circle 5, if you feel somewhere in between circle any one of the numbers between 1 and 5. If you feel neutral or undecided the midpoint is 3.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

1. It is important to me that I be thoroughly competent in everything I do
2. If I fail at work/school, I am a failure as a person
3. I set higher goals than most people
4. If someone does a task at work/school better than I, then I feel like I failed the whole task
5. If I fail partly it's as bad as being a complete failure
6. I have extremely high goals
7. If I do not do as well as other people it means I am an inferior human being
8. Other people seem to accept lower standards for themselves than I do
9. I expect higher performance in my daily tasks than most other people do
10. The fewer mistakes I make, the more people will like me

Frost, R. O., Marten, P., Lahart, C., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive therapy and research*, 14(5), 449-468.

Revised APS Scale

The following items are designed to measure attitudes people have toward themselves, their performance, and toward others. There are no right or wrong answers. Please respond to all of the items. Use your first impression and do not spend too much time on individual items in responding. Respond to each of the items by using the scale below to describe your degree of agreement with each item. Circle the appropriate number.

Strongly Disagree		Slightly Disagree		Neutral		Slightly Agree		Strongly Agree
1	2	3	4	5	6	7		

1. I have high expectations for myself.
2. Doing my best never seems to be enough.
3. I set very high standards for myself.
4. I expect the best from myself.
5. My performance rarely measures up to my standards.
6. I am hardly ever satisfied with my performance.
7. I have a strong need to strive for excellence.
8. I often feel disappointment after completing a task because I know I could have done better.

## Appendix B

## Centre for Epidemiological Studies Depression (CES-D) Scale

Below is a list of the ways you might have felt or behaved. Please check the boxes to tell me how often you have felt this way in the past week or so...

Not at all or Less than 1-day last week	1-2 days last week	3-4 days last week	5-7 days last week	Nearly every day for 2 weeks
1	2	3	4	5

My appetite was poor.

I could not shake off the blues.

I had trouble keeping my mind on what I was doing.

I felt depressed

My sleep was restless.

I felt sad

I could not get going.

Nothing made me happy.

I felt like a bad person.

I lost interest in my usual activities

I slept much more than usual.

I felt like I was moving too slowly.

I felt fidgety.

I wished I were dead.

I wanted to hurt myself.

I was tired all the time.

I did not like myself.

I lost a lot of weight without trying to.

I had a lot of trouble getting to sleep.

I could not focus on the important things.

REFERENCE: Eaton, W. W., Smith, C., Ybarra, M., Muntaner, C., Tien, A. (2004). Center for Epidemiologic Studies Depression Scale: review and revision (CESD and CESD-R). In ME Maruish (Ed.). *The Use of Psychological Testing for Treatment Planning and Outcomes Assessment* (3rd Ed.), Volume 3: Instruments for Adults, pp. 363-377. Mahwah, NJ: Lawrence Erlbaum

## Appendix C

### Brief Symptom Inventory (BSI)

Participants are asked to rate each of the 6 items on a 5-point Likert scale of distress (0–4), ranging from not at all (0) to extremely (4)

1. Nervousness or shakiness inside
2. Suddenly scared for no reason
3. Feeling fearful
4. Feeling tense or keyed up
5. Spells of terror or panic
6. Feeling so restless you couldn't sit still

Derogatis, L. R., & Melisaratos, N. (1983). The Brief Symptom Inventory: An introductory report. *Psychological Medicine, 13*, 596–605.

## Appendix D

## Perceived Stress Scale (PSS)

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

**0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often**

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and “stressed”?
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
5. In the last month, how often have you felt that things were going your way?
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
7. In the last month, how often have you been able to control irritations in your life?
8. In the last month, how often have you felt that you were on top of things?
9. In the last month, how often have you been angered because of things that were outside of your control?
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

**References**

The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 386-396.

Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social Psychology of Health*. Newbury Park, CA: Sage, 1988.

## Appendix E

## Physical Symptom Checklist (PSC)

Below is a list of common physical symptoms that people experience. Please indicate how often you have experienced each of these in the past two weeks.

For each question choose from the following alternatives:

Never            Almost never            Sometimes            Fairly often            Very often

Headaches

Stomachache/pain

Chest/heart pain

Runny or congested nose

Coughing/sore throat

Faintness/dizziness

Shortness of breath

Acne/pimples

Stiff/sore muscles

Emmons, R. A. (1992). Abstract versus concrete goals: Personal striving level, physical illness, and psychological well-being. *Journal of Personality and Social Psychology*, 62, 292–300.

## Appendix F

## Big Five Inventory (BFI)

John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm Shift to the Integrative Big-Five Trait Taxonomy: History, Measurement, and Conceptual Issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 114-158). New York, NY: Guilford Press.

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which **you agree or disagree with that statement.**

1	2	3	4	5
Disagree	Disagree	Neither agree	Agree	Agree
Strongly	a little	nor disagree	a little	strongly

I am someone who...

- |  |   |
|--|---|
| 1. _____ Is talkative                            | 16. _____ Generates a lot of enthusiasm           |
| 2. _____ Tends to find fault with others         | 17. _____ Has a forgiving nature                  |
| 3. _____ Does a thorough job                     | 18. _____ Tends to be disorganized                |
| 4. _____ Is depressed, blue                      | 19. _____ Worries a lot                           |
| 5. _____ Is original, comes up with new ideas    | 20. _____ Has an active imagination               |
| 6. _____ Is reserved                             | 21. _____ Tends to be quiet                       |
| 7. _____ Is helpful and unselfish with others    | 22. _____ Is generally trusting                   |
| 8. _____ Can be somewhat careless                | 23. _____ Tends to be lazy                        |
| 9. _____ Is relaxed, handles stress well.        | 24. _____ Is emotionally stable, not easily upset |
| 10. _____ Is curious about many different things | 25. _____ Is inventive                            |
| 11. _____ Is full of energy                      | 26. _____ Has an assertive personality            |
| 12. _____ Starts quarrels with others            | 27. _____ Can be cold and aloof                   |
| 13. _____ Is a reliable worker                   | 28. _____ Perseveres until the task is finished   |
| 14. _____ Can be tense                           | 29. _____ Can be moody                            |
| 15. _____ Is ingenious, a deep thinker           |   |

30. \_\_\_\_\_ Values artistic, aesthetic experiences
31. \_\_\_\_\_ Is sometimes shy, inhibited
32. \_\_\_\_\_ Is considerate and kind to almost everyone
33. \_\_\_\_\_ Does things efficiently
34. \_\_\_\_\_ Remains calm in tense situations
35. \_\_\_\_\_ Prefers work that is routine
36. \_\_\_\_\_ Is outgoing, sociable
37. \_\_\_\_\_ Is sometimes rude to others
38. \_\_\_\_\_ Makes plans and follows through with them
39. \_\_\_\_\_ Gets nervous easily
40. \_\_\_\_\_ Likes to reflect, play with ideas
41. \_\_\_\_\_ Has few artistic interests
42. \_\_\_\_\_ Likes to cooperate with others
43. \_\_\_\_\_ Is easily distracted
44. \_\_\_\_\_ Is sophisticated in art, music, or literature

## Appendix G

## Supplementary Analysis: Perfectionism Interaction

Both personal standards and self-critical perfectionism were moderately correlated ( $r = .33, p < .001, 95\%CI [.23, .42]$ ). One concern to examine is whether the interaction of personal standards and self-critical perfectionism is a unique influencer of mental health in students during their first year of university. Simply, how do individuals that are high in both personal standards and self-critical perfectionism fair during this transitional period. There were no significant interactions between personal standards and self-critical perfectionism on baseline scores or the trajectory of change of mental health during the transition to university. Please see Table E1 below for the results of this interaction term.

Table 6

*The interaction of personal standards and self-critical perfectionism on intercept and the trajectory of change of depression, anxiety, stress and physical symptoms reporting during first year university.*

	Intercept		Slope	
	B [95%CI]	P	B [95%CI]	p
Depression	-.01[-.05, .03]	.532	-.01[-.03, .02]	.522
Anxiety	-.01[-.06, .05]	.791	-.01[-.03, .02]	.700
Stress	-.01[-.05, .03]	.740	-.01[-.03, .01]	.269
PSC	.02[-.03, .06]	.444	-.01[-.03, .01]	.259

Note: PSC is physical symptoms

## Appendix H

## Correlation of Mental Health across Times

In Table 7 below, a correlation matrix is included for mental health across time-points. This was done to show that although mental health is related across time, each time point is distinct. Additionally, personal standards and self-critical perfectionism were highly correlated at Time 1 and Time 4 (SCP:  $r(325) = .632, p < .001$ ; PSP:  $r(325) = .652, p < .001$ ).

Table 7

*The correlation of mental health variables across time.*

	Dep/Anx/PSS/PSC T2				Dep/Anx/PSS/PSC T3				Dep/Anx/PSS/PSC T4			
Dep/Anx/PSS/PSC T1	<b>.66</b>	<b>.61</b>	<b>.61</b>	<b>.72</b>	<b>.58</b>	<b>.63</b>	<b>.55</b>	<b>.65</b>	<b>.54</b>	<b>.55</b>	<b>.51</b>	<b>.64</b>
Dep/Anx/PSS/PSC T2					<b>.70</b>	<b>.68</b>	<b>.65</b>	<b>.72</b>	<b>.67</b>	<b>.63</b>	<b>.64</b>	<b>.68</b>
Dep/Anx/PSS/PSC T3									<b>.74</b>	<b>.65</b>	<b>.69</b>	<b>.68</b>

Note: PSP = Personal standards perfectionism, SCP = Self-critical perfectionism, Dep = Depression, Anx = Anxiety, PSS = Perceived stress, PSC = Physical Symptoms. Bolded items are significant  $p < .001$ . Time 1: N = 634, Time 2: N = 437, Time 3: N = 418, Time 4: N = 346.

## Appendix I

## Comparing Linear and Quadratic Models

For depression, anxiety, and perceived stress linear models were more appropriate than quadratic models. For these variables the linear models had more optimal AIC and BIC scores than the quadratic models. For physical symptoms the AIC and BIC scores suggest that the quadratic model would be a slightly better fit, but when running this analysis, a positive definite matrix occurred due to the quadratic term, therefore moving forward a linear model would be more appropriate. Therefore, a linear model was used to measure the pattern of change of physical symptoms throughout the year.

Table 8

*Comparing the linear and quadratic growth curve trajectories for depression, anxiety, stress and physical symptoms.*

	Linear		Quadratic	
	AIC	BIC	AIC	BIC
Depression	7499.39	7580.14	7500.04	7607.71
Anxiety	8212.30	8293.06	8219.19	8326.86
Stress	7115.84	7196.59	7123.60	7231.26
Physical Symptoms	3427.65	3467.84	3357.66*	3415.70*

Note: \* For physical symptoms the AIC and BIC scores suggest that the quadratic model would be a slightly better fit, but when running this analysis, a positive definite matrix occurred due to the quadratic term.