Thinking (and Thinking…) About Perfection: A Test of the Perfectionism Cognitions Theory

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Abstract

The current body of work examined the link between perfectionism cognitions and depressive symptoms and, importantly, tested a central mechanism by which rumination acts as an intervening pathway in this relationship. These relationships form the underlying framework of the Perfectionism Cognitions Theory (Flett et al., 2016), which, to date, had not been empirically tested. The current body of work consisted of two separate studies. Study 1 used a community sample of adults ($N = 175$, 53.3% men, $M_{age} = 28.3$ years old). Results of structural equation modeling in Study 1 offered support for the Perfectionism Cognitions Theory. It was found that rumination represented an indirect pathway explaining the relationship between perfectionism cognitions and depressive symptoms. Study 2 used a sample of emerging adult students ($N = 53$, 84.9% women, $M_{age} = 19.9$ years old) to test the Perfectionism Cognitions Theory. Study 2 also closely examined the link between perfectionism cognitions and cognitive flexibility, a behavioural index of rumination that was measured by performance on a set-shifting task. Results of a test of indirect effects in Study 2 replicated the findings of Study 1 by supporting the Perfectionism Cognitions Theory and showing evidence that rumination represents a mechanism by which perfectionism cognitions are related to poorer well-being. Results of regression analysis did not show a link between perfectionism cognitions and set-shifting, but perfectionism cognitions were related to self-reported cognitive flexibility. Together, the findings support Flett et al.’s (2016) Perfectionism Cognition Theory and have important implications for research and practice.

Keywords: perfectionism, perfectionism cognitions, rumination, cognitive flexibility, set-shifting, depressive symptoms, personality, psychopathology, well-being
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Thinking (and Thinking…) About Perfection: A Test of the Perfectionism Cognitions Theory

The compulsive, overwhelming need to be perfect (and to expect perfection from others) is on the rise in Western societies. According to Curran and Hill’s (2017) meta-analysis, there has been a linear increase in multidimensional perfectionism among American, Canadian, and British university students over the course of the last three decades. From 1989 to 2016 there has been a 10% increase in young people’s demands of themselves, a 32% increase in young people’s perceptions of what others demand of them, and a 16% increase in what young people demand of other people (Curran & Hill, 2017). This rise in perfectionism, the authors suggest, has occurred as a function of neoliberal governance in the United States, Canada, and the United Kingdom that fosters competitive individualism; young people in the industrialized world must strive against one another for social and economic resources under the sponsorship of institutions and the ever-increasing demands of parents (Curran & Hill, 2017).

The increasing prevalence of perfectionism represents a compelling backdrop to another concerning trend: the rise of mental illness among young people. According to the World Health Organization (WHO, 2017), serious mental illness afflicts a record number of young people. In the United States, Canada, and the United Kingdom, young people today are experiencing higher levels of depression and anxiety than they did just ten years previously (e.g., Bloch, 2016; Bor, Dean, Najman, & Hayatbakhsh, 2014). For this reason, it is important to consider the potential role of multidimensional perfectionism in the increasing prevalence of psychopathology among young people. To this end, there has been a burgeoning literature on perfectionism’s link to well-being. Perfectionism has been associated with physical and psychological health outcomes that pose a risk to an individual’s health and well-being, including cardiovascular illness, depressive symptoms, anxiety, ulcerative colitis, and early mortality (e.g., Sirois & Molnar, 2016). Thus, the trend showing a linear increase in levels of perfectionism among young people is particularly
troubling. Given the documented associations between perfectionism and indices of poorer well-being it is critical that researchers continue to investigate perfectionism to achieve a clearer understanding of the mechanisms that underlie these harmful relationships.

Whereas there is a robust literature indicating that perfectionism is associated with greater psychopathology, most of this research has focused on trait perfectionism rather than automatic perfectionistic thoughts that reflect state levels of perfectionism. There is, however, a growing body of research that has examined automatic perfectionistic thoughts in relation to outcomes of psychopathology. The main finding from this literature is that, like trait perfectionism, thoughts pertaining to the attainment of perfection have been linked to indices of psychopathology such as anxiety (e.g., Flett, Hewitt, Whelan, & Martin, 2007) and depression (e.g., Flett et al., 2012; Flett, Coulter, Hewitt, & Nepon, 2011). Another important finding that has emerged from this research is that rumination (i.e., a type of cognitive perseveration in which an individual experiences automatic and recurring thoughts pertaining to a stressor) represents an indirect pathway linking automatic perfectionistic thoughts to psychopathology. This finding has, in part, led to the creation of the Perfectionism Cognitions Theory (Flett, Hewitt, Nepon, & Besser, 2018; Flett, Nepon, & Hewitt, 2016), which is a relatively new cognitive theory of perfectionism and health.

The present study will expand on the aforementioned literature by focusing on specific mechanisms that link perfectionism cognitions to psychopathology. To this end, the current body of work will be the first to empirically test Flett et al.’s (2016) Perfectionism Cognitions Theory. Therefore, this project is a novel contribution to the literature examining perfectionism’s relation to mental health. It has the potential to shed light on the complex and nuanced association between the cognitive elements of perfectionism (i.e., automatic perfectionistic thoughts and rumination) and psychopathology. Thus, this research has the potential to have implications for applied practice as well as for scientific inquiry.
What Is Perfectionism?

Perfectionism is a complex construct, and as such there is contention among researchers about how it should be defined, conceptualized, and assessed (Sirois & Molnar, 2016). As it is typically defined within extant literature, perfectionism is the setting of and striving towards exceptionally high and unrealistic standards, combined with frequent thoughts about attaining those standards and engaging in overly critical evaluation of one’s performance (Frost, Marten, Lahart, & Rosenblate, 1990). It should be noted that perfectionism is really an “umbrella term,” often used colloquially to encompass perfectionism as a stable personality disposition (i.e., trait perfectionism, characterized by behaviours linked to compulsive striving for perfection), a more state-related self-presentational behavioural style (i.e., perfectionistic self-presentation), or as a state-related cognitive process (e.g., perfectionism cognitions, in which an individual experiences persistent automatic thoughts about the need to be perfect; Sirois & Molnar, 2016). Each of these three types of perfectionism will be discussed in turn and at length to provide a stable theoretical foundation for the present studies.

**Trait perfectionism.** A prevalent position among individuals who are well versed in the perfectionism literature is that perfectionism is a stable personality trait (Sirois & Molnar, 2016). In fact, perfectionism is identified as a facet of the conscientiousness dimension of personality as measured by both five-factor (i.e., Big Five, assessed by the Revised NEO Personality Inventory; Costa & McCrae, 1992) and six-factor (i.e., HEXACO Personality Inventory; Lee & Ashton, 2004) models of personality. While it is true that these measures tap the characteristics that are associated with perfectionism (e.g., a tendency to be thorough and concerned with details, an intolerance of errors, and the pursuit of unrealistically high standards of performance), measuring perfectionism in this way lacks nuance and detail (Frost et al., 1990; Hewitt & Flett, 1991; Sirois & Molnar, 2016). Indeed, a large body of literature demonstrates that perfectionism differs from
other personality traits such as conscientiousness and neuroticism; whereas scores on measures of perfectionism relate to scores for conscientiousness and neuroticism on the revised NEO-PI-R, they appear to explain empirically distinct constructs (Dunkley, Blankstein, & Berg, 2012; Rice, Ashby, & Slaney, 2007). Additionally, there is literature suggesting that more narrow personality traits (e.g., perfectionism) have better predictive utility than more broad personality traits (e.g., Paunonen, Haddock, Forsterling, & Keinonen, 2003). Therefore, it is necessary to recognize that trait perfectionism is a separate personality characteristic that should be examined more closely.

Most researchers tend to agree that perfectionism is a multidimensional construct and not a unidimensional construct as was initially theorized in decades past (Frost et al., 1990; Hewitt, Flett, Besser, Sherry, & McGee, 2003; Rice et al., 2007). However, Shafran and her group of researchers represent an anomaly to this trend in the field; Shafran maintains that perfectionism is a unidimensional construct and argues in favour of using her unidimensional measure of clinical perfectionism (Shafran, Cooper, & Fairburn, 2002). Shafran et al.’s (2002) clinical perspective of perfectionism is an important and welcome addition to the literature, but it tends to focus on perfectionism as a self-oriented phenomenon that neglects to consider the influential work of researchers who have demonstrated the utility and importance of multidimensional models of perfectionism (e.g., Frost et al., 1990; Hewitt & Flett, 1991; Hewitt et al., 2003). Multidimensional models consider the intrapersonal processes and interpersonal dynamics that are critical to take into account when conceptualizing perfectionism (Hewitt et al., 2003). Acknowledgement of this fact is reflected in the current and widely accepted conceptualization of perfectionism as a multi-dimensional personality trait.

Despite general agreement that perfectionism is a multidimensional construct, there is a distinct lack of consensus over exactly what the specific dimensions of perfectionism are (Rice et al., 2007). The contention over what the dimensions of perfectionism should be (and, indeed,
how many dimensions there are) has led to the development of different models and measures of this construct, each operationally defining perfectionism in a unique way. There are three primary multidimensional conceptualizations of perfectionism that have garnered the most interest and use among researchers.

The first is Frost et al.’s (1990) Multidimensional Perfectionism Scale (FMPS). The FMPS measures six dimensions of perfectionism, which Frost et al. (1990) describe as follows: Concern over Mistakes (i.e., the experience of negative reactions in response to mistakes, the tendency to interpret mistakes as being equivalent to failure, and the belief that one will lose the respect of other people following failure), Personal Standards (i.e., the setting of very high standards paired with prescribing excessive importance to these high standards for self-evaluation), Parental Criticism (i.e., one’s tendency to believe that his or her parents are overly critical of his or her performance), Parental Expectations (i.e., the tendency to believe that one’s parents have very high expectations), Doubts about Actions (i.e., the tendency to feel that projects were not completed to satisfaction), and Organization (i.e., the tendency to emphasize the importance of and preference for order).

The second is Hewitt and Flett’s (1991) measure, also called the Multidimensional Perfectionism Scale (MPSHF). The MPSHF measures three dimensions of perfectionism: Self-Oriented Perfectionism (SOP; setting exceptionally high standards for the self), Other-Oriented Perfectionism (OOP; setting exceptionally high standards for others to live up to), and Socially Prescribed Perfectionism (SPP; the belief that others expect perfection from you).

The third is the Almost Perfect Scale – Revised (APS-R) developed by Slaney, Mobley, Trippi, Ashby, and Johnson (1996). The dimensions measured by the APS-R are: Discrepancy (the perceived gap between an individual’s expectations and their performance), High Standards
(the extent to which one sets high standards of performance for themselves), and Order (the extent to which one prefers order and organization).

Despite these different conceptualizations, two latent higher-order dimensions capture the variance across these different subscales: perfectionistic strivings and perfectionistic concerns (Blankstein & Dunkley, 2002; Dunkley et al., 2012; Dunkley, Blankstein, Masheb, & Grilo, 2006; Stoebber & Otto, 2006). *Perfectionistic strivings* (PS) involves the setting of and striving towards excessively high standards and goals for oneself (Dunkley et al., 2006). The setting of high standards and goals is often discussed as a key component of perfectionism and it is included in each of the three aforementioned measures of perfectionism (i.e., FMPS, MPSHF, and APS-R; Dunkley et al., 2006). Thus, there are clear theoretical links between the MPS and APS-R subscales in relation to the higher-order perfectionism dimension of PS. Empirically, PS indicators include the personal standards subscale from the FMPS, the SOP subscale from the MPSHF, and the High Standards subscale from the APS-R (Dunkley et al., 2012). *Perfectionistic concerns* (PC) is the experience of constant and severe self-criticism and self-evaluation, an inability to feel satisfied with successful performance, and persistent concerns about the criticism and disapproval of others (Dunkley et al., 2006). Concerns about one’s ability to attain the excessive standards and goals that they set for themselves and harsh self-evaluation is another key component of perfectionism that is captured in varying degrees by the FMPS, MPSHF, and APS-R (Sirois & Molnar, 2016). Because of this, it is not difficult to recognize the theoretical “fit” of the MPS and APS-R subscales into the higher-order perfectionism dimension of PC. Empirically, indicators of PC include Concern over Mistakes from the FMPS, the SPP subscale from the MPSHF, and the Discrepancy subscale from the APS-R (Dunkley et al., 2012).

In summary, perfectionism is a complex construct that is the subject of much debate and discord among researchers. Despite this, when regarded as a personality trait it is evident that
there are two overarching dimensions that best capture the variance in conceptualizations: PS and PC. However, as noted previously, extant literature reveals that in addition to trait dimensions of perfectionism there are also comparatively more state-based manifestations of perfectionism.

**State perfectionism.** The current understanding of perfectionism recognizes that there are additional dimensions of perfectionism beyond trait perfectionism (i.e., perfectionistic self-presentation and perfectionism cognitions) that are theorized to be comparatively situational and/or state-like (Flett, Hewitt, Blankstein, & Gray, 1998; Hewitt et al., 2003b). *Perfectionistic self-presentation* refers to a maladaptive presentational style that involves the promotion of one’s perfection and the concealment of one’s imperfections (Hewitt et al., 2003b). On the other hand, *perfectionism cognitions* describe a maladaptive process that involves persistent and automatic thoughts about the need to be perfect (Flett et al., 1998; Sirois & Molnar, 2016). These two situational dimensions of perfectionism will be discussed in greater detail, though the dimension that is most relevant to the current body of work is perfectionism cognitions.

**Perfectionistic self-presentation.** The behavioural facet of perfectionism concerns the interpersonal public expression of this personality trait. Hewitt et al. (2003b) posit that not only do perfectionists differ among themselves in terms of their level of each of the dimensions of trait perfectionism, but also in terms of their need to appear perfect to other people by failing to display or disclose instances of imperfection in public. To create an image of perfection in public situations, certain perfectionists engage in impression management involving self-presentational attempts to appear flawless (Hewitt et al., 2003b). Perfectionistic self-presentation is a useful concept because it can help account for salient differences among individuals who have similar levels of trait dimensions of perfectionism. For example, two individuals with similar levels of SPP can have very different responses to imposed pressure to be perfect: One individual might rebel and become resentful, making it clear to other people that he or she has no desire to be
perfect (thus their emotional experience is characterized by hostility and anger) while the other individual could actively try to keep up the appearance of perfection by attempting to minimize the number of mistakes that he or she makes in public (thus their emotional experience could be characterized by a desire for approval and public self-consciousness; Hewitt et al., 2003b).

Like trait perfectionism, perfectionistic self-presentation is a multidimensional construct. Its unique facets include Perfectionistic Self-Promotion, Nondisplay of Imperfection, and Nondisclosure of Imperfection (Hewitt et al., 2003b). While these dimensions are unsurprisingly correlated with one another given that they describe facets of the same overarching construct of perfectionistic self-presentation, they have unique aspects in that each dimension involves different behaviours (Hewitt et al., 2003b). As their names suggest, these dimensions differ in terms of whether the individual’s focus is on perfectionistic self-promotion designed to demonstrate one’s perfectionism to others compared to an orientation towards minimizing the public display and/or disclosure of mistakes, flaws, and shortcomings. Perfectionistic Self-Promotion is concerned with one’s need to promote him- or herself as perfect to other people (Hewitt et al., 2003b). Nondisplay of Imperfection captures one’s concerns about being seen by other people in a less-than-perfect manner (Hewitt et al., 2003b). Nondisclosure of Imperfection, on the other hand, deals with one’s failure to admit to shortcomings (Hewitt et al., 2003b). Therefore, research reveals that there is a behavioural aspect of perfectionism that helps to explain how and why perfectionists with similar levels of a given trait dimension of perfectionism differ in his or her behavioural expression of this trait.

Perfectionism cognitions. The cognitive facet of perfectionism is gaining attention in the literature, which has led to the recognition of another state-like and/or situational dimension of perfectionism – that of perfectionism cognitions. As previously stated, perfectionism cognitions refers to the experience of automatic and persistent thoughts about a need to be perfect (Sirois &
Perfectionism cognitions differ from trait perfectionism because they assess the present-moment cognitive component of perfectionism that is missing from measures that assess trait perfectionism as a disposition (Flett et al., 1998). Acknowledgement of this dimension of perfectionism dates back a few decades to work by Hewitt and Genest (1990). This early work by Hewitt and Genest (1990) suggests that a tendency to perseverate about an inability to attain extremely high, perfect standards aligns with evidence indicating that the “ideal self” can function as a self-schema that facilitates the recall of perfectionistic content. Hewitt and Genest (1990) state that the ideal self-schema is especially likely to encode and process any information that indicates that perfection has not been obtained. This hypothesis makes sense given what we know about perfectionism – it is the setting of (and striving towards) unrealistic goals and standards of performance, combined with extremely harsh self-criticism when these standards are not met (Frost et al., 1990). Thus, the findings that such behaviours are correlated with dysregulation of cognitive processing and a tendency to fixate and brood over any perceived failures or shortcomings is not surprising; these “failures” do not correspond with the individual’s view of him- or herself, and as such represent a source of tension and anxiety that can be difficult to overcome. This work by Hewitt and Genest (1990) illustrates that there is more to perfectionism than a trait-oriented conceptualization can explain on its own. Perfectionism is a highly complex and nuanced phenomenon that can only be understood by examining each of its many facets. Perfectionism cognitions is one such facet that warrants further examination.

As is the case with trait perfectionism, there is some discord among researchers about the exact way that perfectionism cognitions should be conceptualized (Molnar & Murphy, 2016). In particular, there are competing views as to whether perfectionism cognitions is best defined as a unidimensional or a multidimensional construct (see Flett et al., 1998; Flett & Hewitt, 2014; Stoebert, Kobori, & Brown, 2014; Stoebert, Kobori, & Tanno, 2010). Flett and Hewitt (the
researchers who developed the MPSHF measure of trait perfectionism) belong to the faction positing that perfectionism cognitions is a unidimensional rather than a multidimensional construct. In their (1998) study describing the development of their measure of perfectionism cognitions (i.e., Perfectionism Cognitions Inventory; PCI) and its psychometric properties, Flett et al. note that the evidence points to a single facet; the authors conducted a principle-components analysis on the 25 items included in their measure, the results of which revealed that all 25 items had loadings of .61 or higher on a large first component that accounted for approximately 51.3% of the variance (Flett et al., 1998). Flett et al. (1998) note that these findings have been replicated in other samples.

On the other hand, Stoeber et al. (2010) belong to a group arguing in favour of a multidimensional conceptualization of perfectionism cognitions. Stoeber et al. (2010) propose the Multidimensional Perfectionism Cognitions Inventory – English (MPCI – E) as a measure of perfectionism cognitions. The items of the MPCI – E load onto three components: Perfectionistic Standards, Pursuit of Perfection, and Concern Over Mistakes. A flaw with this measure, however, is that many of the items do not actually assess perfectionistic automatic thoughts, and thus is at odds with the core definition of perfectionism cognitions. As Flett and Hewitt (2014) note, there are items on the MPCI that measure dysfunctional attitudes (e.g., “If I can’t do this well, it means that I am below average,” “There is meaning in doing something perfectly”; Stoeber et al., 2010) rather than the automatic thoughts that are spontaneously experienced and elicited in situational contexts. For this reason, the PCI as developed by Flett et al. (1998) was used to address the aims of the current studies.

The PCI (Flett et al., 1998) targets the measurement of automatic thoughts with themes involving perfectionism and beliefs that perfection is a standard that should be attained. As mentioned previously, factor analysis of the PCI confirmed that unlike trait perfectionism, which
is multidimensional, perfectionism cognitions represent a unidimensional construct (Flett et al., 2007). Interestingly (though perhaps unsurprisingly), research using the PCI has found that this measure is associated with psychological distress and deficits in cognitive self-management, such as a lack of self-reinforcement, lack of a positive self-focus, and perfectionistic inflexibility (Flett et al., 2007). This evidence suggests that automatic thoughts involving perfectionistic themes can be assessed in a reliable and valid manner, though it sheds light on a concerning link: a potential relationship between perfectionism cognitions and psychopathology. The research exposing this association will be discussed later.

Unsurprisingly, a body of research indicates that there is a robust relationship between the experience of perfectionism cognitions concerned with the attainment of ideal standards and the trait dimensions of perfectionism described previously (Flett et al., 1998). For example, a seminal study conducted by Frost and Henderson (1991) empirically examined the association between trait perfectionism and the experience of perfectionistic thoughts. Frost and Henderson’s (1991) study used a sample of 40 competitive female athletes who each completed a series of self-report measures including the FMPS (to assess multidimensional trait perfectionism). Participants also provided structured reports of their thoughts 24 hours before a competition. The results revealed that individuals who scored highly on the FMPS also tended to report a greater propensity to experience perfectionism-related cognitions, such as “I dream of being perfect” and “Images of me making a mistake clog my mind” (Frost & Henderson, 1991). Thus, from this study it is clear that experiencing perfectionism on a trait level is related to the experience of the more transient, state-like phenomenon of perfectionism cognitions.

A subsequent study by Frost et al. (1997) further confirms this relationship. Frost et al.’s (1997) study examined the nature of mistakes among perfectionists. In this study, female undergraduate students were screened for participation using the FMPS, with particular interest
in the Concern over Mistakes (CM) subscale. Seventeen participants who scored in the highest third (i.e., a score of 26 and above) and 20 participants who scored in the lowest third (i.e., a score of 19 or below) were asked to participate. In addition to the FMPS, participants were asked to keep a Mistake Journal in which mistakes made in daily life could be recorded in detail (e.g., the date/time/description of the mistake, and the time that the mistake was recorded). The participants were also asked several personal questions pertaining to reactions to each mistake (i.e., feelings after each mistake occurred, such as upset, frustrated, disappointed, embarrassed, etc.), the seriousness of the mistake, and concern over other people’s reaction to the mistake. Overall, the results indicated that the participants who scored highly on the CM subscale of the FMPS experienced mistakes significantly more acutely than did participants with low CM scores; high-CM participants experienced more negative emotions after each mistake than low-CM participants, they perceived the mistakes as more serious than low-CM participants, and they ruminated more about the mistake. Therefore, Frost et al.’s (1997) study expands on the work of Frost and Henderson (1991) to provide further evidence of a relationship between trait perfectionism and the experience of automatic thoughts pertaining to the attainment of perfect standards.

Therefore, it is clear that there is more to the conceptualization of perfectionism beyond what can be described by trait levels of the construct. It is important to consider the comparatively more transient facets of perfectionism as well. The current project examined perfectionism cognitions (operationalized as a unidimensional construct as measured by the PCI) in an attempt to shed light on its link to important life outcomes. To this end, I was particularly interested in the association between perfectionism cognitions and psychopathology (e.g., depressive symptoms), a relationship documented in the literature that was alluded to previously.
The Relationship between Perfectionism Cognitions and Psychopathology

Perfectionism cognitions are an example of a maladaptive cognitive process that, having been linked to psychological distress, represent a risk for psychopathology and thus are a threat to an individual’s well-being (e.g., Flett et al., 1998; Flett et al., 2007). Two critical outcomes that have been linked to perfectionism cognitions are anxiety and depression (Flett et al., 2007; Flett et al., 2012; Flett, Coulter, Hewitt, & Nepon, 2011).

Perfectionism cognitions and anxiety. Perfectionism cognitions have been found to be a significant predictor of anxiety in a clinical population of adults (Flett et al., 2007). In Flett et al.’s (2007) study, 105 adult psychiatric patients completed the PCI along with the MPSHF measure of multidimensional perfectionism and a measure of anxiety. The results of bivariate correlation analyses revealed that perfectionism cognitions were significantly and positively correlated with the measures of trait perfectionism and anxiety. In other words, experiencing more frequent thoughts relating to the need to be perfect were related to higher scores on trait perfectionism and greater levels of reported anxiety. Hierarchical regression analyses revealed that perfectionism cognitions account for a significant proportion of unique variance in anxiety after accounting for the proportion of variance explained by trait levels of perfectionism. Thus, the findings of Flett et al.’s (2007) study illustrate the incremental predictive utility of perfectionism cognitions with respect to psychological distress, such as the experience of anxiety, after accounting for trait perfectionism. This finding is important because it identifies perfectionism cognitions as a construct that should be targeted in prevention and intervention programs to reduce perfectionists’ anxiety and maximize psychological health and well-being. A strength to the study conducted by Flett et al. (2007) is that the sample consisted of adults who had been diagnosed with a psychiatric disorder. However, despite the important insights that can be gleaned from this study, we still do not know whether these findings are generalizable to other
samples. To address this gap, future research should expand on Flett et al.’s (2007) study by examining the relationship between perfectionism cognitions and anxiety in a non-clinical sample of young people (i.e., emerging adults). Such research would have clinical implications given the importance of early intervention in the diagnosis and treatment of psychopathology. The present study will address this gap in the literature.

**Perfectionism cognitions and depressive symptoms.** The link between automatic thoughts related to perfectionism and depressive symptoms is well documented within the extant literature (e.g., Flett et al., 2011, Flett et al., 2012), which further illustrates that perfectionism cognitions are associated with psychopathology. A recent study conducted by Flett et al. (2012) examined the relationship between perfectionism cognitions and depressive symptoms in a sample of adolescents. In this study, 250 high school students completed the PCI (Flett et al., 1998) along with self-report measures of trait perfectionism and depressive symptomatology. The results of Flett et al.’s (2012) study revealed that there was a significant positive correlation between perfectionism cognitions and depressive symptoms such that higher scores on the PCI were linked to greater reported depressive symptoms. Beyond this, hierarchical regression analyses revealed that perfectionism cognitions accounted for a significant proportion of unique variance in depressive symptomatology after accounting for the effects attributed to trait levels of perfectionism. Therefore, the findings of Flett et al.’s (2012) study illustrate that adolescents who experience a greater degree of perfectionism cognitions are at an elevated risk for depression than individuals who experience fewer automatic perfectionistic thoughts.

This relationship between perfectionism cognitions and depression has been examined in a more nuanced manner. For example, a recent study conducted by Flett et al. (2011) examined the relationships among trait perfectionism, automatic perfectionistic thoughts, rumination, worry, and depressive symptoms in early adolescents. A sample of 81 elementary school students
in Grades 7 and 8 completed self-report measures of the aforementioned constructs. The results of Flett et al.’s (2011) study indicated that there was a significant positive relationship between perfectionistic automatic thoughts and depressive symptoms such that higher scores on the PCI were related to higher depressive symptoms scores. In other words, greater experience of automatic perfectionistic thoughts was related to greater depressive symptomatology. Thus, the outcome of this study and the other aforementioned literature confirms that perfectionism cognitions represent a critical risk factor for the experience of psychopathology (i.e., anxiety and depression) among adolescents. Interestingly, Flett et al.’s (2011) study also found that rumination fully mediated the relationship between perfectionism cognitions and depressive symptoms in this sample. As such, rumination could potentially have an important explanatory role in the link between perfectionism cognitions and psychopathology, particularly in regards to outcomes like anxiety and depression.

**Rumination**

*Rumination* is a response style that arises from the distinctly human ability to reflect upon oneself (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). According to the response styles theory (Nolen-Hoeksema, 1991), rumination is a way of responding to the experience of distress that involves the repetitive and passive focusing on the symptoms of distress and on the possible causes and consequences of these symptoms (Nolen-Hoeksema et al., 2008). People who engage in rumination are fixated on the problem and on their feelings about the problem without taking any action. Thus, rumination does not lead to active problem solving and it manifests as brooding and perseveration about the stressor (Nolen-Hoeksema et al., 2008).

Rumination has been the subject of a vast body of literature, led by the invaluable and influential contributions of Susan Nolen-Hoeksema. Nolen-Hoeksema’s work has shown that a ruminative style of emotion regulation increases an individual’s vulnerability for depression and
exacerbates and perpetuates negative moods (Lyubomirsky, Layous, Chancellor, & Nelson, 2015). In addition to its link to depression, rumination is a transdiagnostic risk factor for several other indices of poor psychological well-being, including anxiety, substance abuse, and eating disorders (Lyubomirsky et al., 2015). But how (and why) is rumination implicated in these outcomes? According to the response styles theory (Nolen-Hoeksema, 1991), rumination exacerbates and prolongs distress (e.g., depression) through several different mechanisms. First, rumination (which tends to focus on negatively-valenced experiences) enhances the effects of depressed mood on an individual’s pattern of thinking, making it more likely that people will use the negative thoughts and memories activated by their depressed mood to understand their current circumstances. Second, (and as stated previously), rumination interferes with effective problem solving by making one’s pattern of thinking more pessimistic and fatalistic. Third, rumination interferes with one’s ability to learn from behaviour-response contingencies, which puts the individual at an increased vulnerability for experiencing stressful circumstances. Each of these mechanisms and consequences of rumination make it more likely that initial symptoms of depression (or other forms of distress, such as anxiety) will persist and become more severe over time. As such, a ruminative response style represents a risk factor that increases an individual’s vulnerability for experiencing psychopathology.

Extant literature on the cognitive and neural correlates of rumination suggests that certain cognitive deficits or changes in neural activity may be consequences of rumination. For example, individuals who engage in a ruminative response style might have poorer cognitive flexibility, an executive function and aspect of rumination that is associated with the ability to be adaptive to changing environmental contingencies, the ability switch between cognitive strategies or behavioural responses, and the ability to inhibit inappropriate behaviours and to mobilize appropriate ones (Mesulam, 2002). Deficits in this ability mirror the processes that are relevant in
a ruminative response (e.g., an inability to adapt to changes, an inability to see past a stressor, and an inability to actively problem solve). Indeed, Nolen-Hoeksema (2008) notes that rumination is a repetitive, perseverative form of thinking that involves cognitive inflexibility (i.e., poorer cognitive flexibility) and difficulties in shifting attention. For this reason, some research (e.g., Davis & Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 2008), suggests that poorer cognitive flexibility is a component of rumination, and is partly why individuals who ruminate get “stuck” brooding about a stressor; these individuals cannot see alternatives to their problem, nor can they actively seek an alternate, more healthy way to cope with the stressor.

Similarly, research has indicated that individuals who ruminate might have a general deficit in their ability to switch from unhelpful to helpful strategies for performing a task (Davis & Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 2008). In their (2000) study, Davis and Nolen-Hoeksema found that people who scored highly on self-reported rumination tended to show more perseverative errors on the Wisconsin Card Sort Task than people who scored low on rumination. This pattern of results was observed even after controlling for group differences in levels of depression. To explain why this phenomenon occurs, Whitmer and Banich (2007) used a set-shifting task to parse whether individuals who ruminate make perseverative errors due to either having trouble switching to a new strategy or having difficulty inhibiting the previously useful strategy. The researchers found that rumination was related to impaired ability to inhibit previously useful but currently suboptimal strategies. Thus, individuals who have a ruminative response style appear to have a deficit in their ability to discard strategies that are currently in use (even if they are not optimal) in favour of new and potentially more useful strategies for solving tasks. As such, poorer cognitive flexibility (as measured by an inability to set-shift) represents an important behavioural index of rumination that can be used as an objective measure of ruminative response styles.
Research has also identified specific areas of the brain that play a role in rumination. In a review of the literature, Nolen-Hoeksema et al. (2008) notes that neurophysiology has shown activation of the amygdala, medial prefrontal cortex (PFC), and left ventrolateral PFC as well as reduced activity in the rostral anterior cingulate cortex and the anterior and posterior medial PFC during rumination tasks. Cognitive flexibility has also been linked to activity in the PFC (Mesulam, 2002). Therefore, when studying rumination from a behavioural perspective it would be valuable to administer neuropsychological assessments that are designed to target frontal lobe activation and function to determine whether he or she is actually “getting stuck” (as indicated by impairments in performance on the tasks).

Given the well-documented association between ruminative response styles, distress, and psychopathology combined with its link to perfectionism cognitions, rumination is an important potential mechanism to consider in the relationship between perfectionism cognitions and psychopathology. This potential pathway forms the basis for a new cognitive theory of perfectionism and mental health called the Perfectionism Cognitions Theory (see Figure 1; Flett et al., 2016). The Perfectionism Cognitions Theory (Flett et al., 2016) is a valuable contribution to the literature and is central to the current body of work.

**The Role of Rumination in the Relationship between Perfectionism and Psychopathology:**

**Perfectionism Cognitions Theory**

There is an established link between perfectionism (whether measured at the trait or state level) and rumination. Flett et al. (2011) noted that there was a significant positive bivariate correlation between trait perfectionism and rumination. To be more specific, higher scores on the SOP dimension of trait perfectionism were linked to higher scores on a self-report measure of rumination. Whereas the relationship between SPP and rumination was positive, it did not reach a level of statistical significance. The study by Flett et al. (2011) also revealed that there was a
significant positive association between perfectionism cognitions and a ruminative response style such that a greater tendency to experience automatic perfectionistic thoughts was related to a greater likelihood of getting “stuck” brooding over and thinking about mistakes or perceived failures. Furthermore, Flett et al.’s (2011) study concluded that rumination fully mediated the link between perfectionism cognitions and depressive symptoms in a sample of elementary school children. Thus, it makes sense to consider the role of rumination more closely.

Given that extant literature has documented associations among perfectionism cognitions, rumination, and psychopathology, Flett et al. (2016) have presented a new cognitive theory of perfectionism and mental health. This theory, called Perfectionism Cognitions Theory, is a conceptual framework that elucidates and explores the cognitive mechanisms, processes, and outcomes that accompany and characterize perfectionism. There are several main tenets of the Perfectionism Cognitions Theory. First, this theory posits that perfectionism is associated with quicker and more frequent onset of rumination as well as a greater persistence of rumination; not only will perfectionism cognitions be linked to greater tendency to ruminate overall, but this pattern of ruminative thinking will last for a longer period of time. Second, perfectionism is associated with many types of recurring thoughts and forms of cognitive perseveration, including some types of overthinking that are unique to perfectionism and that separate this construct from other personality vulnerabilities. Such patterns of overthinking include mistake rumination, failure rumination, and post-event stress-related rumination (Flett et al., 2016). Third, perfectionists’ tendency to ruminate is associated with many costs and consequences to the individual, such as deficits in attentional capacity and working memory during times of stress. Fourth, excessive cognitive perseveration has the ability to lead to an overdeveloped memory for mistakes, failures, and stressful events that emphasize and highlight a sense of personal inadequacy. Flett et al. (2016) suggest that the extremely high cognitive salience of past mistakes
and failures among perfectionists who perseverate is accompanied by a hyper-vigilance and indeed a cognitive bias toward cues that signal the possibility of failure, mistakes, and negative social evaluations. Last, the ruminative response style that is linked to perfectionism is related to heightened stress and is a key contributor to poor psychological well-being. Moreover, Flett et al. (2016) argue that the impact of negative ruminations will be particularly heightened among perfectionists who engage in an overgeneralization of the self (i.e., the belief that one flaw is a global reflection of the self) and who have an overwhelming need to be perfect in everything that he or she does. The reason for this, the authors suggest, is that these perfectionists will have a chronically elevated level of self-focused attention that increases the intensity of emotional reactions to perceived failures (e.g., shame), which will make it more difficult to self-regulate and to limit ruminative responses (Flett et al., 2016).

Therefore, the Perfectionism Cognitions Theory (Flett et al., 2016) describes potential paths or mechanisms that underlie the link between perfectionism cognitions and psychopathology. It is a fascinating perspective that has not yet been tested empirically in the literature. This reflects a gap in the current understanding of perfectionism’s relationship to well-being, particularly in terms of the cognitive processes that help to shape this relationship. To gain a more thorough and nuanced understanding of perfectionism’s impact on well-being it is imperative to address this gap in the literature. Such an endeavour has clinical implications because it has the potential to identify an important mechanism that could be targeted in intervention programs to help mitigate the impact of perfectionism cognitions on mental health outcomes.

The Current Study

Even though the perfectionism literature has burgeoned in the past three decades there is still much to learn, especially in regards to the cognitive mechanisms, processes, and outcomes
that accompany and characterize this construct. Of particular interest are links between perfectionism (particularly the comparatively more state-like or situational dimension of perfectionism cognitions) with psychopathology. To do this, I empirically tested the underlying theoretical framework of the Perfectionism Cognitions Theory (Flett et al., 2016) in two separate studies.

Study 1 examined whether perfectionism cognitions were related to higher levels of depressive symptoms, and importantly tested whether rumination represented an explanatory pathway linking perfectionism cognitions with depressive symptoms in an adult sample aged 18 to 35 years. In response to this aim of the present study I tested the model presented in Figure 2. It was hypothesized that perfectionism cognitions would be positively related to higher levels of depressive symptoms and that rumination would be an indirect pathway linking perfectionism cognitions and depressive symptoms. That is, higher levels of perfectionism cognitions would be related to greater rumination, which, in turn, would be related to greater depressive symptoms.

Study 2 built upon the foundations established by Study 1 in several ways. First, as in Study 1, Study 2 empirically tested Flett et al.’s (2016) Perfectionism Cognitions Theory. However, this time the Perfectionism Cognitions Theory (Flett et al., 2016) was tested using a younger sample of emerging adults (i.e., individuals between the ages of 18 and 25 years). Given that Flett et al.’s (2016) Perfectionism Cognitions Theory has yet to be comprehensively tested in the literature outside of Study 1, it was important to attempt to replicate the findings (regardless if the hypotheses were supported or not) to ensure that the results of Study 1 did not reflect a spurious relationship. Replication is important and necessary for the advancement of science, particularly in the field of psychology (Amir & Sharon, 1990). As with Study 1, Study 2 employed self-report measures of perfectionism cognitions, rumination, and depressive
symptoms (along with the covariates, including trait perfectionism) to empirically test the Perfectionism Cognitions Theory (Flett et al., 2016).

Second, Study 2 more closely investigated one specific relationship within the model representing the Perfectionism Cognitions Theory (Flett et al., 2016): the link between perfectionism cognitions and rumination. However, Study 2 went beyond the use of self-report measures of rumination by including objective behavioural measures that would allow the behavioural correlates of rumination to be examined and to assess whether individuals who reported a tendency to ruminate actually experienced cognitive perseveration at a behavioural level. Thus, Study 2 focused in on cognitive flexibility, a facet of rumination that has been highlighted in the literature (e.g., Whitmer & Banich, 2007). More specifically, Study 2 explored cognitive flexibility by assessing participants’ ability to set shift. Set-shifting is a dimension of cognitive flexibility that is a central component of rumination (Davis & Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 2008). As mentioned previously, extant literature has shown that individuals who ruminate exhibit deficits in his or her ability to set-shift (Whitmer & Banich, 2007). Given that perfectionism cognitions are associated with an increased tendency to engage in self-reported rumination (e.g., Flett et al., 2011), whether these individuals also experience behavioural setbacks on indices of rumination, such as set-shifting, should be examined. To date this link between perfectionism cognitions and set-shifting has not been studied in the literature. However, personality traits such as neuroticism and conscientiousness (correlates of trait perfectionism) have been associated with poorer cognitive flexibility (i.e., deficits in set-shifting), though not at a level of statistical significance (Murdock, Oddi, & Bridgett, 2013). Higher neuroticism has also been associated with significantly lower updating/monitoring skills (i.e., monitoring and updating information in working memory; Murdock et al., 2013). Thus, it is
likely that individuals with a greater tendency to experience perfectionism cognitions would experience similar behavioural markers of rumination.

In response to the aims of Study 2, it was hypothesized that perfectionism cognitions would be positively related to higher levels of depressive symptoms and that rumination would be an indirect pathway between perfectionism cognitions and depressive symptoms. That is, higher levels of perfectionism cognitions would be related to greater rumination, which, in turn, would be related to greater depressive symptoms. It was also hypothesized that perfectionism cognitions would be negatively linked with cognitive flexibility as assessed by performance on a behavioural measure of set-shifting. Thus, Study 2 built on Study 1 and had implications for research because it attempted to replicate the findings of Study 1 and it went beyond the use of self-report measures to objectively evaluate part of Flett et al.’s (2016) Perfectionism Cognitions Theory. At a clinical level, the ultimate goal of Study 2 was to identify mechanisms (i.e., rumination and cognitive flexibility) that intervention programs could target to help mitigate the consequences of perfectionism cognitions on mental health outcomes (e.g., depressive symptoms).

**Study 1**

Study 1 empirically tested Flett et al.’s Perfectionism Cognitions Theory (2016), which is represented in the conceptual model depicted in Figure 1 (i.e., the indirect effect of rumination on the relationship between perfectionism cognitions and psychopathology). In the current study, depressive symptoms were used as an index of psychopathology. Thus, Study 1 explored a potential mechanism (i.e., ruminative responses) underlying the relation between perfectionism cognitions and depressive symptoms (see Figure 2). As mentioned previously, this study has the potential to shed light on important factors (e.g., perfectionism cognitions and rumination) that elevate an individual’s risk and vulnerability for poorer psychological health, such as the experience of psychopathology.
In addition to the primary construct of interest (i.e., perfectionism cognitions) it was important to account for the effects of potential covariates to determine the specific effects of perfectionism cognitions with respect to rumination and psychopathology. First, I accounted for the effects of trait perfectionism. It was critical to account for trait levels of perfectionism because extant literature suggests that there are robust associations between trait levels of perfectionism and psychopathology (e.g., Burgess & DiBartolo, 2016; Hewitt & Flett, 1991). In particular, the PC dimension of trait perfectionism has not only been related to greater levels of psychopathology across studies (e.g., Frost & DiBartolo, 2002; Graham et al., 2010; Sirois & Molnar, 2016), but it has also been identified as both a risk factor and a maintaining factor in the experience of depressive symptoms (Egan, Wade, & Shafran, 2011). Trait perfectionism is also positively related to rumination (e.g., Randles, Flett, Nash, McGregor, & Hewitt, 2010). Research suggests that there is also a significant positive correlation between trait perfectionism and perfectionism cognitions (e.g., Frost & Henderson, 1991; Frost et al., 1997), which highlights the need to parse the effects of each to gain a true measure of the link between perfectionism cognitions and the outcomes of interest (i.e., rumination, depressive symptoms). Therefore, trait perfectionism must be accounted for in the analyses to test the incremental predictive utility of perfectionism cognitions with respect to rumination and psychopathology as posited by the Perfectionism Cognitions Theory (Flett et al., 2016). In other words, it is important to determine whether perfectionism cognitions contribute to depressive symptomatology and rumination after accounting for the effects of trait perfectionism. Second, in light of evidence indicating that perfectionism is robustly associated with various forms of negative affect (Dunkley et al., 2012; Dunkley, Sanislow, Grilo, & McGlashan, 2009; Molnar et al., 2006; Stoeber, 2014) and literature linking negative affect to psychopathology (Carleton et al., 2013; Lahey, 2009), I accounted for the effects of negative affect in all analyses to assess whether perfectionism cognitions provided
greater incremental explanatory power in rumination and depressive symptomatology over and above negative affect. Lastly, it was also important to account for age because there is evidence to suggest that there are differences in perfectionism across the lifespan (e.g., Landa & Bybee, 2007). Specifically, trait perfectionism might decrease with age. This link is not yet known with respect to perfectionism cognitions, but age should be accounted for in light of this evidence.

Study 1 also treated respondents’ sex as a moderator of the link between perfectionism cognitions and depressive symptoms via rumination to test whether the conceptual model (see Figure 2) is invariant with respect to sex. There is a large body of literature showing that there are robust sex-related differences for both rumination and depression (e.g., Johnson & Whisman, 2013; Kessler, 2006). According to Kessler (2006), sex differences in the experience of depressive symptomatology begin in adolescence, where the incidence of depression is higher among women than men. In adulthood, women are twice as likely as men to experience depression (Kessler, 2006). Nolen-Hoeksema’s response styles theory (1991) suggests that this difference is in part due to the fact that women have a greater propensity to ruminate about their depressive symptoms than do men. Indeed, a recent meta-analysis by Johnson and Whisman (2013) demonstrates that women tend to score higher than men on general rumination and on two subtypes of rumination (i.e., brooding and reflection). The literature on sex-related differences in perfectionism is less clear – there does not appear to be significant sex-related differences in the experience of trait perfectionism between men and women (e.g., Hewitt, Flett, & Endler, 1995), and sex-related differences in perfectionism cognitions has not been adequately addressed in the literature. Thus, by testing whether there are sex differences in the experience of perfectionism cognitions and by testing whether the model representing the Perfectionism Cognitions Theory (Flett et al., 2016) is invariant related to sex, Study 1 represents a novel contribution to the extant literature.
Method

Participants

This study consisted of data collected from 175 American adults who had accounts on Amazon Mechanical Turk (MTurk), an online crowdsourcing platform used for participant recruitment. The sample was relatively evenly distributed between male and female participants (53.3% men, n = 96). The age of the participants ranged from 19 to 35 years old ($M = 28.3$, $SD = 3.8$ years). The majority of participants had completed some post-secondary education (87.4%, $n = 153$), with 54.3% ($n = 95$) of the sample having completed a university undergraduate degree. Most of the participants were in a romantic relationship (54.3%, $n = 95$) and approximately 25.1% of the participants had children ($n = 44$). Additionally, most of the participants identified as Caucasian (72.6%, $n = 127$). Data was missing on some demographic variables (see Table 1).

Procedure

Participants were recruited using MTurk. Participants completed a survey on personality and health behaviours hosted through Qualtrics, an online survey program. Completion of the survey took place remotely on the participants’ own computers or mobile devices. Participation took approximately 1 hour for which participants received $3.00 USD in compensation. This payment was in keeping with the average rate of compensation on MTurk (Paolacci & Chandler, 2014). Consistent with ethical standards, informed consent was obtained from all participants prior to participation in this study and all participants were debriefed (in written form) upon completion of the study. This project received clearance by Brock University’s Research Ethics Board (file # 16 – 011).

Measures

**Perfectionism cognitions.** The participants’ self-reported level of perfectionism cognitions was evaluated using the Perfectionism Cognitions Inventory (PCI; Flett et al., 1998).
The PCI consists of 25 items that measure the extent to which participants experience automatic thoughts about perfectionism and the belief that perfection should be attained (e.g., “I can always do better, even if things are almost perfect,” “I should be perfect,” “My work should be flawless”; Flett et al., 1998). The PCI is scored using a 5-point Likert scale ranging from 0 (= Not at all) to 4 (= All of the time). Flett et al. (1998) report that the PCI is reliable and valid given that it shows adequate internal consistency ($\alpha = .95$) and is correlated with other perfectionism measures (e.g., MPSHF). See Table 2 for the internal consistencies observed in the present study.

**Rumination.** The participants’ self-reported tendency to ruminate was evaluated using a short form of the Ruminative Response Scale (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). The RRS consists of 10 items that measure participants’ ruminative response style. Thus, the items of the RRS evaluate the extent to which an individual reflects on and repetitively thinks about his or her mistakes or perceived failures. The items fall into two subscales: Brooding (e.g., “Think about a recent situation, wishing it had gone better,” “Think ‘Why can’t I handle things better?’”; Treynor et al., 2003) and Reflection (e.g., “Analyze recent events to try to understand why you are depressed,” “Write down what you are thinking and analyze it”; Treynor et al., 2003). The 10-item RRS is scored using a 4-point Likert scale ranging from 1 (= Almost never) to 4 (= Almost always). The Brooding and Reflection subscale items have good internal consistency with Cronbach’s alpha coefficients of .77 and .82 respectively (Treynor et al., 2003). See Table 2 for the internal consistencies observed in the present study.

**Depressive symptoms.** The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used to assess participants’ self-reported depressive symptomatology. The CES-D consists of 20 items that measure the extent to which participants experienced various symptoms of depression within the past week (e.g., “I thought my life had been a failure,” “I felt depressed”; Radloff, 1977). The items of the CES-D are scored using a 4-point Likert scale
ranging from 0 (= Rarely or none of the time [less than 1 day]) to 3 (= Most or all of the time [5-7 days]). Some of the items have a positive valence (e.g., “I felt positive about the future,” “I was happy”; Radloff, 1977). The scoring for these positive items was reversed, such that the scale ranges from 0 (= Most or all of the time [5-7 days]) to 3 (= Rarely or none of the time [less than 1 day]). Thus, higher scores on the CES-D reflect greater depressive symptoms. Radloff (1977) recommends scores ≥ 16 as the clinical cut-off criteria for depression. However, more recent literature suggests that a cut-off score of ≥ 20 may be more appropriate (Vilagut, Forero, Barbaglia, & Alonso, 2016). The CES-D has high internal consistency reliability, with Cronbach’s alpha coefficients ranging from .85 to .90 (Radloff, 1977). The CES-D also has good test-retest reliability, with correlations ranging between .45 and .70 (Radloff, 1977). See Table 2 for the internal consistencies observed in the present study.

**Covariates.**

**Trait perfectionism.** Hewitt and Flett’s Multidimensional Perfectionism Scale (MPSHF; 1991) was used to measure and control for participants’ trait level of perfectionism. For the purposes of this study, only the 30 items that made up the SOP and SPP subscales were used because the items assessing OOP tend not to contribute to PS and PC. The SOP subscale measured participants’ expectations of perfection from his or her own performance (e.g., “When I am working on something, I cannot relax until it is perfect”; Hewitt & Flett, 1991). The SPP subscale evaluated the extent to which participants believe that other people expect perfect performance from them (e.g., “People expect nothing less than perfection from me”; Hewitt & Flett, 1991). The items of the MPSHF were scored using a 7-point Likert scale ranging from 1 (= Strongly disagree) to 7 (= Strongly agree). Some items were reverse-scored, in which case the scale ranged from 1 (= Strongly agree) to 7 (= Strongly disagree). The MPSHF has good internal consistency reliability, with Cronbach’s alpha coefficients of .86 and .87 for the SOP and SPP.
subscales respectively (Hewitt & Flett, 1991). Hewitt and Flett (1991) state that the MPSHF is a valid measure of trait perfectionism. See Table 2 for the internal consistencies observed in the present study.

**Negative affect.** The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was used to measure and control for the participants’ self-reported level of negative affect. The PANAS (Watson et al., 1988) consisted of 20 items in total, with 10 of the items measuring participants’ positive affect and 10 of the items measuring participants’ negative affect. For the purpose of this study only the 10 items that made up the Negative Affect subscale of the PANAS were used because they were the most relevant to depressive symptomatology, which was the main outcome of interest in Study 1 (e.g., “On average I tend to feel disinterested,” “On average I tend to feel sad,” “On average I tend to feel guilty”; Watson et al., 1988). The PANAS was scored using a 5-point Likert scale ranging from 1 (= Not at all) to 5 (= Extremely). The PANAS has demonstrated good internal consistency reliability (α = .85; Crawford & Henry, 2004). See Table 2 for the internal consistencies observed in the present study.

**Preliminary Analyses**

**Missing Data**

Each of the variables of interest was examined for missing data. Data was missing for 9 of the 12 variables of interest. Despite this, less than 3% of the data was missing. See Table 1 for a summary of missing data.

**Testing of Univariate Assumptions**

**Univariate outliers.** Data was examined for univariate outliers. Outliers were identified by converting the raw scores on each of the variables of interest (i.e., perfectionism cognitions, brooding, reflection, four parcels of depressive symptomatology, SOP, SPP, negative affect, and...
age) into standardized z-scores. There were no outliers observed as none of the standardized z-scores fell outside of +/- 3 standard deviations (SD) about the mean (Field, 2013).

**Univariate normality.** Histograms were created to help assess the univariate normality of each variable of interest. Skewness and kurtosis values were also calculated and evaluated using the liberal anchors of +/- 2 SD about the mean as benchmarks (Field, 2013). Visual inspection of the histograms showed that the data appeared to be normally distributed as the data consistently followed a bell-shaped curve for each variable (see Figures 3 through 13). In support of this observation, the skewness and kurtosis values fell within a normal range when using the anchors of +/- 2 SD about the mean. Given this evidence, it can be concluded that the data comes from a normally distributed population (i.e., the data is normally distributed). See Table 2 for a summary of descriptive information including the skewness and kurtosis values.

**Linearity.** To test for the assumption of linearity, scatterplots were produced to show the relationship between each parcel of the criterion variable (i.e., depressive symptoms) and each of the predictor variables (i.e., perfectionism cognitions, SOP, SPP, negative affect, and age). Scatterplots were also produced to show the relationship between each parcel of the criterion variable (i.e., depressive symptoms) and the indicators of the proposed intervening variable (i.e., brooding and reflection). It was also necessary to create scatterplots to show the relationships between each of the aforementioned predictor variables with each of the indicators of the proposed intervening variable. Each scatterplot displayed a linear relationship between the variables as evidenced by a straight line of best fit (see Figures 14 through 53).

**Testing of Multivariate Assumptions**

To obtain the standardized residual and standardized predicted scores that were required for testing multivariate assumptions a simultaneous multiple regression analysis was performed in which the outcome (i.e., depressive symptoms) was regressed on the predictors (i.e.,
perfectionism cognitions, brooding, and reflection) and covariates (i.e., SOP, SPP, negative affect, and age). The standardized residual and standardized predicted values were saved and were used to test the assumptions of regression outlined below.

**Multivariate outliers.** To test for this assumption, the standardized residual scores were examined to see whether any data fell outside of +/- 3 SD about the mean as values outside of this range are considered outliers. Outlier data was observed for one participant (z = 3.45), thus this assumption was not met. To handle the outlier data, the analysis was performed twice. First, the analysis was performed with the outlier data present. Then, the analysis was performed with the outlier data removed from the data set. The pattern of results between these two analyses was then compared.

**Multivariate normality.** A histogram along with skewness and kurtosis values were used to evaluate the assumption of multivariate normality. The histogram was created using the frequency of standardized residual scores. Visual inspection of the histogram indicated that the data was normally distributed as the data followed a bell-shaped curve (see Figure 54). In support of this observation, the skewness and kurtosis values fell within the range of +/- 2 SD about the mean. Given this evidence, it can be concluded that the assumption of multivariate normality was met. See Table 2 for a summary of descriptive information.

**Homoscedasticity.** To test for the assumption of homoscedasticity (i.e., the assumption that variances are equal at every point of the regression line), a scatterplot was created using the standardized residual scores and the unstandardized predictor values. A visual inspection of the scatterplot suggested that the data met this assumption because the data appeared to be evenly clustered about the regression line and was not cone-shaped (see Figure 55).

**Independence of residuals.** To test for the assumption of independence of residuals, a scatterplot was created with the participant ID number (i.e., 1 through 175) on the X-axis and the
standardized residual score on the Y-axis. No pattern was observed in the position of the points on the graph, indicating that the residuals were independent (see Figure 56). As a secondary check for this assumption, a Durbin-Watson test was performed which produced a value of 1.72. This value is within the ideal range of 1.5 and 2.5 (Hair, Anderson, Tatham, & Black, 1995), so it can be concluded that the residuals are independent. Thus, this assumption of regression was met.

**Statistical Analyses**

Prior to performing the primary statistical analyses, latent (i.e., non-observable) variables were created for the outcome of interest (i.e., depressive symptoms) and the proposed intervening variable (i.e., rumination). The latent variable for depressive symptoms consisted of four random groups of depressive symptom scores called *parcels*. Parcels can be used to optimize the measurement structure of constructs being used in SEM analyses (Little, Cunningham, Shahar, & Widaman, 2002). To create the parcels, the 16 items of the CES-D were sorted at random into four groups. Copying the scoring instructions for the CES-D, the sum of the items in each parcel was then calculated. These sums became the depressive symptom scores for each parcel. This approach was used because the latent variable (i.e., depressive symptoms measured by the CES-D) is unidimensional and the primary interest is in the structural model, both of which are suitable reasons for parceling (Little et al., 2002). The latent variable for rumination consisted of two indicator variables: the Brooding and Reflection subscales of the RRS (Treynor et al., 2003).

For the primary analysis, structural equation modeling (SEM) was conducted using Mplus version 8 software (Muthén & Muthén, 1998–2017) to test the conceptual model presented in Figure 2. In the hypothesized model depressive symptoms was regressed on the proposed intervening variable (i.e., rumination) along with the covariates (i.e., SOP, SPP, negative affect, and age). Rumination was regressed on perfectionism cognitions in addition to the covariates (SOP, SPP, negative affect, and age). Importantly, the indirect effect of perfectionism cognitions
on depressive symptoms via rumination was specified in the conceptual model along with covariances among the exogenous variables.

To assess model fit, Root Mean Square Error of Approximation (RMSEA) with 90% confidence intervals, Comparative Fit Index (CFI; Hu & Bentler, 1988), Standardized Root Mean Square Residual (SRMR; Hu & Bentler, 1999), and Chi-Square Test of Model Fit ($\chi^2$) were used. An RMSEA less than .06, a CFI greater than .95, and an SRMR less than .08 were used to determine acceptable fit of the models (Hooper, Coughlan, & Mullen, 2008). Having a nonsignificant $\chi^2$ value is often used to determine adequate fit of a model. However, it can be sensitive to sample size (Kline, 2016). Therefore, to determine a model with acceptable fit, a $\chi^2/df$ value less than 5 was used (Wheaton, Muthén, Alwin, & Summers, 1977). Direct effects were estimated using maximum likelihood (ML) estimation. ML estimation with 10,000 bias-corrected bootstrapped confidence intervals was employed to test whether the indirect path from perfectionism cognitions to depressive symptoms via rumination was statistically significant. Confidence intervals that do not cross zero were used to determine statistically significant indirect effects (Shrout & Bolger, 2002). This fully indirect model was also tested without the inclusion of covariates. This was done to test whether the model changed in a meaningful way (i.e., whether the pattern of results differs) when covariates were included in the model compared to when they were not (Simmons, Nelson, & Simonsohn, 2011).

SEM was also conducted to test an alternative and partially indirect model in which a direct path was added from perfectionism cognitions to depressive symptoms. In this partially indirect model, depressive symptoms was regressed simultaneously onto perfectionism cognitions and the covariates (i.e., SOP, SPP, negative affect, and age), along with the hypothesized intervening pathway (i.e., rumination). Further, rumination was regressed onto perfectionism cognitions and the covariates. Covariances among the exogenous variables were
also specified. The direct and indirect effects of perfectionism cognitions on depressive symptoms were estimated, along with direct effects of perfectionism cognitions on the pathway variable (i.e., rumination) and direct effects of the pathway variable on depressive symptoms. This partially indirect model was also tested without the inclusion of covariates. As before, this was done to test whether the model changed in a meaningful way when covariates were included in the model compared to when they were not.

Lastly, multiple group analyses were conducted to determine whether the structural model was invariant with respect to respondent sex. To do this, the structural model was tested with and without equality constraints followed by a chi-square difference test. A chi-square difference test comparing the $\chi^2$ and degrees of freedom ($df$) values for both the fully indirect model and the partially indirect model was performed to evaluate changes in the fits of the models. A non-significant chi square test would indicate that the model was invariant with respect to sex. The CFIs were also compared. A change in CFI of less than .01 would indicate that the model did not meaningfully change when a direct path was added from perfectionism cognitions to depressive symptoms (Cheung & Rensvold, 2002).

**Results**

**Descriptives**

Obtained scores on some of the key variables were compared to normative data scores to determine whether the data for Study 1 falls within a normal range. See Table 2 for a summary of descriptive information. For the PCI, normative data for a community sample ($N = 987$) was 38.51 ($SD = 18.94$; Hewitt, n.d.a). This is very close to the score obtained by the community sample in Study 1 (see Table 2). For the SOP subscale of the MSHF, normative data for a community sample ($N = 1,334$) was 65.96 ($SD = 16.62$; Hewitt, n.d.b). Again, this is very close to the score obtained by the community sample used in the present study (see Table 2). For the
SPP subscale of the MPSHF, normative data for a community sample \((N = 1,334)\) was 50.28 \((SD = 15.02)\); Hewitt, n.d.b). The community sample used in Study 1 obtained similar scores on this measure (see Table 2). In sum, the community sample that was obtained for Study 1 appears to be comparable to other samples with respect to the key perfectionism variables that were used in the model.

With respect to the CES-D, 84 participants (46.93% of the sample) met clinical cut-off criteria for major depression based on a recommended score of \(\geq 16\) (Radloff, 1977). However, recent literature suggests that a cut-off score of \(\geq 20\) may be more appropriate (Vilagut et al., 2016), in which case 70 participants (39.11% of the sample) met cut-off criteria for a diagnosis of depression.

Scores on model variables were compared for men and women. Results of independent samples \(t\)-tests showed that scores on PCI, SOP, SPP, negative affect, Brooding, Reflection, and depressive symptoms did not significantly differ between women and men. See Table 3 for a summary of results of the independent samples \(t\)-tests. Overall, there appeared to be no support for sex-related differences with respect to the model variables.

**Bivariate Correlations**

Bivariate correlations between all model variables are presented in Table 4. Higher levels of perfectionism cognitions were significantly and positively related to scores on the Brooding and Reflection subscales of the RRS. These correlations were considered to be moderate and strong, respectively. Thus, greater experiences of perfectionism cognitions were linked to greater experiences of brooding and reflection rumination. Perfectionism cognitions also displayed significant and moderate-to-strong positive correlations with depressive symptoms, which indicated that higher levels of perfectionism cognitions were associated with higher levels of depressive symptoms. Moreover, the Brooding and Reflection subscales of the RRS were
significantly and strongly associated with depressive symptoms in a positive direction, demonstrating that greater brooding and reflection rumination were related to higher levels of depressive symptoms.

**Structural Model**

**Direct effects model.** In the direct effects model, depressive symptoms was simultaneously regressed on perfectionism cognitions and the covariates to evaluate whether perfectionism cognitions shared a unique association with depressive symptoms after the covariates (i.e., SOP, SPP, negative affect, and age) were accounted for in the analyses. Results indicated that this model fit the data relatively well ($\chi^2(17) = 23.60, p = .13; \text{RMSEA} = .05, 90\% \text{CI} [.00, .09]; \text{CFI} = .99; \text{SRMR} = .01$) and accounted for 74% of the variance in depressive symptoms.

Results revealed that the factor loadings for each of the depressive symptoms parcels making up the latent depressive symptoms variable were relatively high, ranging from .90 to .95. Further, all factor loadings were statistically significant, $p < .001$.

With respect to the structural paths, results indicated that there was a significant direct effect of perfectionism cognitions on depressive symptoms even when the covariates were included in the model (see Table 5). Specifically, higher levels of perfectionism cognitions were associated with higher levels of depressive symptoms. With respect to the covariates, SOP was related to lower levels of depressive symptoms, whereas SPP was related to higher levels of depressive symptoms. Negative affect was positively related to depressive symptoms whereas age was not significantly associated with depressive symptoms. These findings indicate that perfectionism cognitions are uniquely associated with depressive symptoms over and above the effects of negative affect, age, SOP and SPP. See Table 5 for a summary of results.
**Hypothesized model.** Results from SEM testing the hypothesized conceptual model linking perfectionism cognitions and the covariates (i.e., SOP, SPP, negative affect, and age) to depressive symptoms via rumination (see Figure 2) revealed good fit of the model ($\chi^2(29) = 33.40, p = .26$; RMSEA = .03, 90% CI [.00, .07]; CFI = 1.00; SRMR = .02). This model accounted for 76% of the variance in depressive symptoms and 72% of the variance in rumination.

Results indicated that the factor loadings for each of the depressive symptom parcels making up the latent depressive symptoms variable were comparable to those observed for the direct effects model, ranging from .90 to .95 ($p < .001$). Estimates for the rumination indicators revealed a factor loading of .63 for the Brooding subscale and a factor loading of .94 for the Reflection subscale, $p < .001$ in both instances.

With respect to direct effects, results indicated that the path linking rumination to depressive symptoms was statistically significant. Specifically, higher levels of rumination were related to higher levels of depressive symptoms. With respect to the covariates, SOP was related to lower levels of depressive symptoms whereas SPP was related to higher levels of depressive symptoms. Similarly, negative affect was linked to higher levels of depressive symptoms. As in the direct effects model, age was unrelated to depressive symptoms. See Table 6 for a summary of results.

With respect to the direct paths from perfectionism cognitions and the covariates to rumination, results revealed that perfectionism cognitions shared a significant and positive association with rumination. That is, higher scores on perfectionism cognitions were related to a greater tendency to ruminate. With respect to the covariates, SOP was significantly associated with a decreased tendency to ruminate. Negative affect, on the other hand, was related to higher
rumination scores. The paths from SPP and age to rumination, respectively, were not statistically significant. See Table 6 for a summary of results.

With respect to indirect effects, results revealed a significant and positive indirect effect of perfectionism cognitions to depressive symptoms via rumination (see Table 6). Specifically, higher levels of perfectionism cognitions were related to higher levels of rumination, which, in turn, were associated with greater depressive symptoms. With respect to trait perfectionism, results indicated that there was a significant and negative indirect effect of SOP on depressive symptoms via rumination. That is, higher SOP scores were related to a decreased tendency to ruminate, which, in turn, was associated with lower levels of depressive symptoms. Unlike in the direct effects model, the path between SPP and depressive symptoms was not statistically significant when rumination was included as a potential intervening pathway. See Table 6 for a summary of these results.  

Alternative model. An alternative model that included a direct path from perfectionism cognitions to depressive symptoms was then tested. This model also fit the data well ($\chi^2 (28) = 33.37, p = .22$; RMSEA = .03, 90% CI [.00, .07]; CFI = 1.00; SRMR = .02). This alternative model accounted for 76% of the variance in depressive symptoms and 72% of the variance in rumination. However, adding a direct path from perfectionism cognitions to depressive symptoms to the model did not improve the model fit and as a result did not statistically impact the model ($\Delta \chi^2 = .03, \Delta df = 1, p = .86; \Delta CFI = 0$). Moreover, the direct path from perfectionism cognitions to depressive symptoms was not statistically significant ($\beta = .01; p = .86; 95\%$ CI

1 When the covariates were removed from the hypothesized model there were no meaningful differences in the results (i.e., the general observed pattern of results remained the same with and without covariates included in the model).
[-.02, .03]), indicating that the observed relationship between perfectionism cognitions and depressive symptoms was completely explained by the intervening pathway variable (i.e., rumination).

Results of ML estimation with 10,000 bias-corrected bootstrapped confidence intervals revealed that the indirect path between perfectionism cognitions and depressive symptoms remained statistically significant when the direct path from perfectionism cognitions to depressive symptoms was included in the model ($b = .17, 95\% \text{ CI } [.08, .27]$).²

**Multiple Groups Analysis**

A multiple groups analysis was conducted to determine whether the model was invariant with respect to respondent sex (i.e., women vs. men). The structural model was tested both with and without equality constraints followed by a chi-square difference test. Because the $\chi^2$ difference value did not surpass the critical value, it was established that the model did not differ based on respondent sex (i.e., the model is invariant with respect to sex; $\Delta\chi^2 = 17.98, \Delta df = 11, p = .08; \Delta CFI = .01$).

**Discussion**

**Main Findings**

The objective of Study 1 was to empirically test the theoretical framework underlying Flett et al.’s (2016) Perfectionism Cognitions Theory, which posits that rumination is a critical mechanism by which perfectionism cognitions are related to poorer physical and psychological well-being. In other words, the Perfectionism Cognitions Theory (Flett et al., 2016) hypothesizes

² When the covariates were removed from the alternative model there were no meaningful differences in the results (i.e., the general observed pattern of results remained the same with and without covariates included in the model).
that perfectionism cognitions are related to poorer well-being (e.g., depressive symptoms) via the tendency to engage in a ruminative response style (i.e., rumination). As mentioned previously, to date the Perfectionism Cognitions Theory as a whole has not been comprehensively tested, though some of the components have been (e.g., the relationship between perfectionism cognitions and rumination, the relationship between rumination and depressive symptoms, etc.). As such, the findings of the present study address a substantial gap in the literature.

To this end, the results offer clear support for the Perfectionism Cognitions Theory (Flett et al., 2016). The current study found that the relationship between perfectionism cognitions and depressive symptomatology is fully explained by increased tendency to ruminate about stressors such as the experience of perceived failures. The results also highlight the incremental predictive utility of perfectionism cognitions in relation to depressive symptoms over and above trait perfectionism (e.g., SOP and SPP). As a result, this research represents a novel contribution to the literature by filling gaps in the field’s current understanding of perfectionism’s relationship to well-being. In particular, the findings point to rumination as being a critical cognitive process that shapes this relationship. The specific findings as they pertain to the hypotheses of the current study will be addressed hereafter.

Specific Findings

At the outset of Study 1, it was hypothesized that perfectionism cognitions would be positively associated with higher levels of depressive symptomatology. It was also hypothesized that rumination would represent an indirect pathway that explains the relationship between perfectionism cognitions and depressive symptoms. In other words, it was hypothesized that higher levels of perfectionism cognitions would be related to an increased tendency to ruminate over stressors, which, in turn, would be related to higher depressive symptoms scores. These hypotheses were supported by the results of Study 1.
The first hypothesis was addressed by examining bivariate correlations and by testing the direct effects model which tested the incremental predictive utility of perfectionism cognitions with respect to depressive symptoms after accounting for the effects of the covariate variables (i.e., SOP, SPP, negative affect, and age). At the bivariate level, statistically significant and strong positive correlations were observed between perfectionism cognitions and depressive symptoms. In other words, higher scores on perfectionism cognitions were associated with higher scores on depressive symptoms. Notably, results from the direct effects model provided evidence that perfectionism cognitions were uniquely associated with depressive symptoms over and above the variance explained by trait perfectionism (SOP, SPP), negative affect, and age.

These findings support the extant literature. For example, Flett et al.’s (2012) study revealed that there was a significant positive correlation between perfectionism cognitions and depression such that higher scores on the PCI were linked to greater reported depression. Beyond this, in Flett et al.’s (2012) study hierarchical regression analyses revealed that perfectionism cognitions accounted for a significant proportion of unique variance in depressive symptomatology after accounting for the effects attributed to trait levels of perfectionism. That the findings of the current study support Flett et al.’s (2012) conclusions offers encouraging evidence to suggest that there is something specific about the frequency of automatic thoughts about the need to be perfect that uniquely contributes to the experience of depressive symptomatology beyond the influence of trait levels of perfectionism and trait negative affect. Thus, the results shed light on an important factor that is associated with an increase in one’s risk and vulnerability for poorer psychological health.

The second hypothesis was addressed using SEM to test the direct and indirect effect of perfectionism cognitions on depressive symptoms via rumination. This model was tested with and without the covariates (i.e., SOP, SPP, negative affect, and age). The two models did not
significantly differ from one another. Importantly though, with and without covariates the analyses support a fully indirect model where the relationship between perfectionism cognitions and depressive symptoms is fully explained by rumination. In other words, these results suggest that rumination represents a mechanism by which perfectionism cognitions, SOP, and negative affect are associated with depressive symptomatology. Specifically, higher levels of perfectionism cognitions are related to greater levels of depressive symptomatology via greater experiences of rumination (i.e., individuals who tend to experience more frequent automatic thoughts about the need to be perfect also tend to engage in greater rumination, which, in turn, is associated with greater depressive symptomatology). These findings are not surprising given the robust associations between perfectionism cognitions and psychopathology (e.g., Flett et al., 2007; Flett et al., 2012), perfectionism cognitions and rumination (e.g., Flett et al., 2011), and rumination and depression (e.g., Lyubomirsky et al., 2015).

With respect to negative affect, results indicated that the path between negative affect and depressive symptoms was similar to that of perfectionism cognitions whereby higher levels of negative affect were related to greater depressive symptomatology via higher levels of rumination. As a result, the findings of Study 1 point to negative affect being a risk factor for depressive symptoms given that it is related to greater rumination. This finding is not surprising given that extant literature documents a positive relationship between negative affect and rumination (e.g., Lyubomirsky et al., 2015). For example, in a study by Lyubomirsky et al. (2015) negative affect was related to a tendency to engage in a ruminative response style after experiencing a stressor. Moreover, negative affect has been widely associated with a greater risk for psychopathology (e.g., Carleton et al., 2013; Stanton & Watson, 2014).

The findings as they pertain to SOP are more complicated to untangle. In the present study, greater reported SOP was associated with lower levels of depressive symptoms via less
rumination. In this way, the results of Study 1 seem to point to SOP as being a protective factor against rumination and depressive symptoms. However, it is very important to consider these findings within the broader context of the literature; SOP has a complex relationship with indices of well-being and thus should not be viewed as a protective factor. While extant literature does support the observed relationship between SOP and rumination (e.g., Flett et al. [2011] documents associations between SOP and rumination such that greater SOP is linked to less rumination), the findings as they pertain to SOP and psychopathology are decidedly mixed. For example, SOP is positively related to eating disorders such that greater SOP is linked to greater tendencies to experience anorexia nervosa, bulimia nervosa, and other indices of disordered eating (e.g., Wade, O’Shea, & Shafran, 2016). Given the negative health consequences of eating disorders, SOP is a profoundly dangerous trait when it comes to this particular outcome of well-being. However, the relationship between SOP and other indices of psychopathology such as depressive symptoms is more complicated. Some studies have found that SOP is associated with greater depressive symptomatology, other studies have found that SOP is not related to depressive symptomatology, and still others have found that SOP is related to less depressive symptoms (Sirois & Molnar, 2016). Either way, the relationship between SOP and depressive symptoms cannot be easily summarized as protective given the conflicting results. Moreover, a recent meta-analysis by Smith et al. (2016) indicates that SOP is implicated in greater suicide ideation, which calls into question the notion that PS (i.e., perfectionistic strivings) are adaptive, protective, or “healthy” when it comes to individuals’ well-being. Thus, the finding of the present study that SOP was associated with lower levels of depressive symptoms via less rumination should be interpreted with extreme caution and within the context of the wider literature.

The effects of suppression could also help to explain this seemingly adaptive function of SOP that was observed in the current study and, indeed, in the broader array of perfectionism
literature (Molnar & Sirois, 2016). Often, the potentially adaptive effects of SOP only emerge when the joint variance between SOP and SPP (or the overarching dimensions of PS and PC, respectively) has been statistically accounted for in the analyses. To illustrate this point using the results of Study 1, at the bivariate level there is a statistically significant positive relationship between SOP and RRS Brooding such that greater SOP is related to greater brooding rumination. In other words, greater tendency to strive for perfection is associated with a greater tendency to engage in a ruminative response style in response to stressors. This is decidedly maladaptive. However, when both SOP and SPP were included in the model tested using SEM and the joint variance between the two dimensions of perfectionism was accounted for, there was a negative relationship between SOP and rumination, giving the impression that SOP acts as a protective factor against rumination. Some researchers argue that this pattern of results might be explained by the fact that when the overlapping variance between SOP and SPP (or PS and PC) is accounted for, it is possible that what is left over of SOP is less representative of perfectionism and is instead more analogous to conscientiousness (Molnar & Sirois, 2016). This could be why SOP is sometimes associated with better outcomes, as was the case in the results of the present study and in some extant literature (Molnar & Sirois, 2016).

Interestingly, the current study found that there were no sex-related differences in the link between perfectionism cognitions and depressive symptomatology via rumination. In other words, the model was invariant with respect to sex. Not only this, but sex differences were not observed with respect to the model variables either (i.e., perfectionism cognitions, SOP, SPP, NA, brooding, reflection, and depressive symptoms). This finding is somewhat surprising given that there is a large body of literature showing that there are robust sex-related differences for both rumination and depression (e.g., Johnson & Whisman, 2013; Kessler, 2006). According to Kessler (2006), sex differences in the experience of depressive symptomatology begin in
adolescence, where the incidence of depression is higher among women than men. In adulthood, women are twice as likely as men to experience depression (Kessler, 2006). That the current study diverges from the extant literature with respect to this finding suggests that perfectionism cognitions, the driving force behind the Perfectionism Cognitions Theory (Flett et al., 2016), operate similarly in men and in women and this could potentially have carry-over effects for rumination and depressive symptoms. This finding is a novel contribution to the extant literature because, prior to the current study, sex-related differences in perfectionism cognitions had not been adequately examined. Thus, the present study expands on the current understanding of the ways in which perfectionism cognitions operate across individuals.

Conclusions

Overall, the results of Study 1 offer compelling evidence to suggest that rumination acts as an intervening variable in the relationship between perfectionism cognitions and depressive symptoms in a relatively young sample of American adults (i.e., individuals between 19 and 35 years of age). Though Study 1 empirically supports the Perfectionism Cognitions Theory (Flett et al., 2016), it is important to attempt to replicate the findings, both with self-report data and with the inclusion of behavioural measures of rumination. Also, because perfectionism is on the rise among young people (Curran & Hill, 2017), it is important to test the model within a sample of emerging adults, a population in a developmental period that has important implications for the developmental trajectory, particularly with respect to the development of psychopathology. These are part of the aims of Study 2.

Study 2

The purpose of Study 2 was to expand on the findings of Study 1. The first goal of Study 2 was to replicate the findings of Study 1 with a new sample of emerging adults (i.e., individuals aged 18 to 25). As highlighted above and in the general introduction to both studies, emerging
adulthood represents a period that has lasting implications for the developmental trajectory, particularly as it pertains to psychological well-being (Baggio, Studer, Iglesias, Daeppen, & Gmel, 2017; Mental Health Commission of Canada, 2015). This period of transition is related to greater risk for poorer well-being, particularly psychopathology (Mental Health Commission of Canada, 2015). Emerging adulthood is also a critical period with respect to perfectionism. A recent meta-analysis by Curran and Hill (2017) indicates that perfectionism is particularly high within this developmental stage and has increased dramatically among young people in this age group over the past few decades. Depressive symptoms are also particularly prevalent among individuals aged 18 to 25 years, with as many as one in four emerging adults experiencing a depressive episode (Kuwabara, Van Voorhees, Gollan, & Alexander, 2007). Thus, it is necessary to gain insight into the mechanisms underlying poorer well-being among emerging adults. Moreover, replication is important for the advancement of scientific inquiry, particularly in the field of psychology (Amir & Sharon, 1990). Replication refers to the process of repeating research to determine the extent to which findings are generalizable across time and situations (Diener & Biswas-Diener, 2015). There is a replication crisis in psychology, whereby there is a failure to replicate the findings of research (Diener & Biswas-Diener, 2015). To give perspective on the enormity of this problem, only about 33 per cent of the findings of psychological studies published in top-tier journals replicate (Diener & Biswas-Diener, 2015; Open Science Collaboration, 2015). To address this concern, there has been a call for scientists to put more of an effort into the replication of studies to determine the generalizability of the results (Kahneman, 2012). Thus, Study 2 represented an opportunity to not only attempt to replicate the findings of Study 1, but also to focus the research on a new developmental stage that has a critical influence on the developmental trajectory.
The second goal of Study 2 was to extend the findings of Study 1 by gaining greater understanding of how perfectionism cognitions and trait perfectionism are related to cognitive flexibility, which is a key facet of rumination (Davis & Nolen-Hoeksema, 2000; Flett et al., 2016; Gabrys, Tabri, Anisman, & Matheson, 2018; Lo, Lau, Cheung, & Allen, 2012). Cognitive flexibility (or a lack thereof) was operationally defined and assessed through the use of set-shifting paradigms. This rationale is rooted in the literature. As outlined previously, rumination refers to a response style that is characterized by responding to the experience of distress by passively and repeatedly focusing on the stressor (i.e., individuals who engage in rumination fixate on the problem and on their feelings about the problem but they do not take any action to address it; Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2008). Therefore, Nolen-Hoeksema et al. (2008) argue that rumination does not lead to active problem solving, but rather manifests as brooding and perseveration about the stressor. In this way, rumination interferes with one’s ability to learn from behaviour-response contingencies, which puts the individual at an increased vulnerability to experiencing stressful circumstances (Nolen-Hoeksema, 1991). This perseveration over a stressor represents poor cognitive flexibility, which is defined as the human ability to selectively switch between mental processes to appropriately adjust one’s behaviour according to changes in the environment (Dajani & Uddin, 2015). Indeed, a recent meta-analysis conducted by Morris and Mansell (2018) found that greater rigidity (i.e., less cognitive flexibility, or cognitive inflexibility to use another term) was a central component of ruminative thinking. Cognitive flexibility can be assessed via set-shifting paradigms (Morris & Mansell, 2018).

*Set-shifting* is an executive function involving one’s ability to unconsciously shift his or her attention from one task to another, and is regarded as a behavioural index of cognitive flexibility (Shallice, Stuss, Picton, Alexander, & Gillingham, 2008). Research has shown that
individuals who engage in a ruminative response style may have a general deficit in their ability to switch from unhelpful to helpful strategies for performing a task (Davis & Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 2008). In their (2000) study, Davis and Nolen-Hoeksema found that people who scored highly on self-reported rumination tended to show more perseverative errors on the Wisconsin Card Sort Task than people who scored low on rumination. Whitmer and Banich (2007) used a set-shifting task to distinguish whether individuals who ruminate make perseverative errors due to either having trouble switching to a new strategy or having difficulty inhibiting the previously useful strategy. They found that rumination was related to impaired ability to inhibit previously useful strategies. Thus, individuals who have a ruminative response style appear to have a deficit in their ability to discard strategies that are currently in use (even if they are not optimal) in favour of new and potentially more useful strategies for solving tasks. As such, poor cognitive flexibility (as measured by an inability to set-shift) represents an important behavioural index of rumination that can be used as an objective measure of ruminative response styles. For this reason, set-shifting was employed to attempt to understand the relationship between perfectionism cognitions and rumination. The rationale for this decision was that, based on findings outlined previously, set-shifting was thought to potentially be the facet of rumination linking perfectionism cognitions to depressive symptoms.

Neurophysiological studies have identified the frontal lobe as being the part of the brain involved in the carrying out of set-shifting paradigms (Shallice et al., 2008). This is consistent with research identifying activation of brain areas such as the medial PFC and left ventrolateral PFC during rumination tasks (Nolen-Hoeksema et al., 2008). A meta-analysis by Derrfuss, Brass, Neumann, and von Cramon (2005) identified several regions that showed relatively consistent effects across the many task switching, set-shifting, and stimulus-response reversal studies that were included in the analysis (e.g., the inferior frontal junction, the inferior frontal sulcus, the
inferior frontal gyrus, and the anterior cingulate). Activation tended to involve both hemispheres, and a subsequent meta-analysis by Buchsbaum, Greer, Chang, and Berman (2005) suggested that the right frontal regions that are involved in switching tasks might regulate the inhibition of a previously learned response rule. Therefore, the neural correlates that underlie set-shifting are numerous and disparate, though it is clear that the frontal lobe is at the root of rumination and, more specifically, set-shifting.

To date, links between perfectionism cognitions and rumination have been documented in the literature, revealing that a greater tendency to experience automatic thoughts about the need to be perfect is related to greater rumination about stressors (i.e., getting “stuck” brooding over and thinking about mistakes or perceived failures; Flett et al., 2011). However, this work relied on self-report measures of rumination and did not focus on the specific facet of cognitive flexibility as assessed by set-shifting. To my knowledge, no studies have tested this specific relationship. There are, however, some preliminary findings with respect to trait levels of perfectionism and cognitive flexibility, both in terms of self-report and performance on switching paradigms; overall, the research within the seven studies conducted on the subject support a relationship between poor cognitive flexibility and trait perfectionism (Morris & Mansell, 2018). However, the findings are inconsistent. For example, in a study by Wetterneck et al. (2011) the Doubts about Actions subscale of the FMPS (Frost et al., 1990) was significantly and positively associated with the Flexibility subscale of the OMNI Personality Inventory (OMNI; Loranger, 2001) though no other significant correlations between the two measures were observed. In a sample of female children with anorexia, perfectionism (as measured by the Maudsley Obsessive-Compulsive Inventory [MOCI; Hodgson & Rachman, 1977]) was significantly associated with poorer performance on a trail making task and The Brixton Test (Burgess & Shallice, 1997) but not other measures of flexibility. Consequently, the link between perfectionism and cognitive
flexibility is not clear, particularly as it pertains specifically to perfectionism cognitions. The paucity of literature on the subject represents an important gap in the literature to be explored.

There is, however, more literature examining the association between neuroticism and conscientiousness (two notable correlates of perfectionism; Dunkley et al., 2012) and executive functioning, such as cognitive flexibility. For example, research does not support a relationship between neuroticism and cognitive inflexibility nor between conscientiousness and cognitive inflexibility (i.e., deficits in set-shifting; Murdock et al., 2013) directly. However, research demonstrates that there is a statistically significant and negative relationship between neuroticism and updating/monitoring skills (i.e., monitoring and updating information in working memory, which is an index of cognitive flexibility; Murdock et al., 2013). Specifically, higher scores on neuroticism are associated with poorer updating/monitoring skills (Murdock et al., 2013). Thus, research has demonstrated that there is a link between personality characteristics and executive functioning. Importantly, research shows that neuroticism is positively associated with the overarching PC dimension of trait perfectionism (Smith, Saklofske, & Nordstokke, 2014). With respect to perfectionism cognitions, the PCI is positively associated with trait perfectionism (Flett et al., 1998). As a result, it stands to reason that trait aspects of perfectionism and perfectionism cognitions also may be associated with executive functions such as cognitive flexibility. Because this particular research question had not yet been addressed in the extant literature, Study 2 addressed this critical gap in the literature by testing whether perfectionism cognitions and trait perfectionism are related to poorer cognitive flexibility. Importantly, rather than relying solely on self-report measures, cognitive flexibility was measured objectively using the Trail Making Test from the Delis-Kaplan Executive Function System (D-KEFS; Delis, Kaplan, & Kramer, 2001).

The D-KEFS is a battery of standardized neuropsychological tests that are designed to comprehensively assess higher-level cognitive functions (i.e., executive functions), such as set-
shifting. The D-KEFS (Delis et al., 2001) was originally designed for use in clinical settings to assess mild brain damage and frontal lobe activation (where the administration of the D-KEFS and interpretation of the integrity of brain functions should only be performed by psychologists with background training in neuropsychology). However, the D-KEFS has since been used in less formal settings to assess perseveration and abstract thinking in a non-diagnostic capacity (Stephens, 2014; Swanson, 2005).

There are a total of nine instruments in the D-KEFS battery of tests measuring verbal and nonverbal executive functions, though it is not necessary to administer all nine; each test is designed as a stand-alone instrument that can be administered on its own or in combination with any other D-KEFS test (Stephens, 2014). As mentioned previously, for the purpose of this study only the D-KEFS Trail Making Test of set-shifting abilities was used to objectively measure cognitive flexibility on a behavioural level. The D-KEFS Trail Making Test was selected because many studies in the extant literature that use the D-KEFS battery to measure cognitive flexibility do so using the Trail Making Test (e.g., Boyer, Geurts, & Van der Oord, 2018; Craun, Lachance, Williams, & Wong, 2019; Denniss, Barker, & Day, 2019; Yochim, Baldo, Nelson, & Delis, 2007). Therefore, using the D-KEFS Trail Making Test to objectively measure cognitive flexibility firmly roots the current study in the literature and complements the existing bodies of work. As well, because the only study that has examined the relationship between perfectionism (i.e., trait perfectionism, not perfectionism cognitions) and cognitive flexibility on a behavioural level used participants’ performance on a trail making test as an indicator of their cognitive flexibility (e.g., Burgess & Shallice, 1997), it was most appropriate to also use the D-KEFS Trail Making Test as the behavioural measure of cognitive flexibility in the current study instead of the other tests in the D-KEFS battery. Moreover, the D-KEFS Trail Making Test was designed for use with both children and adults, having been found reliable and valid across the lifespan (ages
8-89 years; Delis et al., 2001). Thus, it is appropriate to use this test in the targeted population of emerging adults (ages 18-25 years).

In addition to the constructs that are directly relevant to the current study it is important to also measure other variables that could potentially influence the results. To this end, I accounted for the effects of trait levels of perfectionism, intelligence, and mild head injury (i.e., injuries resulting in an altered state of consciousness). It was necessary to account for trait levels of perfectionism to test the incremental predictive utility of perfectionism cognitions with respect to cognitive flexibility to provide a rigorous test of that specific portion of the theoretical framework underlying Flett et al.’s (2016) Perfectionism Cognitions Theory. It was also important to gain an estimate of participants’ intelligence in this study because individuals’ cognitive abilities (e.g., vocabulary, comprehension) can influence their performance on neuropsychological tests such as the D-KEFS Trail Making Test (Keifer & Tranel, 2013). As well, it is common practice in the literature to account for head injury when using objective measures of set-shifting because head injuries can have serious consequences for one’s performance on neuropsychological batteries such as the D-KEFS (and indeed one of the uses of the D-KEFS is to identify brain damage as the result of head injury; Delis et al., 2001). For this reason, it was important to account for mild head injuries. Unlike in Study 1, respondents’ sex was not included as a moderator because there was not enough statistical power to do so given the relatively small number of participants and the fact that the obtained sample consisted primarily of women.

Method

Participants

This study consisted of data collected from 53 emerging adults at a midsize university in Ontario, Canada. The sample included primarily female participants (84.9% women, n = 45). The age of the participants ranged from 18 to 25 years (M = 19.9, SD = 1.7 years). Close to half of the
participants had reported suffering from a mild head injury that resulted in an altered state of consciousness (45.3% yes, \( n = 24 \)). Most of the participants were right handed (90.6%, \( n = 48 \)). Additionally, most of the participants identified as Caucasian (32.6%, \( n = 15 \)).

**Procedure**

Participants were invited into the Developmental Processes in Health and Well-Being Lab at Brock University where they were asked to complete all of the measures of the study. Specifically, participants first completed the aforementioned self-report measures as well as demographic questions (e.g., age, sex, race, ethnicity, etc.) on a secure lab desktop computer. The self-report measures were hosted on Qualtrics, which is an online survey software. These self-report questionnaires were programmed to appear in random order for each participant, with the demographic questions always appearing last. Participants were then administered the Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II; Wechsler, 2011), which was presented in the following order: Block Design subtest, Vocabulary subtest, Matrix Reasoning subtest, and Similarities subtest. After a short break of approximately five minutes, participants were administered the D-KEFS Trail Making Test. Consistent with ethical standards, informed consent was obtained from all participants prior to commencing participation in this study and all participants were debriefed upon completion of the study. Participants were granted two hours of research credit (i.e., 2.0 credits) as compensation for participating. All of the hard copies of the WASI-II and D-KEFS battery were then securely stored in a locked filing cabinet in the lab. This project received clearance by Brock University’s Research Ethics Board (file # 18 – 080).

**Measures**

**Perfectionism cognitions.** Participants’ experience of automatic perfectionistic thoughts was measured using the PCI (Flett et al., 1998). See Study 1 for a detailed description of this measure. See Table 8 for the internal consistencies observed in the present study.
**Self-reported rumination.** Participants’ tendency to ruminate about mistakes was measured using the short-form RRS (Treynor et al., 2003), a questionnaire evaluating ruminative responses. See Study 1 for a description of this measure. See Table 8 for the internal consistencies observed in the present study.

**Cognitive flexibility.** The D-KEFS Trail Making Test (Delis et al., 2001) was used to evaluate participants’ set-shifting abilities (an index of cognitive flexibility). The D-KEFS Trail Making Test is a behavioural measure that consists of two tasks: (1) a visual cancellation task and (2) a series of connect-the-circle tasks. These two tasks are embedded across five conditions. The first condition is a *Visual Scanning* condition where the task is to locate and put a slash through all of the number 3s that are on the page. The second condition is a *Number Sequencing* condition where the task is to connect the numbers in numerical order (e.g., 1-2-3-4). The third condition is *Letter Sequencing* where the task is to connect the letters in alphabetical order (e.g., A-B-C-D). The fourth condition is a *Number-Letter Switching* condition. The task in this condition is to switch between connecting numbers and letters, alternating between numerical order and alphabetical order (e.g., 1-A-2-B). This condition is the main task of interest because it represents the primary executive function task (i.e., it is a means of assessing the participant’s flexibility of thinking on a visual-motor sequencing task). Thus, performance on Condition 4: Number-Letter Switching will provide an index of perseveration and cognitive rigidity (i.e., whether the participant demonstrates ruminative responses on a behavioural level). The fifth and final condition is a *Motor Speed* condition in which the task is to trace a series of dotted lines from “Start” to “End.” Given that the number-letter switching task (i.e., Condition 4: Number-Letter Switching) is the main condition of interest, the purpose of the other four conditions is to provide the examiner with quantifiable and normative data for several important components necessary for performing the switching task. Thus, the D-KEFS Trail Making Test provides information
about the participant’s visual-motor processing, speed, impulsivity, and flexibility of thinking in nonverbal problem solving. The D-KEFS Trail Making Test yields many types of scores, including a composite scaled score and a contrast scaled score that are derived from completion times. The primary scoring measure for each of the five conditions of the D-KEFS Trail Making Test is the number of seconds that it takes to complete each condition. The raw score (in seconds) for each of the Conditions 1-5 is converted to a scaled score ($M = 10; SD = 3$). Once these scores have been calculated, performance on each of the four baseline tasks can be parceled out from performance on the Number-Letter Switching condition (i.e., Condition 4) by computing a series of contrast measures. The contrast measures are derived by subtracting the completion time scaled score for each component task (i.e., Conditions 1, 2, 3, or 5) or the Number Sequencing + Letter Sequencing composite score from the completion time scaled score for Condition 4 (i.e., the switching task). A new contrast scaled score ($M = 10; SD = 3$) is derived for each scaled score difference (Delis et al., 2001). For the current study, only participants’ scaled scores were used. With respect to the scoring of the D-KEFS Trail Making Test, in most cases higher scaled scores reflect better performance given that longer completion times translate into lower scaled scores and shorter completion times translate into higher scaled scores (Delis et al., 2001). The D-KEFS Trail Making Test is a reliable measure having shown good internal consistency, with Cronbach’s alpha coefficients that range from .60 to .81 (Delis et al., 2001; Stephens, 2014).

In addition to the D-KEFS, participants also completed the Cognitive Flexibility Scale (CFS; Martin & Rubin, 1995). The CFS is a self-report measure of participants’ cognitive flexibility, or the extent to which an individual recognizes that within any given situation there are options and alternatives available to them, his or her willingness to be flexible and adapt to changes in a situation, and the extent to which an individual feels that he or she is able to adapt to changes in a situation. The CFS consists of 12 items that tap each of these three facets of
cognitive flexibility outlined above (e.g., “I can find workable solutions to seemingly unsolvable problems,” “I am willing to listen and consider alternatives for handling a problem,” “I have the self-confidence necessary to try different ways of behaving”; Martin & Rubin, 1995). The items of the CFS are scored using a 6-point Likert scale ranging from 1 (= *Strongly disagree*) to 6 (= *Strongly agree*). The CFS is a reliable measure having demonstrated good internal consistency (α = .92; Martin & Rubin, 1995). The present study’s internal consistencies are presented in Table 8.

**Depressive symptoms.** Participants’ self-reported depressive symptoms were assessed with the CES-D (Radloff, 1977). See Study 1 for a detailed description of this measure. See Table 8 for the internal consistencies that were observed in the present study.

**Covariates.**

**Trait perfectionism.** Participants’ self-reported trait perfectionism was assessed with the MPSHF (Hewitt & Flett, 1991). See Study 1 for a detailed description of this measure. See Table 8 for the internal consistencies observed in the present study.

**Intelligence.** The WASI-II assessment (Wechsler, 2011) was used to gain an estimate of participants’ intelligence. Primarily used in clinical, psychoeducational, and research settings, the WASI-II (Wechsler, 2011) was designed to provide a quick and accurate estimate of cognitive intelligence. The WASI-II is a widely used measure that is designed for individuals 6 to 90 years of age (McCrimmon & Smith, 2013). Thus, the WASI-II is appropriate for use as an estimate of intelligence in the targeted population of emerging adults (ages 18-25 years).

The WASI-II is comprised of four subtests: *Block Design, Vocabulary, Matrix Reasoning,* and *Similarities.* First, the participant must complete the Block Design subtest. This subtest consists of 13 tasks during which two-dimensional red-and-white geometric designs are presented to the participant. The participant must then attempt to recreate the design using cube blocks provided. Each item has a specified time limit. Participants are awarded points for
successful completion of the designs (two points for successful recreation of items 1 to 4 on first attempt, one point for successful recreation of items 1 to 4 on second attempt, or between four and seven points based upon quickness of completion for items 5 to 13. The Block Design subtest is discontinued after two consecutive failures. Performance on the Block Design subtest forms part of the Perceptual Reasoning Index (PRI).

Second, the participant must complete the Vocabulary subtest. The Vocabulary subtest consists of 31 items, including three initial picture items. Participants are asked to verbally define and/or describe a word or concept that is presented to him or her orally or in a written format. All participants begin with item four, reversing back to the pictured items if necessary. Scores for each item are awarded on a zero-, one-, or two-point basis according to the general scoring principles that are outlined in the WASI-II manual. The Vocabulary subtest is discontinued after three consecutive failures. Performance on this task forms part of the Verbal Comprehension Index (VCI).

Third, the participants must complete the Matrix Reasoning subtest. This subtest comprises of 30 visually depicted incomplete matrices. Participants are required to choose one item from a selection of five options presented at the bottom of each page that correctly completes each matrix. Each correct item is awarded one point. The Matrix Reasoning subtest is discontinued after three consecutive failures. Performance on this subtest forms the remainder of the PRI.

Last, the participants must complete the Similarities subtest, which consists of 24 items, including three initial picture items. Participants are asked to verbally describe the relationship between two objects or concepts presented orally by the researcher, starting with the orally presented items and returning to the initial picture items if necessary. Scores for each item are awarded on a zero-, one-, or two-point basis according to the general scoring principles that are
outlined in the WASI-II manual. Performance on the Similarities subtest forms the remainder of the VCI. Raw scores on each subtest are converted to t-scores, which can then be converted to Full-Scale IQ-4 Subtests (FSIQ-4) standard scores, percentiles, and age equivalents. For the purpose of the present study, only the FSIQ-4 standardized composite scores were used in the analysis.

The WASI-II is a reliable measure, showing excellent internal consistency (α ranging from .90 to .92 for the subtest scores; α = .95, .94, and .97 for the VCI, PRI, and FSIQ-4 composite scores, respectively; McCrimmon & Smith, 2013). The WASI-II has good stability coefficients for the subtests (r = .83 to .94) and excellent stability coefficients for the composites (r = .90 to .96; McCrimmon & Smith, 2013). The WASI-II is also a valid measure given that it shows strong interrelationships among all of the subtests and composites (McCrimmon & Smith, 2013). As well, positive relationships with scores on other measures of intelligence have been observed (McCrimmon & Smith, 2013).

**Preliminary Analyses**

**Missing Data**

Each of the variables of interest was examined for missing data. Data was missing within one of the variables of interest. One participant was missing data on the WASI-II Composite Score Full Scale-4. Less than 3% of the data was missing on study variables.

**Testing of Univariate Assumptions**

**Outliers.** Data was examined for outliers. Outliers were determined by converting the raw scores on each of the variables of interest (i.e., perfectionism cognitions, cognitive flexibility as measured by self-report, cognitive flexibility as measured objectively by the D-KEFS Trail Making Test, SOP, SPP, and estimated intelligence as measured by the WASI-II assessment) into standardized z-scores. Standardized z-scores that fell outside of +/- 3 SD about the mean were
considered outliers. Regression analyses are particularly sensitive to outlier data, so it was necessary to deal with the outliers appropriately. Outliers were Winsorized, a procedure in which the extreme high or low outlying scores are adjusted to be closer to the next highest or lowest value in the distribution while maintaining the rank order of the data (e.g., an outlier of 18 in a distribution where the next highest value is 12 could be adjusted to 12.10; Reifman & Keyton, 2010). Winsorization is an accepted practice, and is particularly important in the case of small sample sizes where there is a need to protect statistical power (Reifman & Keyton, 2010). See Table 7 for a summary of outlier data including participant ID, raw scores, and Winsorized scores.

Univariate normality. Histograms were created to help assess the univariate normality of each variable of interest. Skewness and kurtosis values were also calculated and evaluated. Visual inspection of the histograms indicate that the data was normally distributed as the data followed a bell-shaped curve for each of the variables of interest (see Figures 57 through 71). In support of this observation, the skewness and kurtosis values fell within the liberal range of +/- 2 SD about the mean (Field, 2013). Given this evidence, it can be concluded that the assumption of normality has been met (i.e., the data is considered to be normally distributed). See Table 8 for a summary of descriptive information.

Statistical Analyses

To address the first aim of Study 2 (i.e., replicating the findings of Study 1 using a sample of emerging adults), the theoretical model (see Figure 2) was tested using the PROCESS macro (Hayes, 2013) for SPSS Version 25. PROCESS tests indirect effects using an approach that is analogous to Baron and Kenny’s (1986) approach to testing indirect pathways. In other words, a series of linear regression analyses were used to test the hypothesized model linking perfectionism cognitions to depressive symptoms via rumination.
Using Baron and Kenny’s (1986) framework, the first step was to regress depressive symptoms (i.e., the outcome of interest) onto perfectionism cognitions (i.e., the predictor variable) and the covariates (i.e., SOP and SPP) to evaluate the direct effect between these variables (i.e., the c path). Next, self-reported rumination was regressed onto perfectionism cognitions, SOP, and SPP to test the relationship between the predictor, the covariates, and the proposed intervening variable (i.e., the a path; Baron & Kenny, 1986). The PROCESS macro also simultaneously regressed depressive symptoms onto perfectionism cognitions, the covariates (i.e., SOP and SPP), and rumination to: (a) test the relationship between rumination and depressive symptoms and (b) test the residual relationship among these variables and depressive symptoms after accounting for each in the analysis (i.e., the b path and the c’ path; Baron & Kenny, 1986). The results of this regression was interpreted if the a path is found to be statistically significant (i.e., p < .05). The results of the test of indirect effects was examined if the b path and the c’ path were observed to be statistically significant (i.e., p < .05 or 95% CIs that do not cross the midpoint).

Following Hayes’ (2013) guidelines for testing indirect effects, bootstrapping analyses were performed to determine whether rumination represented an indirect pathway from perfectionism cognitions to depressive symptoms using 10,000 bootstrap samples with 95% bias-corrected CIs.

After replicating Study 1 by testing Flett et al.’s Perfectionism Cognitions Theory (2016) in a younger sample of emerging adults, the second aim of Study 2 was addressed (i.e., taking a closer look at the relationship between cognitive flexibility and perfectionism cognitions). To do this, participants’ scores on the D-KEFS Trail Making Number-Letter Switching condition were used as an index of cognitive flexibility (as measured by set-shifting abilities). As such, cognitive flexibility was primarily assessed in these analyses using an objective behavioural measure.
A series of regressions were performed to gain a deeper understanding of the link between perfectionism cognitions and cognitive flexibility. First, the scaled score of participants’ performance on the D-KEFS Trail Making Number-Letter Switching task was regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to address the primary question of how performance on a set-shifting task is related to perfectionism cognitions. Second, participants’ scaled scores on the Visual Scanning task were regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to examine the relationship between perfectionism cognitions and participants’ performance on a lower-order baseline scanning and attention task. Third, the participants’ scaled scores on the Motor Speed task were regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to examine the relationship between perfectionism cognitions and participants’ performance on a baseline motor response task. Fourth, the participants’ composite scaled score on the Combined Number Sequencing + Letter Sequencing measure was regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to examine the relationship between perfectionism cognitions and participants’ performance on lower-order baseline sequencing tasks. Finally, participants’ self-reported cognitive flexibility was regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury).

Results

Descriptives

Obtained scores on the model variables were compared to normative data scores to determine whether the data for Study 2 falls within a normal range. See Table 8 for a summary of
descriptive information. For the PCI, normative data for a student sample \((N = 2,014)\) was 42.50 \((SD = 21.25;\) Hewitt, n.d.a). This is substantially higher than the score obtained by the student sample in Study 2 (see Table 8). For the SOP subscale of the MPSHF, normative data for a student sample \((N = 1,595)\) was 65.91 \((SD = 14.88;\) Hewitt, n.d.b). This is close to the score obtained by the student sample included in the present study (see Table 8). For the SPP subscale of the MPSHF, normative data for a student sample \((N = 1,595)\) was 54.75 \((SD = 13.52;\) Hewitt, n.d.b). The student sample that makes up Study 2 obtained similar scores on this measure (see Table 8).

The WASI-II (Wechsler, 2011) was used to gain an estimate of participants’ intelligence. The mean FSIQ-4 score for a normative sample is a score of 100, with scores deemed “average” ranging from 90 to 110 (Wechsler, 2011). Scores between 80 and 90 are considered “low average,” scores between 70 and 80 are considered “borderline,” and scores lower than 70 are considered “extremely low” (Wechsler, 2011). Conversely, scores between 110 and 120 are considered “high average,” scores between 120 and 130 are considered “superior,” and scores higher than 130 are considered “very superior” (Wechsler, 2011). Overall, the sample of the current study could be considered normal given that the mean score fell within the average range (see Table 8). The majority of participants had intelligence estimates that fell within the average range. Three participants had FSIQ-4 scores that fell in the borderline range, and three participants had FSIQ-4 scores that fell in the high average range. Therefore, the present sample did not differ from a normative sample.

With respect to the D-KEFS Trail Making Test, the scaled scores for a normative sample have a mean of 10 with a \(SD\) of 3 on each of the conditions (Delis et al., 2001). The sample of the current study had comparable average scores on each condition compared to those obtained from a normative sample (see Table 8).
With respect to depressive symptoms as measured by the CES-D, 39 participants (73.9% of the sample) met clinical cut-off criteria for depression based on a recommended score of $\geq 16$ (Radloff, 1977). However, recent literature suggests that a cut-off score of $\geq 20$ might be more appropriate (Vilagut et al., 2016), in which case 34 participants (64.2% of the sample) met cut-off criteria for a diagnosis of depression.

**Bivariate Correlations**

Bivariate correlations between all model variables are presented in Table 9. At the bivariate level, there was a strong positive correlation between perfectionism cognitions and SOP such that higher scores on perfectionism cognitions were related to higher scores on SOP. There was also a positive correlation between perfectionism cognitions and SPP that was moderate in strength. Higher levels of perfectionism cognitions were related to greater SPP. Moderate positive correlations were also observed between perfectionism cognitions and all indices of self-reported rumination (i.e., RRS Total, RRS Brooding, and RRS Reflection) such that greater perfectionism cognitions were related to higher total RRS scores and higher scores on both the RRS Brooding and RRS Reflection subscales. There was no link between perfectionism cognitions and either cognitive flexibility, head injury, or WASI-II Composite Score Full Scale-4 at the bivariate level. There was, however, a significant moderately strong positive correlation between perfectionism cognitions and scores on depressive symptoms such that higher scores on perfectionism cognitions were related to greater self-reported depressive symptomatology. With respect to the D-KEFS Trail Making Test, scores on perfectionism cognitions as measured by the PCI did not share significant associations with any of the conditions or scaled scores that make up this particular test, which is an index of cognitive flexibility.

Additionally, SPP shared moderate-to-strong positive bivariate associations with RRS Total, RRS Brooding, and depressive symptoms along with a negative association with self-
reported cognitive flexibility. Thus, higher SPP was significantly associated with higher total rumination scores, greater brooding, less self-reported cognitive flexibility, and greater depressive symptomatology. SPP was not related to the D-KEFS Trail Making Test conditions at a level of statistical significance, though there was evidence to suggest a negative pattern of results emerging with respect to D-KEFS Trail Making Letter Sequencing and D-KEFS Trail Making Number-Letter Switching scaled scores that approached statistical significance cut-offs. In this way, higher SPP may be related to poorer performance on Letter Sequencing and Number-Letter Switching with greater statistical power.

There was also a strong positive association between self-reported rumination and depressive symptoms such that higher scores on total rumination were related to higher depressive symptoms scores. Self-reported rumination was not significantly related to scaled scores on any of the D-KEFS Trail Making conditions.

With respect to the rumination subscales, Brooding had a strong positive relationship with Reflection such that higher scores on Brooding were associated with higher scores on Reflection. Brooding also had a significant negative correlation with self-reported cognitive flexibility such that higher scores on brooding rumination were related to lower scores on reported cognitive flexibility. This bivariate correlation was moderately strong. There was also a strong positive correlation between Brooding and depressive symptoms such that higher scores on Brooding were linked to greater reported depressive symptomatology. Brooding was not significantly related to scaled scores on any of the D-KEFS Trail Making conditions.

Reflection was significantly and strongly associated with depressive symptoms in a positive direction such that higher scores on reflection rumination were related to greater depressive symptom scores. Reflection was not significantly related to scaled scores on any of the D-KEFS Trail Making conditions.
With respect to self-reported cognitive flexibility, results from bivariate correlations indicated that there was a significant and moderately strong negative relationship between cognitive flexibility and depressive symptoms such that higher scores on self-reported cognitive flexibility were associated with less depressive symptoms. Self-reported cognitive flexibility also had a statistically significant negative relationship with scaled scores on the D-KEFS Trail Making Motor Speed test such that higher cognitive flexibility scores were related to lower D-KEFS Trail Making Motor Speed scaled scores. Lower scaled scores on this condition represent greater completion time (i.e., poorer performance). So, participants who reported having better cognitive flexibility tended to take longer to complete the Motor Speed condition.

At the bivariate level, having experienced a mild head injury (i.e., injuries resulting in an altered state of consciousness) was not significantly correlated with participants’ performance on any of the D-KEFS Trail Making conditions.

At the bivariate level, intelligence as measured by the WASI-II Composite Score Full Scale-4 was not related to any of the D-KEFS Trail Making scaled scores nor was it related to depressive symptoms.

With respect to the D-KEFS Trail Making Test, most of the scores shared an association with one another. The D-KEFS Trail Making Test did not show any associations with depressive symptoms at the bivariate level. See Table 9.

**Main Analyses**

**Theoretical model.** To replicate Study 1, the theoretical model representing Flett et al.’s (2016) Perfectionism Cognitions Theory positing that perfectionism cognitions are related to depressive symptoms via rumination was tested using PROCESS macro (Hayes, 2013) for SPSS Version 25.
Consistent with Baron and Kenny’s (1986) approach to testing for indirect pathways, self-reported depressive symptoms was regressed onto perfectionism cognitions to test the direct effect between these two variables (i.e., the c path). Results indicated that there was a statistically significant positive association between perfectionism cognitions and depressive symptoms such that greater levels of reported perfectionism cognitions were associated with greater reported depressive symptomatology after accounting for the effects of trait perfectionism (i.e., SOP, SPP) in the analysis. This model explained 58.5% of the variance in depressive symptoms ($F(4,48) = 16.94, p < .001$).

Next, rumination was regressed onto perfectionism cognitions (i.e., the a path; Baron & Kenny, 1986). The results of the analysis showed that there was a statistically significant positive relationship between perfectionism cognitions and rumination after accounting for the effects of trait perfectionism (i.e., SOP, SPP), such that higher perfectionism cognitions scores were related to greater levels of rumination. This model explained 21.1% of the variance in rumination ($F(3,49) = 4.37, p < .001$).

Lastly, depressive symptoms was regressed onto perfectionism cognitions and rumination simultaneously to: (a) test the relationship between rumination and depressive symptoms, and (b) test the residual relationship among these two variables (i.e., perfectionism cognitions, rumination) and depressive symptoms after accounting for each in the analysis (i.e., the b path and the c’ path; Baron & Kenny, 1986). The results of the regression analysis showed that there was a statistically significant positive association between rumination and depressive symptoms such that higher rumination scores were associated with greater depressive symptomatology. Moreover, the observed relationship between perfectionism cognitions and depressive symptoms did not remain statistically significant when rumination was included in the model. Specifically, results indicated that there was a significant indirect effect from perfectionism cognitions to
depressive symptoms via rumination such that higher levels of perfectionism cognitions were related to greater rumination, which, in turn, was related to greater depressive symptoms (see Table 10). Therefore, the results replicated the findings from Study 1 supporting the hypothesis that rumination represents an indirect pathway linking perfectionism cognitions to depressive symptoms.

**Cognitive flexibility.** The second aim of Study 2 was to take a closer look at the link between perfectionism cognitions and cognitive flexibility, a facet of rumination. To address this aim, a linear regression analysis was performed in which the scaled score of participants’ performance on the D-KEFS Trail Making Number-Letter Switching task was regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to gain insight into how performance on a set-shifting task on its own is related to perfectionism cognitions. Results of the regression analysis revealed that the model was not statistically significant ($F(5,46) = 1.26, p = .30$). See Table 11 for a summary of results. Thus, there was no statistically significant relationship between perfectionism cognitions and performance on the D-KEFS Trail Making Number-Letter Switching task.

A series of additional linear regression analyses were performed to take a closer look at the link between perfectionism cognitions and the other conditions of the D-KEFS Trail Making Test. First, participants’ scaled scores on the Visual Scanning task were regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to examine the relationship between perfectionism cognitions and participants’ performance on a lower-order baseline scanning and attention task. Results of the regression analysis revealed that the model was not statistically significant ($F(5,46) = .31, p = .90$). See Table 12 for a summary of results. Thus, there was no relationship between perfectionism cognitions and performance on the D-KEFS Trail Making Visual Scanning task.
Second, the participants’ scaled scores on the Motor Speed task were regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to examine the relationship between perfectionism cognitions and participants’ performance on a baseline motor response task. Results of the regression analysis revealed that the model was not statistically significant \( F(5,46) = .51, p = .77 \). See Table 13 for a summary of results. Thus, there was no relationship between perfectionism cognitions and performance on the D-KEFS Trail Making Motor Speed task.

Third, the participants’ composite scaled score on the Combined Number Sequencing + Letter Sequencing measure was regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to examine the relationship between perfectionism cognitions and participants’ performance on lower-order baseline sequencing tasks. Results of the regression analysis revealed that the model was not statistically significant \( F(5,46) = .72, p = .61 \). See Table 14 for a summary of results. Thus, there was no relationship between perfectionism cognitions and performance on the D-KEFS Trail Making Combined Number Sequencing + Letter Sequencing composite measure.

Last, participants’ self-reported cognitive flexibility was regressed onto perfectionism cognitions and the covariates (i.e., WASI-II Composite Score Full Scale-4, SOP, SPP, and mild head injury) to gain insight into how one’s perceptions of his or her cognitive flexibility is related to perfectionism cognitions. Results of the regression analysis revealed that the model was statistically significant \( F(5,46) = 2.63, p = .04 \) and accounted for 22.3% of the variance in self-reported cognitive flexibility (see Table 15 for a summary of results). Perfectionism cognitions were not related to self-reported cognitive flexibility. However, SPP was negatively related to self-reported cognitive flexibility such that higher scores on SPP were related to less self-reported cognitive flexibility.
Discussion

Main Findings

The first objective of Study 2 was to replicate the findings of Study 1 by testing Flett et al.’s (2016) Perfectionism Cognitions Theory using a sample of Canadian emerging adults. The Perfectionism Cognitions Theory (Flett et al., 2016) posits that perfectionism cognitions are related to poorer well-being (such as depressive symptoms) via the tendency to ruminate. Study 1 provided empirical support for this theoretical framework by revealing that the relationship between perfectionism cognitions and depressive symptoms was fully explained by rumination. Encouragingly, the results of Study 1 were replicated in Study 2. Therefore, the first hypothesis that perfectionism cognitions would be related to depressive symptomatology via an increased tendency to ruminate was supported by Study 2. In this way, the findings support Flett et al.’s (2016) position that rumination is a key pathway linking perfectionism cognitions to indices of well-being (e.g., depressive symptoms). Thus, the results offer clear support for the Perfectionism Cognitions Theory (Flett et al., 2016).

Consistent with Study 1, the results also highlight the incremental predictive utility of perfectionism cognitions in relation to depressive symptoms over and above trait perfectionism (e.g., SOP, SPP). As a result, this research makes an important contribution to the advancement of scientific enquiry through its replication of previous research (i.e., Study 1 of this investigation). As well, it provides further evidence to support the Perfectionism Cognitions Theory (Flett et al., 2016), which has not been comprehensively tested outside of the current studies and thus the findings represent a novel and important contribution to the literature.

The second aim of Study 2 was to more closely examine the link between perfectionism cognitions and cognitive flexibility, a behavioural index of rumination measured by performance on set-shifting tasks (Whitmer & Banich, 2007). As stated previously, to date and to my
knowledge the relationship between perfectionism cognitions and set-shifting has not been tested. There has, however, been some evidence to suggest that trait perfectionism is related to deficits in cognitive flexibility (Morris & Mansell, 2018). Given that there are robust associations between perfectionism cognitions and trait perfectionism (e.g., Flett et al., 1998), it made sense to predict that a similar pattern of results would be observed for perfectionism cognitions. As well, research shows that perfectionism cognitions are related to rumination (e.g., Flett et al., 2011) and, in turn, rumination is related poorer cognitive flexibility (e.g., Davis & Nolen-Hoeksema, 2000). Thus, it seemed logical to hypothesize that the relationship between perfectionism cognitions and rumination would extend to one of its key components (i.e., cognitive flexibility). Based on this literature, it was predicted that perfectionism cognitions and trait perfectionism would be related to poorer cognitive flexibility as reflected by lower scaled scores on the D-KEFS Trail Making Number-Letter Switching task. Surprisingly, there were no statistically significant associations found between perfectionism cognitions and this behavioural index of cognitive flexibility at either the bivariate level or when the scaled scores on D-KEFS Trail Making Number-Letter Switching were regressed onto perfectionism cognitions and the covariates in linear regression analyses. There were also no statistically significant associations between perfectionism cognitions and self-reported cognitive flexibility. However, at the bivariate level the association between trait SPP and scaled scores on D-KEFS Number-Letter Switching was very close to being statistically significant. Higher SPP scores were related to lower Number-Letter Switching scaled scores (though not quite at the level of statistical significance). So, a pattern seems to be emerging that points to SPP being related to less cognitive flexibility. This complements the finding from Burgess and Shallice (1997), which suggested that perfectionism was related to less cognitive flexibility as measured by performance on a trail making task (not the D-KEFS) and The Brixton Test. This finding should be studied further in future studies to gain a better
understanding of this relationship with particular emphasis on its implications for psychological well-being.

An interesting discrepancy in the findings was that self-reported rumination did not show significant associations with the D-KEFS Trail Making Test outcomes, including on the Number-Letter Switching condition that is intended to tap participants’ objective cognitive flexibility skill. This was a surprising finding because the D-KEFS Trail Making Test (and, indeed, the D-KEFS neuropsychological assessment battery as a whole) is a gold standard test of set-shifting abilities and is ubiquitously used in research and clinical practice (Stephens, 2014; Swanson, 2005). Thus, it was expected that all aspects of self-reported rumination (i.e., total rumination scores, Brooding rumination scores, and Reflection rumination scores) would be negatively associated with the D-KEFS Trail Making Test, especially with respect to performance on the switching condition.

As stated previously, there are robust associations between self-reported rumination and deficits in set-shifting/cognitive flexibility within the literature (e.g., Davis & Nolen-Hoeksema, 2000; Whitmer & Banich, 2007). For example, in their (2000) study, Davis and Nolen-Hoeksema found that individuals who engage in a ruminative response style might have a general deficit in their ability to switch from unhelpful to helpful strategies for performing a task. In particular, Davis and Nolen-Hoeksema noted that individuals who scored highly on self-reported rumination tended to display a greater number of perseverative errors on the Wisconsin Card Sort Task than people who scored low on rumination. Whitmer and Banich (2007) used a set-shifting task to further investigate this relationship and concluded that individuals who ruminate have a deficit in their ability to shirk strategies that are currently in use (even if they are not optimal) in favour of new and potentially more useful strategies for solving tasks. In this way, existing literature indicates that poor cognitive flexibility (as measured by an inability to set-shift) represents an important behavioural index of rumination that can be used as an objective measure of ruminative
response styles. That the current study did not replicate these findings is at odds with the literature.

Given that existing literature suggests that self-reported rumination is linked to objective behavioural impairments in set-shifting abilities, it is puzzling that this relationship was not observed in the current study. A potential reason for this discrepancy could be that the sample might not have been large enough or diverse enough. The lack of diversity in the sample could have impacted ability of the current study to replicate the findings present in the extant literature, particularly as they pertain to the relationship between self-reported rumination and cognitive flexibility. The sample used in the present study was a convenience sample of undergraduate students who were similar in age, education, and socio-economic status (SES). As a result of their similar demographic characteristics, participants may not have differed from one another on the study variables to a great enough extent to find meaningful differences in scores. Lack of diversity is a limitation of convenience sampling because not only does it provide a sample that is not representative of the general population (and thus the findings are not generalizable outside of the study sample), but it also is associated with insufficient statistical power in the analysis (Bornstein, Jager, & Putnick, 2013). As Bornstein et al. (2013) explain, in nonprobability convenience sampling there is often just enough diversity and variation in the sample to produce statistical noise in the analyses but not enough to control for, which could explain the small and inconsistent effects that are found across research in the developmental sciences. For this reason, it is important to have a large and diverse sample.

Another reason for the apparent lack of association between all aspects of self-reported rumination (i.e., total rumination, Brooding rumination, and Reflection rumination) and behavioural rumination as assessed by cognitive flexibility could be that the two measures are actually testing inherently different underlying constructs. In the RRS (Treynor et al., 2003), the
items heavily tap into the negative affect emotional component of the construct of rumination that Nolen-Hoeksema (e.g., 1991, 2008) identifies as being a critical driving component. In her response styles theory (2001), Nolen-Hoeksema argues that rumination is able to exacerbate and prolong symptoms of distress such as depressive symptoms by enhancing the effects of depressed mood on an individual’s pattern of thinking (i.e., individuals will use the negative thoughts and memories activated by their depressed mood to understand their current circumstances) and by interfering with effective problem solving by making one’s pattern of thinking more pessimistic and fatalistic. Thus, it is clear that negative affect has a key role in rumination, which is evaluated by many items of the RRS (e.g., “Think, ‘What am I doing to deserve this?’”, “Think, ‘Why do I have problems other people don’t have?’”, “Think, ‘Why can’t I handle things better?’”, “Think about a recent situation, wishing it had gone better”; Treynor et al., 2003). This emotional aspect of rumination is not measured by the D-KEFS Trail Making Test (or, indeed, the D-KEFS battery of neuropsychological assessments as a whole). The Trail Making Test, particularly the Number-Letter Switching condition, simply measures one’s ability to set-shift with a lack of regard for the critical negative affective component.

The selection of behavioural task could also explain the disparity in findings between the current study and extant literature. As mentioned previously, research has linked rumination with impaired cognitive flexibility on set-shifting tasks (e.g., Davis & Nolen-Hoeksema, 2000; Whitmer & Banich, 2007). In these studies, participants completed the Wisconsin Card Sort Task (WCST; Grant & Berg, 1948). The WCST (Grant & Berg, 1948) has long been regarded as a gold standard measure of cognitive flexibility, though in recent years its specificity in assessing prefrontal function has been questioned (e.g., Nyhus & Barceló, 2009). For this reason, a different behavioural measure of cognitive flexibility was used in the current study (i.e., D-KEFS Trail Making Test; Delis et al., 2001). However, this decision could have been to the detriment of
the current study’s ability to replicate extant literature’s evidence linking self-report rumination to behavioural cognitive flexibility. The WCST is a much more extensive and comprehensive test of set-shifting than the D-KEFS Trail Making Test, spread across many conditions and trials. As such, this task may be a richer, more complex, and more nuanced measure of cognitive flexibility than the single-trial Number-Letter Switching condition of the D-KEFS Trail Making Test (Delis et al., 2001) that better captures the construct of cognitive flexibility.

Another surprising finding was that, at the bivariate level, self-reported rumination was not related to the self-report measure of cognitive flexibility. This was initially unexpected given the literature indicating that cognitive flexibility is a feature of rumination (e.g., Davis & Nolen-Hoeksema, 2000; Whitmer & Banich, 2007). However, when looking at the wording of items on the RRS (Treynor et al., 2003) measure of rumination compared to the wording of items on the CFS (Martin & Rubin, 1995) measure of cognitive flexibility, it is perhaps less surprising that there was no observed relationship between the two in this study. For example, the items of the RRS consist of statements evaluating the frequency of repetitively thinking about perceived failures such as, “Think about a recent situation, wishing it had gone better,” “Think ‘Why can’t I handle things better?’”, “Analyze recent events to try to understand why you are depressed,” “Write down what you are thinking and analyze it”; Treynor et al., 2003). These are scored on a scale ranging from Almost never to Almost always. In contrast, the CFS includes statements such as, “I can find workable solutions to seemingly unsolvable problems,” “I am willing to listen and consider alternatives for handling a problem,” and “I have the self-confidence necessary to try different ways of behaving” (Martin & Rubin, 1995). As such, it appears that, despite the CFS being a widely used measure of cognitive flexibility, it taps a distinctly different construct. Whereas the RRS clearly assesses the cognitive experience of dealing with a stressor, the CFS seems to evaluate people’s perceptions of themselves, particularly their self-efficacy as it pertains
to handling a potentially stressful situation in which there are conflicting viewpoints. These are not necessarily the same thing, which could explain why there was no correlation between self-reported rumination and self-reported cognitive flexibility. In sum, as mentioned previously the RRS taps the negative affective component that is so central to rumination (e.g., Nolen-Hoeksema, 2001). The CFS, on the other hand, does not assess this emotional response, which could lend further credence to the position that these two self-report measures assess inherently different constructs.

Moreover, extant literature links perfectionism to the construct of self-efficacy that is heavily tapped by the CFS (e.g., Hart, Gilner, Handal, & Gfeller, 1998; LoCicero & Ashby, 2000; Yu, Chae, & Chang, 2016). Hart et al. (1998) found that higher levels of SOP were related to lower self-efficacy whereas higher levels of SPP were related to higher self-efficacy. LoCicero and Ashby (2000) found a similar pattern of results, however, Yu et al. (2016) found that higher SPP was related to lower self-efficacy. Despite these mixed findings, together they show that there is a link between perfectionism and self-efficacy. That the CFS seems to tap self-efficacy could help to explain why inverse relationships were observed between SPP, total rumination, and Brooding rumination (positive) and SPP and self-reported cognitive flexibility (negative) at the bivariate level. These inverse associations could also be linked to the fact that rumination as measured by the RRS taps negative affect, and SPP perfectionism is related to greater negative affect (e.g., Castro, Soares, Pereira, & Macedo, 2017).

As mentioned previously, data for Study 2 was collected from only 53 participants. The small sample size could also help to explain why the scaled scores on the D-KEFS Trail Making Test (particularly with respect to the Number-Letter Switching condition) were not related to perfectionism cognitions as measured by the PCI either at the bivariate level or in any of the regression analyses examining this potential relationship. Perhaps with a larger sample size and
greater statistical power these variables might have been related to one another. It is also possible that there simply is not a relationship between perfectionism cognitions and set-shifting. As mentioned previously, to date this relationship has not been tested in the literature, and there is also a dearth of literature examining the link between trait perfectionism and executive functioning skills such as set-shifting. My hypothesis that perfectionism cognitions would be negatively related to set-shifting abilities was based on literature showing that perfectionism cognitions is associated with rumination (e.g., Flett et al., 2011) and that, in turn, rumination is linked to less cognitive flexibility measured by an inability to set-shift (e.g., Davis & Nolen-Hoeksema, 2000; Whitmer & Banich, 2007). Moreover, my hypothesis was also based on the literature showing that personality characteristics are related to executive functioning (e.g., Murdock et al., 2013). For example, research shows that there is a statistically significant and negative relationship between neuroticism (a notable correlate of perfectionism; Dunkley et al., 2012) and updating/monitoring skills (i.e., an index of cognitive perseveration, an important feature of rumination) in the literature. Specifically, higher scores on neuroticism are associated with poorer updating/monitoring skills (Murdock et al., 2013). Thus, research has demonstrated that there is a link between personality characteristics and executive functioning. As such, given the overlap between neuroticism with trait perfectionism it, to my mind, stood to reason that perfectionism and perfectionism cognitions also threaten executive functions such as cognitive flexibility. The findings of the present study, however, did not support this position with respect to perfectionism cognitions but they did provide preliminary evidence to suggest that SPP was related to poorer cognitive flexibility.

Conclusions

Overall, the results of Study 2 provide convincing evidence to suggest that rumination acts as an intervening pathway in the association between perfectionism cognitions and
depressive symptoms among Canadian emerging adults between the ages of 18 and 25 years. Such findings represent an important and novel contribution to the literature. They have the potential to inform future research and applied practice. Future research should address the limitations of the present study (particularly with respect to the restricted sample size), as they could have impaired the validity of the findings. However, it is important to note that the current study did not find evidence to suggest that cognitive flexibility is the aspect of rumination that may explain the association between perfectionism cognitions and depressive symptoms given that perfectionism cognitions were unrelated to cognitive flexibility as measured by the D-KEFS Trail Making Test of set-shifting. Yet, there was some evidence to support that trait dimensions of perfectionism such as SPP may be related to poorer cognitive flexibility. Future research into identifying the aspect of rumination that links perfectionism cognitions to depressive symptoms (as well as further investigating the relationship between SPP and cognitive flexibility) is warranted.

**General Discussion**

The main objective and rationale for the current body of work was to test the theoretical framework underlying Flett et al.’s (2016) Perfectionism Cognitions Theory. As mentioned, the Perfectionism Cognitions Theory (Flett et al., 2016) is a new cognitive theory of perfectionism that is intended to explain how and why perfectionism, specifically the cognitive dimension of perfectionism called perfectionism cognitions (i.e., automatic and intrusive thoughts focused on a need to be perfect) are related to poorer well-being. Thus, this theory elucidates and explores the cognitive mechanisms, processes, and outcomes that accompany and characterize perfectionism. The central component of the Perfectionism Cognitions Theory (Flett et al., 2016) is rumination, which is the tendency to repetitively and passively focus on a stressor such as a perceived failure. The experience of a failure (either real or perceived) is particularly salient among individuals
who score highly on perfectionism because they threaten his or her self-concept (Flett et al., 2016). Perfectionists’ identity is entwined with and defined by their perfectionism, or their need to achieve perfect performance in everything they do, and as a result, any perceived failures are viewed as a global reflection of the self (Flett et al., 2016). Because of this, people who score highly on trait dimensions of perfectionism and perfectionism cognitions have a difficult time self-regulating and inhibiting ruminative responses (Flett et al., 2016). Given this link, rumination is proposed to be a mechanism that underlies the established relationship between perfectionism cognitions and psychopathology, such as depressive symptoms (e.g., Flett et al., 2011; Flett et al., 2012). Indeed, rumination is itself related to depressive symptoms (e.g., Lyubomirsky et al., 2015), which further builds the case for the role of rumination as an indirect pathway linking perfectionism cognitions to depressive symptoms. Parts of the Perfectionism Cognitions Theory (Flett et al., 2016) have been examined and supported within extant literature (e.g., Flett et al., 2011), but to date this theory had not been tested comprehensively, taking into account critical covariates such as trait perfectionism and negative affect. To this end, the current body of work addressed this gap in the literature.

The aforementioned associations among the variables of interest were replicated within both Study 1 and Study 2. In these studies, perfectionism cognitions were positively associated with both a greater tendency to ruminate and greater experience of depressive symptoms over and above the effect of trait perfectionism, indicating the incremental predictive utility of considering the impact of perfectionism cognitions on these variables. Rumination was also positively related to greater depressive symptomatology. Beyond this, Study 1 and Study 2 both provided empirical support for Flett et al.’s (2016) Perfectionism Cognitions Theory among young people (ages ranging from 18 to 35 years across the two studies); in both studies, the relationship between perfectionism cognitions and depressive symptoms was explained by a tendency to engage in a
ruminative response style. Thus, based on the findings of this body of work it can be concluded that, as predicted by the Perfectionism Cognitions Theory (Flett et al., 2016), rumination does represent a critical mechanism by which the association between perfectionism and poorer well-being can be explained.

With respect to Study 2 specifically, the results as they pertain to the relationship between perfectionism cognitions and cognitive flexibility measured objectively by performance on a set-shifting task were less encouraging (see Discussion in Study 2 for a comprehensive discussion of the findings, including how they relate to extant literature). It was predicted that perfectionism cognitions would be related to poorer cognitive flexibility, in part, because of research suggesting that trait dimensions of perfectionism represent a risk for poorer set-shifting abilities and thus less cognitive flexibility. This relationship was not observed in the present study, which suggests that perhaps cognitive flexibility (at least as measured by behavioural assessments of set-shifting) is not the feature of rumination explaining why perfectionism cognitions are related to poorer well-being.

If not cognitive flexibility, then what? Perhaps the issue has been overcomplicated. It could be that the cognitive perseveration that characterizes rumination is itself the mechanism underlying the relationship. After all, Nolen-Hoeksema’s response styles theory (1991) clearly outlines the ways in which perseverating on symptoms of distress relates to poorer well-being, and these positions have been supported by the literature. For example, Nolen-Hoeksema (1991) posits that rumination enhances the effects of depressed mood on an individual’s pattern of thinking, making it more likely that people will use the negative thoughts and memories activated by their depressed mood to understand their current circumstances; rumination interferes with effective problem solving by making one’s pattern of thinking more pessimistic and fatalistic; and rumination interferes with one’s ability to learn from behaviour-response contingencies,
which puts the individual at an increased vulnerability to experiencing stressful circumstances. Each of these mechanisms and consequences of rumination make it more likely that initial symptoms of depression (or other forms of distress) will persist and become more severe over time. Research by Lyubomirsky et al. (2015) supports this position that rumination increases an individual’s vulnerability for depression and exacerbates and perpetuates negative moods.

Alternatively, underlying all of these mechanisms involved in a ruminative response style is stress. Stress plays an important role in both the development and maintenance of a host of psychological and physical dysfunctions such as depression, anxiety, cardiovascular illnesses, and cancer via prolonged activation of the hypothalamic pituitary adrenal (HPA) axis (e.g., Cohen, Janicki-Deverts, & Miller, 2007). The HPA axis is the primary stress response system that links the central nervous system and the endocrine system. Hyperactivation of the HPA axis taxes the system and can lead to burnout and impaired mental and physical well-being (e.g., Guilliams & Edwards, 2010). Therefore, perhaps it is the stress associated with rumination that explains how and why perfectionism cognitions are related to poorer well-being. It is necessary for researchers to continue to dedicate attention and resources to the aim of further elucidating the mechanisms involved in the Perfectionism Cognitions Theory (Flett et al., 2016) so that this key question can be answered.

**Strengths and Limitations**

The main strength of this body of work is the replication of the major findings. Not only do the present studies each replicate findings from the existing literature with respect to the main variables involved in the Perfectionism Cognitions Theory (Flett et al., 2016), but the results of the main analyses empirically testing the theoretical framework of this theory replicated from one study to the other. In both Study 1 and Study 2 of the current project, perfectionism cognitions were linked to depressive symptoms fully through the tendency to engage in rumination. In other
words, both studies indicate that rumination represents a cognitive mechanism explaining how and why perfectionism cognitions pose a risk to individuals’ well-being, such as their vulnerability for experiencing depressive symptoms. The fact that the findings replicate across studies (and that they support the associations among these variables that are documented in the extant literature) helps to address the replicability crisis in psychological research and directly responds to Kahneman’s (2012) call for researchers to replicate their studies to (a) determine the validity of the findings and to (b) determine the generalizability of the results. That perfectionism cognitions are related to depressive symptoms via rumination was observed in two disparate samples (a community sample of American adults and Canadian emerging adult university students, respectively) offers encouraging preliminary evidence that the findings may indeed be generalizable outside of the sample.

This current body of work provides encouraging evidence in support of the Perfectionism Cognitions Theory (Flett et al., 2016), but it is not without limitations. Most notably, both Study 1 and Study 2 rely on self-report measures as the primary source of data. The use of self-report questionnaires allows for subjective constructs such as perfectionism cognitions, trait perfectionism, negative affect, rumination, perceptions of cognitive flexibility, and depressive symptoms to be tested. Yet, inherent in the use of self-report measures is the risk of social desirability bias in the responses (Rosenman, Tennekoon, & Hill, 2011); the participants might have wanted to answer questions in a socially acceptable way. Social desirability bias is a common and often-reported limitation when using self-report measures in research (Rosenman et al., 2011). For example, in the present studies participants might have answered questions about perfectionism cognitions and trait perfectionism in a way that made them seem less perfectionistic than they really are. As well, participants might have reported that they ruminate less than they really do or that they have better cognitive flexibility than they really do. These
biases may have impacted the results. As well, the use of self-report measures relies on participants’ abilities to recognize these qualities within themselves. However, the use of self-report measures was also a strength because it allowed me to gain insight into aspects of human cognition and behaviour that could not be directly observed.

To address the limitation, behavioural measures of cognitive flexibility/set-shifting, which is thought to be a key feature of rumination (e.g., Cropley, Zijlstra, Querstret, & Beck, 2016; Davis & Nolen-Hoeksema, 2000) were included in Study 2. By using the D-KEFS battery of neuropsychological assessments (particularly the Trail Making Test), objective measures of cognitive flexibility were obtained. These measures are thought to be free of the social desirability bias that is common when using self-report data. Thus, the inclusion of an objective behavioural measure of set-shifting/cognitive flexibility represented a strength of the design of Study 2 because it allowed me to test the cognitive mechanisms that underlie rumination without regard to how participants perceive or report their tendency to ruminate.

Another particular strength within the current body of work is that it considers potential covariates such as trait perfectionism, negative affect, and age in Study 1 and trait perfectionism, intelligence, and severe head injury in Study 2. This is particularly important for establishing the incremental predictive utility of using perfectionism cognitions over and above the effect of trait dimensions of perfectionism and other personality characteristics as a potential risk factor for poorer psychological well-being (e.g., depressive symptoms). However, more covariates could be included in future investigations that were left out of the current body of work due to restricted statistical power. For example, it could be important to account for other personality traits, such as neuroticism and emotionality because these traits are linked to perfectionism and depressive symptoms in the literature (e.g., Enns, Cox, & Clara, 2005; Hewitt, Flett, & Blankstein, 1991;
Thus, it is important to account for the effect of these and other traits in the analyses.

It is also important to control for participants’ performance on each of the conditions of the D-KEFS Trail Making Test (Delis et al., 2001) to parse out the effect of baseline performance on switching abilities, the key index of cognitive flexibility. This was not done in the analyses for Study 2 due to the small sample size and restricted statistical power. Thus, performance on the D-KEFS Trail Making Number-Letter Switching condition was the measure of cognitive flexibility used in Study 2, which represents a limitation to the current study. To address this limitation in the future, the Scaled Contrast Scores for the contrast measures (i.e., Number-Letter Switching vs. Visual Scanning, Number-Letter Switching vs. Number Sequencing, Number-Letter Switching vs. Letter Sequencing, Number-Letter Switching vs. Combined Number Sequencing + Letter Sequencing, Number-Letter Switching vs. Motor Speed) should be examined. This will provide a more accurate and nuanced depiction of how participants perform on the switching task compared to on the other conditions.

Another limitation of the present study is the use of nonprobability convenience sampling to collect participants for both studies. In Study 1, participants were collected using the Amazon MTurk crowdsourcing platform. Given the ready availability of research study participants, MTurk has become a valuable asset to researchers in recent years (Chandler & Shapiro, 2016). However, a growing body of literature points to some of the methodological issues in using an MTurk nonprobability convenience sample (e.g., Berinsky, Huber, & Lenz, 2012; Chandler & Shapiro, 2016). MTurk samples tend to be less representative than web-based probability samples (e.g., participants who have been recruited for a study through the use of random digit dialing or by invitation on an online forum) on key demographic characteristics such as gender, race, income, and marital status (Chandler & Shapiro, 2016). Despite this, MTurk samples are more
representative of the general population than university student samples or samples of participants collected from university towns (Berinsky et al., 2012). Additionally, MTurk samples may differ from the general population with respect to clinical symptoms, such as depression and anxiety. For example, in their comprehensive overview of the use of MTurk crowdsourced convenience samples, Chandler and Shapiro (2016) note that some studies find that the prevalence of depression and anxiety reported by MTurk workers is comparable to that reported in other community samples, whereas other studies find lower rates of depression and anxiety and still others report higher rates of depression and anxiety. Thus, the findings are inconsistent with respect to this particular demographic variable. However, estimates of lifetime diagnosed mental illness range from 20 to 30 per cent (Chandler & Shapiro, 2016). Indeed, not replicating commonly found sex-related differences for rumination or depression could point to the fact that the sample used in the present study differs from those used in other studies. However, since the norms for perfectionism cognitions and other model variables tended to be relatively normative (with the exception of relatively high depression rates), the sample used in Study 1 does not appear to differ too much from other samples collected from the community.

In Study 2, the university research participant pool was used to recruit participants. A convenience sample of university students presents similar issues to those highlighted above with respect to MTurk nonprobability convenience samples, particularly the issue of diversity. The sample used in Study 2 was a convenience sample of undergraduate students who were similar in age, education, and SES. Lack of diversity is a limitation of convenience sampling because not only does it provide a sample that is not representative of the general population (and thus the findings are not generalizable outside of the study sample), but it also is associated with insufficient statistical power in the analysis (Bornstein et al., 2013). That said, the student sample in the current body of work did not substantially differ in their scores on the key constructs
compared to the norms reported for a student sample (with the exception of perfectionism cognitions, which had a lower average score in the current student sample than in both a normative student population and the community sample used in Study 1). However, the student sample used in Study 2 did exhibit high rates of depressive symptomatology.

The aforementioned high rates of depressive symptoms within the two samples (as observed using both the conservative and liberal cut-offs of $\geq 16$ [Radloff, 1977] and $\geq 20$ [Vilagut et al., 2016], respectively), could also point to a limitation of the current body of work. The relatively high rates of depressive symptomatology could impact the generalizability of the findings. In other words, it is possible that the findings do not represent a pattern of results that reflect the general population given that a large proportion of both samples were higher in their levels of depressive symptoms.

Another substantial limitation (particularly with respect to Study 2) was the relatively small sample size. Unfortunately, only 53 participants were collected due to availability of participants and timeline constraints. Ideally, data would have been collected from more participants. The small sample size likely negatively impacted the statistical power of the analyses, which, in turn, potentially hindered my ability to (a) observe relationships that I had predicted to find and (b) replicate results that had been found in existing literature.

The fact that the data is cross-sectional also represents a limitation to the current body of work. Because the data was collected at a single time point, temporal precedence cannot be established among the variables of interest (i.e., perfectionism cognitions, rumination, depressive symptoms, and the covariates). However, this limitation is mitigated by the fact that the present study tested the underlying tenet of the Perfectionism Cognitions Theory (Flett et al., 2016) that rumination is an intervening pathway explaining the relationship between perfectionism cognitions and well-being (as measured in the present study by depressive symptoms). Therefore,
the model presented in the current study is theoretically driven. Moreover, research that has studied the link between perfectionism and depressive symptoms over time has found evidence that perfectionism is both an antecedent risk factor for the onset of depression and a maintenance factor for the continued experience of depressive symptoms (e.g., Egan et al., 2011). This evidence supports the direction of associations found in the present study.

To address the issue of temporal precedence, future research should use a longitudinal research design to test the associations among these variables. This is particularly important with respect to the relationship between perfectionism and depressive symptoms (and, indeed, the Perfectionism Cognitions Theory as a whole) because Asseraf and Vaillancourt (2015) have found evidence in support of the scar model of perfectionism, which postulates that depressive symptoms cause perfectionism and not the other way around. In their (2015) study, Asseraf and Vaillancourt found that in cross-lagged paths analysis using SEM increases to depressive symptoms lead to increases in trait SPP. It is important to replicate these findings, this time with the inclusion of perfectionism cognitions to determine whether the scar model applies to this dimension of perfectionism as well. Thus, by addressing the issue of temporal precedence the results could lend support to one theory of perfectionism and well-being over another.

**Implications and Applications**

The results of Study 1 and Study 2 have important implications. As highlighted previously, the current body of work addresses a substantial gap in the literature by being among the first to test the theoretical framework underlying the Perfectionism Cognitions Theory (Flett et al., 2016). That the results of both studies empirically support the theoretical foundations of Flett et al.’s (2016) Perfectionism Cognitions Theory is an exciting and revolutionary finding. It also offers incredible new insight into the link between perfectionism and well-being, with particular emphasis on a cognitive process that underlies this relationship. The findings also raise
potential for further research. For example, future studies could build on the foundations of the present study by examining additional outcomes pertaining to psychopathology (e.g., anxiety, eating disorders). Doing so would allow for the relationships between perfectionism cognitions and other indices of psychopathology to be explored, particularly within the guiding theoretical framework of Flett et al.’s (2016) Perfectionism Cognitions Theory. It is important to include other forms of psychopathology because evidence suggests perfectionism cognitions are related to both depression and anxiety (see Flett et al., 2007; Flett et al., 2011, Flett et al., 2012). Indeed, research supports that perfectionism is a transdiagnostic factor, cutting across multiple mental disorders with respect to psychopathology (Egan, Wade, & Shafran, 2011). Therefore, rumination may be a key mechanism linking perfectionism cognitions to a wide range of psychopathologies, and it is necessary to determine whether the pathway from perfectionism cognitions to psychopathology via rumination is equally important for other outcomes or if it is more relevant to one specific type of psychopathology over the other. Additionally, there is a high level of comorbidity between depression and anxiety (Coplan, Aaronson, Panthangi, & Kim, 2015), so it is logical for future research to look at both of these outcomes together within the context of Flett et al.’s (2016) Perfectionism Cognitions Theory rather than study them in isolation.

Given the growing literature linking perfectionism to health problems (Molnar, Sirois, Flett, Janssen, & Hewitt, 2017; Sirois & Molnar, 2016), a logical next step would be to expand the model tested in the current study (which only included mental health as an outcome of interest) to include physical health. Indeed, the Perfectionism Cognitions Theory (Flett et al., 2016) is a theoretical model that intends to explain the relationship between perfectionism cognitions and both psychological health and physical health outcomes. Including physical health as an outcome in the model would allow for a more thorough understanding of how personality characteristics such as perfectionism (particularly perfectionism cognitions) and
cognitive processes such as rumination are related to physical well-being in addition to mental well-being.

The results also have clinical implications. Most notably, the findings point to rumination as being a critical cognitive process that shapes the relationship between perfectionism cognitions and depressive symptoms. As such, rumination should be targeted by clinicians when developing treatment plans for patients, particularly those who present with perfectionistic characteristics or who self-identify as perfectionists. This is particularly important given Curran and Hill’s (2017) finding that perfectionism has rapidly increased in a linear fashion over the past few decades, and is a particularly troubling issue among university students. The robust relationship between perfectionism cognitions and rumination that has been documented in the literature and which was replicated in Study 1 emphasizes that those who score highly on perfectionism cognitions should receive education and instruction on how to manage not only his or her perfectionism, but also their tendency to ruminate.

Conclusion

By supporting the Perfectionism Cognitions Theory (Flett et al., 2016), the results of Study 1 and Study 2 represent a novel contribution to the existing literature. They also show that despite the fact that perfectionism literature has burgeoned over the past three decades, there is still much to learn, especially with respect to the cognitive mechanisms, processes, and outcomes that accompany and characterize this construct. The findings of the current study are just a step towards a more comprehensive understanding of perfectionism and the impact that it has on the lives of the individuals who experience it in any of its forms. The findings are particularly salient given the current mental health crisis among young people in Canada and the troubling trend with respect to the rapidly increasing incidence of perfectionism among young people in the Western world.
References


Coplan, J. D., Aaronson, C. J., Panthangi, V., & Kim, Y. (2015). Treating comorbid anxiety and


Denniss, R. J., Barker, L. A., & Day, C. J. (2019). Improvement in cognition following double-


between executive functioning and the Big Five personality traits. *Journal of Individual Differences, 34*, 97-104.


Stanton, K., & Watson, D. (2014). Positive and negative affective dysfunction in


Figure 1. The hypothesized theoretical model linking perfectionism cognitions to psychopathology via rumination.
Figure 2. The conceptual model for Study 1 linking perfectionism and potential covariates to depressive symptoms via rumination with respondent sex acting as a potential moderator.
Figure 3. A histogram showing the distribution of scores for the variable perfectionism cognitions (measured by the PCI) for Study 1.

Figure 4. A histogram showing the distribution of scores for the variable brooding rumination (measured by the RRS) for Study 1.
Figure 5. A histogram showing the distribution of scores for the variable reflection rumination (measured by the RRS) for Study 1.

Figure 6. A histogram showing the distribution of scores for the variable depressive symptoms (parcel 1, measured by the CES-D) for Study 1.
**Figure 7.** A histogram showing the distribution of scores for the variable depressive symptoms (parcel 2, measured by the CES-D) for Study 1.

**Figure 8.** A histogram showing the distribution of scores for the variable depressive symptoms (parcel 3, measured by the CES-D) for Study 1.
Figure 9. A histogram showing the distribution of scores for the variable depressive symptoms (parcel 4, measured by the CES-D) for Study 1.

Figure 10. A histogram showing the distribution of scores for the variable self-oriented perfectionism (measured by the MPSHF) for Study 1.
Figure 11. A histogram showing the distribution of scores for the variable socially prescribed perfectionism (measured by the MPSHF) for Study 1.

Figure 12. A histogram showing the distribution of scores for the variable negative affect (measured by the PANAS) for Study 1.
Figure 13. A histogram showing the distribution of scores for the variable age for Study 1.

Figure 14. A scatterplot showing the relationship between depressive symptoms and perfectionism cognitions for parcel 1 for Study 1.
Figure 15. A scatterplot showing the relationship between depressive symptoms and brooding rumination for parcel 1 for Study 1.

Figure 16. A scatterplot showing the relationship between depressive symptoms and reflection rumination for parcel 1 for Study 1.
Figure 17. A scatterplot showing the relationship between depressive symptoms and self-oriented perfectionism scores for parcel 1 for Study 1.

Figure 18. A scatterplot showing the relationship between depressive symptoms and socially prescribed perfectionism scores for parcel 1 for Study 1.
Figure 19. A scatterplot showing the relationship between depressive symptoms and negative affect scores for parcel 1 for Study 1.

Figure 20. A scatterplot showing the relationship between depressive symptoms and age for parcel 1 for Study 1.
Figure 21. A scatterplot showing the relationship between depressive symptoms and perfectionism cognitions for parcel 2 for Study 1.

Figure 22. A scatterplot showing the relationship between depressive symptoms and brooding rumination for parcel 2 for Study 1.
Figure 23. A scatterplot showing the relationship between depressive symptoms and reflection rumination for parcel 2 for Study 1.

Figure 24. A scatterplot showing the relationship between depressive symptoms and self-oriented perfectionism scores for parcel 2 for Study 1.
Figure 25. A scatterplot showing the relationship between depressive symptoms and socially prescribed perfectionism scores for parcel 2 for Study 1.

Figure 26. A scatterplot showing the relationship between depressive symptoms and negative affect scores for parcel 2 for Study 1.
Figure 27. A scatterplot showing the relationship between depressive symptoms and age for parcel 2 for Study 1.

Figure 28. A scatterplot showing the relationship between depressive symptoms and perfectionism cognitions for parcel 3 for Study 1.
Figure 29. A scatterplot showing the relationship between depressive symptoms and brooding rumination for parcel 3 for Study 1.

Figure 30. A scatterplot showing the relationship between depressive symptoms and reflection rumination for parcel 3 for Study 1.
Figure 31. A scatterplot showing the relationship between depressive symptoms and self-oriented perfectionism scores for parcel 3 for Study 1.

Figure 32. A scatterplot showing the relationship between depressive symptoms and socially prescribed perfectionism scores for parcel 3 for Study 1.
Figure 33. A scatterplot showing the relationship between depressive symptoms and negative affect scores for parcel 3 for Study 1.

Figure 34. A scatterplot showing the relationship between depressive symptoms and age for parcel 3 for Study 1.
Figure 35. A scatterplot showing the relationship between depressive symptoms and perfectionism cognitions for parcel 4 for Study 1.

Figure 36. A scatterplot showing the relationship between depressive symptoms and brooding rumination for parcel 4 for Study 1.
Figure 37. A scatterplot showing the relationship between depressive symptoms and reflection rumination for parcel 4 for Study 1.

Figure 38. A scatterplot showing the relationship between depressive symptoms and self-oriented perfectionism scores for parcel 4 for Study 1.
Figure 39. A scatterplot showing the relationship between depressive symptoms and socially prescribed perfectionism scores for parcel 4 for Study 1.

Figure 40. A scatterplot showing the relationship between depressive symptoms and negative affect scores for parcel 4 for Study 1.
Figure 41. A scatterplot showing the relationship between depressive symptoms and age for parcel 4 for Study 1.

Figure 42. A scatterplot showing the relationship between brooding rumination and perfectionism cognitions for Study 1.
Figure 43. A scatterplot showing the relationship between brooding rumination and reflection rumination for Study 1.

Figure 44. A scatterplot showing the relationship between brooding rumination and self-oriented perfectionism for Study 1.
Figure 45. A scatterplot showing the relationship between brooding rumination and socially prescribed perfectionism for Study 1.

Figure 46. A scatterplot showing the relationship between brooding rumination and negative affect for Study 1.
Figure 47. A scatterplot showing the relationship between brooding rumination and age for Study 1.

Figure 48. A scatterplot showing the relationship between reflection rumination and perfectionism cognitions for Study 1.
Figure 49. A scatterplot showing the relationship between reflection rumination and brooding rumination for Study 1.

Figure 50. A scatterplot showing the relationship between reflection rumination and self-oriented perfectionism for Study 1.
Figure 51. A scatterplot showing the relationship between reflection rumination and socially prescribed perfectionism for Study 1.

Figure 52. A scatterplot showing the relationship between reflection rumination and negative affect for Study 1.
Figure 53. A scatterplot showing the relationship between reflection rumination and age for Study 1.

Figure 54. A histogram showing the distribution of the standardized residual scores for Study 1.
Figure 55. A scatterplot showing the relationship between the standardized residual and the unstandardized predicted value for Study 1.

Figure 56. A scatterplot showing the relationship between the standardized residual and participant ID for Study 1.
Figure 57. A histogram showing the distribution of scores for the variable perfectionism cognitions (measured by the PCI) for Study 2.

Figure 58. A histogram showing the distribution of scores for the variable self-oriented perfectionism (measured by the MPSHF) for Study 2.
Figure 59. A histogram showing the distribution of scores for the variable socially prescribed perfectionism (measured by the MPSHF) for Study 2.

Figure 60. A histogram showing the distribution of scores for the variable rumination (measured by the RRS) for Study 2.
Figure 61. A histogram showing the distribution of scores for the variable brooding rumination (measured by the RRS) for Study 2.

Figure 62. A histogram showing the distribution of scores for the variable reflection rumination (measured by the RRS) for Study 2.
Figure 63. A histogram showing the distribution of scores for the variable cognitive flexibility (measured by the CFS) for Study 2.

Figure 64. A histogram showing the distribution of scores for the variable depressive symptoms (measured by the CES-D) for Study 2.
Figure 65. A histogram showing the distribution of scores for the variable estimated intelligence (measured by the WASI-II) for Study 2.

Figure 66. A histogram showing the distribution of scores for the variable visual scanning (measured by the D-KEFS Trail Making Test) for Study 2.
Figure 67. A histogram showing the distribution of scores for the variable number sequencing (measured by the D-KEFS Trail Making Test) for Study 2.

Figure 68. A histogram showing the distribution of scores for the variable letter sequencing (measured by the D-KEFS Trail Making Test) for Study 2.
Figure 69. A histogram showing the distribution of scores for the variable number-letter switching (measured by the D-KEFS Trail Making Test) for Study 2.

Figure 70. A histogram showing the distribution of scores for the variable motor speed (measured by the D-KEFS Trail Making Test) for Study 2.
Figure 71. A histogram showing the distribution of scores for the variable age for Study 2.
Table 1

Summary of Missing Data Across Variables of Interest for Study 1.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Missing</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI</td>
<td></td>
<td>1</td>
<td>.60</td>
</tr>
<tr>
<td>RRS Brooding</td>
<td></td>
<td>2</td>
<td>1.10</td>
</tr>
<tr>
<td>RRS Reflection</td>
<td></td>
<td>2</td>
<td>1.10</td>
</tr>
<tr>
<td>CES-D Parcel 1</td>
<td></td>
<td>1</td>
<td>.60</td>
</tr>
<tr>
<td>CES-D Parcel 2</td>
<td></td>
<td>1</td>
<td>.60</td>
</tr>
<tr>
<td>CES-D Parcel 3</td>
<td></td>
<td>1</td>
<td>.60</td>
</tr>
<tr>
<td>CES-D Parcel 4</td>
<td></td>
<td>1</td>
<td>.60</td>
</tr>
<tr>
<td>SOP</td>
<td></td>
<td>0</td>
<td>.00</td>
</tr>
<tr>
<td>SPP</td>
<td></td>
<td>0</td>
<td>.00</td>
</tr>
<tr>
<td>PANAS Negative Affect</td>
<td></td>
<td>0</td>
<td>.00</td>
</tr>
<tr>
<td>Respondent Sex</td>
<td></td>
<td>2</td>
<td>1.10</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>4</td>
<td>2.20</td>
</tr>
</tbody>
</table>

Note. PCI = Perfectionism Cognitions Inventory; SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; RRS = Ruminative Response Scale; CES-D = Center for Epidemiologic Studies in Depression Scale; PANAS = Positive and Negative Affect Schedule.
Table 2

Summary of Psychometric Properties of the Variables of Interest and the Standardized Residual for Study 1

<table>
<thead>
<tr>
<th>Measure</th>
<th>$M$</th>
<th>$SD$</th>
<th>$\alpha$</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI</td>
<td>39.55</td>
<td>21.53</td>
<td>.95</td>
<td>.21</td>
<td>-.86</td>
</tr>
<tr>
<td>RRS Brooding</td>
<td>10.27</td>
<td>3.76</td>
<td>.84</td>
<td>.31</td>
<td>-.82</td>
</tr>
<tr>
<td>RRS Reflection</td>
<td>10.83</td>
<td>3.66</td>
<td>.82</td>
<td>.23</td>
<td>-.55</td>
</tr>
<tr>
<td>CES-D Parcel 1</td>
<td>3.91</td>
<td>3.80</td>
<td>.86</td>
<td>.64</td>
<td>-.69</td>
</tr>
<tr>
<td>CES-D Parcel 2</td>
<td>4.37</td>
<td>3.86</td>
<td>.83</td>
<td>.63</td>
<td>-.67</td>
</tr>
<tr>
<td>CES-D Parcel 3</td>
<td>3.40</td>
<td>3.33</td>
<td>.81</td>
<td>.68</td>
<td>-.50</td>
</tr>
<tr>
<td>CES-D Parcel 4</td>
<td>4.69</td>
<td>4.00</td>
<td>.86</td>
<td>.37</td>
<td>-.96</td>
</tr>
<tr>
<td>SOP</td>
<td>66.89</td>
<td>18.47</td>
<td>.93</td>
<td>-.63</td>
<td>.37</td>
</tr>
<tr>
<td>SPP</td>
<td>53.37</td>
<td>12.95</td>
<td>.83</td>
<td>-.43</td>
<td>.31</td>
</tr>
<tr>
<td>NA</td>
<td>18.07</td>
<td>7.26</td>
<td>.92</td>
<td>.77</td>
<td>-.24</td>
</tr>
<tr>
<td>Age</td>
<td>28.31</td>
<td>3.80</td>
<td>—</td>
<td>-.05</td>
<td>-.68</td>
</tr>
<tr>
<td>Standardized Residual</td>
<td>0.00</td>
<td>.98</td>
<td>—</td>
<td>.74</td>
<td>.70</td>
</tr>
</tbody>
</table>

Note. PCI = Perfectionism Cognitions Inventory; RRS = Ruminative Response Scale; CES-D = Center for Epidemiologic Studies in Depression Scale; SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; NA = Negative Affect.
Table 3

Results of Independent Samples \(t\)-test for Equality of Means Comparing Scores on PCI, SOP, SPP, NA, Rumination, and Depressive Symptoms between Men and Women for Study 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men</th>
<th>SD</th>
<th>Women</th>
<th>SD</th>
<th>(t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI</td>
<td>40.00</td>
<td>21.54</td>
<td>38.73</td>
<td>21.61</td>
<td>-.39</td>
</tr>
<tr>
<td>SOP</td>
<td>67.43</td>
<td>17.53</td>
<td>66.57</td>
<td>18.74</td>
<td>-.31</td>
</tr>
<tr>
<td>SPP</td>
<td>53.83</td>
<td>12.76</td>
<td>53.24</td>
<td>12.67</td>
<td>-.30</td>
</tr>
<tr>
<td>NA</td>
<td>17.90</td>
<td>7.54</td>
<td>18.37</td>
<td>6.98</td>
<td>.43</td>
</tr>
<tr>
<td>RRS Brooding</td>
<td>10.52</td>
<td>3.80</td>
<td>9.93</td>
<td>3.68</td>
<td>-1.06</td>
</tr>
<tr>
<td>RRS Reflection</td>
<td>10.63</td>
<td>3.48</td>
<td>11.11</td>
<td>3.87</td>
<td>.88</td>
</tr>
<tr>
<td>CES-D Parcel 1</td>
<td>4.04</td>
<td>3.83</td>
<td>3.78</td>
<td>3.78</td>
<td>-.45</td>
</tr>
<tr>
<td>CES-D Parcel 2</td>
<td>4.51</td>
<td>3.84</td>
<td>4.22</td>
<td>3.89</td>
<td>-.50</td>
</tr>
<tr>
<td>CES-D Parcel 3</td>
<td>3.52</td>
<td>3.26</td>
<td>3.29</td>
<td>3.44</td>
<td>-.44</td>
</tr>
<tr>
<td>CES-D Parcel 4</td>
<td>4.85</td>
<td>4.00</td>
<td>4.52</td>
<td>4.01</td>
<td>-.53</td>
</tr>
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</table>

Note. PCI = Perfectionism Cognitions Inventory; SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; NA = Negative Affect; RRS = Ruminative Response Scale; CES-D = Center for Epidemiologic Studies in Depression Scale.
### Table 4
Summary of Intercorrelations Correlations among Variables of Interest for Study 1

<table>
<thead>
<tr>
<th>Measure</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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<td></td>
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</tr>
<tr>
<td>RRS Brooding</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>CES-D Parcel 1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CES-D Parcel 2</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>SOP</td>
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</tr>
<tr>
<td>SPP</td>
<td></td>
<td>0.50**</td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>NA</td>
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</tbody>
</table>

Note. PCI = Perfectionism Cognitions Inventory; RRS = Ruminative Response Scale; CES-D = Center for Epidemiologic Studies Scale; SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; NA = Negative Affect. For the M and SD of each variable see Table 2.

*p < .05, **p < .01.
Table 5

Summary of Results of Path Analysis for Direct Effects Model in which Depressive Symptoms was Regressed onto Perfectionism Cognitions, SOP, SPP, Negative Affect and Age for Study 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>95% CI [LL, UL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfectionism Cognitions</td>
<td>.03**</td>
<td>.01</td>
<td>.18</td>
<td>[.01, .05]</td>
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<tr>
<td>SOP</td>
<td>-.04**</td>
<td>.01</td>
<td>-.19</td>
<td>[-.06, -.02]</td>
</tr>
<tr>
<td>SPP</td>
<td>.06**</td>
<td>.02</td>
<td>.22</td>
<td>[.03, .10]</td>
</tr>
<tr>
<td>NA</td>
<td>.32**</td>
<td>.03</td>
<td>.66</td>
<td>[.27, .38]</td>
</tr>
<tr>
<td>Age</td>
<td>-.03</td>
<td>.04</td>
<td>.04</td>
<td>[-.11, .05]</td>
</tr>
</tbody>
</table>

Note. SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; NA = Negative Affect. When the covariates are removed from the model there are no meaningful differences in the results.

** p < .01.
Table 6

**Summary of Results of Path Analysis for Hypothesized Model in which Depressive Symptoms was Regressed onto Rumination, SOP, SPP, Negative Affect and Age and Rumination was regressed on Perfectionism Cognitions, SOP, SPP, Negative Affect and Age for Study 1**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized Direct Effects on Pathway Variable with 95% CI</th>
<th>Standardized Effects on Depression with 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rumination Direct Indirect</td>
<td></td>
</tr>
<tr>
<td>Perfectionism Cognitions</td>
<td>.58* [.45, .71]</td>
<td>.17* [.08, .27]</td>
</tr>
<tr>
<td>SOP</td>
<td>-.17* [-.30, -.05]</td>
<td>-.14** [-.23, -.04]</td>
</tr>
<tr>
<td></td>
<td>[.01] [-.02, .06]</td>
<td></td>
</tr>
<tr>
<td>SPP</td>
<td>.04 [-.09, .17]</td>
<td>.21** [.10, .32]</td>
</tr>
<tr>
<td></td>
<td>[.01] [-.02, .06]</td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td>.47* [.36, .59]</td>
<td>.52** [.39, .64]</td>
</tr>
<tr>
<td>Age</td>
<td>-.05 [-.15, .05]</td>
<td>-.02 [-.10, .06]</td>
</tr>
<tr>
<td>Rumination</td>
<td>[.29** [.16, .43]</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; NA = Negative Affect. When the covariates are removed from the model there are no meaningful differences in the results.

* *p < .05. ** *p < .01.
Table 7

Summary of Outlier Data within Variables of Interest for Study 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Participant ID</th>
<th>z</th>
<th>Raw Score</th>
<th>Winsorized Score</th>
</tr>
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<tbody>
<tr>
<td>D-KEFS Trail Making Number Sequencing Raw Score</td>
<td>1031</td>
<td>3.03814</td>
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</tr>
<tr>
<td>D-KEFS Trail Making Number-Letter Switching Raw Score</td>
<td>2014</td>
<td>3.49640</td>
<td>142.39</td>
<td>107</td>
</tr>
<tr>
<td>D-KEFS Trail Making Number-Letter Switching Scaled Score</td>
<td>2014</td>
<td>-3.53961</td>
<td>1.00</td>
<td>4.90</td>
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<tr>
<td>D-KEFS Trail Making Motor Speed Raw Score</td>
<td>1012</td>
<td>5.74699</td>
<td>120.00</td>
<td>54</td>
</tr>
<tr>
<td>D-KEFS Trail Making Motor Speed Scaled Score</td>
<td>1012</td>
<td>-3.99405</td>
<td>1.00</td>
<td>4.90</td>
</tr>
</tbody>
</table>

*Note.* D-KEFS = Delis-Kaplan Executive Function System.
Table 8

Summary of Psychometric Properties of the Variables of Interest for Study 2

<table>
<thead>
<tr>
<th>Measure</th>
<th>$M$</th>
<th>$SD$</th>
<th>$\alpha$</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI</td>
<td>27.41</td>
<td>15.86</td>
<td>.92</td>
<td>.69</td>
<td>.34</td>
</tr>
<tr>
<td>SOP</td>
<td>68.11</td>
<td>14.56</td>
<td>.88</td>
<td>.52</td>
<td>.17</td>
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<tr>
<td>SPP</td>
<td>53.00</td>
<td>13.33</td>
<td>.84</td>
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<tr>
<td>RRS Total</td>
<td>25.45</td>
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<td>RRS Brooding</td>
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<td>3.47</td>
<td>.78</td>
<td>-.06</td>
<td>-.79</td>
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<tr>
<td>RRS Reflection</td>
<td>12.13</td>
<td>3.52</td>
<td>.75</td>
<td>-.01</td>
<td>-.91</td>
</tr>
<tr>
<td>CFS</td>
<td>52.89</td>
<td>6.75</td>
<td>.71</td>
<td>-.11</td>
<td>-.31</td>
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<tr>
<td>CES-D</td>
<td>25.47</td>
<td>12.48</td>
<td>.93</td>
<td>.41</td>
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<td>Age</td>
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<td>1.74</td>
<td>—</td>
<td>.73</td>
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<tr>
<td>WASI-II Composite Score Full Scale-4</td>
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<td>10.24</td>
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<td>-.30</td>
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<tr>
<td>D-KEFS Trail Making Visual Scanning Raw Score</td>
<td>22.32</td>
<td>5.14</td>
<td>—</td>
<td>.54</td>
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<tr>
<td>D-KEFS Trail Making Visual Scanning Scaled Score</td>
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<td>2.25</td>
<td>—</td>
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<td>1.62</td>
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<tr>
<td>D-KEFS Trail Making Number Sequencing Raw Score</td>
<td>31.08</td>
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<td>—</td>
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<td>9.53</td>
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<td>—</td>
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<tr>
<td>D-KEFS Trail Making Letter Sequencing Raw Score</td>
<td>31.17</td>
<td>8.36</td>
<td>—</td>
<td>.24</td>
<td>-.53</td>
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<tr>
<td>D-KEFS Trail Making Letter Sequencing Scaled Score</td>
<td>9.38</td>
<td>2.48</td>
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<td>-.56</td>
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<td>71.63</td>
<td>18.17</td>
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<td>-.99</td>
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<tr>
<td>D-KEFS Trail Making Number-Letter Switching Scaled Score</td>
<td>9.36</td>
<td>2.12</td>
<td>—</td>
<td>-.31</td>
<td>-.92</td>
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<td>D-KEFS Trail Making Motor Speed Raw Score</td>
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<td>—</td>
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<td>.16</td>
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<tr>
<td>D-KEFS Trail Making Combined Number Sequencing + Letter Sequencing Composite Scaled Score</td>
<td>9.83</td>
<td>2.71</td>
<td>—</td>
<td>-.25</td>
<td>.08</td>
</tr>
</tbody>
</table>

*Note.* PCI = Perfectionism Cognitions Inventory; SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; RRS = Ruminative Response Scale; CFS = Cognitive Flexibility Scale; CES-D = Center for Epidemiologic Studies in Depression Scale; WASI-II = Wechsler Abbreviated Scale of Intelligence – Second Edition; D-KEFS = Delis-Kaplan Executive Function System.
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<tr>
<th>Measure</th>
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<td>.33**</td>
<td>.35*</td>
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<td>.23*</td>
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<td>.08*</td>
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<td>RRS Reflection</td>
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<td>.15</td>
<td>.01</td>
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<td>D-KEFS Trail Making Number-Letter Switching Scaled Score</td>
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<td>D-KEFS Trail Making Letter Score</td>
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<tr>
<td>D-KEFS Trail Making Number Sequencing Scaled Score</td>
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<td>D-KEFS Trail Making Visual Number Sequencing Visual Spirituality Scaled Score</td>
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</table>

Summary of Intercorrelations among Variables of Interest for Study 2
<table>
<thead>
<tr>
<th>Test Description</th>
<th>Scaled Score</th>
<th>p Value</th>
</tr>
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<tbody>
<tr>
<td>D-KEFS Trial Making Speed</td>
<td>15.10</td>
<td>*</td>
</tr>
<tr>
<td>D-KEFS Trial Making Motor</td>
<td>16.57**</td>
<td>**</td>
</tr>
<tr>
<td>D-KEFS Trail Making Number</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>D-KEFS Trail Making Composite</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Abbreviated Scale of Intelligence – Second Edition: D-KEFS = Delis-Kaplan Executive Function System. For M and SD (along with Cronbach’s α) see Table 9. Note. PCI = Perfectionism Cognitions Inventory; SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; RRS = Ruminative Response Scale; CFS = Cognitive Flexibility Scale; CES-D = Center for Epidemiologic Studies in Depression Scale; WASI-II = Wechsler Abbreviated Scale of Intelligence – Second Edition.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 10

Summary of Results of Indirect Effects Analysis for Study 2

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>SE</th>
<th>p</th>
<th>95% CI [LL, UL]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rumination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCI</td>
<td>.18</td>
<td>.07</td>
<td>.01</td>
<td>[.04, .31]</td>
</tr>
<tr>
<td>SOP</td>
<td>-.07</td>
<td>.07</td>
<td>.31</td>
<td>[-.21, .07]</td>
</tr>
<tr>
<td>SPP</td>
<td>.06</td>
<td>.06</td>
<td>.38</td>
<td>[-.07, .19]</td>
</tr>
<tr>
<td><strong>Depression</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCI</td>
<td>.10</td>
<td>.11</td>
<td>.38</td>
<td>[-.12, .31]</td>
</tr>
<tr>
<td>Rumination</td>
<td>1.11</td>
<td>.22</td>
<td>.00</td>
<td>[.67, 1.54]</td>
</tr>
<tr>
<td>SOP</td>
<td>-.19</td>
<td>.10</td>
<td>.08</td>
<td>[-.39, .02]</td>
</tr>
<tr>
<td>SPP</td>
<td>.32</td>
<td>.10</td>
<td>.00</td>
<td>[.12, .51]</td>
</tr>
<tr>
<td><strong>Direct Effect</strong></td>
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<td>.11</td>
<td>.38</td>
<td>[-.12, .31]</td>
</tr>
<tr>
<td><strong>Indirect Effect</strong></td>
<td>.20</td>
<td>.08</td>
<td>.38</td>
<td>[.05, .36]</td>
</tr>
</tbody>
</table>

*Note. PCI = Perfectionism Cognitions Inventory; SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism.*
### Table 1

**Summary of Results of Regression Analysis in which D-KEFS Number-Letter Switching Scaled Scores were Regressed onto Perfectionism Cognitions, SOP, SPP, Intelligence, and Head Injury for Study 2**

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>p</th>
<th>95% CI [LL, UL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfectionism Cognitions</td>
<td>.02</td>
<td>.03</td>
<td>.14</td>
<td>.49</td>
<td>[-.03, .07]</td>
</tr>
<tr>
<td>SOP</td>
<td>-.02</td>
<td>.03</td>
<td>-.14</td>
<td>.42</td>
<td>[-.07, .03]</td>
</tr>
<tr>
<td>SPP</td>
<td>-.03</td>
<td>.02</td>
<td>-.21</td>
<td>.17</td>
<td>[-.08, .02]</td>
</tr>
<tr>
<td>WASI-II</td>
<td>.05</td>
<td>.03</td>
<td>.22</td>
<td>.12</td>
<td>[-.01, .10]</td>
</tr>
<tr>
<td>Head Injury</td>
<td>-.55</td>
<td>.58</td>
<td>-.13</td>
<td>.35</td>
<td>[-1.73, .62]</td>
</tr>
</tbody>
</table>

*Note.* SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; WASI-II = Wechsler Abbreviated Scale of Intelligence – Second Edition.
Table 12

*Summary of Results of Regression Analysis in which D-KEFS Visual Scanning Scaled Scores were Regressed onto Perfectionism Cognitions, SOP, SPP, Intelligence, and Head Injury for Study 2*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>p</th>
<th>95% CI [LL, UL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfectionism Cognitions</td>
<td>.00</td>
<td>.03</td>
<td>-.03</td>
<td>.58</td>
<td>[-.07, .04]</td>
</tr>
<tr>
<td>SOP</td>
<td>.03</td>
<td>.03</td>
<td>.18</td>
<td>.70</td>
<td>[-.05, .07]</td>
</tr>
<tr>
<td>SPP</td>
<td>-.01</td>
<td>.03</td>
<td>-.03</td>
<td>.23</td>
<td>[-.02, .09]</td>
</tr>
<tr>
<td>WASI-II</td>
<td>.03</td>
<td>.03</td>
<td>.15</td>
<td>.98</td>
<td>[-.06, .07]</td>
</tr>
<tr>
<td>Head Injury</td>
<td>-.92</td>
<td>.60</td>
<td>-.22</td>
<td>.81</td>
<td>[-1.17, 1.49]</td>
</tr>
</tbody>
</table>

*Note.* SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; WASI-II = Wechsler Abbreviated Scale of Intelligence – Second Edition.
Table 13

Summary of Results of Regression Analysis in which D-KEFS Motor Speed Scaled Scores were Regressed onto Perfectionism Cognitions, SOP, SPP, Intelligence, and Head Injury for Study 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>p</th>
<th>95% CI [LL, UL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfectionism Cognitions</td>
<td>.04</td>
<td>.03</td>
<td>.30</td>
<td>.81</td>
<td>[-.06, .04]</td>
</tr>
<tr>
<td>SOP</td>
<td>-.03</td>
<td>.03</td>
<td>-.23</td>
<td>.69</td>
<td>[-.06, .04]</td>
</tr>
<tr>
<td>SPP</td>
<td>-.05</td>
<td>.02</td>
<td>-.29</td>
<td>.28</td>
<td>[-.02, .07]</td>
</tr>
<tr>
<td>WASI-II</td>
<td>.05</td>
<td>.03</td>
<td>.24</td>
<td>.81</td>
<td>[-.05, .06]</td>
</tr>
<tr>
<td>Head Injury</td>
<td>-.38</td>
<td>.60</td>
<td>-.09</td>
<td>.53</td>
<td>[-.58, 1.76]</td>
</tr>
</tbody>
</table>

Note. SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; WASI-II = Wechsler Abbreviated Scale of Intelligence – Second Edition.
Table 14

Summary of Results of Regression Analysis in which D-KEFS Combined Number Sequencing + Letter Sequencing Composite Scaled Scores were Regressed onto Perfectionism Cognitions, SOP, SPP, Intelligence, and Head Injury for Study 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>p</th>
<th>95% CI [LL, UL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfectionism Cognitions</td>
<td>.02</td>
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<td>.14</td>
<td>.75</td>
<td>[-.06, .08]</td>
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<tr>
<td>SOP</td>
<td>-.01</td>
<td>.03</td>
<td>-.07</td>
<td>.29</td>
<td>[-.10, .03]</td>
</tr>
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<td>SPP</td>
<td>-.05</td>
<td>.03</td>
<td>-.26</td>
<td>.42</td>
<td>[-.09, .04]</td>
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<tr>
<td>WASI-II</td>
<td>.06</td>
<td>.04</td>
<td>.23</td>
<td>.34</td>
<td>[-.04, .11]</td>
</tr>
<tr>
<td>Head Injury</td>
<td>-.20</td>
<td>.76</td>
<td>-.04</td>
<td>.79</td>
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</table>

Note. SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; WASI-II = Wechsler Abbreviated Scale of Intelligence – Second Edition.
Table 15

Summary of Results of Regression Analysis in which Self-Reported Cognitive Flexibility was Regressed onto Perfectionism Cognitions, SOP, SPP, Intelligence, and Head Injury for Study 2

<table>
<thead>
<tr>
<th>Variable</th>
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<th>$\beta$</th>
<th>$p$</th>
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<td>Perfectionism Cognitions</td>
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<td>.08</td>
<td>-.10</td>
<td>.59</td>
<td>[-.20, .11]</td>
</tr>
<tr>
<td>SOP</td>
<td>.13</td>
<td>.08</td>
<td>.27</td>
<td>.11</td>
<td>[-.03, .28]</td>
</tr>
<tr>
<td>SPP</td>
<td>-.17</td>
<td>.07</td>
<td>-.34</td>
<td>.02</td>
<td>[-.32, -.03]</td>
</tr>
<tr>
<td>WASI-II</td>
<td>-.13</td>
<td>.09</td>
<td>-.19</td>
<td>.16</td>
<td>[-.30, .05]</td>
</tr>
<tr>
<td>Head Injury</td>
<td>-1.64</td>
<td>1.80</td>
<td>-.12</td>
<td>.37</td>
<td>[-5.25, 1.97]</td>
</tr>
</tbody>
</table>

*Note. SOP = Self-Oriented Perfectionism; SPP = Socially Prescribed Perfectionism; WASI-II = Wechsler Abbreviated Scale of Intelligence – Second Edition.*