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What Are You Ruminating About? The Development and Validation of a Content-Dependent Measure of Rumination

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Abstract

Rumination is a past-focused distress response characterized by repetitive and passive fixation on symptoms, possible causes, and/or consequences of distress (Nolen-Hoeksema, 1991). To date, previous measures of rumination have focused on general levels of rumination without considering the content of ruminative thought. This dissertation describes the development of a new rumination measure, the Rumination Domains Questionnaire (RDQ), which considers the content of ruminative thought. Furthermore, the present dissertation describes group differences found in the content of ruminative thought that have been difficult and/or unfeasible to capture in research prior to the introduction of the RDQ. In the introduction, a case is made for how scientists and practitioners may benefit from such a scale and how such a scale should be developed based on the scale development literature. Study 1 describes the rigorous procedures which constituted scale development, including item generation and selection based on empirical criteria. Study 2 is concerned with the validation of the RDQ in terms of reliability, concurrent validity, convergent validity, discriminant validity, and structural validity using two samples: a student sample and a community sample. In this study, reliability, concurrent, convergent, and to a lesser extent discriminant validity was supported, as was the scale's structural validity as a 10-factor scale (with domains as factors). In Study 3, the criterion and incremental validity of the scale was tested using daily diary methods. In this study, daily rumination (specific to a domain) was predicted by the corresponding RDQ domain score, whereas the RDQ-total score predicted relevant outcomes such as negative mood and amotivation, often even above and beyond the effect of other rumination scales. In Study 4, criterion validity was assessed once again, reliability was demonstrated (both internal consistency and test-retest reliability), and relationships with social desirability were examined. Moreover, two samples were collected: a

student sample and an older sample, with which sex differences and differences between the samples in rumination content, as well as anxiety and depression, were investigated. Overall, these studies provide promising preliminary evidence for the RDQ's validity, which may be used to assess the previously oft-neglected area of rumination content.

Keywords: rumination, perseverative cognition, neuroticism

Summary for Lay Audience

Rumination is a past-focused distress response characterized by repetitive and passive fixation on symptoms, possible causes, and/or consequences of distress. Overall, researchers have generally been interested in the extent to which individuals ruminate but have largely neglected the content of the rumination – that is, what people ruminate about. The dearth of research on this topic is at least partially due to a lack of measurement tools that capture the degree to which individuals ruminate about certain issues. The purpose of this dissertation was to create a rumination scale that considers the content of rumination. Based on the previous literature, as well as clinical and counselling case studies, I generated approximately 250 statements for 10 domains of life. After expert screening, these statements were subjected to rigorous statistical treatments to reduce the initial pool of items to a total of 60 statements (six statements per domain). In a subsequent study, a student sample and a community sample completed the 60 items, as well as various other measures to assess the extent to which this new scale (called the Rumination Domains Questionnaire; RDQ) complies with other constructs in such a way that is consistent with other rumination measures, previous rumination research, as well as relevant theory. Overall, the RDQ did well according to these empirical and theoretical criteria. In the next study, participants completed the RDQ and then every day for seven days reported the time they spent ruminating about each domain of life, as well as their daily sleep quality, amotivation, and negative mood. It was found that the RDQ domains successfully predicted the daily rumination in the corresponding domain, as well as outcomes such as amotivation and negative mood, supporting the validity of the RDQ (i.e., that the RDQ measures what it is supposed to measure). In the final study, it was demonstrated that the RDQ is reliable, and correlates with relevant outcomes.

Further, it was found that women ruminate more than men in most domains of life and that students ruminated more than older individuals in almost all domains of life.

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Chapter 1

1.1. Introduction

The personality trait of neuroticism describes one of the most salient emotional aspects of the human condition. Although general measures of neuroticism exist, the over-generality of the construct limits its utility in some contexts. Hence, the goal of my dissertation is to create a measure of rumination, a major feature of neuroticism. Specifically, this dissertation describes the development and validation of a new self-report measure of rumination, the Rumination Domains Questionnaire (RDQ) that considers the content of ruminative cognitions (i.e., what do people ruminate about?).

This paper begins with a discussion of neuroticism as a construct with a focus on rumination. Rumination, defined as a past-focused distress response characterized by repetitive and passive fixation on symptoms, possible causes, and/or consequences of distress (Nolen-Hoeksema, 1991) will be reviewed, including literature regarding comparisons to the construct of worry (a similar but distinct cognitive tendency), as well as its effects and correlates. Following the discussion of neuroticism, a review of the extant literature on quantitative group differences (i.e., age and sex) in perseverative cognition will be presented. After reviewing the literature and group difference findings, a proposal is put forth based on the literature examining values, worry, and interactional anxiety theory. Based on the review, it will be suggested that a new domain-specific approach to rumination measurement is necessary to investigate the individual and likely group differences in content of ruminative thoughts. To further demonstrate the need for a domain-specific rumination scale, current popular measures of rumination will be scrutinized in terms of psychometric issues. In the *Present Study* section, the purpose and the main goals of this dissertation will be reiterated in light of the reviewed literature.

The next sections of this paper will outline the plan of scale development and validation. Specifically, Study One of the study will describe the item selection and initial construction of a new domain-specific measure of rumination. Study Two concerns the concurrent and discriminant validation of the constructed measure. Study Three will concern the validation of the newly constructed measure, beyond standard self-report measures. Specifically, this study will use daily-diary methods to assess the criterion validity of the new measure. Finally, Study Four will investigate group differences in rumination content, as well as further assess concurrent validity, the effect of social desirability, and test-retest reliability.

1.2 The Power and Pitfalls of Neuroticism as a Construct

Neuroticism (i.e., the reverse of emotional stability) is a major dimension that has been recognized by all major comprehensive personality taxonomies, including the Five-Factor model (Costa & McCrae, 1992), HEXACO model (Lee & Ashton, 2004), and Eysenck's personality model (Eysenck & Eysenck, 1975). The ubiquity of neuroticism is also complemented by its enormous predictive power, especially in the realm of psychopathology (Claridge & Davis, 2001). Trait neuroticism is associated with such outcomes as somatic symptoms (Denovan et al., 2019; Rosmalen et al., 2007), alcohol dependence (Devynck et al., 2017), depression severity and proneness (Saklofske et al., 1995), eating disorders and maladaptive eating (Cervera et al., 2003; Kornacka et al., 2021; Riley et al., 2021), schizophrenia (Van Os & Jones, 2001), negative affect (Hisler et al., 2020), internalizing disorders and substance use (Griffith et al., 2010), suicidal ideation (Rappaport et al., 2017; Tucker et al., 2014), and loneliness (Abdellaoui et al., 2019). It is clear from the literature that the construct of neuroticism is remarkably powerful and encompasses an enormous amount of variance associated with negative emotion. In the context of psychopathology, Claridge and Davis (2001) have stated that finding high neuroticism "to be

a correlate of deviance is so unremarkable that it comes as quite a shock to discover exceptions"[1] (p. 384). Given the potency of the construct, it is not surprising that researchers have noted that neuroticism likely has tremendous economic (Cuijpers et al., 2010) and public health implications (Lahey, 2009; Widiger & Oltmanns, 2017). For example, Cuijpers et al. (2010) estimated that for the year of 2007 in The Netherlands, the total excess costs of neuroticism (including medical costs, non-medical costs associated with health care system usage, and losses associated with health-related absences) per 1 million inhabitants for the top 25% of neuroticism scorers reached $1.393 billion (USD). With such critical implications, the value of gaining an understanding of neuroticism and its mechanisms is crucial to potentially mitigating the harms associated with neuroticism and in fact, some researchers have posited that addressing neuroticism in psychological treatment may prove to be highly effective in treating general psychopathology (Sauer-Zavala et al., 2017).

Some researchers have questioned the explanatory and descriptive value of neuroticism because the construct is overgeneral (e.g., Claridge & Davis, 2001; Ormel et al., 2004). Specifically, the construct lacks discriminatory power in the sense that even though it is very good at predicting general vulnerability to psychopathology and abnormal outcomes, it does little to describe or discriminate between different forms of psychopathology, identify mechanisms of psychopathology, or describe much about the nature of psychopathology (Ormel et al., 2004). Thus, a finer-grained approach looking at the mechanisms of neuroticism may be necessary to understand and differentiate neurotic outcomes. One such mechanism is self-generated negative thought (such as worry or rumination), which some have posited is the engine of neuroticism (Perkins et al., 2015). Perkins et al. (2015) explain that self-generated thought could account for

[1] Though this statement is likely more true of emotion-related psychopathology and perhaps less valid with regard to other psychopathologies.

why neurotic individuals tend to experience negative affect and unpleasant emotions in the absence of an affect-triggering stimulus. Of course, this is not to claim that there are not other important mechanisms that are responsible for neurotic outcomes, however, there is compelling evidence that self-generated thought such as rumination is a key factor in neurotic psychopathology. For example, research has found that intrusive thought such as rumination, accounted for the relationships between neuroticism and anxiety and depression (Chen et al., 2020; Lu et al., 2017; Lyon et al., 2020; Merino et al., 2016; Muris et al., 2005; Roelofs et al., 2008). As well, research has found that rumination partially mediated and mediated the negative relationship between neuroticism and cognitive performance (Munoz et al., 2013). Moreover, rumination fully mediated the relationship between neuroticism and somatic complaints (Denovan et al., 2019). Furthermore, research has indicated that the positive relationship between neuroticism and sleep impairment became nonsignificant when daily rumination and negative affect were statistically controlled (Slavish et al., 2018). In the same vein, randomized controlled trials have shown that interventions targeting rumination and worry may be effective in preventing anxiety disorders and depression (Topper et al., 2017; Watkins, 2016). Therefore, understanding rumination may be crucial in comprehending and eventually mitigating the substantial harms of neuroticism.

1.3. Rumination Defined

Introspection and self-reflection are intrinsic parts of the human experience and are associated with several positive outcomes, including self-insight (Hixon & Swann, 1993), improved problem-solving (Jäkel & Schreiber, 2013), resilience (Cowden & Meyer-Weitz, 2016), subjective happiness (Elliot & Corker, 2008), and self-esteem (Brown & Brown, 2011). However, when these processes become repetitive, intrusive, and uncontrollable, they become

dysfunctional and destructive. Rumination is a distress response characterized by repetitive and passive fixation on symptoms, possible causes, and/or consequences of the distress (Nolen-Hoeksema, 1991; see Nolen-Hoeksema et al., 2008 and Smith & Alloy, 2009 for reviews)[2] and is characterized by negative judgement of the experience or emotion (Rude et al., 2007). Individuals who ruminate brood over their problems compulsively but fail to engage in active problem-solving to attend to the issue at hand (Nolen-Hoeksema et al., 2008). Moreover, individuals who ruminate extrapolate their negative emotions to predictions of the future and expect negative events to occur (Watkins et al., 2015). Rumination does not increase insight compared to other forms of problem-focused thought and promotes avoidance and inactivity (Kambara et al., 2019; Kingston et al., 2014). This form of self-attention is associated with such negative outcomes as anxiety (Aldao et al., 2010; Armey et al., 2009; Dar & Iqbal, 2015; Flett et al., 2002; Liu et al., 2023; Muris, et al., 2005; Olatunji et al., 2013; Silvia & Phillips, 2011; Szkodny & Newman, 2019), interpersonal problems (Pearson et al., 2010), poor physical health (Thomsen et al., 2004), social anxiety (Kocovski et al., 2005), delay of seeking diagnosis for breast cancer symptoms (Lyubormirsky et al., 2006), higher shame (Cheung et al., 2004), regret (Roese et al., 2009), poor problem-solving (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubormirsky et al., 1999; Watkins & Baracaia, 2002; Watkins & Moulds, 2005; though some evidence has suggested an inverted U-shaped relationship between rumination and problem-solving performance; Hubbard et al., 2015), diminished performance monitoring (Tanovic et al., 2017), cognitive rigidity (Davis & Nolen-Hoeksema, 2000; Grant et al., 2021; Koster et al., 2013; Owens & Derakshan, 2013; Yang et al., 2017), reduced sleep duration and quality (Jiang & Poon, 2021; Nota & Coles, 2015; Ottaviani et al., 2015; Thomsen et al., 2003), reduced

[2] Although there are conceptualizations of rumination in which there can be positive types of rumination (e.g., Yang et al., 2020), generally, rumination is seen as being negative in emotional valence.

cognitive control (Beckwé et al., 2014; Holas et al., 2019), inhibition of instrumental behaviours (Lyubormirsky & Nolen-Hoeksema, 1993; Ward et al., 2003), higher blood pressure and impaired blood pressure recovery (Ottaviani et al., 2017), internalizing disorders (Brinker et al., 2014), low resting heart-rate variability (Carnevali et al., 2018; Ottaviani et al., 2011; Ottaviani et al., 2016), substance abuse (Aldao et al., 2010; Nolen-Hoeksema & Harrell, 2002; Nolen-Hoeksema et al., 2007; Willem et al., 2011), eating disorders (Aldao et al., 2010; Nolen-Hoeksema et al., 2007), health risk behaviours (Clancy et al., 2016) poor self-esteem (Silvia & Phillips, 2011), psychological distress (Tanner et al., 2013), increased cortisol concentrations (Zoccola & Dickerson, 2012), depression (Aldao et al., 2010; Armey et al., 2009; Hilt et al., 2010; Muris et al., 2005; Nolan et al., 1998; Nolen-Hoeksema & Harrell, 2002; Nolen-Hoeksema et al., 2007; Olatunji et al., 2013; Raes, 2010; Silvia & Phillips, 2011; Stange et al., 2017; Szkodny & Newman, 2019; Thomsen, 2006; Willem et al., 2011), loneliness, worse well-being (Borawski, 2019; Vanhalst et al., 2012), lower self-compassion (Raes, 2010); negative future thinking (Lavender & Watkins, 2004), and negative affect (Mor & Winquist, 2002; Thomsen, 2006; Pe et al., 2013)

Theorists have suggested that episodes of rumination occur as a response to a discrepancy between one's perception of oneself and their ideal self, or of insufficient progress in reaching a goal (Martin & Tesser, 1989, 1996; Watkins, 2008), in that repetitive thoughts about the discrepancy between ones' goals and their present state. The most used theoretical framework (response styles theory; Nolen-Hoeksema, 1991; 2004) characterizes rumination as a response to distress where individuals perseverate about the causes or consequences of their distress. Others have suggested that the tendency to ruminate can be solidified in a similar way to developing a habit (Watkins & Nolen-Hoeksema, 2014). Specifically, Watkins and Nolen-Hoeksema (2014)

posited that rumination will become habitual if episodes of rumination are contingent on negative mood (such as when there is a discrepancy between one's goal and current state), in such a way where this contingent relationship is repeated over time for an associative link, through priming and increased accessibility of goal-relevant information, is formed between distress and cognition.

Such a tendency is problematic, as rumination prolongs depression and distress by increasing the effects of depressed mood on cognitive processes by activating depressing thoughts and memories in the attempt to understand current situations (Nolen-Hoeksema, 1991). Research has also found that rumination fully mediates the relationship between concurrent symptoms of depression and anxiety in adolescents, and partially mediates this relationship in adults, suggesting that it is a key factor in the comorbidity of depression and anxiety (McLaughlin & Nolen-Hoeksema, 2011). Further, research has indicated that rumination mediates the relationship between stressful life events and symptoms of anxiety and depression (Michl et al., 2013). Moreover, rumination promotes a feeling of helplessness and individuals who ruminate are less likely to participate in behaviours that will improve their present predicaments, even if they believe that those behaviours would be helpful (Lyubomirsky & Nolen-Hoeksema, 1993). Rumination can be destructive, but also can often be completely pointless in nature as ruminative thoughts are often about situations from the past that cannot be changed, altered, or fixed (Gold & Wegner, 1995).

Rumination is often compared to worry and some researchers have posited that they are the same phenomenon or share common cognitive processes and only differ in content (e.g., worry is future-oriented and rumination is past-oriented; McEvoy et al., 2010; Watkins et al., 2005; see also Hong, 2007). Other researchers have maintained that these are distinct processes

which share some common features (see Papageorgiou & Wells, 2004 for review of differences between rumination and worry). Fresco et al. (2002), for instance, entered data from commonly used worry and rumination scales into an exploratory factor analysis, which yielded four factors: two factors comprised of worry items and two factors comprised of rumination items, with only four items (out of 38) which loaded onto multiple factors. Moreover, using meta-analysis, Clancy et al. (2016) found that increases in rumination, but not worry were associated with health risk behaviours (e.g., smoking, substance abuse, unhealthy eating, alcohol consumption), indicating diverse outcomes associated with these two cognitive phenomena. Hur et al. (2019) found that worry and rumination differ in their attentional bias. Specifically, Hur et al. (2019) found that worry is associated with a bias away from threat, whereas rumination was associated with a bias toward loss/failure. In the same vein, Lewis et al. (2019) found that compared to rumination, worry leads to attentional avoidance of positive information. These results indicate that a differentiation is warranted between the two constructs. Similarly to rumination, worry is a thought process that is relatively uncontrollable, negatively valanced, affect-laden, and represents an attempt at problem-solving (Borkovec et al., 1983; Kircanski et al., 2015). Moreover, worry is strongly correlated with rumination (Fresco et al., 2002; Kowalski & Schermer, 2019a) and shares many of the same negative correlates with rumination, such as anxiety and depression (Brosschot et al., 2006; Kircanski et al., 2015). Because of their similarities, rumination and worry are often described as forms of perseverative cognition (Brosschot et al., 2006). It is posited that stressors alone have relatively minor consequences associated with mental and physical health as they often result in only short bursts of physiological arousal. On the other hand, perseverative cognition prolongs the physiological arousal prior to and following a stressor. Because of the perseverative properties, rumination and

worry (or perseverative cognition, more broadly) increase the chance of detrimental health outcomes.

1.4. Group Differences in Rumination

Differences in perseverative cognition exist among different demographics. For example, women, on average, tend to worry more than men (e.g., Zalte & Chambless, 2008; Zlomke & Hahn, 2010). Butler and Nolen-Hoeksema (1994) have also found that, on average, women tended to ruminate more than men and this finding was later supported by a meta-analysis of 59 studies (14,321 participants) by Johnson and Whisman (2013; Cohen's d = .24), as well as other research (e.g., Jose et al., 2001). Furthermore, Sutterlin et al. (2012) found that there are age group differences in rumination. In their study, they found that individuals tend to ruminate less as they get older. Specifically, they divided their sample into five age groups (i.e., 24 years of age and younger, 25-37, 38-50, 51-62, and 63 years of age and older) and found that the youngest cohort (24 years of age and younger) scored highest on ruminative brooding, followed by the 51-62 cohort, followed by the 25-37 cohort and the 38-50 cohort, whereas the oldest cohort scored significantly lower on ruminative brooding than the other age groups. Other research has also found negative age trends in worry with reductions of levels of worry occurring later in life (Basevits et al., 2008). Barahmand (2008) noted that trends in worry may be under the influence of tasks that individuals face at each stage in development (this conclusion was made regarding adolescent groups, but it can be reasonably surmised that this would hold for life stages in general). Furthermore, in a study comparing a sample from an individualistic culture (New Zealand) and a sample from a collectivistic culture (China), Jose and colleagues (2001) found that adolescents from these cultures differed in what they were stressed about (i.e., New Zealanders were concerned with physical appearance and conflict with family, whereas Chinese

adolescents were concerned with low grades and lack of free time). Jose and colleagues (2001) also found differences in levels of general rumination, with Chinese adolescents scoring higher on rumination than their counterparts from New Zealand; researchers surmised that this may be due to a stronger collectivist orientation in interpersonal relationships. Based on the extant literature, quantitative differences in perseverative cognition, and more specifically, rumination, exist between sexes and age cohorts (and possibly other categorizations of people as well). What is less known and necessary to better understand are what qualitative differences exist in rumination across groups.

1.5. A Domain-Specific Approach

Previous research on sex differences has shown that men and women differ in what they value. Specifically, Schwartz and Rubel (2005) found that men consistently attribute more importance than women to the values of hedonism, power, stimulation, self-direction, and achievement, whereas women consistently attribute more importance to the values of benevolence and universalism. Women also tended to attribute more importance to security values, but these results were less consistent across cultures. In a more recent study, Vilar et al. (2020) found that women not only differed from men (although these effects were not large) in values, but that these values differed in importance across the lifespan. For example, older adults scored higher than young adults in values that were associated with social (i.e., interactive and normative goals) and central goals (suprapersonal and existence goals), whereas young adults valued personal goals (excitement and promotion) more so than older adults and this pattern of results was consistent across cultures. These studies reflect the differences in priorities and challenges across sexes and throughout the lifespan. Therefore, if individuals and groups differ substantially in their priorities and challenges, then it is clear that they should ruminate about

different domains of life (particularly those associated with the values that are deemed of higher importance; presumably, individuals should not be as vulnerable to negative emotion when problems arise in domains in which they are not invested). As such, there is a need of researchers and psychological practitioners (e.g., therapists) for a measure of rumination that considers both the level of rumination and the content of these ruminative and worry-related thoughts, especially considering that research has demonstrated that increased personal importance of a situation has been associated with rumination (Watkins, 2004). Thus, a greater understanding of rumination content may help uncover group differences in rumination, and potentially may help uncover relationships between content of rumination and undesirable psychological constructs (e.g., anxious attachment) and psychopathologies, as well as investigate the suitability of rumination-centered interventions based on the content of rumination.

Such an approach has already been employed in the measurement of non-clinical worry. Tallis et al. (1992) developed the Worry Domains Questionnaire (WDQ) to measure worry in five domains of life: relationships, lack of confidence, aimless future, work incompetence, and financial (the authors also included a sixth domain, the socio-political domain, but cautioned against using this subscale in the calculation of an overall worry score). The WDQ has demonstrated strong internal consistency in both clinical and non-clinical samples (McCarthy-Larzelere et al., 2011; Stober, 1998), high test-retest reliability (Stober, 1998), and strong convergent validity (Stober, 1998). Similarly, Davey et al. (2022) developed a domain measure of worry for students, the Student Worry Questionnaire (SWQ) which measures worry in the domains of academics, health, finances, relationships, what others think, and family. The internal reliability and construct validity has been described as good (Davey et al., 2022), however, because of the novelty of the measure, its validity has not been extensively tested.

Research with the WDQ has yielded results demonstrating differences in worry content between men and women. For instance, Scott et al. (2002) found that there were no group ethnic differences across Caucasians, African Americans, and Asian Americans in worry when a general worry scale was used (nor were there differences in frequency of Generalized Anxiety Disorder). However, when the WDQ was employed, the researchers found significant group differences in all domains of the WDQ other than the financial domain. In the same vein, Wood et al. (2005) reported that when participants were asked to rate the worry of a typical man or woman and/or the worry of their significant other, women (both typical women and significant others) were perceived to worry significantly more about relationship-related issues than men, and typical men were perceived to worry significantly more about achievement and finances-related issues than typical women. When participants were asked about their own worry, Wood et al., (2005) found a marginally significant difference with women worrying more about achievement-related issues than men. Ladouceur et al. (2002) investigated the social basis of worry amongst samples of high school students, undergraduate students, and older adults. The authors predicted that the first factor extracted in a factor analysis of the WDQ items would reflect content relating to social worries and that this factor would be the best correlate of a general tendency to worry as measured by a different worry measure. The results supported the hypotheses in both the high school student and undergraduate student samples, but the first factor for the older adult sample was not saliently social (described as ‘issues about aging’; Ladoucer et al., 2002). Moreover, the second factor (which reflected the most social content) in the older adult sample was almost equally correlated with general worry as the first factor, indicating age differences in life domains that contribute to general worry. Based on the conceptual similarity between worry and rumination, there is no reason to assume that group differences cannot exist

in content of ruminative thought, and even if such group differences do not exist, there can be great utility in systematically exploring rumination content in groups of individuals for both researchers and practitioners.

The interaction model of anxiety posits that state anxiety, a construct which is closely related to worry and rumination, is a function of anxiety traits and the situation (Endler, 1997; Endler & Kocovski, 2001; Endler & Parker, 1990). For example, individuals who score high in trait anxiety toward social evaluation will experience more state anxiety in ego-threatening situations than a person who is relatively low in anxiety towards social evaluation, even when the individuals have similar overall levels of general trait anxiety (i.e., trait anxiety towards social evaluation and anxiety due to a physically dangerous situations will not interact to predict state anxiety; Flood & Endler, 1980). This model has been supported in various settings including academic examinations (Endler & Magnusson, 1977), athletic competitions (track and field and equestrian; Flood & Endler, 1980; Trotter & Endler, 1999), parachute training (Endler et al., 1992), and acute exercise settings (Blanchard et al., 2002). Similar presuppositions can be made regarding rumination. That is, individuals who score similarly on measures of general rumination may differ in the content of their ruminative thoughts. Individuals differ in their priorities, goals, and life challenges; therefore, individuals may ruminate more about problems, difficulties, or issues that are more relevant to their most salient priorities, goals, or life challenges. This idea is also consistent with Martin and Tesser's (1996) goal-pursuit model of rumination, which posits that rumination is often the product of failure or difficulty associated with attainment of a goal and is especially intense when these failures or difficulties pertain to a goal of high personal importance. This theory has been supported in past research (e.g., McIntosh, Harlow, & Martin, 1995), including research using experience sampling (e.g., Moberly & Watkins 2010).

Further, a domain approach to rumination could prove to be useful in clinical and counselling contexts. Interventions targeting rumination have shown much promise in addressing certain psychopathologies (e.g., Knabb et al., 2022; Sloan et al., 2008; Querstet & Cropley, 2013; Watkins et al., 2011), however little is known about targeting certain content of rumination (e.g., targeting relationship-oriented rumination). Such an approach would likely be useful in the study of psychopathology, domain-specific psychopathologies and psychological conditions exist. For example, if an individual suffered from social anxiety (but not General Anxiety Disorder), a practitioner would likely recommend a course of action that would target the social domain, rather than one that is targeted towards general anxiety. Likewise, an individual with anxious attachment may have more success with dealing specifically with thoughts regarding romantic relationships than with general anxiety. There are a number of such examples that may be domain-dependent (e.g., specific phobias, PTSD, etc.), hence, it may be fruitful, in some cases, to investigate interventions for psychopathologies, where rumination may be a mechanism, through the perspectives of life domains.

1.6. Measurement of Rumination

Recent research has produced three widely used measures: the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991; Treynor et al., 2003), the Rumination and Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), and the Rumination on Sadness scale (RSS; Conway et al., 2000). These questionnaires have been valuable to the study of trait rumination in identifying correlates and consequences, but also for identifying potential interventions (e.g., mindfulness; Deyo et al., 2009). All three of these measures have several issues. One limitation of these measures, and the main impetus for the creation and validation of my measure, is that neither of these measures distinguish between the content of rumination,

which limits the utility of these measures to research concerning only general levels of rumination. In addition to this limitation in depth of content, there are several psychometric issues with each scale, as outlined below.

1.6.1. Ruminative Responses Scale. The RRS was first developed by Nolen-Hoeksema and Morrow (1991) to investigate psychological responses of individuals to the Loma Prieta Earthquake in 1989. The original Ruminative Responses scale had 22 items and the reliability reported by the original study was excellent (alpha = .89) with similar findings in other studies (alpha ranging from .88 to .92; Bagby et al., 1999; Just & Alloy, 1997; Nolan et al., 1998; Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema et al., 1999; Nolen-Hoeksema et al., 1994). In addition, the original Ruminative Responses scale was reported to correlate strongly with diary reports of rumination on depressed mood (Nolen-Hoeksema & Morrow, 1991). Since then, several issues have been identified with the RRS including excessive overlap with other constructs related to automatic thought, items overlapping with measures of depression, irrelevant items, only moderate test-retest reliability, and a questionable factor structure (Conway, et al., 2000; Cox et al., 2001; Just & Alloy, 1997; Roberts et al., 1998; Sergerstrom et al., 2000; Treynor et al., 2003). To address some of these issues, Treynor et al. (2003) revised the original RRS by removing items that were deemed too similar to depression-related items (i.e., items that were more closely related to sadness, fatigue, or difficulty in performing simple tasks, than they were to rumination). The original 22-item scale was reduced to 10 items which produced two factors (subscales): brooding and reflection (five items in each subscale). Each subscale had acceptable internal consistency, and some research has found that the scale has marginal test-retest reliability (Schoofs et al., 2010; Surrence et al., 2010; Treynor et al., 2003). Although the brooding subscale predicted concurrent and future depression, as expected, and

mediated the gender difference in depression (the RRS also reflected true gender differences in rumination; Whisman et al. 2018), as expected, Whitmer and Gotlib (2011) found that that the two-factor structure did not replicate in samples of individuals with depression. Moreover, Parola et al. (2017) found that the reflection subscale had questionable internal reliability (alpha < .70) and the two-factor structure proposed by Treynor et al. (2003) did not fit their data satisfactorily. Brinker and Dozois (2009) also noted that the instructions of the RRS are problematic as they ask participants to report how often they engage in ruminative thoughts when they are "feeling sad, blue, or depressed" (Treynor et al., 2003). This wording limits the applicability of the questionnaire to individuals' responses to times of sadness and does not allow for the investigation of ruminative cognitions when the individual is not feeling sad or blue (Brinker & Dozois, 2009).

1.6.2. Rumination and Reflection Questionnaire. The Rumination and Reflection Questionnaire (RRQ) was developed by Trapnell and Campbell (1999). The RRQ has two distinct subscales (12 items in each) representing rumination (comparable to the brooding factor of the RRS) and reflection (as opposed to the RRS, the RRQ conceptualization of rumination excludes reflection as a factor of rumination). Both subscales have shown strong internal reliability in past research (Kowalski & Schermer, 2019a; Trapnell & Campbell, 1999) and the two-factor structure proposed was supported by Principal Components Analysis (PCA; Trapnell & Campbell, 1999). Other research has shown unacceptably low internal reliability for the reflection subscale ($\alpha = .47$; Newman & Nezlek, 2019). Some researchers have also questioned the meaning of the reflection subscale as an adaptive dimension considering significant positive correlations with neuroticism and overlap with rumination (Nolen-Hoeksema et al., 2008).

Despite the relatively common use of the RRQ in psychological research, there is a dearth of comprehensive psychometric assessments in the literature regarding this scale.

1.6.3. Rumination on Sadness Scale. To overcome some of the issues for which Nolen-Hoeksema and Morrow's (1991) RRS was criticized, Conway et al. (2000) developed the Rumination on Sadness Scale (RSS). Conway et al. (2000) demonstrated that their 13-item measure was best represented by a one-factor solution (using PCA). Moreover, Conway et al. (2000) demonstrated that their measure had excellent internal consistency (alpha = .91) and discriminant and convergent validity, as well as adequate test-retest reliability, though for a relatively short period between tests (r = .70; 2–3-week period). Moreover, the RSS proved to be a better predictor of depression than the RRS in the present study. Treynor et al. (2003), however, have claimed that the RSS likely had depression-confounding issues as most of the items explicitly mention sadness and other studies have corroborated this claim (e.g., Roelofs et al., 2006). The RSS has also been criticized for having items that tap into more than one of the intended aspects of rumination, as defined by the original developers, and for the inconsistent number of items measuring each aspect (Raes et al., 2008). Moreover, the unidimensional factor structure posited by Conway et al. (2000) failed to replicate in Raes et al.'s (2008) investigation. Smith and Alloy (2009) have also argued that because the RSS has not been as widely used as the other scales, it is unclear if it measures only sadness-related responses, or whether it is also useful for predicting depression or other psychopathologies. Another issue worth noting is the excessive length and confusing phrasing of some of the items of this measure; with a minimum word count of 12 words (e.g., "I repeatedly analyze and keep thinking about the reasons for my sadness"), whereas the longest item has a total of 35 words (e.g., "I get the feeling that if I think long enough about my sadness I will find that it has some deeper meaning and that I will be able

to understand myself better because of it"). This is especially problematic as longer items may diminish clarity and increase complexity, which would increase the attentional demands on participants, who may not always be particularly invested in the quality of the data (DeVellis, 2017). For a more comprehensive review of the psychometric properties of rumination measures, see reviews by Luminet (2004), Samtani and Moulds (2017), and Smith and Alloy (2009).

1.7. Present Study

The construct of rumination has been fruitfully studied up to this point, but despite the richness and vastness of the extant rumination literature, psychologists have still not developed a comprehensive domain measure of rumination, which may be of use to researchers. More importantly, the lack of a content-related measure has constrained the field to general levels of rumination. The introduction of a more fine-grained and content-related approach may aid in the understanding of the construct of rumination and individual differences in trait rumination. The purpose of the present study is to develop a valid and reliable domain measure of trait rumination for use in non-clinical samples. This goal will be achieved in four studies: the first study will deal with scale development, whereas the second, third, and fourth studies will deal with the validation of the scale. Moreover, the third study will also investigate potential age and sex differences in rumination content. A more detailed summary of the stages is presented in Table 1.

Table 1

Summary of studies

	Purpose	Summary of methods
Study 1	Scale development	Generate item pool. Expert Screening. Cross-sectional empirical analysis. Examine correlations with social desirability, total construct score, and criterion items. Examine differential reliability. Re-examine flagged items. Cut items to form preliminary measure. Examine EFA loadings. Select items for final measure.
Study 2	Scale validation	Cross-sectional design (community and student samples). Concurrent validity with RRQ, RSS, RRS, WDQ, Padua Inventory, neuroticism. Criterion validity with STICSA, BDI-II. Examine sex differences. Assess structure- CFA.
Study 3	Scale validation	Daily diary design (7 days). Criterion validity with daily time ruminating on domains, daily amotivation, daily sleep quality, and daily negative mood.
Study 4	Scale validation Assessment of group differences	Cross-sectional design (student, community, older samples). Correlations with BIMI (social desirability). Criterion validity with STICSA BDI-II. Examine age and sex differences. Test-retest reliability (student sample only).

Note: RRQ: Rumination-Reflection Questionnaire (Trapnell & Campbell, 1999); RSS: Rumination on Sadness Scale (Conway et al., 2000); RRS: Ruminative Response Scale (Treynor et al., 2003); WDQ: Worry Domains Questionnaire (Tallis et al., 1992); STICSA: State-Trait Inventory for Cognitive and Somatic Anxiety (Ree et al., 2008); BDI-II: Beck Depression Inventory-II (Beck et al., 1996); BIMI: Bidimensional Impression Management Index; Blasberg et al., 2014).

The most common definition of rumination in the scientific literature describes rumination as, a past-focused "mode of responding to distress that involves repetitively and passively focusing on the symptoms of distress and to the possible causes and consequences of those symptoms" (Nolen-Hoeksema et al., 2008, p. 400). The proposed scale therefore will measure the tendency of a person to have thoughts that are: A) focused on something that happened in the past or on present feelings, B) are repetitive and not passing, and C) and do not lead to an attainment of a goal or solving of the problem (Conway et al., 2000; Lyubormirsky & Tkach, 2004; Thomsen, 2006). Moreover, the measured construct will reflect a style of thinking that is intrusive and relatively uncontrollable (Ehring et al., 2011; Kircanski et al., 2015; Nolen-Hoeksema et al., 2008). Moreover, research has identified that understanding situations, as well as dwelling on the causes and meanings of the situation are related to the tendency to ruminate (Watkins, 2004) and this will be reflected in the present scale.

Despite this being the dominant definition of rumination, there are inconsistencies in the literature on how the definition materializes in scale development. For instance, Treynor et al. (2003) conceptualize rumination as two-dimensional (i.e., reflection and brooding), where brooding represents a maladaptive form of repetitive thought that more closely captures the definition previously described, whilst reflection is a neutrally valenced form of thought aimed at coping with overcoming difficulties, which, strictly speaking, is inconsistent with the definition of rumination. Trapnell and Campbell (1999), on the other hand, distinguished between rumination and reflection as separate constructs. Such an approach has also been advocated by Smith and Alloy (2009) and is used in the present study.

Chapter 2: Study 1

This study is concerned with the development of the scale. As stated above, a narrow conceptualization of rumination has already been derived. A related issue is the formation of domains of life. For the purposes of the present measure, the domains should be narrow enough to differentiate domains of life that are related, but substantially distinct, whilst the domains need to be sufficiently broad in order to be manageable and practical in measurement. Several subfields in psychology that are related to rumination have taken a domain of life approach (see Table 2 for a summary), including happiness (Bardo, 2017), priorities in quality of life (Bowling, 1995), life satisfaction (Eng et al., 2005; Rojas, 2006), procrastination (Hen & Goroshit, 2018), perfectionism (Haase et al., 2013; Slaney & Ashby, 1996), life goals (Roberts & Robins, 2012), regret (Roese & Summerville, 2005), and worry (Tallis et al., 1992). Out of these taxonomies of domains, all of them have domains (sometimes multiple domains) that correspond to a general achievement domain (such as self-esteem, work, home environment, as categorized by factor analyses; Eng et al., 2005). This domain is also most saliently relevant to Martin and Tesser's (1996) theory which posits that rumination is most often prompted by failures and setbacks in goal achievement (see Moberly & Watkins, 2010 for test of this model) though problems in achieving goals also occur in other domains as well. Another common domain for these taxonomies is a health domain [except for Eng et al.'s (2005) domains, Roberts and Robins's (2000) goal domains, Slaney and Ashby's (1996) perfectionism domains, and Tallis et al.'s (1992) worry domains. All the taxonomies have domains related to relationships with other people; in some cases, these represent relationships more broadly, whilst others distinguish between relationships with family, friends (which are sometimes included in general social domains), and romantic partners. Practically speaking, these distinctions are not necessarily

mutually exclusive, as a spouse can reasonably be categorized as a family member, friend, and romantic partner, however, for other individuals (e.g., unmarried individuals) this distinction is meaningful. Hence, although these domains are sometimes related, a distinction is warranted (i.e., family domain: e.g., relationships and well-being of family members; social domain: e.g., friends, social situations, leisure, or social ostracism; and a romantic domain). It is also worth noting that rumination in response to social and romantic concerns has been investigated independently in the past (e.g., Jiang & Poon, 2021; Saffrey & Ehrenberg, 2007).

Table 2

Summary of life domains in previous research

Reference	Field of research	Domains
Bardo (2005)	Happiness	1. Family 2. Friends 3. Health 4. Hobbies 5. Place of residence
Bowling (1995)	Quality of life	1. Relationships with family 2. Relationships with others 3. Own health 4. Health of someone close 5. Financial security 6. Environment 7. Job security 8. Ability to work 9. Social life 10. Religion 11. Education 12. Other
Eng, Coles, Heimberg, and Safren (2005)	Life satisfaction	1. Achievement 2. Social functioning 3. Personal growth

		4. Surroundings
Haase, Prapavessis, and Owens (2013)	Perfectionism	1. University/work 2. Relationship 3. Physical activity 4. Domestic environment 5. Appearance
Hen and Goroshit (2018)	Procrastination	1. Career 2. Community 3. Education 4. Parenting 5. Family 6. Finance 7. Friends 8. Health 9. Leisure 10. Romance 11. Self
Roberts and Robins (2000)	Life goals	1. Economic goals 2. Aesthetic goals 3. Social goals 4. Relationship goals 5. Political goals 6. Hedonistic goals

		7. Religious goals
Roese and Summerville (2005)	Regret	1. Career 2. Community 3. Education 4. Parents 5. Family 6. Finance 7. Friends 8. Health 9. Leisure 10. Romance 11. Spirituality 12. Self
Rojas (2006)	Life satisfaction	1. Health 2. Economic 3. Job 4. Family 5. Friendship 6. Personal 7. Community
Slaney and Ashby (1996)	Perfectionism	1. Professional/Academic 2. Relationships 3. Housework/Cleaning

		4. Parenting 5. Hobbies/social 6. Personal appearance 7. Self-esteem 8. Religious life 9. Athletics
Tallis, Eysenck, and Mathews (1992)	Worry	1. Relationships 2. Lack of competence 3. Aimless future 4. Work incompetence 5. Financial 6. Socio-political

Another common theme within the domains of life is financial well-being as Bowling (1995), Roberts and Robins (2000), Hen and Goroshit (2018), Rojas (2006), and Tallis et al. (2002) all have domains relating to financial concerns. Bowling (1995), Eng et al. (2005), Roese and Summerville (2005), Slaney and Ashby (1996), and Tallis et al. (1992) share domains relating to existential concerns (e.g., religion, spirituality, and aimless future). A number of taxonomies also have domains relating to socio-political concerns (e.g., political goals, community, socio-political; Hen & Goroshit, 2018; Roberts & Robins, 2000; Roese & Summerville, 2005; Rojas, 2006; Tallis et al., 1992); though rumination is most often self-relevant in content, this is not always the case and it is possible to ruminate about socio-political issues (Papageorgiou & Wells, 2001; 2004). Although less common, some taxonomies had

domains relating to personal physical appearance (Haase et al., 2013; Slaney & Ashby, 2006) and general cleanliness (i.e., cleanliness of environment and personal hygiene; Bowling, 1995; Haase et al., 2013; Slaney & Ashby, 1996), respectively. Based on this literature, 10 broad domains of life can be inferred and rumination regarding these domains will be measured in the developed rumination sale: 1) achievement, 2) health, 3) family, 4) social, 5) romance, 6) finances, 7) existential concerns, 8) socio-political, 9) personal physical appearance, and 10) cleanliness.

After domains were solidified, items were generated according to these domains. Items were generated by examining the empirical and theoretical literature, clinical and counselling case studies, as well suggestions from experts. I generated approximately 25 items for each domain of rumination. Simplicity in the language of the items was a priority (Lambie et al., 2017), as some measures include words in items that may be difficult to understand to a naïve audience (e.g., the word ‘rumination’ is mentioned in the RRQ; Trapnell & Campbell, 1999). Moreover, the initial list of items was purposely overinclusive as Clark and Watson (1995) suggested that the initial pool should be broader than the theoretical definition and include items that are tangentially related to the construct; psychometric techniques can help weed out weak items, but they cannot detect items that should be included but were not and therefore it is best to err on the side of over-inclusiveness (Boateng et al., 2018; Clark & Watson, 1995). After the initial list of items was generated, they were critically screened by 4 experts in the field before they were included in a preliminary scale for empirical analysis with a sample of undergraduate students. These experts screened items for problematic phrasing (e.g., ambiguity, double-barreled items, etc.), as well as flagged (i.e., identified items for further examination to be potentially removed or revised) items that may stray too far away from the boundaries of the

intended construct or were overly redundant. With feedback from the experts, the measure was reduced to approximately 10 items per domain (each domain had a minimum of 10 items with a total of 106 items) with the goal of reducing the scale further through empirical means to approximately five items per domain for the final measure [Kline (1986) posits that twice as many items as are necessary for the final version of the measure are needed].

One crucial issue in scale development is the type of response. For example, will the scale be an ipsative measure or will a continuous response scale be used? Moreover, if a continuous response scale will be used, how many response categories will be used? Regarding the former question, ipsative measures have several serious disadvantages such as issues with standard data analysis techniques and interpretation (Johnson et al., 1988), inflation of internal reliability estimates (Tenopyr, 1988), negative test-taker reactions (Converse et al., 2008), and reduced variance (Hicks, 1970). As for the relative benefits of ipsative measures, they are more difficult to fake (Bowen et al., 2002; Martin et al., 2002), are less susceptible to social desirability bias, and are better suited for maximizing intra-individual differences amongst scales rather than inter-individual differences (Jackson, 1977; see Kowalski & Schermer, 2019b for a brief discussion of ipsative measures). Distorted internal consistency estimates, reduced variance, and limitations regarding standard data analysis techniques would be detrimental for the purposes of this measure, whereas steps can be taken to address concerns of social desirability overly affecting responses. Therefore, a Likert-type scale was employed. Related to this issue, the way a measure's response categories represent the construct that is being represented is of critical importance. Specifically, the poles of the measure (i.e., the most extreme response categories), as well as the gradation of the items, should be defined (Tay & Jebb, 2018). With respect to the present measure, the extremes represent low or the theoretical

absence of rumination (the minimum response category; labelled "*almost never"*) and a high level of rumination (the maximum response category; labelled "*almost always"*). The same labels for the response poles were used in previously validated scales such as the Rumination Response Scale (Treynor et al., 2003). As for the gradations of the items, the second and third response options are "*sometimes"* and "often", respectively. Further, the decision of whether to include negatively worded items is also important. Such a practice has been used to reduce mindless responding and participant acquiescence (DeVellis, 2017). Because recent research has shown very serious limitations of this approach (e.g., producing an additional factor unique to negatively-worded items, producing method variance, yielding little information, low discrimination, not being interchangeable with positively-worded items; Barnette, 2000; Cole et al., 2019; DiStegano & Motl, 2006; Lindwall et al., 2012; Rodebaugh et al., 2007; Schmitt & Suits, 1985; Schweizer & Rauch, 2008; Sliter & Zickar, 2014; Spector et al., 1997; van Sonderen et al., 2013), this approach was not employed in this new scale.

The number of response categories available for each item is another non-trivial decision that should be made on based on findings in the psychometrics literature. For instance, based on simulated data, Lee and Paek (2014) found that four to six Likert-type response categories are best in terms of precision, reliability (IRT, Alpha, and interitem), and convergent and divergent validity. Simms et al. (2019) concluded that there were no improvements in psychometric precision past six response categories. Some researchers have noted that a midpoint response option characteristic of an odd number of response categories may be problematic because of their potentially ambiguous meaning (e.g., does it connotate moderate responses, context-dependent responses, unsure, or indifferent responses? (Kulas & Stachowski, 2009; 2013) and

their potential relationship to social desirability (Garland, 1991). Based on this evidence, the measure developed in this study will employ a four-point Likert-type response scale.

2.1. Method

2.1.1. Participants

In total, 462 participants completed the study. Careless responding was mitigated in several ways. Firstly, participants who completed the study in an unrealistic short amount of time (i.e., five minutes or less) were removed. Following, participants were asked if their data should be considered reliable and included in the study; data from participants who indicated that their data should not be considered were removed. Finally, four attention checks were included where participants were asked to select a specific response option. Participants who passed at least two attention checks were included in the final sample, as recommended by Curran (2016).

The final sample comprised 385 participants (127 men; 248 women; 10 participants did not identify as men or women) ranging from 18 to 62 years of age (M_{age} = 20.13; *SD* = 5.03) who were enrolled as university students at the University of Western Ontario. Some participants were recruited through a participant pool for partial course credit, whereas some of them voluntarily participated through a mass email advertisement for the study. The data for this study is publicly available at https://osf.io/x6bu2/.

2.1.2. Measures

Rumination item list. The list of 106 items that was generated to assess rumination in 10 domains of life presented to participants. This list of items is displayed in Appendix A. The items share the same stem (i.e., “I have negative repetitive thoughts about…”) and responses range from a range of 1 (*almost never*) to 4 (*almost always*).

Three rumination characteristics items. Three Likert-type items ("When you have a negative thought, how long do you keep thinking about that thought?", "When you have a negative thought, how difficult is it stop thinking about the negative thought?", and "When you have the same negative thought that occurs more than once, how disruptive is this thought?") were included to assess the performance of items in tapping into characteristics of rumination (repetitiveness, uncontrollability, and disruptiveness, respectively). These items were scored on a scale from 1(*almost not at all; extremely easy; not disruptive at all*, respectively) to 5 (*I can't stop thinking about it*; *extremely difficult*; *extremely disruptive*, respectively).

Bidimensional Impression Management Index (BIMI; Blasberg, et al., 2013). The BIMI was used to measure social desirability. This scale comprises 20 items (example agentic item: "I have met people smarter than myself"; example communal item: "I don't gossip about other people's business") with two subscales: agentic impression management (the extent to which one exaggerates one's social or intellectual status) and communal impression management (the extent to which one repudiates ones socially undesirable impulses or faults). Respondents indicate their agreement with an item on a scale from 1 (*not true*) to 7 (*very true*). Extant research usually demonstrated that the BIMI has adequate to strong internal reliability (total α ranging from .73 to .83; agentic management α ranging from .64 to .74; communal management α ranging from .50 to .77; under fake good conditions total α ranging from .88 to .93; agentic management α ranging from .87 to .90; communal management α ranging from .89 to .91; Blasberg et al., 2013; Hopwood & Good, 2019; Rogers et al., 2022). Previous research has also supported the convergent validity of the BIMI (Blasberg et al., 2013). In the present study, the BIMI had marginally acceptable internal reliability (total α = .68; agentic management α = .64; communal management α = .62).

2.1.3. Procedure

Participants completed the questionnaires online through a commonly used survey platform. After participants read the letter of information, they indicated consent by clicking a box on the screen, after which they were taken to the questionnaires. Once participants completed the questionnaires, a debriefing letter was displayed on the screen for participants to read. Participation was fully online, and respondents could complete the study from the comfort of their own homes. Participants usually took approximately 30 minutes or less to complete their sessions. Ethics approval for this study was obtained through the Ethics Board of the University of Western Ontario (REB#: 120339).

2.2. Data analyses

Once the preliminary scale of 106 items was generated, empirical analyses were employed to select the best items to measure the construct. At the stage of preliminary empirical analysis, a series of methods were implemented to reduce the effect of response styles. Socially desirable responding was controlled by re-examining items if they did not correlate highly with their total domain score or have a high correlation with the Bidimensional Impression Management Index (BIMI; Blasberg et al., 2014) scales (Kendall's Tau B < .41 and .19, respectively[3, 4]). If the flagged items were deemed important to the measurement of the construct, they were retained and items that did not fit this criterion were removed. Along with the rumination items, participants were given three Likert-type items (i.e., "When you have a

[3] Kendall's Tau B was used as the rumination items being tested have four response categories and thus should be considered ordinal in level of measurement. Tau B is a non-parametric coefficient that assesses the relationship between an ordinal and a continuous variable. Evidence has suggested that Tau B may be a more accurate estimate of the correlation in population than Spearnan's Rho (Howell, 1997, pp.293). Jamovi (2021) was used to calculate Kendall's Tau B.

[4] These values were chosen based on their conversion to Pearson's r. That is Tau B = .41 is approximately equal to *r* = .60 and Tau B = .19 is approximately equal to *r* = .29, according to Gilpin (1993).

negative thought, how long do you keep thinking about that thought?", "When you have a negative thought, how difficult is it stop thinking about the negative thought?", and "When you have the same negative thought that occurs more than once, how disruptive is this thought?") which assess characteristics of ruminative thinking. Correlations between rumination scale items and these items were assessed and these correlations were considered when discarding items. Specifically, items with correlations equal to or smaller than *Tau B* = .07 were flagged and examined[5]. Flagged items that were deemed non-central were removed. The differential reliability indices (DRI; see Jackson, 1970), defined as the estimate of content variance relative to desirability variance (Jackson, 1984), of the remaining items was assessed and ranked. Items with DRIs of .45 or weaker (this cut-off value was used in previous research, e.g., Ramanaiah et al., 1983) were flagged for potential removal. This ranking was also considered in the selection when further reducing the preliminary measure.

2.2.1. Unidimensionality of individual scales

In this study, I first employed EFAs on each domain individually to assess their unidimensionality. Such an approach supersedes the need to perform an EFA on all items by confirming that the assumption of unidimensionality within each factor is not violated. Items which are deemed problematic in this regard would be removed. Specifically, Kline (1994) recommended considering removing items with factor loadings less than .30 and this guideline was followed in the present study. EFAs were performed in Mplus 7.2 (Muthén & Muthén, 2012) using weighted least squares estimation with robust corrections (WLSMV)[6] and oblimin

[5] Based on Gilpin's (1993) conversion table, Tau B = .07 is approximately equal to r = .11.

[6] WLSMV performs better than maximum likelihood estimation and full weighted least squares for indicators that are considered ordinal (Barendse et al., 2015; Beauducel & Herzberg, 2006; DiStefano & Hess, 2005; Finney & DiStefano, 2006; Flora & Curran, 2004; Li, 2016; Lubke & Muthén, 2004; Rhemtulla et al., 2012). WLSMV uses polychoric correlation matrix to assess the relationships amongst categorical variables, which has been found to provide more accurately reflections of measurement models (Holgado-Tello et al., 2010).

rotation. The reason EFA was used, as opposed to Confirmatory Factor analysis (CFA), was because even though CFA is suited to test whether a given model adequately fits the data, EFA is better suited for determining if a prediction regarding factor structure (in this case, the unidimensionality of each domain) could be erroneous (Flora & Flake, 2017). Unidimensionality is determined when the primary dimension can explain a latent trait, whereas recognizing that peripheral factors may also exist in the data (Reeve & Fayers, 2005).

Many criteria have been suggested for minimum sample sizes in past literature. Gorsuch (1983) and Kline (1994), for example, recommended a minimum sample size of 100 participants, whereas Comrey and Lee (1992) posited that a sample size of 100 participants is poor. Guilford (1954) posited that a minimum sample size of 200 is acceptable. The sample size for the present study ($N = 385$) satisfies Gorsuch's (1983), Kline's (1994), and Guilford's (1954) suggestions, whereas in Comrey and Lee's (1992) criteria, our sample size would be described as '*good*' (i.e., Comrey and Lee described a sample size of 300 as *'good'* and a sample size of 500 as '*very good*'). Yong and Pearce (2013) also recommended that a sample comprise at least 300 participants for factor analysis. The present sample size is also defensible from the perspective of Cattell's (1978) recommendation that there should be three to six participants for every variable, as, in the current study, the number of participants for each item exceeds three. Mundfrom et al. (2005), on the other hand, recommended that when there are at least seven variables (in this case, items) to every factor, the minimum sample size for excellent agreement is usually less than 150, but never greater than 180 participants. In other words, it is always better to have more participants, but 180 participants will be adequate in most circumstances.

Prior to factor extraction, the factorability of the data were assessed for each individual domain by examining the Kaiser-Meyer-Olkin value (KMO; Kaiser, 1974) which is an index of

the strength of the relationships among variables, whilst assessing the sampling adequacy for the overall model and each variable (Kaiser, 1974; Watson, 2017). Secondly, Bartlett's test of sphericity was examined, which assesses the degree to which the correlation matrix produced is an identity matrix (Watson, 2017). Eigenvalues[7], screeplots (Cattell, 1966), loadings, and factor correlations (when applicable) will be examined to assess the dimensionality of the domains.

Following, to refine the scales further all the remaining items were analyzed together using exploratory structural equation modelling (ESEM) with target rotation and the WLSMV estimator (Mplus 7.2 was used; Muthén & Muthén, 2012). A target rotation in ESEM allows for the specification of which variables should load highly on hypothesized factors (Asparouhov & Muthén, 2009), however, unlike CFA, which also allows for this specification, rather than cross-loadings being constrained to 0, ESEM allows for cross-loadings to manifest. ESEM was used rather than confirmatory factor analysis, as the latter rarely produces proper fit according to conventional recommendations due to unrealistically rigid assumptions of cross-loadings being constrained to 0 (Asparouhov & Muthén, 2009; Guay et al., 2015; Hopwood & Donnellan, 2010; Hurley et al., 1997; Marsh et al., 2020; Marsh et al., 2011; Marsh et al., 2013; Marsh et al., 2014; Perry et al., 2015; Raykov, 1998; van Zyl, & Klooster, 2022). ESEM, on the other hand, overcomes this issue as negligible cross-loadings will not cause undue model misspecification (Guay et al., 2015; Marsh, et al., 2010; Marsh et al., 2011; Perry et al., 2015). Items with high cross-loadings are evidence of poor discriminant validity and suggest that the item may be problematic, and thus, in the present study, were flagged for potential removal. Items which loaded on an unintended factor more strongly than on its intended factor were flagged for

[7] van der Eijk and Rose (2015) found that Kaiser's (1960) "eigenvalues greater than 1" rule, although criticized for over-dimensionalization, tends to work more precisely when using polychoric correlations, such as when the WLSMV estimator is used.

removal. Moreover, items with loadings lower than .30[8] on the target scale were also flagged for removal. Removal was done iteratively; that is, after each individual item was removed, the ESEM was rerun without the removed item before other items were removed. Such an approach was taken as item removal can affect the whole model. Fit was assessed for the original model and model after items were removed at the ESEM stage. Before any items were removed at this stage, fit was assessed (with chi-square, RMSEA, CFI, and WRMR, as recommended by Kline, 2016 for CFA). Determination of good fit is indexed by a non-significant chi-square, RMSEA below .05 (or below .08 for acceptable fit), CFI greater than .90. and WRMR less than 1.00 (Barrett, 2007; Bentler, 1990; DiStefano et al., 2018; MacCallum et al., 1996; Muthén & Muthén, 2012; Steiger, 1990). Of these indices, Chi-square has been criticized for being highly dependent on sample size (e.g., Marsh et al., 1988; Sun, 2005), whereas the other indices avoid this limitation as they are sample-independent (Hu & Bentler, 1999; Marsh et al., 2005; Marsh et al., 2004). Also worth noting, though WRMR shows promise as a fit index, it is still considered experimental and should be interpreted with caution. After ill-performing items were removed, fit of the model was assessed again. Finally, once domains were reduced to equal numbers of items, fit was assessed once more and these fit.

The remaining items constitute the final measure. The desired number of items per domain was six to nine items, as research has indicated that this scale length is optimal in terms of balancing validity and measurement efficiency concerns (Soto & John, 2019) and this goal was achieved as the final measure contained six items per domain. Next, the final list of items, was subjected to a CFA to assess model fit using a more restrictive framework (i.e., lack of cross-loadings between scales). Three models were assessed: 1) a model with all domains

[8] Kline (1994) suggested that loadings of .30 or higher can be regarded as salient loadings.

separate but correlated, 2) a unidimensional model, and 3) a hierarchical model with a unidimensional factor and domains as dimensions below the unidimensional factor. Reliability (alpha – i.e., the average of all split-half reliabilties - and omega – i.e., the general factor saturation of test- coefficients; McDonald, 1999; Warrens, 2015) were assessed on the remaining items for both the full scale and subscales[9] based on CFA[10] using Jamovi (2021). Finally, bivariate correlations between the rumination domain and total scores, and social desirability and rumination characteristics items were examined.

2.3. Results

Item correlations with their domain, as well as with BIMI total scores and subscale scores were assessed (see Tables 3-12). Items with correlations with their domain lower than $r = .60$ were flagged, as well as items with correlations with BIMI total or subscale scores stronger than $r = .29$. Based on these criteria, 11 items were flagged, including items 22 (health), 25 (romantic), 27 (existential), 44 (social), 47 (existential), 57 (existential), 78 (socio-political), 79 (physical appearance), 87 (existential), 90 (cleanliness), and 99 (physical appearance). Items 22, 25, 27, 44, 78, 79, and 90 were removed from the item pool. Items 47, 57, 87, and 99 were deemed too important to the construct to be removed at this stage of preliminary analysis.

[9] Advantages of using coefficient omega relative to using coefficient alpha are discussed thoroughly in the psychometrics literature (see Dunn et al., 2014; Goodboy & Martin, 2020; Hayes & Coutts, 2020; Kalkbrenner, 2021; McNeish, 2018; Peters, 2014; Revelle & Condon, 2019; Trizano-Hermosilla & Alvarado, 2016; Viladrich et al., 2017). Amongst other advantages, Omega is not affected by unequal indicator contributions (i.e., it is more robust to violations of Tau-equivalence) and is insensitive to the number, whereas Alpha is underestimated under these conditions and is highly sensitive to number of items. Alpha and Omega will be similar if assumptions of alpha are not violated.

[10] Omega can also be calculated using ESEM, however research has found that regardless of the superior fit of ESEM models relative to CFA models, Omega should not differ substantially regardless of which type of model is used (Fu et al., 2022).

Table 3.
Correlations between achievement items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
1	my failures.	.69*	-.18*	-.22*	-.07
11	When I have not achieved an important goal.	.76*	-.13	-.11	-.09
21	When I haven't worked hard enough to achieve my goals.	.72*	-.11	-.11	-.06
31	Missed chances for success.	.78*	-.10	-.08	-.07
41	When I couldn't finish an important task.	.79*	-.04	-.04	-.01
51	When my performance was not appreciated.	.69*	-.06	.02	-.09
61	When my work was not taken seriously.	.68*	.01	.09	-.04
71	When my performance was not good enough.	.80*	-.11	-.07	-.09
81	Not fulfilling my ambitions.	.76*	-.06	-.03	-.06
91	when I fell behind in my work.	.71*	-.16	-.18*	-.08

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with a domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 4.
Correlations between health items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
2	symptoms of illness.	.60*	-.13	-.11	-.09
12	limitations caused by my health.	.67*	-.08	-.06	-.06
22	**my fitness level.**	**.51***	-.06	-.13	-.15
32	my sleeping problems.	.62*	-.05	-.06	-.01
42	how tired I am.	.65*	-.22*	-.21*	-.14
52	regretting not taking better care of my health.	.67*	-.13	-.04	-.14
62	the time I wasted because of health issues.	.69*	-.06	.01	-.08
72	events I missed due to health issues.	.68*	-.06	.01	-.08
82	my overall health.	.77*	-.16	-.10	-.14
92	physical sensations in my body.	.66*	-.11	-.01	-.13
101	my mental health.	.63*	-.20*	-.19*	-.14

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 5.
Correlations between family items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
3	arguments I've had with my family.	.70*	-.17	-.13	-.13
13	when my family has let me down.	.65*	-.06	-.01	-.08
23	when I have said hurtful words to my family.	.69*	-.17	-.06	-.18*
33	problems my family has experienced.	.71*	-.02	-.05	.01
43	having been a burden to my family.	.72*	-.12	-.14	-.05
53	why I am not closer to my family.	.68*	-.17	-.06	-.18*
63	not spending enough time with my family.	.67*	-.15	-.04	-.17
73	resentment towards family members.	.71*	-.12	-.06	-.11
83	when I embarrassed my family.	.71*	-.03	.05	-.06
93	my envy towards a family member.	.60*	-.02	.03	-.03

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 6.
Correlations between social items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
4	when I have been treated badly by friends.	.63*	-.16	-.08	-.16
14	people not liking me.	.75*	-.24*	-.26*	-.13
24	when I have been bullied.	.64*	-.08	-.03	-.07
34	when I have failed to fit in.	.74*	-.13	-.17	-.04
44	**grudges I have towards people.**	**.59***	-.14	-.05	-.14
54	my past awkward social encounters.	.68*	-.26*	-.24*	-.17
64	when I embarrassed myself in front of others.	.75*	-.26*	-.24*	-.18*
74	when I was socially excluded.	.76*	-.11	-.13	-.06
84	resentment towards others.	.68*	-.18*	-.10	-.17
94	people judging me.	.76*	-.22*	-.23*	-.13
102	when I have offended someone.	.69*	-.09	-.14	-.02
105	when I embarrassed my friends.	.66*	-.02	-.13	-.15

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 7.
Correlations between romance items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
5	a lost chance at romance.	.73*	-.14	.01	-.19*
15	when my romantic love treated me coldly.	.75*	-.20*	-.02	-.26*
25	**not spending enough time with my romantic love.**	**.58***	-.09	-.01	-.11
35	resentment towards my romantic love.	.75*	-.14	-.02	-.16
45	when I embarrassed my romantic love.	.64*	-.09	.02	-.11
55	jealousy over my romantic love.	.70*	-.16	.02	-.23*
65	not being able to keep a romantic partner.	.77*	-.16	-.07	-.17
75	being unable to maintain a relationship.	.70*	-.12	-.06	-.11
85	romantic relationships that have ended.	.77*	-.13	-.02	-.16
95	a potential romantic partner that I did not pursue.	.65*	-.15	-.07	-.15
103	regretting rejecting a potential romantic partner.	.68*	-.09	.02	-.13

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 8.
Correlations between finance items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
6	the fact that I am not as financially secure as I would like to be.	.77*	-.11	-.08	-.09
16	my ability to afford the things I would like to buy.	.80*	-.17	-.11	-.15
26	money I have wasted.	.74*	-.15	-.06	-.16
36	missed opportunities to make money.	.72*	-.04	.05	-.09
46	having less things or money than others.	.76*	-16	-.07	-.16
56	my bills and expenses.	.80*	-.08	.01	-.12
66	when I should have saved money.	.84*	-.22*	-.08	-.25*
76	spending money on pricey items.	.78*	-.20*	-.11	-.20*
86	my inability to budget finances well.	.79*	-.18*	-.08	-.18*
96	being financially unskilled.	.74*	-.16	-.12	-.12

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 9.
Correlations between existential items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
7	the meaning of life.	.70*	-.02	.01	-.02
17	my life having no purpose.	.78*	-.15	-.17	-.08
27	**not fulfilling my spiritual needs.**	**.51***	.04	.08	.01
37	the meaning of my struggles and suffering.	.71*	-.08	-.06	-.05
47	**failing to be a good person.**	**.59***	-.14	-.17	-.05
57	**the immorality of others.**	**.59***	.02	.04	-.01
67	being unfulfilled with life.	.76*	-.24*	-.16	-.20*
77	how hopeless life seems to be.	.77*	-.18*	-.15	-.12
87	**my lifestyle not living up to my faith/moral beliefs.**	**.57***	-.11	-.03	-.11
97	how pointless existence is.	.75*	-.16	-.17	-.09
104	the meaninglessness of what I have done in life.	.79*	-.20*	-.15	-.15
106	my existence not having a positive impact on the world.	.73*	-.06	-.06	-.04

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 10.
Correlations between sociopolitical items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
8	people struggling in the world.	.72*	.05	.01	.06
18	human rights violations.	.77*	.02	.02	.01
28	damage done to the environment.	.65*	.15	.12	.11
38	the state of the education system.	.65*	.07	.09	.03
48	the problems and suffering caused by war.	.80*	.04	-.02	.06
58	not being able to trust our institutions.	.71*	-.07	.05	-.12
68	a political conflict that I have heard about or seen.	.72*	-.07	-.01	-.06
78	**when I voted for the wrong person in an election.**	**.40***	.11	.05	.13
88	poverty in our country.	.74*	.12	.06	.12
98	Important political issues.	.72*	-.03	-.03	-.01

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 11.
Correlations between physical appearance items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
9	Not being attractive.	.83*	-.20*	-.20*	-.12
19	The appearance of my body.	.82*	-.27*	-.20*	-.23*
29	The appearance of my face.	.85*	-.25*	-.20*	-.20*
39	My physical flaws.	.85*	-.26*	-.22*	-.20*
49	My sense of fashion.	.60*	-.10	-.08	-.06
59	Some of my physical features not being perfectly shaped.	.85*	-.23*	-.17	-.19*
69	When I looked unattractive.	.88*	-.27*	-.21	-.21*
79	**When I had a wardrobe malfunction.**	**.51***	-.02	.02	-.03
89	Other people looking better than me.	.77*	-.25*	-.16	-.24*
99	**How I look.**	.87*	**-.30***	-.20*	-.27*

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Table 12.
Correlations between cleanliness items and domain and social desirability variables.

Item Number	Item	Correlation with domain	Correlation with BIMI total	Correlation with agentic management	Correlation with communal management
10	not having showered recently.	.68*	-.10	-.09	-.07
20	not having brushed my teeth.	.71*	-.17	-.08	-.17
30	my home not being organized.	.72*	-.06	-.01	-.07
40	unclean areas in my home.	.73*	-.05	-.01	-.06
50	my personal hygiene.	.77*	-.17	-.13	-.12
60	about not washing my bedding recently.	.74*	-.15	-.02	-.19*
70	not washing my face.	.74*	-.15	-.05	-.16
80	not having washed my hair.	.77*	-.12	-.03	-.13
90	**when I found a hair in my food.**	**.52***	.09	.14	.03
100	when I saw a messy home.	.64*	.02	.08	-.02

Note: * $p < .001$; two-tailed; bolded items are flagged for having a correlation with domain lower than .60 or correlation with one or more BIMI variables stronger than .29. BIMI = Bidimensional Impression Management Index

Bivariate correlations between the remaining items and self-report duration of ruminative thoughts, uncontrollability of ruminative thoughts, and disruptiveness of ruminative thoughts were assessed. Items with correlations of $r = .10$ or lower with at least one of the characteristics of ruminative thought were flagged. Based on this criterion, items 28 (sociopolitical), 36 (financial), 50 (cleanliness), 88 (sociopolitical), and 95 (romantic) were flagged. After

examination, all these items were removed from the item list. Following, DRIs were examined (displayed in Tables 13-22). There were no items with DRIs of .45 or lower (item 87 had the lowest value with a DRI of .56), therefore no items were removed based on DRI scores alone.

2.3.1. Exploratory Factor Analyses

The appropriateness of data for EFA was assessed using Bartlett's (1954) test of sphericity, as well as the Kaiser-Meyer-Olkin (KMO; Kaiser, 1974) measure of sampling adequacy. Bartlett's (1954) test revealed that the data were appropriate for EFA [χ^2 (4371) = 24449, $p < .001$]. The KMO measure of sampling adequacy indicated that the strength of the relationships among the variables was high (KMO = .95), and therefore the data were acceptable for EFA (values of KMO = .70 or higher are desirable and values above .90 are 'marvellous'; Hoelzle & Meyer, 2013; Kaiser, 1974; Lloret et al., 2017; Watkins, 2018, whereas currently a KMO greater than .60 is usually considered acceptable to proceed; Tabachnick & Fidell, 2013; Watson, 2017).

Achievement. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (45) = 1911, $p < .001$; KMO = .92). Examination of eigenvalues (first factor = 6.07, second factor = .92) and scree plot (all scree plots displayed in Figure 1) supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and did not fall below .69. In a two-factor solution, the two factors were highly correlated (r = .62) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Table 13

Correlations between achievement items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
1	my failures.	.47*	.42*	.41*	.67	71
11	When I have not achieved an important goal.	.32*	.34*	.28*	.75	27
21	When I haven't worked hard enough to achieve my goals.	.29*	.30*	.34*	.71	48
31	Missed chances for success.	.35*	.29*	.29*	.77	14
41	When I couldn't finish an important task.	.36*	.28*	.27*	.79	11
51	When my performance was not appreciated.	.33*	.23*	.23*	.69	61
61	When my work was not taken seriously.	.32*	.18*	.17*	.68	65
71	When my performance was not good enough.	.35*	.22*	.29*	.79	10
81	Not fulfilling my ambitions.	.31*	.24*	.25*	.76	22
91	when I fell behind in my work.	.37*	.30*	.32*	.69	58

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 14

Correlations between health items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
2	symptoms of illness.	.30*	.22*	.22*	.59	92
12	limitations caused by my health.	.32*	.22*	.26*	.67	72
32	my sleeping problems.	.35*	.28*	.31*	.62	85
42	how tired I am.	.40*	.32*	.28*	.61	86
52	regretting not taking better care of my health.	.26*	.23*	.27*	.66	75
62	the time I wasted because of health issues.	.30*	.17*	.21*	.69	61
72	events I missed due to health issues.	.27*	.13	.19*	.68	67
82	my overall health.	.30*	.19*	.24*	.75	24
92	physical sensations in my body.	.29*	.20*	.24*	.65	78
101	my mental health.	.51*	.48*	.39*	.60	89

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 15

Correlations between family items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
3	arguments I've had with my family.	.27*	.19*	.21*	.68	66
13	when my family has let me down.	.25*	.21*	.21*	.65	79
23	when I have said hurtful words to my family.	.29*	.18*	.21*	.67	70
33	problems my family has experienced.	.32*	.23*	.23*	.71	51
43	having been a burden to my family.	.41*	.29*	.31*	.71	50
53	why I am not closer to my family.	.22*	.14	.22*	.66	74
63	not spending enough time with my family.	.24*	.15	.21*	.65	77
73	resentment towards family members.	.28*	.22*	.26*	.70	56
83	when I embarrassed my family.	.28*	.16	.19*	.71	52
93	my envy towards a family member.	.27*	.18*	.13	.60	88

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 16

Correlations between social items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
4	when I have been treated badly by friends.	.34*	.27***	.21***	.61	87
14	people not liking me.	.36*	.30*	.29*	.71	49
24	when I have been bullied.	.27*	.25*	.29*	.63	82
34	when I have failed to fit in.	.40*	.33*	.32*	.73	32
54	my past awkward social encounters.	.34*	.30*	.20*	.63	84
64	when I embarrassed myself in front of others.	.37*	.31*	.23*	.70	55
74	when I was socially excluded.	.41*	.37*	.30*	.75	26
84	resentment towards others.	.36*	.25*	.31*	.66	76
94	people judging me.	.38*	.36*	.31*	.73	36
102	when I have offended someone.	.36*	.24*	.27*	.68	63
105	when I embarrassed my friends.	.36*	.29*	.29*	.66	73

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 17

Correlations between romance items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
5	a lost chance at romance.	.27*	.19*	.21*	.72	47
15	when my romantic love treated me coldly.	.29*	.25*	.26*	.72	40
35	resentment towards my romantic love.	.29*	.19*	.26*	.74	30
45	when I embarrassed my romantic love.	.21*	.17*	.20*	.63	83
55	jealousy over my romantic love.	.29*	.18*	.21*	.68	64
65	not being able to keep a romantic partner.	.27*	.19*	.15	.75	24
75	being unable to maintain a relationship.	.35*	.20*	.24*	.69	59
85	romantic relationships that have ended.	.25*	.14*	.20*	.76	21
95	**a potential romantic partner that I did not pursue.**	.23*	**.09**	**.06**		
103	regretting rejecting a potential romantic partner.	.28*	.13	.12	.67	68

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 18

Correlations between finances items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
6	the fact that I am not as financially secure as I would like to be.	.24*	.16	.20*	0.76	19
16	my ability to afford the things I would like to buy.	.23*	.15	.20*	0.78	12
26	money I have wasted.	.22*	.14	.19*	0.72	37
36	**missed opportunities to make money.**	.14	**.07**	.13		
46	having less things or money than others.	.26*	.17*	.20*	0.74	29
56	my bills and expenses.	.26*	.18*	.21*	0.80	9
66	when I should have saved money.	.26*	.20*	.18*	0.81	5
76	spending money on pricey items.	.24*	.15	.17*	0.75	23
86	my inability to budget finances well.	.27*	.12	.20*	0.77	16
96	being financially unskilled.	.22*	.15	.16	0.72	41

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 19

Correlations between existential items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
7	the meaning of life.	.24*	.20*	.22*	.70	57
17	my life having no purpose.	.39*	.34*	.30*	.77	17
37	the meaning of my struggles and suffering.	.38*	.32*	.34*	.71	54
47	failing to be a good person.	.26*	.18*	.22*	.57	93
57	the immorality of others.	.26*	.21*	.20*	.59	91
67	being unfulfilled with life.	.42*	.32*	.33*	.72	42
77	how hopeless life seems to be.	.40*	.24*	.29*	.75	28
87	my lifestyle not living up to my faith/moral beliefs.	.33*	.21*	.22*	.56	94
97	how pointless existence is.	.34*	.23*	.26*	.73	31
104	the meaninglessness of what I have done in life.	.40*	.26*	.28*	.76	18
106	my existence not having a positive impact on the world.	.36*	.29*	.29*	.73	35

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 20

Correlations between sociopolitical items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
8	people struggling in the world.	.25*	.19*	.17*	.72	44
18	human rights violations.	.21*	.21*	.14	.77	15
28	**damage done to the environment.**	.12	**.07**	**.08**		
38	the state of the education system.	.22*	.18*	.16	.65	80
48	the problems and suffering caused by war.	.21*	.18*	.12	.80	8
58	not being able to trust our institutions.	.27*	.14	.16	.71	53
68	a political conflict that I have heard about or seen.	.24*	.19*	.17*	.72	46
88	**poverty in our country.**	.20*	.11	**.06**		
98	Important political issues.	.24*	.22*	.17*	.72	43

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 21

Correlations between physical appearance items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
9	Not being attractive.	.34*	.34*	.27*	0.81	7
19	The appearance of my body.	.31*	.31*	.21*	0.77	13
29	The appearance of my face.	.34*	.32*	.31*	0.81	4
39	My physical flaws.	.42*	.41*	.35*	0.81	6
49	My sense of fashion.	.20*	.13	.18*	0.59	90
59	Some of my physical features not being perfectly shaped.	.40*	.33*	.28*	0.82	2
69	When I looked unattractive.	.37*	.32*	.29*	0.84	1
89	Other people looking better than me.	.40*	.33*	.27*	0.73	33
99	How I look.	.38*	.36*	.33*	0.82	3

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Table 22

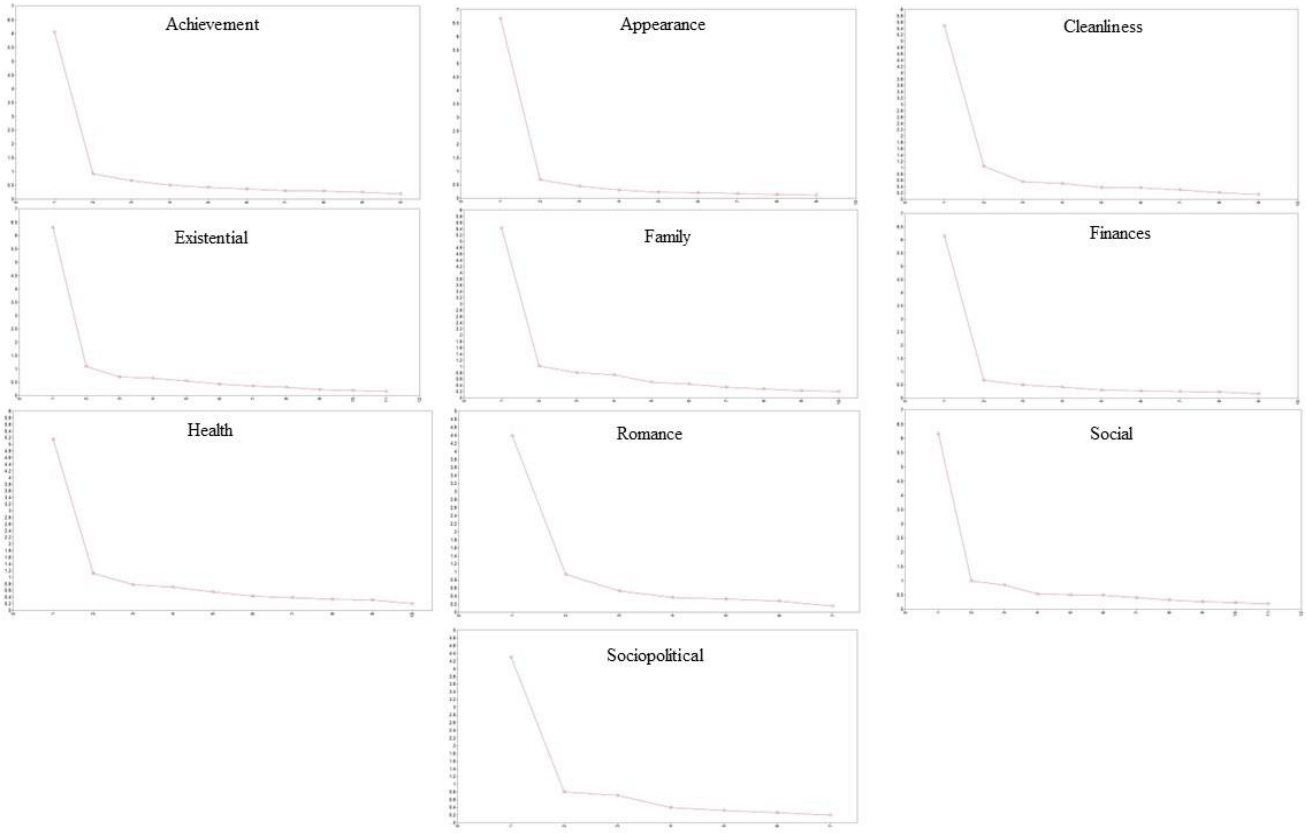
Correlations between cleanliness items and three rumination characteristic questions and DRIs.

Item Number	Item	Duration	Uncontrollability	Disruptiveness	DRI	DRI rank
10	not having showered recently.	.25*	.22*	.17*	0.67	69
20	not having brushed my teeth.	.16	.11	.15	0.69	60
30	my home not being organized.	.17*	.13	.10	0.72	45
40	unclean areas in my home.	.20*	.12	.11	0.73	33
50	**my personal hygiene.**	.16	**.10**	.11		
60	about not washing my bedding recently.	.17*	.12	.17*	0.72	37
70	not washing my face.	.19*	.12	.14	0.72	37
80	not having washed my hair.	.24*	.18*	.18*	0.76	20
100	when I saw a messy home.	.20*	.13	.15	0.64	81

Note: * $p < .001$; two-tailed; bolded items are flagged for having correlations lower than $r = .11$ with rumination characteristics. DRI = Differential Reliability Index

Figure 1

Scree plots for EFAs of individual domains



Appearance. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (36) = 2654, p < .001; KMO = .95). Examination of eigenvalues (first factor = 6.67, second factor = .68) and scree plot supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and indeed did not fall below .56. In a two-factor solution, the two factors were highly correlated (r = .77) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Cleanliness. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (28) = 1316, p < .001; KMO = .86) Two factors had eigenvalues greater than 1 (first factor =

5.48, second factor = 1.05), but examination of the scree plot strongly supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and did not fall below .61. In a two-factor solution, the two factors were highly correlated (r = .65) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Existential. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (55) = 2079, p < .001; KMO = .92). Two factors had eigenvalues greater than 1 (first factor = 6.31, second factor = 1.10), but examination of the scree plot strongly supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and did not fall below .50. In a two-factor solution, the two factors were highly correlated (r = .61) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Family. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (45) = 1477, p < .001; KMO = .87). Two factors had eigenvalues greater than 1 (first factor = 5.43, second factor = 1.02), but examination of the scree plot strongly favoured a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and indeed did not fall below .69. In a two-factor solution, the two factors were moderately-to-highly correlated (r = .51) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Finances. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (36) = 2011, p < .001; KMO = .93). Examination of eigenvalues (first factor = 6.16, second factor = .68) and scree plot supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and indeed did not fall below .76. In a

two-factor solution, the two factors were highly correlated (r = .86) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Health. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (45) = 1367, p < .001; KMO = .88). Two factors had eigenvalues greater than 1 (first factor = 5.16, second factor = 1.12), but examination of the scree plot strongly supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and indeed did not fall below .57. In a two-factor solution, the two factors were highly correlated (r = .58) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Romance. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (36) = 1601, p < .001; KMO = .89). Examination of eigenvalues (first factor = 4.39, second factor = .95) and scree plot supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and indeed did not fall below .65. In a two-factor solution, the two factors were highly correlated (r = .60) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Social. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (55) = 1905, p < .001; KMO = .91). Examination of eigenvalues (first factor = 6.16, second factor = 1.00) and scree plot supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and indeed did not fall below .60. In a two-factor solution, the two factors were highly correlated (r = .64) indicating substantial overlap.

Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

Sociopolitical. The appropriateness of data for EFA was ascertained (Bartlett's χ^2 (21) = 1138, $p < .001$; KMO = .86). Examination of eigenvalues (first factor = 4.30, second factor = .80) and scree plot supported a one-factor solution. All items loaded on the intended factor above the suggested threshold of .30 (Kline, 1994) and indeed did not fall below .58. In a two-factor solution, the two factors were highly correlated (r = .71) indicating substantial overlap. Therefore, a one-factor solution was deemed appropriate, and no items were removed at this stage.

2.3.2. Exploratory Structural Equation modeling

Once unidimensionality was supported for each individual domain, ESEM was used to model the domains simultaneously to aid in the selection of problematic items for removal to ensure the discriminant validity of each domain. When fit was assessed in the original model (i.e., before items were removed using ESEM) indices indicated that the model had good fit. Despite a significant chi-square, RMSEA, CFI, and WRMR were in the commonly accepted range for what is considered good fit (Table 23). Because of lower-than-desirable target loadings and/or cross-loadings higher than target loadings, 12 items were removed: 4 (social), 24 (social), 32 (health), 42 (health), 45 (romance), 47 (existential), 49 (appearance), 57 (existential), 63 (family), 84 (social), 87 (existential), and 101 (health). When these items were removed, fit was assessed again (i.e., the modified model). In this model, fit was comparable in that the chi-square was still significant and RMSEA, CFI, and WRMR were still considered good. RMSEA was slightly higher (indicating worse fit), CFI was slightly higher (indicating better fit), and WRMR was lower (indicating better fit).

Table 23

Fit indices of original model, modified model, and final model of scale items.

Model	X^2 (df)	RMSEA (CI)	CFI	WRMR
1. Original ESEM	4443.202 (3393)*	.028 (.026-.031)	.968	.691
2. Modified ESEM	3375.101 (2475)*	.031 (.028-.033)	.970	.651
3. Final ESEM	1729.999 (1215)*	.033 (.030-.037)	.977	.558

Note: * $p < .001$; Modified ESEM denotes model after removal of problem items.

The romance domain had the least number of items (i.e., 6), thus the worst-performing items were removed from other domains until all domains contained an equal number of items in order to make the domain scores more comparable to each other. To this end, items 1 (achievement), 26 (finance), 30 (cleanliness), 37 (existential), 38 (sociopolitical), 40 (cleanliness), 43 (family), 51 (achievement), 53 (family), 61 (achievement), 69 (appearance), 83 (family), 86 (financial), 89 (appearance), 91 (achievement), 92 (health), 96 (financial), 100 (cleanliness), 102 (social), 105 (social), and 106 (existential) were removed and all domains had 6 items in total in the final scale (60 items in total). Again, ESEM fit was assessed, and the model demonstrated comparable fit to the earlier models. Chi-square was still significant, whereas the other indices indicated good fit. RMSEA and CFI were slightly higher, whereas WRMR was lower, relative to the modified ESEM model. The final scale and factor loading matrix is displayed in Table 24, whereas the factor correlations can be found in Table 25. In the final model, no cross-loadings surpassed target loadings in strength and all items loaded on their correct factor.

Table 24.
Final scale and loading matrix of final ESEM

Item	Target Domain	Factors									
		Ach	Hea	Fam	Soc	Rom	Fin	Exi	Sop	App	Clea
11. when I have not achieved an important goal.	Ach	**.62**	-.05	.06	.11	.03	-.01	.03	.06	.17	.02
21. when I haven't worked hard enough to achieve my goals.	Ach	**.80**	-.05	.01	-.02	-.04	.01	.05	.04	.07	-.03
31. missed chances for success.	Ach	**.62**	.04	.06	.08	.06	.08	.20	-.04	.05	-.05
41. when I couldn't finish an important task.	Ach	**.65**	.18	.06	.10	-.11	.05	.02	.02	-.04	.09
71. when my performance was not good enough.	Ach	**.64**	.16	.04	.18	-.04	.01	.08	-.01	-.03	.01
81. not fulfilling my ambitions.	Ach	**.66**	.15	.01	.08	-.03	.02	.16	.02	-.08	.02
2. symptoms of illness.	Hea	-.05	**.49**	.17	-.19	.06	-.03	-.04	.15	.25	-.02
12. limitations caused by my health.	Hea	.01	**.70**	.07	-.09	-.01	.01	.01	.05	.11	.01
51. regretting not taking better care of my health.	Hea	.27	**.31**	-.04	.08	.02	.13	-.03	.11	-.02	.20
61. the time I wasted because of health issues.	Hea	-.04	**.87**	-.08	-.04	.13	.02	-.03	.03	.03	.01
72. events I missed due to health issues.	Hea	.06	**.67**	.10	.01	.14	.02	.02	-.01	-.08	.11
82. my overall health.	Hea	.25	**.58**	.05	-.04	.02	.04	.01	.05	.07	.09
3. arguments I've had with my family.	Fam	.15	-.10	**.68**	.05	.11	-.02	-.06	.07	-.04	.08
13. when my family has let me down	Fam	-.02	.15	**.73**	.01	-.09	.01	.01	.01	.01	.07
23. when I have said hurtful words to my family.	Fam	.15	-.16	**.39**	-.01	.24	.01	.04	.13	-.04	.07

33. problems my family has experienced.	Fam	.18	.05	**.42**	-.07	.05	.09	.06	.22	.09	.21
73. resentment towards family members.	Fam	-.06	.19	**.63**	.20	.02	.05	.09	.01	-.15	-.01
93. my envy towards a family member.	Fam	-.18	.15	**.43**	.25	.04	.11	.26	-.04	-.01	.01
14. people not liking me.	Soc	.04	-.10	.21	**.48**	.11	-.01	-.01	.06	.40	.02
34. when I have failed to fit in.	Soc	.15	.11	.15	**.50**	-.04	.02	.14	.01	.23	-.05
54. my past awkward social encounters.	Soc	.15	-.09	-.06	**.68**	.07	.08	-.01	.16	-.01	.07
64. when I embarrassed myself in front of others.	Soc	.22	-.08	.01	**.58**	.16	.04	.02	.08	.01	.14
74. when I was socially excluded.	Soc	.02	.10	.24	**.49**	.04	.02	.01	.06	.10	.07
94. people judging me.	Soc	.13	-.02	.14	**.46**	.13	.04	-.09	.08	.37	-.01
5. a lost chance at romance.	Rom	.11	-.01	.01	-.12	**.76**	.02	.01	-.06	.11	-.03
35. resentment towards my romantic love.	Rom	-.01	.06	.28	.01	**.60**	.17	.01	-.09	-.09	-.05
55. jealousy over my romantic love.	Rom	-.08	.05	.21	.01	**.56**	.12	.03	.03	-.16	.07
65. not being able to keep a romantic partner.	Rom	-.14	.10	-.21	.14	**.92**	-.03	.02	.07	.05	-.03
75. being unable to maintain a relationship.	Rom	-.06	.09	-.13	.23	**.71**	-.08	.09	.09	.08	.01
85. romantic relationships that have ended.	Rom	-.03	.02	.11	-.11	**.81**	.01	.07	-.11	-.06	.03
6. the fact that I am not as financially secure as I would like to be.	Fin	-.01	-.03	.02	-.19	-.05	**.85**	.11	.01	.07	-.05

16. my ability to afford the things I would like to buy.	Fin	-.06	-.06	.08	-.02	.05	**.88**	-.02	.01	.10	-.12
46. having less things or money than others.	Fin	-.06	.10	-.05	.08	.01	**.75**	.03	-.01	.14	-.08
56. my bills and expenses.	Fin	-.03	.07	.06	-.06	-.07	**.86**	-.04	.08	-.07	-.02
66. when I should have saved money.	Fin	.14	-.05	-.09	.01	.10	**.84**	-.11	-.02	-.08	.15
76. spending money on pricey items.	Fin	-.05	-.01	-.05	.17	.04	**.71**	.02	-.04	-.02	.16
7. the meaning of life.	Exi	.10	-.08	-.04	-.31	.09	.06	**.59**	.27	.07	.02
17. my life having no purpose.	Exi	.12	-.11	-.01	-.02	.01	.09	**.78**	.01	.09	.01
67. being unfulfilled with life.	Exi	.30	.12	-.05	.04	.12	.02	**.55**	.01	-.02	-.03
77. how hopeless life seems to be.	Exi	.02	.04	.02	.03	-.03	.02	**.85**	-.02	.01	.01
97. how pointless existence is.	Exi	-.14	-.07	.10	-.01	.02	-.09	**.95**	.01	.05	.07
103. the meaninglessness of what I have done in life.	Exi	.01	.05	.07	.04	.07	-.01	**.80**	-.04	-.02	.02
8. people struggling in the world.	Sop	.09	-.02	.06	-.29	.08	-.05	-.02	**.81**	.22	-.07
18. human rights violations.	Sop	-.05	-.05	.10	-.06	-.05	.01	-.04	**.85**	.09	.01
48. the problems and suffering caused by war.	Sop	.05	.05	.05	.03	-.05	.11	-.06	**.76**	-.01	-.06
58. not being able to trust our institutions.	Sop	-.03	.10	-.02	.07	-.04	.08	.24	**.48**	-.14	.16
68. a political conflict that I have heard about or seen.	Sop	-.05	.09	-.04	.24	.02	-.01	.05	**.73**	-.17	.04
98. Important political issues.	Sop	-.10	.08	-.03	.28	-.04	-.03	.07	**.78**	-.20	.01

9. not being attractive.	App	.04	.04	.01	.10	.08	.03	.05	.02	**.75**	.02
19. the appearance of my body.	App	-.06	.07	-.02	.12	-.05	.05	.04	.01	**.82**	.10
29. the appearance of my face.	App	.13	.05	.04	.09	.11	.04	.04	-.06	**.68**	.09
39. my physical flaws.	App	.08	.11	-.01	.15	-.01	.05	.14	.03	**.70**	.04
59. some of my physical features not being perfectly shaped.	App	-.05	.09	-.01	.14	-.01	.18	.09	.03	**.69**	.02
99. how I look.	App	.10	.03	-.01	.13	.05	.08	.02	-.01	**.68**	.17
10. not having showered recently.	Cle	-.12	-.01	.10	-.06	-.11	-.07	.06	.05	.20	**.75**
20. not having brushed my teeth.	Cle	-.04	.01	.04	-.04	.01	.05	-.01	-.01	.01	**.80**
50. my personal hygiene.	Cle	.01	.08	-.04	-.01	-.08	.07	.07	-.04	.07	**.78**
60. about not washing my bedding recently.	Cle	.01	.04	-.01	-.02	.03	.01	.07	.08	-.09	**.72**
70. not washing my face.	Cle	.07	.04	-.04	-.04	.14	-.01	-.05	-.01	.01	**.78**
80. not having washed my hair.	Cle	-.01	.02	.11	.11	-.01	.04	-.03	-.03	.06	**.73**

Note: Ach = Achievement; Hea = Health; Fam = Family; Soc = Social; Rom = Romantic; Fin = Financial; Exi = Existential; Sop = Sociopolitical; App = Physical Appearance; Cle = Cleanliness.

Table 25

ESEM correlations between factors.

Domain	**Ach**	**Hea**	**Fam**	**Soc**	**Rom**	**Fin**	**Exi**	**Sop**	**App**	**Cle**
Ach										
Hea	.25*									
Fam	.24*	.39*								
Soc	.29*	.30	.23*							
Rom	.22*	.32*	.36*	.27*						
Fin	.33*	.42*	.38*	23*	.40*					
Exi	.42*	.41*	.36*	.31*	.39*	40*				
Sop	.32*	.34*	.35*	.18*	.22*	.35*	.36*			
App	.34*	.18*	.29*	.27*	.24*	.30*	.25*	.19*		
Clea	.31*	.43*	.36*	.35*	.32*	.46*	.37*	.33*	.23*	

Note: Ach = Achievement; Hea = Health; Fam = Family; Soc = Social; Rom = Romantic; Fin = Financial; Exi = Existential; Sop = Sociopolitical; App = Physical Appearance; Cle = Cleanliness; * $p < .001$; two-tailed.

2.3.3. Confirmatory Factor Analysis of Final Model

The final list of items was tested within the constraints of CFA with three different models (see Table 26). The first model (i.e., 10 correlated domains as separate factors). This solution demonstrated good fit according to RMSEA and CFI, but not Chi square and WRMR[11]. The second model (i.e., the unidimensional model) did not meet the criteria for good fit for any of the fit indices used. The third model (i.e., hierarchical model with one dimension encompassing 10 factors representing domains) demonstrated good fit according to RMSEA and CFI, but not Chi square and WRMR, though all fit indices for this model were slightly worse than the first model. The standardized loadings for the first model are displayed in Table 27.

Table 26
Fit indices of CFAs.

Model	X^2 (df)	RMSEA (CI)	CFI	WRMR
1. 10-domain model	2737.000 (1665)*	.041 (.038-.044)	.951	1.150
2. Unidimensional model	8006.425 (1710)*	.098 (.096-.100)	.715	2.685
3. Hierarchical model	2938.489 (1700)*	.044 (.041-.046)	.944	1.338

Note: * $p < .001$

[11] The correlations between factors for this model ranged between $r = .17$ (sociopolitical and romantic) and .54 (social and appearance).

Table 27
Standardized loadings of 10-domain CFA.

Item	Domain	Loading on domain
11. when I have not achieved an important goal.	Ach	.78
21. when I haven't worked hard enough to achieve my goals.	Ach	.69
31. missed chances for success.	Ach	.85
41. when I couldn't finish an important task.	Ach	.82
71. when my performance was not good enough.	Ach	.82
81. not fulfilling my ambitions.	Ach	.81
2. symptoms of illness.	Hea	.58
12. limitations caused by my health.	Hea	.68
51. regretting not taking better care of my health.	Hea	.78
61. the time I wasted because of health issues.	Hea	.74
72. events I missed due to health issues.	Hea	.84
82. my overall health.	Hea	.85
3. arguments I've had with my family.	Fam	.67
13. when my family has let me down	Fam	.67
23. when I have said hurtful words to my family.	Fam	.71
33. problems my family has experienced.	Fam	.80
73. resentment towards family members.	Fam	.76
93. my envy towards a family member.	Fam	.78
14. people not liking me.	Soc	.82
34. when I have failed to fit in.	Soc	.83
54. my past awkward social encounters.	Soc	.71
64. when I embarrassed myself in front of others.	Soc	.81
74. when I was socially excluded.	Soc	.78
94. people judging me.	Soc	.83
5. a lost chance at romance.	Rom	.72
35. resentment towards my romantic love.	Rom	.81
55. jealousy over my romantic love.	Rom	.78
65. not being able to keep a romantic partner.	Rom	.82
75. being unable to maintain a relationship.	Rom	.88
85. romantic relationships that have ended.	Rom	.73
6. the fact that I am not as financially secure as I would like to be.	Fin	.77
16. my ability to afford the things I would like to buy.	Fin	.83
46. having less things or money than others.	Fin	.82
56. my bills and expenses.	Fin	.82
66. when I should have saved money.	Fin	.86
76. spending money on pricey items.	Fin	.85
7. the meaning of life.	Exi	.70
17. my life having no purpose.	Exi	.86
67. being unfulfilled with life.	Exi	.89
77. how hopeless life seems to be.	Exi	.86

97. how pointless existence is.	Exi	.83
103. the meaninglessness of what I have done in life.	Exi	.88
8. people struggling in the world.	Sop	.75
18. human rights violations.	Sop	.77
48. the problems and suffering caused by war.	Sop	.80
58. not being able to trust our institutions.	Sop	.83
68. a political conflict that I have heard about or seen.	Sop	.81
98. Important political issues.	Sop	.76
9. not being attractive.	App	.85
19. the appearance of my body.	App	.85
29. the appearance of my face.	App	.90
39. my physical flaws.	App	.92
59. some of my physical features not being perfectly shaped.	App	.88
99. how I look.	App	.91
10. not having showered recently.	Cle	.74
20. not having brushed my teeth.	Cle	.77
50. my personal hygiene.	Cle	.85
60. about not washing my bedding recently.	Cle	.77
70. not washing my face.	Cle	.80
80. not having washed my hair.	Cle	.87

Note: Ach = Achievement; Hea = Health; Fam = Family; Soc = Social; Rom = Romantic; Fin = Financial; Exi = Existential; Sop = Sociopolitical; App = Physical Appearance; Cle = Cleanliness

2.3.4. Reliability, Social Desirability, and Validity

Internal consistency of the domains and total score were assessed using coefficient alpha and coefficient omega (see Table 28). All domains and the total scores presented strong internal consistency. Finally, bivariate correlations (Pearson's *r*) between the variables of the final measure and social desirability and rumination characteristics items were assessed (see Table 29). All rumination domains and the total score were significantly positively correlated with all rumination characteristics, supporting the validity of the measure. All domains except for the sociopolitical domain were significantly negatively correlated with the BIMI total score, whereas only social and appearance domains and the total score were significantly negatively correlated with agentic management. All domains except for the achievement and sociopolitical domains were negatively correlated with communal management. The sociopolitical domain was not

correlated significantly with any of the BIMI scales. All correlations with the BIMI scales were weaker than r = -.30.

Table 28

Internal consistency reliability of scale.

Scale	Coefficient Alpha	Mcdonald's Omega
Achievement	.88	.88
Health	.83	.84
Family	.81	.81
Social	.88	.88
Romantic	.86	.86
Financial	.90	.90
Existential	.90	.90
Sociopolitical	.86	.86
Appearance	.94	.94
Cleanliness	.87	.87
Total	.96	.96

Note: Even though total reliability is reported, it must be noted that a unidimensional model did not demonstrate good fit according to any of the fit indices used.

Table 29

Correlations between rumination, BIMI variables, and rumination characteristics.

Scale	BIMI total	Ag	Com	Dur	Unc	Dis
Achievement	-.11	-.09	-.08	.41*	.35*	.36*
Health	-.14	-.07	-.13	.39*	.26*	.32*
Family	-.13	-.07	-.12	.39*	.28*	.29*
Social	-.26*	-.27*	-.15	.48*	.41*	.35*
Romantic	-.19*	-.03	-.22*	.37*	.24*	.28*
Financial	-.19*	-.09	-.20*	.30*	.20*	.24*
Existential	-.19*	-.16	-13	.45*	.32*	.34*
Sociopolitical	-.01	.01	-.01	.31*	.25*	.21*
Appearance	-.29*	-.23*	-.23*	.42*	.40*	.34*
Cleanliness	-.18*	-.08	-.18	.25*	.18*	.20*
Total	-.25*	-.16	-.21*	.53*	.41*	.41*

Note: Ag = Agentic; Com = Communal; Dur = Duration; Unc = Uncontrollability; Dis = Disruptiveness; * $p < .05$, ** $p < .01$, *** $p < .001$; two-tailed

1.4. Study 1 Discussion

The purpose of Study 1 was to develop a valid and reliable domain scale of rumination. In this study, many items were generated, vetted, and subjected to rigorous psychometric analyses. After the initial removal of items which had excessive correlations with social desirability or suboptimal correlations with the designated domain or with rumination characteristics, unidimensionality of the domains was ascertained using EFA. Following, items were removed if items did not load highly enough on target loadings or had substantial cross-loadings when subjected to a series of ESEM. The list of items was iteratively reduced to a final list comprising 60 items, with each of the 10 domains containing six items and tested using CFA. CFA results determined that a structure with 10 correlated factors fit the data well, as did a hierarchical structure with one higher-order factor encompassing 10 subdomains. The final list of items demonstrated strong internal consistency. Most of the finalized domains correlated with social desirability, albeit weakly. Complete elimination of the relationship of the scales with social desirability would be inappropriate and would negatively affect content validity, as evidence suggests that individuals who ruminate and seek social support may be less satisfied with their social support network than non-ruminating individuals, possibly because people in their social support network being annoyed with or withdrawing from the ruminating individual (e.g., Nolen-Hoeksema & Davis, 1999). The final domain scales had significant correlations with the rumination characteristics, providing some support for the content validity of the final scales.

Though the present study supports the validity of the new scale, much more work is needed to validate this measure. First, solely relying on a student sample may have limited the generalization. In addition, the concurrent criterion-related validity and discriminant validity must still be ascertained. This is the goal of the subsequent study.

Chapter 3: Study 2

In this study, both concurrent criterion-related validity (the extent to which two measures that should be related, are related) and discriminant (the extent to which two measures that should not be related, are unrelated) validity were assessed using two large samples of participants: a university student sample and a community sample. Concurrent criterion-related validity was assessed against previously validated measures of rumination, as well as related traits, such as worry, obsessive and compulsive behaviour, anxiety, depression, and neuroticism (Kowalski & Schermer, 2019a; Slavish et al., 2018). Specifically, concurrent validity was assessed using the RRS (Treynor et al., 2003), RRQ (Trapnell & Campbell, 1999), RSS (Conway et al., 2000), WDQ (Tallis et al., 1992), the Padua Inventory- Washington State University Revision [a measure of obsessional and compulsive behaviour (Burns et al., 1996)], and the neuroticism scale from International Personality Item Pool (Goldberg et al., 2006).

Research has delineated differences between rumination, worry, and obsessions. Specifically, in a review of the literature, Turner et al. (1992) concluded that although these phenomena have many similarities (e.g., a shared cognitive component; Raines et al., 2017), worry is more frequently perceived by an external or internal event, whereas obsessions are not. Further, ruminations and worries tend to be related to normal everyday experiences, whereas obsessions are more frequently associated with contamination, religion, sex, and aggression. Moreover, worry and rumination characterize thoughts, whereas obsessions can occur in the form of thoughts, impulses, or images (Turner et al., 1992). At the same time, although much of the research has delineated these constructs, research has consistently found that these traits are related. In previous literature, rumination tended to be moderately-to-strongly correlated with obsessive-compulsive symptoms (Dar & Iqbal, 2015; Wahl et al., 2011). Moreover, rumination

tended to be strongly correlated with worry in the extant literature (de Jong-Meyer et al., 2009; Raes, 2010.)

To measure criterion validity, correlations between the new rumination measure and the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA; Ree et al., 2008) and Beck depression inventory II (BDI-II; Beck et al., 1996) were assessed. It was expected that high correlations (i.e., > .30; Hemphill, 2003) would emerge between the new scale and other measures of rumination, as well as moderate-to-high correlations between the new scale and worry, depression, anxiety, obsessive and compulsive behaviours, and neuroticism (e.g., Hong, 2007; Trapnell & Campbell, 1999; Wahl et al., 2011).

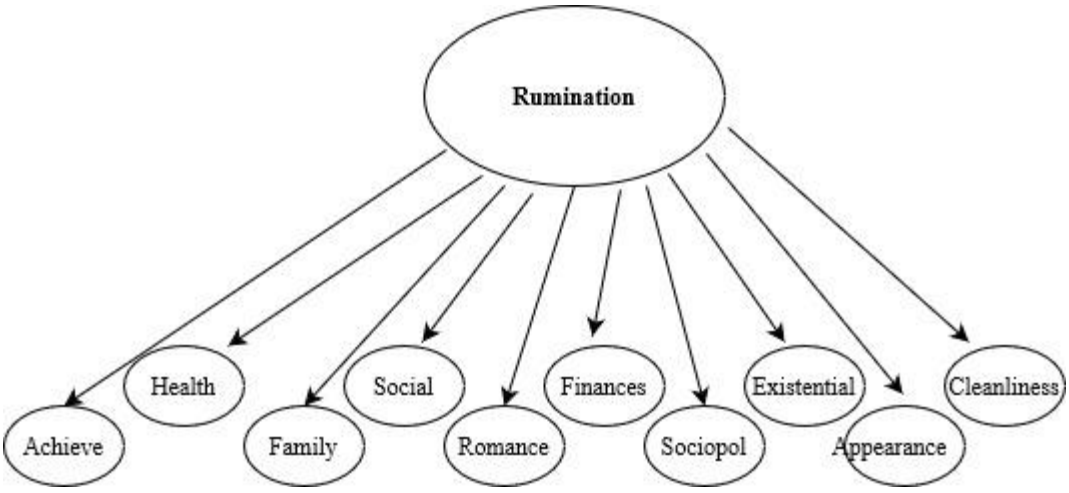
To ascertain that the new measure is consistent with previous literature and theory, sex differences were also assessed (i.e., known-groups validation; DeVellis, 2017). It was expected that general rumination, as measured by the new scale, would be higher in women (e.g., Hilt et al., 2010; Johnson & Whisman, 2013; Nolen-Hoeksema & Aldao, 2011). It should be noted that no explicit hypotheses were made regarding sex differences at the domain level, so these findings should be considered exploratory. Discriminant validity was assessed against traits that have been found to be unrelated to rumination such as extraversion, conscientiousness, and agreeableness (e.g., Trapnell & Campbell, 1999). Extraversion, agreeableness, and conscientiousness (as measured by measures from the IPIP; Goldberg et al., 2006) were expected to be weakly (i.e., $r < .20$; Hemphill, 2003) correlated with the new rumination measure. Reliability estimates (alpha and omega) were assessed with this new sample.

Furthermore, CFA was performed to assess the fit of the structure of the measure. A (1) unidimensional model, a (2) hierarchal model with a general rumination higher-order factor and with separate lower order factors for each domain (see figure 2 for diagram), a (3) model with 10

separate factors, representing domains, and a (4) model with 10 separate orthogonal factors representing domains, were assessed. It was expected that all models would have good fit, except for the orthogonal 10-factor model. It was also expected that model 4 would have the worst fit. Fit assessed by examining model chi-square (χ^2; good fit indicated by $p > .05$; Barrett, 2007), comparative fit index (CFI; good fit indicated by CFI ≥ .90; Bentler, 1990), root mean square error of approximation (RMSEA; acceptable fit indicated by RMSEA < .08; MacCallum et al., 1996; Steiger, 1990), and weighted root mean square residual (WRMR; acceptable fit indicated by WRMR < 1.00; Muthén & Muthén, 2012).

Figure 2

Diagram of hierarchical CFA



Note: Each lower-level factor comprises 6 items.

Moreover, to control for common method variance (see Podsakoff et al., 2012 and Podsakoff et al., 2003 for reviews), the correlation-based marker variable technique was used (Lindell & Whitney, 2001). This method requires the selection of a marker variable that, theoretically, should not be related to the constructs of interest, but that share a similar format (e.g., self-report Likert) to the constructs of interest (Lindell & Whitney, 2001; Podsakoff et al., 2012). In the context of the present study, an adapted version of the interest in gardening scale from the Oregon Avocational Interest Scale (ORAIS; Goldberg, 2010) will be used. The interest in gardening scale has six items rated on a scale from 1 to 5. In the original scale, the scale points represent the frequency of participating in various gardening activities, but for the purposes of this study to more closely match the format of the new items, participants will respond to the gardening items with a Likert type scale ranging from 1 (Almost never) to 4 (Very often). Traditionally, the smallest correlation between the variables of interest and the marker variable represents an estimate of common method bias (Lindell & White, 2001; Podsakoff et al., 2012), however, a problem with such an approach is that the weakest correlation would likely be an underestimate of common method variance. To provide a more conservative estimate, the average of all correlations between RDQ variables and interest in gardening was used in the present study. The bivariate correlations between substantive variables are then adjusted by subtraction of the common method bias estimate from the bivariate correlation between any pair of substantive variables and dividing by 1 minus the common method bias estimate (1 – estimate) to provide a partial correlation. If this partial remains significantly different from zero, the relationships between the substantive variables hold after controlling for common method bias.

3.1. Method

3.1.1. Participants

In the student sample, 1180 participants completed the study. Careless responding was addressed by removing data from participants who completed the study in an unrealistic short amount of time (i.e., 10 minutes or less). As well, participants were asked if their data should be considered reliable and included in the study; data from participants who indicated that their data should not be considered were removed. Finally, three attention checks were included where participants were asked to select a specific response option. Participants who passed at least two attention checks were included in the final sample, as recommended by Curran (2016).

The final student sample comprised 920 students from the University of Western Ontario, including 651 women, 262 men, and 7 who reported other genders (ages ranging from 16 to 57, mean age = 19.07, *SD* = 3.48). These participants were given course research credits for their participation.

In the community sample, 1675 participants completed the study. Data from participants who were flagged by the software as bots were removed. Further data from participants who completed the study in 10 minutes or less were removed. Participants were asked if their data should be considered reliable; data from participants who indicated that their data should not be considered in our study were removed. Three attention checks were included and data from participants who failed any attention checks was not included in the final sample.

The final community sample was comprised of 573 North American participants (305 women, 262 men, 6 who reported other sexes, and 3 who did not report their sex), aged 18 to 80 (M_{age} = 35.07, *SD* = 13.55). In this sample, 440 participants were recruited through social media and were given a chance to win one of 20 $20 (CAD) gift cards, whereas 133 participants were

recruited through Leger, a popular survey panel service and were compensated 3000 LEO points (equivalent of $3 CAD) for their participation. The data for this study is publicly available at https://osf.io/x6bu2/.

3.1.2. Measures

In addition to the Rumination Domains Questionnaire, which was developed in the previous study, the following measures were employed in the present study.

International Personality Item Pool (IPIP; Goldberg, 1999; Goldberg et al., 2006). To measure neuroticism (example item: “often feel blue”), extraversion (example item: “make friends easily”), agreeableness (example item “respect others”), and conscientiousness (example item: “carry out my plans”), the 20 item scales from the IPIP (Goldberg, 1999; Goldberg et al., 2006) were used. Participants were asked to respond to the items using a five-point Likert-type scale ranging from 1 (very inaccurate) to 5 (very accurate). In past research, these scales have been to have excellent reliability in self-report contexts (neuroticism α ranging from .85 to .96; extraversion α ranging from .90 to .93; agreeableness α ranging from .85 to .88; conscientiousness α ranging from .88 to .92; Bäckström et al., 2009; Behrend et al., 2011; Diab et al., 2008; Goldberg, 1999; Heaven & Bucci, 2001; Judge et al., Kowalski & Schermer, 2019; Macdonald et al., 2008; Mlačić & Goldberg, 2007) and peer-report contexts (neuroticism α = .90; extraversion α = .92; agreeableness α = .91; conscientiousness α = .93; Mlačić & Goldberg, 2007). There is high convergence between self- and peer-report responses (congruence coefficients ranging from .96 to .98; Mlačić & Goldberg, 2007). Moreover, the measures have shown strong convergent validity with other measures of the same construct (including with self- and peer-report) and strong discriminant validity as indicated with low correlations with other Big Five traits (Judge et al., 2002; Mlačić & Goldberg, 2007).

IPIP ORAIS Interest in Gardening Scale (Golderg, 2010). A version of the Interest in Gardening scale was used in the present study with a four-point Likert-type scale (example item: "I did yard work", ranging from 1 (*almost never*) to 4 (*almost always*). According to the IPIP website, the Interest in Gardening scale had high internal reliability (α =.85).

Padua inventory- Washington state revision (PI-WSUR; Burns, Keortge, Formea, & Sternberger, 1996). The PI-WSUR, a revision of the Padua Inventory (Sanavio, 1988), was used to measure obsessive and compulsive behaviour. This measure assesses OCD symptoms across five domains [contamination/washing (example item: "I find it difficult to touch an object when I know it has been touched by strangers or by certain people"), checking compulsions (example item: "I tend to keep on checking things more often than necessary"), dressing/grooming (example item: "Before going to sleep, I have to do certain things in a certain order"), obsessional thoughts of harm to self/others (example item: "I invent useless worries about germs and diseases"), obsessional impulses to harm self/others (example item: "Seeing weapons excites me and makes me ting violent thoughts")]. The PI-WSUR comprises 39 Likert-type items ranging from 0 (not at all) to 4 (very much). In previous research, the PI-WSUR has shown good to excellent internal reliability (Total α ranging from = .89 to .95; contamination/washing α ranging from .80 to .92; checking compulsions α ranging from .85 to .90; dressing grooming α ranging from .68 to .80; obsessional thoughts of harm to self/others α ranging from .75 to .79; obsessional impulses of harm to self/others α ranging from .76 to .83; Burns et al., 1996; Cougle et al., 2012; Cougle et al., 2011; Deacon & Maack, 2008; Doron et al., 2009; Ecker & Gönner, 2008; Jónsdóttir & Smári, 2000; Mahoney & McEvoy, 2012; Mahoney et al., 2012; McEvoy & Mahoney, 2011, 2012; Pleva & Wade, 2006; Rubio-Aparicio et al., 2020). The PI-WSUR has also shown solid test-retest reliability (meta-analytic estimates of total r_{tt} = .77;

contamination/washing r_{tt} = .79; checking compulsions r_{tt} = .66; dressing/grooming r_{tt} = .69; obsessional thoughts of harm to self/others r_{tt} =.64; obsessional impulses of harm to self/others r_{tt} =.72; Rubio-Aparicio et al., 2020). The PI-WSUR has shown strong convergent validity with its relationships with other measures of obsessive-compulsive symptoms, as well as discriminant validity with its relationships with worry (Burns et al., 1996; Jónsdóttir & Smári, 2000). Overall, the factor structure reported by Burns et al. (1996) has found support in later research (Jónsdóttir & Smári, 2000).

Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II was employed to measure depression. This measure consists of 21 self-report items (example item: "I dislike myself"), ranging from 0 to 3 (minimal to severe). Participants are asked to report on symptoms of depression they may have experienced in the past two weeks by choosing the statement that best describes the extent of each symptom (example statement: "I do not feel sad." Past research has demonstrated excellent internal consistency (α ranging from .82 to .96; ω = .90; Al-Turkait & Ohaeri, 2010; Arnau et al., 2001; Balsamo, 2010; Beck et al., 1996; Boettcher et al., 2014; Brouwer et al., 2013; Carlucci et al., 2018; Carmody, 2005; Ciesla & Roberts, 2007; Cougle et al., 2012; Cougle et al., 2011; Devynck et al., 2017; Dozois et al., 1998; Frasure-Smith & Lespérance, 2008; Gustavson et al., 2018; Hill et al., 2013; Kapci et al., 2008; McEvoy et al., 2013; Mahoney & McEvoy, 2012; Mahoney et al., 2012; Marcks & Woods, 2005; McEvoy & Mahoney, 2011, 2012; Pearson et al., 2011; Raes, 2010; Raes et al., 2008; Roberts et al., 2016; Schoofs et al., 2010; Sprinkle et al., 2002; Stange et al., 2017; Steer et al., 1997; Steer & Clark, 1997; Takano et al., 2019; Tindall et al., 2021; Titov et al., 2011; Wahl et al., 2019; Whisman et al., 2000). Previous research has also shown that the BDI-II performs well in terms of test-retest reliability (one to twelve days r_{tt} = .96; two weeks r_{tt} = .94; 6-month r_{tt} ranging from .66 to .69;

Kapci et al., 2008; Pearson et al., 2011; Sprinkle et al., 2008; Zetsche & Joorman, 2011). The BDI-II has demonstrated concurrent validity with other measures of depression (Al-Turkait & Ohaeri, 2010; Dozois et al., 1998; Kapci et al., 2008; Sprinkle et al., 208; Steer et al., 1997; Titov et al., 2011) and concurrent criterion-related validity with measures of solitude, sociotropy (Steer & Clark, 1997), mental health (Arnau et al., 2001), and anxiety (Steer et al., 1997) in past research. Discriminant validity has also been demonstrated in extant research with measures of independence (Steer & Clark, 1997), though some studies have raised questions regarding the discriminant validity of this measure (e.g., Kapci et al., 2008). Though the BDI-II is often separated into two subscales (i.e., cognitive-affective and somatic), some research has concluded the BDI-II is best reported as a single dimension (Brouwer et al., 2013), as it will be presented in the present study.

Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999). One of the measures used to assess rumination was the RRQ. The RRQ is composed of 24 items (12 items assess rumination, 12 items assess reflection; example rumination item: “My attention is often focused on aspects of myself I wish I'd stop thinking about”; example reflection item: “I'm very self-inquisitive by nature.”). The items are scored on a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Past research has shown that the RRQ has strong reliability (i.e., rumination α ranging from .85 to .92; reflection α ranging from .79 to .91; Hur et al., 2019; Kowalski & Schermer, 2019; Luyckx et al., 2008; Schoofs et al., 2010; Siegle et al., 2004; Trapnell & Campbell, 1999; Wupperman & Neumann, 2006), though some research has found unacceptably low reliability for the reflection factor (α = .47; Newman & Nezlek, 2019). The two-factor structure has been supported in past research (Trapnell & Campbell, 1999).

Ruminative Response Scale (RRS; Treynor et al., 2003). Additionally, rumination was assessed with the 10-item RRS (Treynor et al., 2003). This measure has 10 items (example reflection item: "Analyse recent events to try and understand why you are depressed"; example brooding item: "Think 'why do I always react this way?'") and two subscales (i.e., reflection and brooding). This version of the RRS is a revision of the original RRS (Nolen-Hoeksema & Morrow, 1991) that was revised to remove the items that assess depression, rather than rumination as a construct (Treynor et al., 2003). In past research, the RRS has shown acceptable to excellent internal reliability (i.e., total α ranging from .75 to .89; reflection α ranging from .66 to .86; brooding α ranging from .66 to .96; Aydin & Güneri, 2022; Bartoskova et al., 2018; Curci et al., 2013; Devynck et al., 2017; Feldman et al., 2008; Griffith & Raes, 2015; Gustavson et al., 2022; Hasegawa et al., 2014; Heinzel et al., 2020; Kornacka et al., 2016; Nota & Coles, 2015; Parola et al., 2017; Pearson et al., 2011; Schoofs et al., 2010; Siegle et al., 2004; Stange et al., 2017; Takano et al., 2019; Whisman, & Miyake, 2018). Moreover, the RRS has shown decent test-retest reliability (i.e., reflection: 1-year r_{tt} = .60, 6-month r_{tt} ranging from .35 to .56, 5-month r_{tt} = .47, 3-month r_{tt} = .52, 8-week r_{tt} = .58, 6-week r_{tt} = .72; brooding: 1-year r_{tt} = .62, 6-month r_{tt} ranging from .60 to .74, 5-month r_{tt} = .57, 3-month r_{tt} = .53, 8-week r_{tt} = .60, 6-week r_{tt} = .59; Hasegawa, 2013; Hasegawa et al., 2013; Pearson et al., 2011; Raes et al., 2012; Treynor et al., 2003; Zetsche & Joorman, 2011). Past research has shown mixed support for the two-factor structure with some research indicating adequate to good fit (Hasegawa, 2013; Hasegawa et al., 2013; Schoofs et al., 2010; Treynor et al., 2003; Whitmer & Gotlib, 2011), whereas other research has lead to questions regarding the validity of the reflection factor (Griffith & Raes, 2015; Parola et al., 2017) or found that the structure does not replicate in samples of individuals with depression (Whitmer & Gotlib, 2011). Moreover, research has shown adequate convergent,

discriminant, and predictive validity of the subscales when assessing with measures of rumination, reflection, and depression (Schoofs et al., 2010; Treynor et al., 2003) and the scale has been described as the gold standard to measure rumination (Topper et al., 2014).

Rumination on Sadness Scale (RSS; Conway et al., 2000). The RSS was also used to assess individual differences in rumination. The RSS comprises 13 items (example item: "When I feel sad, down, or blue, I repeatedly analyze and keep thinking about my sadness") with which respondents indicate the extent to which they ruminate on sadness on a five-point Likert-type scale ranging from 1 (not at all) to 5 (very much). The RSS presents a unidimensional structure (Conway et al., 2000). Internal reliability in previous research has been established (α = .81 to .93; Ciesla & Roberts, 2007; Conway et al., 2000; Conway et al., 2004; Raes et al., 2008; Raes et al., 2008; Siegle et al., 2004; Watkins et al., 2008; Wupperman & Neumann, 2006). Extant research has also shown that the RSS has decent test-retest reliability (two to three weeks r_{tt} = .70; Conway et al., 2000). The RSS has also shown good concurrent and criterion-related validity through strong correlations with other rumination measures and related constructs like depression, negative ideation, neuroticism, extraversion, conscientiousness, and worry, as well as discriminant validity as it is more strongly correlated with other rumination measures than measures of worry and has weak correlations with need for cognition (Conway et al., 2000; Raes, Hermans et al., 2008).

State-Trait Inventory for Cognitive and Somatic Anxiety- trait version (STICSA; Ree et al., 2008). The STICSA was used to assess trait cognitive and somatic anxiety. This measure was developed to measure both trait and state cognitive and somatic anxiety and has two sets of identical items with differing instructions (one set for trait and the other for state anxiety). In the present study, only the trait set was employed. The STICSA- trait comprises 21

Likert-type items (cognitive item example: “I have trouble remembering things”; somatic item example: “My heart beats fast”). Respondents indicate their level of anxiety on a scale from 1 (not at all) to 4 (very much so). The STICSA-trait has demonstrated good to excellent internal reliability in past research in both self-report (i.e., total α ranged from .85 to .95; total ω ranged from .92 to .94; cognitive anxiety α ranged from .79 to .94; cognitive anxiety ω ranged from .89 to .95; somatic anxiety α ranged from .81 to .94; somatic anxiety ω ranged from .87 to .94; Balsamo et al., 2015; Barros et al., 2022; Gros et al., 2010; Grös et al., 2007; Kowalski & Schermer, 2019; Lancaster et al., 2015; Ree et al., 2008; Roberts et al., 2016; Styck et al., 2022) and peer-report (cognitive anxiety α = .92; somatic anxiety α = .94; Gros et al., 2010) contexts. Most of the previous research has also supported the original structure proposed by Ree et al. (2008) in both self-report and peer-report contexts (Balsamo et al., 2015; Barros et al., 2022; Carlucci et al., 2018; Gros et al., 2010; Grös et al., 2007; Roberts et al., 2008; Styck et al., 2022; Tindall et al., 2021; see Lancaster et al., 2015 for contrary evidence). Moreover, this scale has shown at least acceptable convergent, concurrent, discriminant, and predictive validity in both self-report and peer-report contexts when validated against measures of interoceptive avoidance, worry, anxiety, depression, affect, responses to somatic and cognitive stressors, and other intrusive thought (Balsamo et al., 2015; Barros et al., 2022; Carlucci et al., 2018; Gros et al., 2010; Ree et al., 2008; Roberts et al., 2008; Tindall et al., 2021). It should be noted, however, that some research has questioned the discriminant validity of the STICSA subscales, as some research has found stronger correlations with depression than with other measures of anxiety (e.g., Balsamo et al., 2015; Grös et al., 2007; Lancaster et al., 2015) The STICSA has also shown adequate self-other agreement (Gros et al., 2010).

Worry Domains Questionnaire (WDQ; Tallis et al., 1992). In the present study, worry was assessed using the WDQ. The WDQ was developed to measure worry in five domains of life (i.e., relationships, lack of confidence, aimless future, work incompetence, and financial) in subclinical populations. This measure comprises 25 five-point Likert-type items (five items per domain, example item: "I worry that I will lose close friends"), ranging from 0 (not at all) to 4 (extremely). This measure can be used to measure worry in a particular domain or can be used as a unidimensional measure. The WDQ has shown strong internal reliability in past research (total α ranging from .90 to .95, relationships α ranging from .70 to .96, lack of confidence α ranging from.78 to .92, aimless future α from .70 to .95, work incompetence α ranging from .71 to .91, and financial α ranging from .80 to .92, in the cited research; Chang et al., 2007; Davey, 1993; Joorman & Stöber, 1997; Kelly, 2002; Kowalski & Schermer, 2019; Nota & Coles, 2015; Scott et al., 2002; Stöber, 1998; Stöber & Joormann, 2001). Past research has also shown that the WDQ has strong test-retest reliability over 4 weeks for all facets except (total r_{tt} = .85; relationships r_{tt} = .81; lack of confidence r_{tt} = .86; aimless future r_{tt} = .80; work incompetence r_{tt} = .71; financial r_{tt} = .81; Stöber, 1998). The WDQ has also demonstrated substantial peer-peer rating agreement (total ICC = .47; relationships ICC = .48; lack of confidence ICC = .47; aimless future ICC = .42; work incompetence ICC = .34; financial ICC =.38; Stöber, 1998) and self-peer (sp) rating convergence (total r_{sp} = .49; relationships r_{sp} = .45; lack of confidence r_{sp} = .52; aimless future r_{sp} = .49; work incompetence r_{sp} = .32; financial r_{sp} = .53; Stöber, 1998). Research has also noted that despite a significant negative correlation between social desirability and WDQ-measured worry, social desirability did not attenuate the validity of the measure (Stöber, 1998). Previous research has also shown that the WDQ has strong convergent validity (Stober, 1998). Further, research has supported the intercorrelated five-factor structure of the WDQ, as

such a model best accounted for the data compared to other models (i.e., one-, two-, and three-factor models) and was stable across samples (Joorman & Stöber, 1997).

3.1.3. Procedure

Participants completed the questionnaires online. After participants read the letter of information, they indicated consent by clicking a box on the screen, after which they were taken to the questionnaires. Once participants completed the questionnaires, a debriefing letter was displayed on the screen for participants to read. Participation was online only and respondents could complete the study from the comfort of their own homes. Participation usually took approximately 40 minutes or less to complete their sessions. Ethics approval for this study was obtained through the Ethics Board of the University of Western Ontario (REB#: 120938).

3.2. Results

3.2.1. Student Sample

Reliabilities for all measures and descriptive statistics are presented in Table 30. Coefficient alphas and omegas for RDQ subscales ranged from .80 to .95, indicating strong internal consistency. All measures employed in this study, for the student sample, demonstrated at least acceptable internal consistency. Assessment of univariate skewness and kurtosis amongst the RDQ total and subscales identified no problems as absolute values of skewness and kurtosis ranged from -.150 to .936 and -1.047 to .304, respectively. These values are within the guidelines of Kline (2011) which described values between -3.0 to 3.0 for absolute skewness and between -10.0 and 10.0 for absolute kurtosis to be indicators of acceptable univariate normality.

Table 30.

Reliabilities and descriptive statistics of all measures (student sample)

	Cronbach's α	McDonald's ω	*M (SD)*
RDQ total	.96	.96	132.51(31.04)
Achievement	.88	.88	17.32(4.23)
Health	.84	.85	12.00(4.24)
Family	.80	.80	12.62(3.88)
Social	.90	.90	15.51(4.72)
Romance	.87	.87	11.76(4.75)
Finance	.87	.87	13.01(4.51)
Existential	.92	.92	12.93(5.18)
Sociopolitical	.83	.84	11.44(3.76)
Physical Appearance	.95	.95	15.43(5.39)
Cleanliness	.88	.88	10.51(4.18)
RRS			
Brooding	.78	.78	13.22(3.60)
Reflection	.75	.76	12.25(3.58)
RRQ			
Rumination	.90	.90	44.46(9.20)
Reflection	.89	.89	37.26(9.24)
RSS	.92	.92	39.52(12.19)
WDQ	.95	.95	75.90(21.95)
Financial	.89	.89	12.79(5.50)
Lack of Confidence	.88	.88	16.40(5.42)
Aimless Future	.83	.83	16.13(5.12)
Relationships	.81	.81	14.52(5.32)
Work Incompetence	.82	.82	16.06(4.92)
PI			
Contamination	.90	.90	21.49(8.84)
Grooming	.78	.79	6.20(3.19)
Checking	.91	.91	24.67(9.65)
Thoughts of harm	.84	.84	14.24(5.90)
Impulses to harm	.87	.88	14.22(6.51)
Neuroticism	.92	.92	63.18(15.04)
Extraversion	.95	.95	63.87(17.28)
Agreeableness	.89	.89	73.91(11.68)
Conscientiousness	.93	.94	67.45(14.37)
STICSA	.93	.93	45.59(13.15)
Cognitive	.90	.91	24.74(7.06)
Somatic	.92	.92	20.85(7.70)
BDI	.93	.93	18.90(12.27)
Gardening	.88	.88	10.60(4.24)

Note: RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; RSS = Rumination on Sadness Scale; WDQ = Worry Domains Questionnaire; PI = Padua Inventory – Washinton State Revision; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

Validity evidence. Pearson correlation coefficients among the RDQ (totals and subscales) and other rumination measures are presented in Table 31. As expected, the RDQ was strongly[12] positively correlated with RRQ rumination, RRS brooding, and the RSS, with correlations ranging from .59 to .67, demonstrating the RDQ's concurrent validity. At the domain level, all domains correlated positively with the other measures of rumination, with correlations ranging from .26 (between cleanliness and RRQ-rumination) and .67 (between social and RRQ-rumination).

[12] The categorization of strength of correlation is based on Hemphill's (2003) empirical guidelines, where correlations of less than .20 is classified as weak, a correlation between .20 and .30 is classified as medium, and a correlation of stronger than .30 is categorized as strong.

Table 31.

Correlations between the RDQ total, domains, and other measures of rumination (student sample)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. RDQ total															
2. Achievement															
3. Health		.43*													
4. Family		.48*	.50*												
5. Social		.55*	.43*	.55*											
6. Romance		.28*	.34*	.39*	.47*										
7. Finances		.36*	.33*	.43*	.39*	.39*									
8. Sociopolitical		.37*	.36*	.49*	.36*	.26*	.39*								
9. Existential		.50*	.46*	.47*	.53*	.39*	.46*	.48*							
10. Appearance		.44*	.36*	.41*	.65*	.45*	.41*	.30*	.48*						
11. Cleanliness		.35*	.41*	.42*	.41*	.30*	.37*	.33*	.35*	.46*					
12. RRS-Brooding	.67*	.54*	.43*	.54*	.61*	.40*	.38*	.37*	.54*	.47*	.32*				
13. RRS-Reflection	.46*	.37*	.30*	.35*	.38*	.29*	.24*	.34*	.41*	.27*	.23*	.54*			
14. RRQ-Rumination	.59*	.49*	.36*	.43*	.67*	.34*	.29*	.28*	.45*	.48*	.26*	.66*	.45*		
15. RRQ-Reflection	.07	.05	.08	.08	.01	.01	.03	.23*	.12*	-.04	-.01	.08	.39*	.08	
16. RSS	.67*	.48*	.46*	.52*	.58*	.40*	.40*	.40*	.58*	.43*	.35*	.68*	.63*	.63*	.08

Note: * $p < .001$; two-tailed; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; RSS = Rumination on Sadness Scale

Table 32 presents correlations between the RDQ and rumination-related variables. The RDQ was also strongly and positively correlated with worry and all domains of worry (r = .52 to .75). As for the rumination domain level, all rumination domains were strongly correlated with total worry (r = .41 to .67). The RDQ achievement, health, social, and romance domains were moderately to strongly positively correlated with all domains of worry. The RDQ family, financial, sociopolitical, existential, appearance, and cleanliness domains were strongly positively correlated with all worry domains. Of note, the RDQ achievement domain was most strongly correlated with work incompetence and aimless future domains of worry, which seem intuitively related to achievement. As well, the RDQ family domain was most strongly correlated with worry in the relationships domain, which also makes intuitive sense considering family is a type of significant relationship one may have. In the same vein, RDQ- financial rumination was most strongly correlated with worry in the financial domain. Overall, the hypotheses regarding the RDQ and worry were supported.

Table 32.

Correlations between rumination measures and related constructs (student sample)

	WDQ total	WDQ-Finances	WDQ-Lack of Confidence	WDQ-Aimless future	WDQ-Relationships	WDQ- Work Incompetence	PI-contamination	PI-Grooming	PI-Checking	PI-thoughts of harm	PI-Impulses	Neuroticism	STICSA-total	STICSA-Cognitive	STICSA-Somatic	BDI
RDQ total	.78*	.52*	.71*	.68*	.75*	.62*	.25*	.21*	.38*	.53*	.38*	.64*	.67*	.68*	.52*	.66*
Achievement	.56*	.26*	.51*	.56*	.48*	.56*	.17*	.13*	.27*	.33*	.16*	.50*	.45*	.53*	.29*	.48*
Health	.45*	.26*	.40*	.40*	.44*	.38*	.25*	.20*	.33*	.44*	.26*	.44*	.51*	.47*	.43*	.47*
Family	.54*	.36*	.46*	.46*	.55*	.45*	.22*	.18*	.28*	.42*	.28*	.48*	.50*	.47*	.42*	.46*
Social	.67*	.28*	.76*	.54*	.66*	.53*	.17*	.14*	.31*	.42*	.24*	.64*	.57*	.63*	.40*	.54*
Romance	.43*	.27*	.39*	.31*	.55*	.29*	.09*	.16*	.23*	.32*	.30*	.32*	.39*	.40*	.30*	.35*
Finances	.58*	.75*	.38*	.45*	.44*	.41*	.18*	.14*	.24*	.31*	.27*	.34*	.43*	.41*	.35*	.39*
Sociopolitical	.41*	.32*	.32*	.37*	.35*	.35*	.17*	.13*	.25*	.37*	.23*	.31*	.36*	.34*	.30*	.32*
Existential	.64*	.40*	.54*	.68*	.57*	.50*	.15*	.11*	.27*	.40*	.37*	.55*	.61*	.62*	.47*	.65*
Appearance	.62*	.32*	.68*	.50*	.65*	.45*	.15*	.12*	.23*	.32*	.24*	.51*	.44*	.47*	.32*	.49*
Cleanliness	.47*	.34*	.38*	.39*	.44*	.40*	.22*	.16*	.21*	.34*	.23*	.31*	.37*	.35*	.32*	.36*
Other Rumination scales																
RRS-Brooding	.60*	.29*	.62*	.52*	.57*	.51*	.23*	.18*	.33*	.45*	.27*	.64*	.56*	.61*	.40*	.55*
RRQ-Rumination	.57*	.23*	.64*	.49*	.55*	.47*	.13*	.08	.29*	.38*	.19*	.68*	.57*	.66*	.38*	.55*
RSS	.63*	.35*	.59*	.58*	.58*	.53*	.26*	.22*	.39*	.48*	.35*	.62*	.65*	.68*	.48*	.63*

Note. * $p < .001$; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination -Reflection Questionnaire; RSS = Rumination on Sadness Scale; WDQ = Worry Domains Questionnaire; PI; Padua Inventory – Washington State Revision; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

For obsessive and compulsive behaviour, the RDQ was moderately positively correlated with the contamination subscale of the PI-WSUR. This relationship was comparable in strength to the correlations between the RRS and RSS correlations with the contamination scale. At the domain level, all domains were positively and weakly correlated with the contamination subscale, other than the health, family, and cleanliness domains of the RDQ which were moderately correlated with the contamination subscale. The RDQ was moderately correlated with the grooming subscale of the PI-WSUR. This relationship was similar to the relationship between the other measures of rumination (specifically, the RRS and RSS). At the domain level, all domains were weakly correlated with the grooming subscale, except for the health domain, which was moderately correlated with the grooming subscale. Moreover, the RDQ was strongly positively correlated with the checking subscale and this correlation was similar to the relationship between the other rumination scales and this subscale. At the domain level, all domains were moderately correlated with the checking subscale, except for the health and social subscales which were strongly correlated. Furthermore, the RDQ was strongly positively correlated with the thoughts of harm subscale and this result was similar to that of the relationship between the other rumination scales (especially the RRS and RSS) with the thoughts of harm subscale. The RDQ was also strongly correlated with the impulses to harm subscale and this relationship was similar to that of the RSS and this subscale. At the domain level, all RDQ domains were moderately positively correlated with the impulse scale, except for the achievement domain (weakly positively correlated) and the existential domain (strongly positively correlated). Overall, the relationships with the RDQ and the PI-WSUR scales were as expected and were comparable to those of previously validated rumination scales, supporting the validity of the RDQ.

Rumination, as measured by the RDQ, was strongly positively correlated with neuroticism. This correlation was virtually identical to that of the RRS brooding and neuroticism and remarkably similar to relationships between the other rumination measures and neuroticism. As for the domain level, all RDQ domains were strongly positively correlated with neuroticism.

As expected, RDQ rumination was strongly positively correlated with depression, as were all domains of the RDQ, with correlations ranging from r = .32 to .65 (sociopolitical and existential domains, respectively). The relationship between RDQ rumination and depression was comparable to the relationships between the other rumination measures and depression. In the same vein, the RDQ was strongly and positively correlated with total anxiety, as well as cognitive and somatic anxiety (r = .67, .68, and .52, respectively). These relationships were comparable to relationships between the other rumination measures and anxiety. At the domain level, all rumination domains were strongly correlated with overall anxiety (ranging from r = .36 to .61) and cognitive anxiety (r = .34 to .63). All rumination domains were strongly and positively correlated with somatic anxiety, except for achievement (r = .29), romance (r = .30), and sociopolitical (r = .30; domain correlations with somatic anxiety ranged from r = .29 to .47). Overall, these findings support the RDQ's criterion validity.

Sex differences in rumination (see Table 33) were assessed to ascertain that the RDQ is consistent with theory and prior empirical research, as well as to assess sex differences in rumination content. It was expected that women would score higher on rumination than men and this hypothesis was supported. Women scored significantly higher than men on the RDQ, supporting the validity of this measure. Further, women scored significantly higher than men on all RDQ domains, except for the romantic domain.

Table 33.

Sex differences in RDQ variables (student sample)

	Men *M*(*SD*)	Women *M*(*SD*)	*F*	*t*(*df*)	*d*
RDQ total	123.63(29.73)	135.99(30.81)	.79	-5.54***(909)	.41
Achievement	16.63(4.11)	17.61(4.25)	1.41	-3.16**(911)	.23
Health	11.48(3.99)	12.19(4.31)	1.07	-2.29*(911)	.17
Family	11.23(3.42)	13.20(3.91)	6.42*	-7.56***(547.90)	.52
Social	13.97(4.57)	16.13(4.65)	1.33	-6.37***(910)	.47
Romance	12.06(4.73)	11.65(4.75)	.01	1.20(911)	-.09
Finances	12.15(4.15)	13.35(4.58)	5.55*	-3.86***(528.55)	.27
Sociopolitical	10.74(3.55)	11.70(3.81)	1.37	-3.50***(911)	.26
Existential	12.28(4.97)	13.18(5.23)	1.59	-2.38*(911)	.18
Appearance	13.35(5.02)	16.24(5.31)	3.63	-7.55***(910)	.55
Cleanliness	9.73(3.88)	10.79(4.23)	3.69	-3.51***(911)	.26

Note: * $p < .05$, ** < .01, *** $p < .001$; two-tailed; F = Levene's test; d = Cohen's d, d = .2 indicates a small effect size, d = .5 indicates a medium effect size, d = .8 indicates large effect size; RDQ = Rumination Domains Questionnaire

Discriminant validity of the RDQ (Table 34) was assessed by examining the correlations of the RDQ with extraversion, conscientiousness, agreeableness, and interest in gardening. Contrary to expectations, the RDQ was moderately negatively correlated with extraversion. Although this result is not consistent with our hypotheses which are based on extant literature, the relationship between RDQ rumination and extraversion was similar to, and even slightly weaker than, the relationship between the other rumination measures and extraversion, in the current sample. At the domain level, all domains were weakly negatively correlated with extraversion, except for the social and existential domains, which were moderately negatively correlated. Consistent with hypotheses, agreeableness was weakly negatively correlated with the RDQ, and similar results were found for the other rumination measures (especially the RSS). At the domain level, all domains were weakly negatively correlated with agreeableness. Contrary to hypotheses, conscientiousness was moderately negatively correlated with the RDQ. Although a weak correlation was expected, the other rumination measures used in the present study were

only slightly weaker in magnitude, with the correlation between the RSS and conscientiousness also reaching a moderate level. All domains of the RDQ were weakly negatively correlated with conscientiousness, except for the family, social, and cleanliness domains, which were moderate in strength, and the existential domain, which was strongly negatively correlated with conscientiousness. As expected, interest in gardening was weakly and non-significantly correlated with the RDQ and all the other rumination measures in the present study. Moreover, all domains of the RDQ were weakly correlated with interest in gardening.

Table 34.

Correlations between rumination measures and variables predicted to be weakly correlated with rumination (student sample)

	Extraversion	Agreeableness	Conscientiousness	Gardening
RDQ total	-.21*	-.11	-.28*	.05
Achievement	-.16*	-.03	-.14*	.03
Health	-.17*	-.08	-.19*	.07
Family	-.15*	-.09	-.20*	.11
Social	-.29*	-.02	-.20*	-.04
Romance	-.04	-.14	-.16*	-.01
Finances	-.07	-.13*	-.19*	.05
Sociopolitical	-.08	-.05	-.11	.15*
Existential	-.26*	-.14*	-.32*	.03
Appearance	-.13*	-.02	-.19*	-.03
Cleanliness	-.11	-.09	-.22*	.05
Other rumination measures				
RRS-Brooding	-.23*	-.04	-.19*	.04
RRQ-Rumination	-.29*	-.01	-.18*	-.04
RSS	.-.26*	-.11	-.23*	.03

Note. * $p < .001$; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; RSS = Rumination on Sadness Scale

Structural validity. Prior to factor analyses, KMO and Bartlett's sphericity were examined to determine if the data were appropriate for factor analyses. These values (i.e., KMO

= .93, Bartlett's sphercity = 33,811.95, $p < .001$), suggesting that the data is appropriate for factor analyses. Confirmatory factor analyses (CFA) with WLSMV estimation and oblimin rotation were performed to assess the fit of the structure (see Table 35). Four models were tested. It was hypothesized that all models would have good fit, except for the orthogonal 10-factor model. Contrary to expectations, the unidimensional model did not fit the data well, according to all fit indices employed in this study. Specifically, this model produced a significant χ^2, a CFI of less than .90, an RMSEA greater than .08, and a WRMR greater than 1, suggesting that one general factor is insufficient in explaining the common variance amongst the items. Loadings from this model range from .37 to .88 and can be found in Table 36. On the other hand, the hierarchical model, with a unidimensional factor that subsumed 10 factors (see Table 37 for standardized loadings), produced good fit according to CFI and RMSEA. This model did not reach adequate fit according to $\chi 2$ and WRMR. It should be noted, however, that $\chi 2$ is inflated in large samples (Marsh, et al., 1988; Sun, 2005), hence this result is not surprising. As for WRMR, this index is still in the experimental stage and is known to be biased with larger sample sizes (DiStefano et al., 2018), so it should be interpreted with caution.. Lower order loadings from this model ranged from .54 to .94, whereas higher order loadings ranged from .59 to .84. The correlated 10-factor model also produced good fit according to the CFI and RMSEA indices. Again, this model did not reach traditional $\chi 2$ and WRMR values which would indicate adequate fit. Loadings from this model ranged from .54 to .94 can be found in Table 36. As predicted, the orthogonal 10-factor model showed the worst fit of all the models with none of the fit indices indicating adequate fit. Loadings from this model ranged from .54 to .94 and can be found in Table 38.

Table 35

Fit indices of CFA models (student sample)

Model	$\chi^2(df)$	CFI	RMSEA (CI)	WRMR
Unidimensional model	21802.30* (1710)	.67	.11 (.11-.11)	4.26
Hierarchical model	4941.45* (1700)	.95	.05 (.04-.05)	1.79
Ten-factor model	4547.51*(1665)	.95	.04 (.04-.05)	1.50
Orthogonal ten-factor model	30265.73*(1710)	.53	.14 (.13-.14)	8.98

Note. * $p < .001$.

Table 36

Loadings for unidimensional CFA and 10-factor CFA (student sample)

	Standardized Loadings										
	Unidimensional model	10 Factor model									
Item	Factor 1	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
Achievement											
1	.52	.70									
2	.57	.76									
3	.63	.82									
4	.63	.81									
5	.66	.86									
6	.64	.83									
Health											
1	.37		.54								
2	.53		.75								
3	.57		.81								
4	.57		.81								
5	.57		.81								
6	.60		.84								
Family											
1	.51			.67							
2	.55			.73							
3	.50			.66							
4	.56			.75							
5	.56			.74							
6	.56			.73							
Social											
1	.70				.83						
2	.67				.79						
3	.71				.84						
4	.62				.74						
5	.71				.84						
6	.73				.86						
Romance											
1	.51					.77					
2	.55					.81					
3	.51					.75					
4	.59					.83					
5	.63					.90					
6	.45					.69					
Finances											
1	.52						.75				
2	.58						.82				
3	.59						.82				
4	.55						.78				
5	.57						.81				
6	.54						.77				
Sociopolitical											
1	.46							.71			
2	.51							.79			
3	.45							.71			
4	.58							.88			
5	.48							.76			
6	.50							.79			
Existential											
1	.53								.66		
2	.75								.88		
3	.72								.86		
4	.82								.93		
5	.79								.90		
6	.77								.89		
Appearance											
1	.78									.88	
2	.79									.87	
3	.84									.92	
4	.88									.94	
5	.82									.90	
6	.87									.93	
Cleanliness											
1	.54										.76
2	.59										.82
3	.63										.88
4	.50										.72
5	.57										.80

6	.56	.80

Table 37

Standardized loadings for hierarchical CFA (student sample)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10	Higher order factor
Achievement											.71
1	.70										
2	.76										
3	.82										
4	.81										
5	.86										
6	.83										
Health											.67
1		.54									
2		.75									
3		.81									
4		.81									
5		.81									
6		.84									
Family											.77
1			.67								
2			.73								
3			.66								
4			.75								
5			.74								
6			.73								
Social											.84
1				.83							
2				.79							
3				.85							
4				.74							
5				.84							
6				.86							
Romance											.61
1					.77						
2					.81						
3					.75						
4					.83						
5					.91						
6					.69						
Finances											.64
1						.75					
2						.82					
3						.82					
4						.78					
5						.81					
6						.77					
Sociopolitical											.59
1							.71				
2							.79				
3							.71				
4							.89				
5							.76				
6							.79				
Existential											.76
1								.66			
2								.88			
3								.86			
4								.93			
5								.90			
6								.89			
Appearance											.74
1									.88		
2									.87		
3									.92		
4									.94		
5									.90		

6	.93	
Cleanliness		.65
1	.76	
2	.82	
3	.88	
4	.72	
5	.80	
6	.80	

Table 38

Standardized loadings for Orthogonal CFA (student sample)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
Achievement										
1	.74									
2	.80									
3	.79									
4	.81									
5	.85									
6	.80									
Health										
1		.54								
2		.81								
3		.62								
4		.88								
5		.85								
6		.80								
Family										
1			.71							
2			.79							
3			.59							
4			.72							
5			.80							
6			.60							
Social										
1				.84						
2				.81						
3				.80						
4				.77						
5				.81						
6				.87						
Romance										
1					.81					
2					.74					
3					.71					
4					.89					
5					.83					
6					.76					
Finances										
1						.82				
2						.84				
3						.80				
4						.81				
5						.76				
6						.71				
Sociopolitical										
1							.66			
2							.76			
3							.76			
4							.55			
5							.86			
6							.88			
Existential										
1								.69		
2								.88		
3								.83		
4								.92		
5								.92		
6								.88		
Appearance										
1									.87	
2									.88	
3									.92	
4									.93	
5									.90	
6									.94	
Cleanliness										
1										.78
2										.85
3										.79
4										.74
5										.82
6										.82

Common method bias. A version of the correlational marker method (Lindell & Whitney, 2001) was used to assess common method bias. Lindell and Whitney (2001) assumed that the weakest correlation between the variables of interest and the marker variable (in this case, interest in gardening) could serve as an estimate of common method variance, however, a problem with such an approach would likely be an underestimate of common method variance. To provide a more conservative estimate, the average of all correlations between RDQ variables and interest in gardening was used (i.e., .042) as an estimate of common method variance, which indicated that the effect of common method variance was low. Moreover, as shown in Tables 39-41, when this estimate was partialled out of the correlations between the RDQ variables and other variables, this did not substantially alter the correlations and did not mitigate the correlations between theoretically relevant variables enough to make them non-significant.

Table 39

Partial correlations amongst RDQ variables and rumination measures with common method bias controlled (student sample)

	RDQ total	Achievement	Health	Family	Social	Romance	Finance	Sociopolitical	Existential	Appearance	Cleanliness
RDQ total											
Achievement											
Health		.41*									
Family		.46*	.48*								
Social		.53*	.41*	.53*							
Romance		.25*	.31*	.36*	.45*						
Finances		.33*	.30*	.41*	.36*	.36*					
Sociopolitical		.34*	.33*	.47*	.33*	.23*	.36*				
Existential		.48*	.44*	.45*	.51*	.36*	.44*	.46*			
Appearance		.42*	.33*	.38*	.63*	.43*	.38*	.27*	.46*		
Cleanliness		.32*	.38*	.39*	.38*	.27*	.34*	.30*	.32*	.44*	
RRS-Brooding	.66*	.52*	.41*	.52*	.59*	.37*	.35*	.34*	.52*	.45*	.29*
RRS-Reflection	.44*	.34*	.27*	.32*	.35*	.26*	.21*	.31*	.38*	.24*	.20*
RRQ-Rumination	.57*	.47*	.33*	.41*	.66*	.31*	.26*	.25*	.43*	.46*	.23*
RRQ-Reflection	.03	.01	.04	.04	-.03	-.03	-.01	.20*	.08	-.09	-.05
RSS	.66*	.46*	.44*	.50*	.56*	.37*	.37*	.37*	.56*	.41*	.32*

Note: * p<.001; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; RSS = Rumination on Sadness Scale

Table 40

Partial correlations between RDQ variables and rumination-related variables, controlling for common method bias (student sample)

	WDQ total	WDQ-Finances	WDQ-Lack of Confidence	WDQ-Aimless future	WDQ-Relationships	WDQ- Work Incompetence	PI-contamination	PI-Grooming	PI-Checking	PI-thoughts of harm	PI-Impulses	Neuroticism	STICSA-total	STICSA-Cognitive	STICSA-Somatic	BDI
RDQ total	.77*	.50*	.70*	.67*	.74*	.60*	.22*	.18*	.35*	.51*	.35*	.62*	.66*	.67*	.50*	.65*
Achievement	.54*	.23*	.49*	.54*	.46*	.54*	.13*	.09	.24*	.30*	.12*	.48*	.43*	.51*	.26*	.46*
Health	.43*	.23*	.37*	.37*	.42*	.35*	.22*	.16*	.30*	.42*	.23*	.42*	.49*	.45*	.41*	.45*
Family	.52*	.33*	.44*	.44*	.53*	.43*	.19*	.14*	.25*	.39*	.25*	.46*	.48*	.45*	.39*	.44*
Social	.66*	.25*	.75*	.52*	.65*	.51*	.13*	.10	.28*	.39*	.21*	.62*	.55*	.61*	.37*	.52*
Romance	.41*	.24*	.36*	.28*	.53*	.26*	.05	.12*	.20*	.29*	.27*	.29*	.36*	.37*	.27*	.32*
Finances	.56*	.74*	.35*	.43*	.42*	.38*	.14*	.10	.21*	.28*	.24*	.31*	.41*	.38*	.32*	.36*
Sociopolitical	.38*	.29*	.29*	.34*	.32*	.32*	.13*	.09	.22*	.34*	.20*	.28*	.33*	.31*	.27*	.29*
Existential	.62*	.37*	.52*	.67*	.55*	.48*	.11	.07	.24*	.37*	.34*	.53*	.59*	.60*	.45*	.63*
Appearance	.60*	.29*	.67*	.48*	.63*	.43*	.11	.08	.20*	.29*	.21*	.49*	.42*	.45*	.29*	.47*
Cleanliness	.45*	.31*	.35*	.36*	.42*	.37*	.19*	.12*	.18*	.31*	.20*	.28*	.34*	.32*	.29*	.33*

Note: * $p<.001$; RDQ = Rumination Domains Questionnaire; WDQ = Worry Domains Questionnaire; PI = Padua Inventory – Washington State Revision; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

Table 41

Partial correlations between RDQ variables and theoretically unrelated variables, controlling for CMV (student sample)

	Extraversion	Agreeableness	Conscientiousness
RDQ total	-.26*	-.16*	-.34*
Achievement	-.21*	-.08	-.19*
Health	-.22*	-.13*	-.24*
Family	-.20*	-.14*	-.25*
Social	-.35*	-.06	-.25*
Romance	-.09	-.19*	-.21*
Finances	-.12*	-.18*	-.24*
Sociopolitical	-.13*	-.10	-.16*
Existential	-.32*	-.19*	-.38*
Appearance	-.18*	-.06	-.24*
Cleanliness	-.16*	-.14*	-.27*

Note: * p<.001; RDQ = Rumination Domains Questionnaire

3.2.2. Community sample

Descriptive statistics and reliabilities for all measures are presented in Table 42. Assessment of univariate skewness and kurtosis amongst the RDQ total and subscales identified no problems as absolute values of skewness and kurtosis ranged from .198 to 1.02 and -.503 to .328, respectively. These values are within the guidelines of Kline (2011). Coefficient alphas and omegas for RDQ subscales ranged from .80 to .89, indicating strong internal consistency. All measures employed in this study, for the community sample, demonstrated strong internal consistency.

Table 42

Reliabilities and descriptive statistics for the community sample

	Cronbach's α	McDonald's ω	*M (SD)*
RDQ total	.97	.97	119.37(30.12)
Achievement	.87	.87	13.49(3.84)
Health	.86	.86	12.14(3.93)
Family	.80	.80	11.85(3.46)
Social	.87	.87	12.67(3.97)
Romance	.87	.87	11.05(4.03)
Finance	.84	.84	12.67(3.83)
Existential	.89	.89	12.06(4.30)
Sociopolitical	.84	.84	11.94(3.80)
Appearance	.89	.89	12.05(4.08)
Cleanliness	.89	.89	9.53(3.73)
RRS			
Brooding	.81	.82	11.95(3.48)
Reflection	.80	.81	11.56(3.54)
RRQ			
Rumination	.89	.90	39.74(8.65)
Reflection	.86	.86	37.89(7.93)
RSS	.93	.93	37.29(11.61)
WDQ	.96	.96	65.16(21.31)
Financial	.88	.88	13.48(4.99)
Lack of Confidence	.88	.88	13.35(4.96)
Aimless Future	.86	.86	13.47(5.00)
Relationships	.84	.84	12.40(4.75)
Work Incompetence	.84	.85	12.46(4.53)
PI			
Contamination	.93	.93	21.55(9.09)
Grooming	.87	.87	6.13(3.14)
Checking	.94	.94	23.06(9.53)
Thoughts of harm	.91	.91	14.56(6.41)
Impulses to harm	.93	.94	15.49(7.86)
Neuroticism	.93	.93	57.85(14.92)
Extraversion	.93	.94	60.32(15.28)
Agreeableness	.86	.87	71.29(11.63)
Conscientiousness	.91	.92	67.68(13.33)
STICSA	.95	.95	42.77(13.19)
Cognitive	.92	.92	22.05(6.91)
Somatic	.93	.93	20.74(7.26)
BDI	.95	.95	18.80(13.19)
Gardening	.89	.89	12.97(4.40)

Note: RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Ruminative-Reflection Questionnaire; RSS = Rumination on Sadness Scale; WDQ = Worry Domains Questionnaire; PI = Padua Inventory – Washinton State Revision; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

Validity evidence. Bivariate correlations among the RDQ (totals and subscales) and other rumination measures are presented in Table 43. As predicted, the RDQ was strongly positively correlated with RRQ rumination, RRS brooding, and the RSS, with correlations ranging from .40 to .63, demonstrating the RDQ's concurrent validity. At the domain level, all domains correlated positively with the other measures of rumination, with correlations ranging from .20 (between sociopolitical and RRQ-rumination) and .58 (between social and RRS-Brooding), except for the relationship between the cleanliness domain and RRQ- Rumination (*r* = .08).

Table 43

Correlations between RDQ and other rumination scales in community sample

	RDQ total	Achievement	Health	Family	Social	Romance	Finance	Sociopolitical	Existential	Appearance	Cleanliness	RRS-Brooding	RRS-Reflection	RRQ-Rumination	RRQ-Reflection	RSS
RDQ total																
Achievement																
Health		.52*														
Family		.61*	.64*													
Social		.69*	.51*	.69*												
Romance		.49*	.53*	.63*	.57*											
Finances		.63*	.52*	.54*	.56*	.50*										
Sociopolitical		.46*	.47*	.50*	.49*	.43*	.46*									
Existential		.61*	.51*	.58*	.61*	.62*	.61*	.53*								
Appearance		.56*	.60*	.57*	.66*	.53*	.54*	.50*	.57*							
Cleanliness		.46*	.56*	.56*	.49*	.60*	.50*	.48*	.51*	.54*						
RRS-Brooding	.63*	.56*	.46*	.52*	.58*	.49*	.53*	.35*	.54*	.49*	.37*					
RRS-Reflection	.54*	.44*	.34*	.42*	.48*	.45*	.40*	.41*	.48*	.38*	.34*	.65*				
RRQ-Rumination	.40*	.47*	.27*	.33*	.51*	.21*	.31*	.20*	.32*	.38*	.08	.49*	.33*			
RRQ-Reflection	.01	.05	-.02	-.01	.02	.01	-.01	.15*	.03	-.06	-.07	.05	.33*	.12		
RSS	.57*	.49*	.39*	.44*	.48*	.48*	.44*	.33*	.56*	.42*	.37*	.64*	.59*	.52*	.20*	

Note: *p<.001; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; RSS = Rumination on Sadness Scale

Table 44 presents correlations between the RDQ and rumination-related variables. The RDQ was strongly and positively correlated with worry and all domains of worry. All rumination domains were strongly correlated with total worry and each worry domain. As in the student sample, the RDQ family domain was most strongly correlated with the relationships domain of worry. In the same vein, the romance rumination domain was also most strongly correlated with worry in the relationships domain. Moreover, RDQ- financial rumination was most strongly correlated with worry in the financial domain. Overall, the hypotheses regarding the RDQ and worry were supported.

Table 44

Correlations between rumination measures and theoretically related constructs in community sample

	WDQ total	WDQ-Finances	WDQ-Lack of Confidence	WDQ-Aimless future	WDQ-Relationships	WDQ- Work Incompetence	PI-contamination	PI-Grooming	PI-Checking	PI-thoughts of harm	PI-Impulses	Neuroticism	STICSA-total	STICSA-Cognitive	STICSA-Somatic	BDI
RDQ total	.72*	.57*	.65*	.63*	.70*	.61*	.53*	.46*	.55*	.64*	.54*	.54*	.67*	.65*	.59*	.64*
Achievement	.63*	.48*	.58*	.59*	.54*	.57*	.34*	.26*	.39*	.43*	.32*	.49*	.51*	.59*	.37*	.50*
Health	.51*	.43*	.45*	.40*	.52*	.44*	.40*	.40*	.43*	.52*	.37*	.37*	.50*	.46*	.47*	.47*
Family	.56*	.45*	.51*	.46*	.59*	.46*	.46*	.39*	.46*	.53*	.42*	.41*	.53*	.51*	.48*	.47*
Social	.65*	.42*	.67*	.57*	.64*	.57*	.37*	.29*	.41*	.48*	.38*	.55*	.59*	.63*	.47*	.52*
Romance	.52*	.37*	.44*	.45*	.60*	.42*	.46*	.47*	.49*	.55*	.52*	.38*	.54*	.49*	.53*	.51*
Finances	.60*	.70*	.46*	.50*	.47*	.48*	.41*	.33*	.42*	.47*	.40*	.43*	.50*	.51*	.42*	.48*
Sociopolitical	.43*	.33*	.40*	.38*	.39*	.38*	.33*	.28*	.31*	.41*	.36*	.26*	.40*	.37*	.37*	.37*
Existential	.63*	.49*	.56*	.66*	.59*	.47*	.43*	.36*	.46*	.51*	.46*	.51*	.59*	.60*	.51*	.64*
Appearance	.59*	.41*	.60*	.49*	.60*	.50*	.41*	.34*	.43*	.48*	.39*	.51*	.56*	.54*	.50*	.52*
Cleanliness	.46*	.37*	.37*	.36*	.47*	.45*	.50*	.47*	.48*	.57*	.55*	.28*	.49*	.39*	.51*	.48*
Other Rumination scales																
RRS- Brooding	.61*	.48*	.56*	.56*	.56*	.51*	.32*	.27*	.42*	.49*	.33*	.51*	.56*	.60*	.45*	.53*
RRQ-Rumination	.50*	.33*	.55*	.44*	.37*	.34*	.04	-.02	.19*	.18*	.01	.61*	.40*	.53*	.22*	.33*
RSS	.69*	.52*	.64*	.66*	.63*	.57*	.40*	.35*	.47*	.54*	.41*	.59*	.67*	.69*	.55*	.57*

Note: * p <.001; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination=Reflection Questionnaire; RSS = Rumination on Sadness Scale; WDQ = Worry Domains Questionnaire; PI = Padua Inventory = Washinton State Revision; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

As for obsessive and compulsive behaviour, the RDQ was strongly positively correlated with all subscales of the PI-WSUR, as was the case for the RSS. Moreover, all domains of the RDQ were strongly positively correlated with all PI-WSUR scales, except for the achievement, social, and sociopolitical domains, which were only moderately positively correlated with the grooming scale. Overall, the relationships with the RDQ and the PI-WSUR scales were as expected and were comparable to those of previously validated rumination scales (especially the RSS), supporting the validity of the RDQ.

Rumination, as measured by the RDQ, was strongly positively correlated with neuroticism. This correlation was virtually very similar to that of other rumination scales and neuroticism. As for the domain level, all RDQ domains were strongly positively correlated with neuroticism, except for the sociopolitical and cleanliness domains, which were moderately correlated with neuroticism.

As predicted, RDQ rumination was strongly positively correlated with depression, as were all domains of the RDQ, with domain correlations ranging from r = .37 to .64 (sociopolitical and existential domains, respectively). The relationship between the RDQ and depression was similar to the relationships between the other rumination measures and depression. Furthermore, RDQ rumination was strongly and positively correlated with total anxiety, as well as cognitive and somatic anxiety (r = .67, .65, and .59, respectively). These relationships were comparable to relationships between the other rumination measures and anxiety. At the domain level, all rumination domains were strongly correlated with overall anxiety (ranging from r = .40 to .59), cognitive anxiety (r = .37 to .63) and somatic anxiety (r = .37 to .53). Overall, these findings support the RDQ's criterion validity.

Sex differences (Table 45) in rumination were assessed to ascertain that the RDQ is consistent prior empirical research, as well as to investigate group differences in rumination content. It was expected that women would score higher on rumination than men and this hypothesis was not supported. There was no significant difference in RDQ rumination between men and women. To further investigate this lack of coherence with our literature-based hypothesis, sex differences were also examined amongst the other rumination measures; although the RRQ produced significant sex differences in the hypothesized direction, $t(553.64) = -2.27$, $p < .05$, RRS brooding [$t(563) = -1.74$, *ns*] and the RSS [$t(551) = 1.02$, *ns*] did not. Hence, this would suggest that this lack of coherence with previous literature may be an accurate reflection of the present sample, rather than an indication of problematic measurement properties of the RDQ. As for domain level differences, Women scored significantly higher on social and appearance-related rumination relative to men. No other sex differences were found amongst the RDQ variables.

Table 45

Sex differences in RDQ scales (community sample)

	Men *M*(*SD*)	Women *M*(*SD*)	*F*	*t(df)*	*d*
RDQ total	117.45(29.33)	120.57(30.61)	.68	-1.23(561)	.10
Achievement	13.44(3.87)	13.45(3.73)	.85	-.05(565)	.01
Health	11.86(3.81)	12.31(3.97)	1.29	-1.36(564)	.12
Family	11.66(3.54)	11.99(3.41)	.20	-1.12(565)	.10
Social	12.27(3.68)	12.95(4.15)	3.22	-2.05*(565)	.17
Romance	11.09(3.85)	11.02(4.20)	1.80	.20(565)	-.02
Finances	12.49(3.66)	12.76(3.95)	2.41	-.83(563)	.07
Sociopolitical	11.76(3.51)	11.99(3.99)	6.13*	-.74(564.66)	.06
Existential	12.19(4.11)	11.92(4.40)	3.81	.77(565)	-.06
Appearance	11.31(3.68)	12.64(4.28)	5.46*	-3.96***(563.99)	.33
Cleanliness	9.55(3.60)	9.50(3.83)	.57	.15(564)	-.01

Note: *p<.05, **p<.01, *** p <.001; F = Levene's test; d = Cohen's d; d = .2 indicates a small effect size, d = .5 indicates a medium effect size, d = .8 indicates large effect size; RDQ = Rumination Domains Questionnaire

Discriminant validity of the RDQ was assessed by examining the correlations of the RDQ with extraversion, conscientiousness, agreeableness, and interest in gardening (see Table 46). Again, contrary to expectations, the RDQ was moderately negatively correlated with extraversion. Even though this result is not consistent with our hypotheses, the relationship between RDQ rumination and extraversion was similar to the relationship between the other rumination measures and extraversion, in the current sample, just as was the case in the student sample. At the domain level, all domains were weakly negatively correlated with extraversion, except for the achievement and appearance domains, which were moderately negatively correlated with extraversion, and the social and existential domains, which were strongly negatively correlated with extraversion. Contrary to expectations, the RDQ was strongly negatively correlated with agreeableness, however, similar results were found for the other rumination measures (especially the RSS). At the domain level, all domains were moderately negatively correlated with agreeableness, except for the health and financial domains, which were weakly negatively correlated, and the romance, sociopolitical, and cleanliness domains, which were strongly negatively correlated. Contrary to hypotheses, conscientiousness was strongly negatively correlated with the RDQ. Although a weak correlation was expected, the RRS brooding scale and the RRS were also strongly negatively correlated with conscientiousness. All domains of the RDQ were strongly negatively correlated with conscientiousness, health, family, and social domains, which were moderate in strength, and the sociopolitical domain, which was weakly negatively correlated with conscientiousness. As expected, interest in gardening was weakly correlated with the RDQ and all the other rumination measures in the present study. Moreover, all domains of the RDQ were weakly correlated with interest in gardening.

Table 46

Correlations between RDQ and theoretically unrelated constructs (community sample)

	Extraversion	Agreeableness	Conscientiousness	Gardening
RDQ total	-.26*	-.34*	-.43*	-.03
Achievement	-.23*	-.21*	-.38*	-.09
Health	-.15*	-.16*	-.28*	.03
Family	-.18*	-.30*	-.28*	.04
Social	-.33*	-.29*	-.40*	-.15
Romance	-.19*	-.37*	-.35*	.04
Finances	-.15*	-.19*	-.31*	-.03
Sociopolitical	-.09	-.19*	-.19*	.03
Existential	-.31*	-.32*	-.47*	-.11
Appearance	-.27*	-.23*	-.35*	-.04
Cleanliness	-.12	-.35*	-.35*	.05
Other rumination measures				
RRS-Brooding	-.19*	-.21*	-.32*	-.01
RRQ-Rumination	-.34*	-.08	-.25*	-.16*
RSS	-.25*	-.28*	-.39*	-.06

Note: *p<.001; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; RSS = Rumination on Sadness Scale

Structural validity. Prior to factor analyses, KMO and Bartlett's sphericity were examined to determine if the data were appropriate for factor analyses. These values (i.e., KMO = .96, Bartlett's sphericity = 20,531.52, p < .001), suggesting that the data is appropriate for factor analyses. Confirmatory factor analyses (CFA) with WLSMV estimation and oblimin rotation were performed to assess the fit of the structure (see Table 47). Four models were tested. It was hypothesized that all models would have good fit, except for the orthogonal model. Contrary to expectations, the unidimensional model did not fit the data well, according to most fit indices employed in this study. Specifically, this model produced a significant χ^2, a CFI of less than .90, and a WRMR greater than 1, however, RMSEA did indicate marginally acceptable

fit, but overall, the fit indices suggest that one general factor is insufficient in explaining the common variance amongst the items. Loadings from this model (see Table 48) range from .46 to .78. The second model, the hierarchical model, with a unidimensional factor that subsumed 10 specific factors, produced good fit according to CFI and RMSEA, but not $\chi 2$ and WRMR. Lower order loadings from this model ranged from .58 to .89, whereas higher order loadings ranged from .69 to .90 and can be found in Table 49. The correlated 10-factor model also produced good fit according to the CFI and RMSEA indices, but not $\chi 2$ and WRMR. Loadings from this model ranged from .58 to .89 can be found in Table 48. Finally, as predicted, the orthogonal 10-factor model showed the worst fit of all the models with none of the fit indices indicating adequate fit. Loadings from this model ranged from .63 to .90 and can be found in Table 50.

Table 47

Fit indices of CFA models (community sample)

Model	χ^2(df)	CFI	RMSEA (CI)	WRMR
Unidimensional model	7631.54* (1710)	.84	.08 (.08-.08)	2.41
Hierarchical model	3628.78* (1700)	.95	.05 (.04-.05)	1.46
Ten-factor model	3399.47* (1665)	.95	.04 (.04-.05)	1.30
Orthogonal ten-factor model	39,718.92*(1710)	.26	.17 (.17-.17)	9.63

Note: *p<.001

Table 48

CFA loadings for unidimensional and 10-factor model (community sample)

	Standardized Loadings										
	Unidimensional model	10 Factor model									
Item	Unidimensional model	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
Achievement											
1	.53	.62									
2	.66	.77									
3	.67	.78									
4	.68	.80									
5	.72	.84									
6	.74	.86									
Health											
1	.71		.86								
2	.68		.83								
3	.52		.64								
4	.59		.72								
5	.62		.76								
6	.64		.79								
Family											
1	.51			.58							
2	.62			.70							
3	.59			.67							
4	.68			.77							
5	.62			.70							
6	.70			.79							
Social											
1	.66				.75						
2	.67				.77						
3	.63				.72						
4	.70				.80						
5	.71				.81						
6	.73				.83						
Romance											
1	.64					.76					
2	.59					.71					
3	.65					.78					
4	.71					.83					
5	.74					.88					
6	.70					.82					
Finances											
1	.58						.71				
2	.51						.62				
3	.69						.84				
4	.64						.77				
5	.64						.77				
6	.62						.75				
Sociopolitical											
1	.52							.72			
2	.50							.68			
3	.46							.63			
4	.58							.79			
5	.64							.86			
6	.56							.75			
Existential											
1	.56								.65		
2	.73								.83		
3	.68								.78		
4	.75								.86		
5	.75								.85		
6	.78								.89		
Appearance											
1	.71									.83	
2	.61									.71	
3	.72									.84	
4	.72									.83	
5	.72									.84	
6	.71									.82	
Cleanliness											
1	.63										.75
2	.73										.86

3	.73	.87
4	.76	.89
5	.72	.85
6	.66	.78

Table 49

CFA loadings for hierarchical model (community sample)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10	Higher order factor
Achievement											.83
1	.62										
2	.77										
3	.78										
4	.80										
5	.84										
6	.86										
Health											.79
1		.86									
2		.83									
3		.64									
4		.72									
5		.76									
6		.79									
Family											.90
1			.58								
2			.70								
3			.67								
4			.77								
5			.70								
6			.79								
Social											.86
1				.75							
2				.77							
3				.72							
4				.80							
5				.81							
6				.84							
Romance											.80
1					.76						
2					.71						
3					.78						
4					.83						
5					.88						
6					.82						
Finances											.81
1						.71					
2						.61					
3						.84					
4						.77					
5						.77					
6						.75					
Sociopolitical											.69
1							.71				
2							.68				
3							.63				
4							.79				
5							.86				
6							.75				
Existential											.84
1								.65			
2								.83			
3								.78			
4								.86			
5								.85			
6								.89			
Appearance											.82
1									.83		
2									.71		
3									.84		
4									.83		
5									.84		

6	.82	
Cleanliness		.79
1	.75	
2	.86	
3	.87	
4	.89	
5	.85	
6	.78	

Table 50

CFA loadings for orthogonal 10-factor model (community sample)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
Achievement										
1	.67									
2	.79									
3	.74									
4	.79									
5	.85									
6	.83									
Health										
1		.85								
2		.81								
3		.63								
4		.82								
5		.66								
6		.81								
Family										
1			.67							
2			.76							
3			.67							
4			.69							
5			.76							
6			.66							
Social										
1				.75						
2				.77						
3				.76						
4				.83						
5				.78						
6				.80						
Romance										
1					.78					
2					.71					
3					.73					
4					.90					
5					.83					
6					.82					
Finances										
1						.70				
2						.68				
3						.74				
4						.84				
5						.79				
6						.70				
Sociopolitical										
1							.64			
2							.69			
3							.70			
4							.69			
5							.89			
6							.79			
Existential										
1								.66		
2								.83		
3								.74		
4								.89		
5								.85		
6								.87		
Appearance										
1									.78	
2									.76	
3									.81	
4									.80	
5									.82	
6									.89	

Cleanliness	
1	.81
2	.84
3	.83
4	.87
5	.85
6	.81

Correlation-based marker variable technique. Again, the average of all correlations between RDQ variables and interest in gardening was used (in this study, this was .023) as an estimate of common method variance, which indicated that the effect of common method variance was low. Moreover, as shown in Tables 51 to 53, when this estimate was partialled out of the correlations between the RDQ variables and other variables, this did not substantially alter the correlations and did not mitigate the correlations between theoretically relevant variables enough to make them non-significant.

Table 51

Partial correlations between rumination measures with marker variable controlled (community sample)

	RDQ total	Achievement	Health	Family	Social	Romance	Finance	Sociopolitical	Existential	Appearance	Cleanliness
RDQ total											
Achievement											
Health		.53*									
Family		.62*	.65*								
Social		.70*	.52*	.70*							
Romance		.50*	.54*	.64*	.58*						
Finances		.64*	.53*	.55*	.57*	.51*					
Sociopolitical		.47*	.48*	.51*	.50*	.44*	.47*				
Existential		.62*	.52*	.59*	.62*	.63*	.62*	.54*			
Appearance		.57*	.61*	.58*	.67*	.54*	.55*	.51*	.58*		
Cleanliness		.47*	.57*	.57*	.50*	.61*	.51*	.49*	.52*	.55*	
RRS-Brooding	.64*	.57*	.47*	.53*	.59*	.50*	.54*	.36*	.55*	.50*	.38*
RRS-Reflection	.55*	.45*	.35*	.43*	.49*	.46*	.41*	.42*	.49*	.39*	.35*
RRQ-Rumination	.41*	.48*	.29*	.35*	.52*	.23*	.33*	.22*	.34*	.39*	.10
RRQ-Reflection	.03	.07	.01	.01	.04	.03	.01	.17*	.05	-.04	-.05
RSS	.58*	.50*	.40*	.45*	.49*	.49*	.45*	.35*	.57*	.43*	.38*

Note: *p<.001; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; RSS = Rumination on Sadness Scale

Table 52

Partial correlations between RDQ and related variables with marker variable controlled (community sample)

	WDQ total	WDQ-Finances	WDQ-Lack of Confidence	WDQ-Aimless future	WDQ-Relationships	WDQ- Work Incompetence	PI-contamination	PI-Grooming	PI-Checking	PI-thoughts of harm	PI-Impulses	Neuroticism	STICSA-total	STICSA-Cognitive	STICSA-Somatic	BDI
RDQ total	.73*	.58*	.66*	.64*	.71*	.62*	.54*	.47*	.56*	.65*	.55*	.55*	.68*	.66*	.60*	.65*
Achievement	.64*	.49*	.59*	.60*	.55*	.58*	.35*	.28*	.40*	.44*	.34*	.50*	.52*	.60*	.38*	.51*
Health	.52*	.44*	.46*	.41*	.53*	.45*	.41*	.41*	.44*	.53*	.38*	.38*	.51*	.47*	.48*	.48*
Family	.57*	.46*	.52*	.47*	.60*	.47*	.47*	.40*	.47*	.54*	.43*	.42*	.54*	.52*	.49*	.48*
Social	.66*	.43*	.68*	.58*	.65*	.58*	.38*	.31*	.42*	.49*	.39*	.56*	.60*	.64*	.48*	.53*
Romance	.53*	.38*	.45*	.46*	.61*	.43*	.47*	.48*	.50*	.56*	.53*	.39*	.55*	.50*	.54*	.52*
Finances	.61*	.71*	.47*	.51*	.48*	.49*	.42*	.35*	.43*	.48*	.41*	.44*	.51*	.52*	.43*	.49*
Sociopolitical	.44*	.35*	.41*	.39*	.40*	.39*	.35*	.30*	.33*	.42*	.37*	.28*	.41*	.38*	.38*	.38*
Existential	.64*	.50*	.57*	.67*	.60*	.48*	.44*	.37*	.47*	.52*	.47*	.52*	.60*	.61*	.52*	.65*
Appearance	.60*	.42*	.61*	.50*	.61*	.51*	.42*	.35*	.44*	.49*	.40*	.52*	.57*	.55*	.51*	.53*
Cleanliness	.47*	.38*	.38*	.37*	.48*	.46*	.51*	.48*	.49*	.58*	.56*	.30*	.50*	.40*	.52*	.49*

Note: *p<.001; RDQ = Rumination Domains Questionnaire; WDQ = Rumination Domains Questionnaire; PI = Padua Inventory – Washington State Revision; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

Table 53

Partial correlations between RDQ and theoretically unrelated variables with marker variable controlled (community sample)

	Extraversion	Agreeableness	Conscientiousness
RDQ total	-.23*	-.31*	-.40*
Achievement	-.20*	-.18*	-.35*
Health	-.12	-.13	-.25*
Family	-.15*	-.27*	-.25*
Social	-.30*	-.26*	-.37*
Romance	-.16*	-.34*	-.32*
Finances	-.12	-.16*	-.28*
Sociopolitical	-.07	-.16*	-.16*
Existential	-.28*	-.29*	-.44*
Appearance	-.24*	-.20*	-.32*
Cleanliness	-.09	-.32*	-.32*

Note: * $p<.001$; RDQ = Rumination Domains Questionnaire

3.3. Study 2 Discussion

In both samples in this study, support was found for the validity of the RDQ. In both samples, RDQ demonstrated strong reliability and was strongly correlated with three of the most popular measures of rumination (i.e., the RRS, RRQ, and RSS) providing evidence for the concurrent validity of the RDQ. Moreover, in both samples, hypotheses regarding the relationships between the RDQ and related constructs and criteria (such as worry, neuroticism, obsessive-compulsive behaviour, anxiety, and depression) were largely supported and were consistent with previous research. For example, just as in our study, previous research has found that rumination is strongly positively correlated with worry (e.g., Hong, 2007; Raes, 2010; Segerstrom et al., 2000) neuroticism (e.g., Trapnell & Campbell, 1999), anxiety (e.g., Hong, 2007; Raes, 2010), and depression (e.g., Hong, 2007; Raes, 2010; Trapnell & Campbell, 1999), and moderately-to-strongly positively correlated with obsessive-compulsive behaviour(e.g., Dar & Iqbal, 2015). Perhaps more importantly, the RDQ was remarkably similar to other measures of

rumination in its correlations with these, suggesting that the RDQ is tapping into a similar construct as the other measures, especially the RSS. Overall, these results provide strong evidence for the criterion-related validity of the RDQ.

Known-groups validity was also supported in the student sample, but not the community sample, as only in the student sample did women score higher in overall rumination than men. In the community sample, this was also the case for two of three other rumination measures, and no sex differences were found for variables for which sex differences are consistently found in previous literature, such as worry (e.g., Mccann et al., 1991; Zalta & Chambless, 2008), neuroticism (e.g., Goodwin & Gotlib, 2004; Schmitt et al., 2008), depression (e.g., Goodwin & Gotlib, 2004), and anxiety (e.g., Goodwin & Gotlib, 2004), hence it seems to be the case that men and women in the community converged more in their levels of negative emotion-related constructs than is normally the case. It is unclear what the reason for this may be, but it seems, based on this, unlikely that the lack of sex differences in rumination is due to validity concerns pertaining to the RDQ. One potential explanation is that sex differences in neuroticism are greatest in young adults, compared to other stages in life (Jorm, 1987; Kajonius & Johnson, 2018), therefore the age differences in the general community should be smaller than in the student sample. Moreover, because the student sample was recruited through social media, it may be the case that avid and frequent social media users may differ in neuroticism compared to the general population (e.g., Marciano, Camerini, & Schulz, 2020) and these differences may manifest in smaller less of a sex gap in rumination.

It was also expected that rumination, as measured by the RDQ, would have weak relationships with agreeableness, conscientiousness, extraversion, and interest in gardening. In both samples, near-zero correlations were found between RDQ-rumination and interest in

gardening, supporting the discriminant validity of the measure. As well, in the student sample, but not the community sample, a weak relationship was found between the RDQ and agreeableness, supporting hypotheses. Contrary to hypotheses, the relationships between the RDQ and extraversion and conscientiousness, and in the community sample, the relationships between the RDQ and extraversion, agreeableness, and conscientiousness were all stronger than expected. Even though this would suggest evidence against the discriminant validity of our scale, it should be noted that these relationships were similar to some of the other measures of rumination, which suggests consistency with measures of the same construct, especially the RSS. Although the results leave some ambiguity in terms of potential interpretations, it can be argued that convergence with other measures of rumination in the same sample may be stronger evidence of validity than is inconsistency with other measures of rumination in samples of previous research (e.g., Trapnell & Campbell, 1999) is evidence of invalidity, hence the results of the present study provide substantial but modest-to-moderate evidence of discriminant validity.

Regarding structural validity, the present study found strong support for a correlated 10-factor model and hierarchical model with 10 factors (representing domains) loading onto a single higher-order factor. As expected, an orthogonal 10-factor model was not supported. Unexpectedly, a unidimensional model was not supported suggesting that a single factor was not sufficient to explain the common variance of the items. Also, the results of both studies suggested that the effect of common method variance due to scale format was minimal and did not substantially affect interpretation of the results. Overall, the present work has supported the validity of RDQ using cross-sectional methods, however a reliance on solely cross-sectional methods may not be sufficient to convincingly demonstrate the validity of the RDQ.

Chapter 4: Study 3

The third study concerns the criterion and incremental validation of the RDQ outside the realm of cross-sectional self-report questionnaires. More precisely, this study assesses the validity of the new rumination scale through interval contingent (i.e., participants responded at the end of the day) daily diary methods (Bolger et al., 2003; Nezlek, 2020).

In the previous sections of this dissertation, the RDQ, a content-dependent measure of rumination, was developed based on existing psychological literature pertaining to rumination, as well as domains of life, and was assessed for validity and reliability in a cross-sectional research context. Although Study 2 of this dissertation demonstrated substantial evidence supporting the reliability and content, structural, and criterion validity in a cross-sectional research context, it is important to assess this measure in a more sophisticated research scenario, especially given the adoption of new and more sophisticated methods and the improving accessibility of these methods given technological advances. More specifically, given that rumination can occur multiple times a day and may fluctuate throughout time (Riley et al., 2022), daily diary methods are well-suited for the study of rumination and may give a more nuanced view of rumination than a simple cross-sectional study. Further, examining the validity of the RDQ in such a research context would assess the robustness of the RDQ as a measure of rumination, above and beyond the realm of cross-sectional research.

Daily diary methods have several advantages over standard cross-sectional methods. These methods examine daily levels in a construct of interest and “capture the particulars of experience in a way not possible using traditional designs” (Bolger et al., 2003, p. 579). Diary methods also avoid the disadvantages associated with reporting based on longer-term retrospection. Furthermore, the disentangling of between- and within-person variance reduces the

chance of ecological fallacy (i.e., conclusions regarding the associations at the day-level of analysis, are conflated with associations at the person-level of analysis; Kramer, 1983).

4.1. Objectives and hypotheses

To assess the criterion validity of the RDQ beyond the realm of cross-sectional methods, the associations between trait rumination, as measured by the RDQ, RRS, and RRQ, and daily levels of rumination, sleep quality, amotivation, and negative mood were examined. To achieve this goal, a seven-day daily diary study method was employed. It is predicted that with respect to daily rumination, each RDQ (person-level) subscale will be positively correlated with and incrementally predict daily rumination in the relevant domain (e.g., the RDQ achievement subscale assessed at person-level will incrementally predict daily rumination on achievement-related content).

Previous research has indicated several outcomes that are consistently associated with rumination that will be used in the present study as outcomes to test to the criterion validity of the RDQ. For example, Nota and Coles (2015) found that rumination was significantly negatively correlated with sleep duration, whereas Jiang and Poon (2021) found that rumination was significantly positively correlated with insomnia, and in fact, mediated the relationship between ostracism and insomnia. These findings were corroborated further by Thomsen et al. (2003), who found that rumination was associated with poorer general sleep quality, longer time to fall asleep, and more sleep disturbances (see also Ottaviani et al., 2015; Slavish et al., 2018; You et al., 2021). Therefore, it is predicted that RDQ rumination will be negatively correlated with and will incrementally predict sleep quality over the effect of the RRS and RRQ.

Research has also found that rumination reduces individuals' motivation (Nolen-Hoeksema et al., 2008). Specifically, research has consistently found a positive association

between rumination and amotivation. Riley et al., (2019) found that individuals who ruminated were more likely to be amotivated and this led to worse health behaviours. Similarly, Wenzlaff et al., (1988) found that rumination undermines the motivation for mental control and Lyubomirsky and Nolen-Hoeksema (1993) reported that rumination led to amotivation of individuals to partake in instrumental behaviour that could improve the individuals' mood or sense of self. Other research also demonstrates the positive relationship between rumination and amotivation with both daily diary studies (e.g., Riley et al., 2019) and other methods (e.g., Means et al., 2018). Therefore, it is predicted that RDQ rumination will be positively correlated with and will incrementally predict amotivation over the effect of the RRS and RRQ.

Moreover, extant research has consistently demonstrated that rumination is positively correlated with negative mood. For example, using a daily diary study, Genet and Siemer (2012) found that rumination was significantly positively correlated with negative mood and that on days when participants reported more intense rumination, high levels of unpleasant daily events predicted higher negative mood, whereas this relationship did not appear on days when participants reported less rumination. Further, Thomsen and colleagues (2003) found that rumination was strongly positively correlated with depressive, anxious, and angry mood states. These results are further supported by other research which found a strong positive correlation between rumination and negative mood or affect (Harding & Mezulis, 2017; Jiang & Poon, 2021; Slavish et al., 2018; You et al., 2021), including meta-analytical evidence (Mor & Winquist, 2002). Therefore, it is predicted that RDQ rumination (measured once at baseline) will be positively correlated with daily negative mood and will incrementally predict negative mood over the effect of the RRS and RRQ.

4.2. Method

4.2.1. Participants

Data from participants who only completed baseline measures but did not participate in daily diary surveys were excluded from analyses (2 participants). Data from participants who failed the attention check in the baseline study were removed (11 participants). Data from participants who reported impossible responses (i.e., reported ruminating more than 24 hours in a day in a single day) were removed (8 participants). Data from individual daily diary sessions were removed when participants failed the attention check (Day 1: 5, Day 2: 4, Day 3: 2, Day 4: 13, Day 5: 7, Day 6: 4, Day 7: 8).

The final sample comprised 121 participants, including 78 men, 42 women, and one that identified as other, aged 20 to 68 (M_{age} = 33.66, *SD* = 8.75). Participants were recruited using SurveySignal (Hofmann & Patel, 2015), a panel service which specializes in daily diary research. Participants were compensated $13 USD if they completed the baseline survey and four daily diary surveys, $14 USD if they completed the baseline survey and five daily diary surveys, $15 USD if they completed the baseline survey and 6 daily diary surveys, and $20 USD if they completed all surveys (participants that did not complete the baseline survey and/or less than four daily diary surveys were not compensated). Data is publicly available at https://osf.io/n84wa/.

4.2.2. Measures

Baseline

The following measures were collected only once, prior to the commencement of the daily diary.

Rumination Domains Questionnaire (RDQ): The RDQ, which was developed in Study 1 and was assessed for validity in Study 2, was used in the present study.

Rumination Response Scale (Treynor et al., 2003; RRS). The RRS, which was used in Study 2, was also used in the present study.

Rumination Reflection Questionnaire (Trapnell & Campbell, 1999; RRQ). The RRQ, which was used in Study 2, was also used in the present study.

Daily Diary Measures

The following measures were collected every day for 7 days as part of the daily diary protocol.

Amotivation (Guay et al., 2003): Amotivation was measured using a subscale from the Global Motivation Scale (GMS-28; Guay et al., 2003). This scale comprises four items (example item: "In general, I do things although I do not see the benefit in what I am doing"). Respondents indicate their agreement with an item on a scale from 1 (*Does not correspond accordingly*) and 7 (*Corresponds completely*). Past research has shown that the Amotivation scale has low to decent reliability with α ranging from .61 to .87 (Erhel et al., 2022; Mills et al., 2021; Rebetez et al., 2015; Riley et al., 2019).

Sleep quality. Sleep quality was assessed with a single item ("How well did you sleep last night?"), ranging from 1 (*very badly*) to 7 (*extremely well*).

Negative mood. Negative mood was assessed with 5 items regarding various moods (sad, irritated, anxious, angry, upset) states ("Please indicate the extent to which you felt each mood today"). These items were rated on a scale from 1 (*not at all*) to 4 (*Completely*).

4.2.3. Procedure

Participants provided informed consent and completed the RDQ, along with the RRS (Treynor et al., 2003) and the RRQ (Trapnell & Campbell, 1999) and following they were asked to respond to a set of questions at the end of each day for a week. In these brief daily questionnaires, participants were asked to estimate the amount of time they spend ruminating on that day in each domain of life (domains of life from the RDQ), as well as outcomes that are associated with rumination, such as amotivation; Guay et al., 2003), an item regarding their sleep quality from the previous night, and items regarding negative mood states (e.g., sad, irritated, anxious, angry, upset). The number of items was kept to a minimum so as to not compromise data quality through tedium or overloading participants, as suggested by Nezlek (2020). Ethics approval was obtained through the University of Western Ontario Research Ethics Board (REB # 122102).

4.2.4. Data analytic plan

To assess the nature of the missing data, Little's (1988) MCAR (Missing completely at random) test was used and was non-significant suggesting that the missing data is missing at random ($x^2_{14} = 7.22$, $p = .93$). To test hypotheses regarding associations, bivariate correlations were examined between the person-level (level two) measures and the mean of daily diary measures. Multilevel modelling (MLM) was employed to test the hypotheses, as MLM can account for dependency of the data (in the present study, repeated measures are clustered within individual participants; West et al., 2011). According to Nezlek (2020), 50 participants for seven time points should be an adequate sample size to assess the relationship between a mean of a daily measure and person-level variables; thus, our sample of 121 participants and seven time points should ensure sufficient power for the conducted analyses. This would also satisfy Maas

and Hox's (2005) suggestion of having a minimum of 50 level-two clusters (in the case of my research, individuals), as this would ensure more adequately accurate estimates of second-level variances.

To examine levels of the dependent variables over time, two-level multilevel models with means as outcomes were developed using a model-building approach. In these models, seven non-varying time points (level one) were nested within participants (level two). Timepoints were coded from 0 to 6 (with the first timepoint being 0 and the last timepoint being 6). For each dependent variable, 3 models were tested: 1) an unconditional intercept model; 2) a model with the RDQ variable as the level two predictor; 3) a model with the relevant RDQ scale, as well as the RRS and RRQ as the level two predictors of the dependent variable. Maximum Likelihood estimation was used. All predictors were grand-mean centered, as suggested by many researchers (e.g., Dedrick et al., 2009; Nezlek, 2011, 2012a, 2012b, 2020, Nezlek & Mroziński, 2020; Peugh, 2010). Intra-class correlations (ICC) were examined before modeling to assess the proportion of level-two variance to total variance.[13] Potential concerns of multicollinearity were assuaged through the examination of variance inflation factors (VIF) and tolerance of each of the final models. As suggested by Myers (1990), a VIF value of 10 or higher was considered problematic. As for tolerance, values of .2 or lower were considered problematic (Menard, 1995). None of the VIF or tolerance values in the present study reached these criteria.

4.3. Results

Reliabilities for all measures, descriptive statistics, and correlations between the RDQ and other ruminations measures are presented in Table 54. Coefficient alphas and omegas for

[13] Although sometimes the ICC is used to determine whether multilevel modeling should be used to analyze the data (i.e., when the ICC is high), in the present study, a low ICC was not used as a criterion to abandon multilevel models in favour of more conventional statistical procedures, as researchers have warned against this practice (Nezlek, 2011; 2012a, 2012b, Nezlek & Mrozinski, 2020).

RDQ subscales ranged from .81 to .89, indicating strong internal consistency. All level-two measures employed in this study, for the student sample, demonstrated at least acceptable internal consistency. All RDQ subscales were positively correlated with RRS brooding and RRQ rumination.

Table 54

Reliabilities, descriptive statistics, and intercorrelations of baseline measures

	Reliability		**Descriptives**	**Correlations**	
	Cronbach's α	**McDonald's ω**	*M (SD)*	*RRS-Brooding*	*RRQ-Rumination*
RDQ total	.98	.98	127.90(36.51)	.46*	.34*
Achievement	.83	.84	13.91(4.18)	.34*	.33*
Health	.83	.83	12.93(3.98)	.42*	.28
Family	.81	.82	12.91(4.06)	.36*	.34*
Social	.85	.86	12.90(4.17)	.42*	.39*
Romance	.87	.87	12.16(4.35)	.34*	.26
Finance	.84	.84	13.59(4.26)	.37*	.32*
Existential	.84	.84	12.59(4.33)	.38*	.31
Sociopolitical	.83	.83	12.93(4.08)	.37*	.25
Physical Appearance	.89	.89	12.26(4.54)	.35*	.30
Cleanliness	.88	.89	11.72(4.84)	.57*	.18
Other measures					
RRS-Brooding	.87	.87	14.44(4.19)		
RRQ-Rumination	.84	.86	39.42(8.82)	.57*	

Note: * $p < .001$; two-tailed; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire

Achievement. The RDQ achievement subscale was significantly positively correlated with aggregated daily achievement ($r = .37$, $p < .001$), which was stronger than the correlation between RRQ-rumination and daily achievement ($r = .28$, $p < .01$; though this difference in correlations was not significant according to Steiger's z, z = .91, *ns*), but similar to the correlation between RRS-brooding and daily achievement rumination ($r = .37$, $p < .001$). This pattern of results supports our hypotheses that the achievement subscale will be positively correlated with the criterion.

Regarding the multilevel models (Table 55), the ICC for the intercept-only model demonstrated that approximately 64% of the variance in daily achievement-related rumination occurred between subjects. For this model, the intercept was estimated at 2.13 indicating the mean of daily achievement rumination scores across all participants and daily diary entries. This estimate does not change substantially in the second and third models. The within-person residual variance was significant, indicating that participants varied in their initial levels of the criterion, and this did not change substantially in later models, as is expected in means-as-outcomes models (Geiser, 2013). In model 2, the achievement subscale of the RDQ significantly predicted daily achievement-related rumination, supporting our hypothesis. The level-two residual variance fell by approximately 14% from the first model but was still significant. The deviance statistic improved from the first model, indicating a better fit to the data. In the third model, where the RRS-brooding and RRQ-rumination were added as predictors, the effect of RDQ-achievement was mitigated, but still significant, indicating that the RDQ subscale predicted the criterion beyond the effect of other measures of rumination, supporting the hypotheses. The RRS also predicted the daily achievement-related rumination beyond the effect of the RDQ subscale and the RRQ. The RRQ did not predict the criterion beyond the effect of

the other predictors. In this model, the level-two residual variance fell by approximately 9% from the previous model. Again, the addition of predictors somewhat improved the deviance statistic.

Table 55

Fixed and random effects (standard error) for models with Daily Achievement rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-achievement as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	2.13***(.15)	2.13***(.14)	2.12***(.13)
RDQ		.14***(.03)	.10**(.03)
RRS			.12**(.04)
RRQ			-.01(.02)
Random effects			
L1 residual	1.35***(.07)	1.35***(.07)	1.36***(.07)
L2 residual	2.37***(.33)	2.05***(.29)	1.86***(.27)
Model summary			
Deviance	2,784.82	2,769.15	2,739.91
k	3	4	6

Note: ICC = .64; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Health. The RDQ Health subscale was significantly positively correlated with aggregated daily health rumination ($r = .26$, $p < .05$). This relationship was similar to the correlation between RRQ-rumination and daily health rumination ($r = .28$, $p < .01$) and weaker than the correlation between RRS-brooding and daily health rumination ($r = .55$, $p < .001$; this difference in correlation strength was significant according to Steiger's z, $z = -3.35$, $p < .001$). These results supported the hypothesis that the RDQ health subscale will be positively correlated

with daily health rumination, however, the other rumination scales outperformed the RDQ in this regard.

Regarding the multilevel models (Table 56), the ICC for the intercept-only model indicated that approximately 74% of the variance in daily health-related rumination occurred between subjects. In this model, the intercept was estimated at 1.80 and did not change substantially in the second and third models. The within-person residual variance was significant, meaning that participants varied in their initial levels of the criterion, and this did not change substantially in subsequent models. In the second model, the health subscale of the RDQ significantly predicted daily health-related rumination, supporting our hypothesis. The level-two residual variance was attenuated by approximately 10% from the previous model but was still significant. The deviance statistic was reduced from the first model, suggesting better fit. In the last model, where the RRS-brooding and RRQ-rumination were considered, the effect of RDQ-health was reduced and nonsignificant, signifying that the RDQ subscale did not incrementally predict the criterion beyond the effect of other rumination measures, going against the hypotheses. The RRS predicted the daily health-related rumination beyond the effect of the RDQ subscale and the RRQ. The RRQ did not predict the criterion beyond the effect of the other predictors. In this model, the level-two residual variance fell by approximately 25% from the previous model. Again, the addition of predictors somewhat improved the deviance statistic.

Table 56

Fixed and random effects (standard error) for models with Daily Health rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-Health as predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	1.80***(.13)	1.80***(.13)	1.82***(.11)
RDQ		.11***(.03)	.04(.03)
RRS			.19***(.03)
RRQ			-.01(.02)
Random effects			
L1 residual	.69***(.04)	.69***(.04)	.69***(.04)
L2 residual	2.00***(.27)	1.80***(.25).	1.35***(19)
Model summary			
Deviance	2,304.33	2,292.42	2,245.48
k	3	4	6

Note: ICC = .74; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Family. The RDQ Family subscale was positively correlated with aggregated daily family rumination ($r = .22$, $p < .05$), which was weaker than the correlation between RRQ-rumination and daily family rumination ($r = .34$, $p < .01$; though this difference was not significant according to Steiger's Z for dependent correlations, z = -1.20, $p = .12$) and the correlation between RRS-brooding and daily family rumination ($r = .56$, $p < .001$; the difference was significant according to Steiger's z, z = -3.73, $p < .001$). These results supported the hypothesis that the RDQ family subscale will be positively correlated with daily family rumination, however, the other rumination scales outperformed the RDQ.

As for the multilevel models (Table 57), the ICC for the baseline model determined that approximately 69% of the variance in daily family-related rumination took place between subjects. For this model, the intercept was estimated at 2.17 indicating the mean of daily family rumination scores across all participants and daily diary entries. The ICC did not change substantially in the other models. The within-person residual variance was significant, suggesting that participants varied in their initial levels of the criterion, and this did not change substantially in later models. In model 2, the family subscale of the RDQ significantly predicted daily family-related rumination, supporting our hypothesis. The level-two residual variance fell by approximately 7% from the previous but remained significant. The deviance statistic was reduced relative to the first model, indicating a better fit to the data. In the third model, where the RRS-brooding and RRQ-rumination were added as predictors, the effect of RDQ-family was attenuated and nonsignificant, indicating that the RDQ subscale did not predict the criterion beyond the effect of other measures of rumination, going against expectations. The RRS predicted the daily family-related rumination beyond the effect of the RDQ subscale and the RRQ. The RRQ did not significantly predict the criterion beyond the effect of the other predictors. In this model, the level-two residual variance fell by approximately 25% from the previous model. Again, the addition of predictors somewhat improved fit.

Table 57

Fixed and random effects (standard error) for models with Daily Family rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-Family as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	2.17***(.15)	2.17***(.14)	2.19***(.12)
RDQ		.10**(.04)	.03(.03)
RRS			.20***(.04)
RRQ			.01(.02)
Random effects			
L1 residual	1.10***(.06)	1.10***(.06)	1.11***(.06)
L2 residual	2.44***(.34)	2.26***(.32)	1.69***(.23)
Model summary			
Deviance	2,655.18	2,646.81	2,592.22
k	3	4	6

Note: ICC = .69; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Social. The RDQ Social subscale was significantly positively correlated with aggregated daily social rumination ($r = .30$, $p < .01$). This relationship was similar to the correlation between RRQ-rumination and daily social rumination ($r = .25$, $p < .05$) and the correlation between RRS-brooding and daily social rumination ($r = .31$, $p < .01$). Overall, the results supported the hypotheses that the social subscale will be positively correlated with aggregated daily social rumination.

The multilevel models (Table 58) determined that the ICC revealed that approximately 64% of the variance in daily social-related rumination was found between subjects. The intercept

was estimated at 1.47. This value did not change much in the second and third models. It was observed that the within-person residual variance was significant, suggesting that participants varied in their initial levels of the daily social rumination, and this did not change substantially in subsequent models. In the second model, the social subscale of the RDQ significantly predicted daily social-related rumination, supporting the hypothesis. The level-two residual variance was attenuated by approximately 11% from the first model but remained significant. The deviance statistic dropped relative to the previous model. In the final model, the effect of RDQ-social was mitigated but significant, determining that the RDQ subscale incrementally predicted the criterion beyond the other measures of rumination, as expected. The RRS and RRQ failed to significantly predict daily social-related rumination in this model. The level-two residual variance fell by approximately 5% from the previous model. Again, the addition of predictors improved fit.

Table 58

Fixed and random effects (standard error) for models with Daily social rumination as a criterion

	(1) Unconditional	(2) Adding RDQ Social as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	1.47***(.11)	1.47***(.11)	1.45***(.10)
RDQ		.09***(.03)	.07*(.03)
RRS			.05(.03)
RRQ			.01(.02)
Random effects			
L1 residual	.77***(.04)	.77***(.04)	.78***(.04)
L2 residual	1.37***(.19)	1.22***(.17)	1.16***(.17)
Model summary			
Deviance	2,350.43	2,337.63	2,316.56
k	3	4	6

Note: ICC = .64; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Romance. The RDQ romance subscale was significantly positively correlated with aggregated daily romantic rumination ($r = .47$, $p < .001$), which was stronger than the correlation between RRQ-rumination and daily romantic rumination ($r = .23$, $p < .05$; this difference in correlation was significant according to Steiger's z, $z = 2.37$, $p < .01$) and the correlation between RRS-brooding and daily romantic rumination ($r = .36$, $p < .001$; though this difference in correlations was not significant according to Steiger's z, $z = 1.19$, *ns*). This pattern of results supported the hypotheses that the romance subscale will be positively correlated with the criterion.

Regarding the multilevel models (Table 59), the ICC for the intercept-only model demonstrated that approximately 69% of the variance in daily romance-related rumination occurred between subjects. For this model, the intercept was estimated at 1.47 indicating the mean of daily romantic rumination scores across all participants and daily diary entries. This estimate does not change substantially in the second and third models. The within-person residual variance was significant, indicating that participants varied in their initial levels of the criterion, and this did not change substantially in later models. In model 2, the romance subscale of the RDQ significantly predicted daily romance-related rumination, supporting our hypothesis. The level-two residual variance fell by approximately 22% from the first model but was still significant. The deviance statistic improved from the first model, indicating a better fit to the data. In the third model, where the RRS-brooding and RRQ-rumination were added as predictors, the effect of RDQ-romance was mitigated, but still significant, indicating that the RDQ subscale predicted the criterion beyond the effect of other measures of rumination, supporting the hypotheses. The RRS also independently predicted the criterion beyond the effect of the RDQ subscale and the RRQ. The RRQ did not significantly predict daily romance-related rumination in this model. In this model, the level-two residual variance fell by approximately 7% from the previous model. Again, the addition of predictors somewhat improved the deviance statistic.

Table 59

Fixed and random effects (standard error) for models with Daily romantic rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-Romance as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	1.47***(.13)	1.47***(.12)	1.48***(.12)
RDQ		.16***(.03)	.13***(.03)
RRS			.08*(.04)
RRQ			.01(.02)
Random effects			
L1 residual	.90***(.05)	.90***(.05)	.91***(.05)
L2 residual	2.01***(.28)	1.56***(.22)	1.45***(.21)
Model summary			
Deviance	2,497.26	2,469.53	2,445.85
k	3	4	6

Note: ICC = .69; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Finances. The financial subscale was significantly positively correlated with aggregated daily financial rumination ($r = .35$, $p < .001$). This relationship was similar to the relationship between RRQ-rumination and daily financial rumination ($r = .37$, $p < .001$) and weaker than the relationship between RRS-brooding and daily financial rumination ($r = .52$, $p < .001$; this difference in correlation strength was significant according to Steiger's z, z = -1.91, $p < .05$). Overall, the results supported the hypothesis that the RDQ finances subscale will be positively associated with daily financial rumination, however, it should be noted that the other rumination measures outperformed the RDQ.

Examining the multilevel models (Table 60) revealed that 71% of the variance in daily finance-related rumination occurred between subjects. In the first model, the intercept was estimated at 2.33 and did not change much in the latter models. The within-person residual variance was statistically significant, indicating that participants varied in their initial levels of the criterion, and this did not change much in later models. In the second model, the financial subscale significantly predicted daily finance-related rumination, as predicted. The second level residual variance fell by approximately 13% from the first model but remained significant. The fit improved from the first model. In the last model, the effect of RDQ-finances was lessened, but remained significant, supporting the hypotheses. The RRS also predicted the daily finance-related rumination beyond the effect of the RDQ subscale and the RRQ. The RRQ failed to predict the criterion beyond the effect of the other predictors. In this model, the level-two residual variance was reduced by approximately 21% from the previous model. Again, the addition of predictors somewhat improved fit.

Table 60

Fixed and random effects (standard error) for models with Daily Financial rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-Financial as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	2.33***(.15)	2.33***(.14)	2.34***(.13)
RDQ		.13***(.03)	.07*(.03)
RRS			.16***(.04)
RRQ			.01(.02
Random effects			
L1 residual	1.03***(.06)	1.03***(.06)	1.04***(.06)
L2 residual	2.54****(.35)	2.22****(.31)	1.75***(.25)
Model summary			
Deviance	2,617.28	2,602.06	2,557.18
k	3	4	6

Note: ICC = .71; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Existential. The RDQ existential subscale was significantly positively correlated with aggregated daily existential rumination ($r = .41$, $p < .001$) and this association was stronger than the association between RRQ-rumination and daily existential rumination ($r = .28$, $p < .05$; though this difference in correlations was not significant according to Steiger's z, z = 1.32, *ns*) and the association between RRS-brooding and daily existential rumination ($r = .31$, $p < .01$; though this difference in correlations was not significant according to Steiger's z, z = 1.07, *ns*). This pattern of results supported the hypothesis that the existential subscale will be positively correlated with daily existential rumination.

The multilevel models (Table 61) determined that approximately 65% of the variance in daily existential rumination was observed between subjects. The intercept was estimated at 1.92 and did not change substantially in the second and third models. The within-person residual variance was significant, indicating that participants varied in their initial levels of the daily existential rumination, and this did not change substantially in the second and third models. In model 2, the existential subscale significantly predicted daily existential rumination, as expected. The level-two residual variance was attenuated (by approximately 23%) from the previous model but remained significant. Model fit improved from the first model. In the three-predictor model, the effect of RDQ-existential was mitigated, but significant, supporting the predictions. The other rumination measures failed to significantly predict daily existential rumination. In this model, the level-two residual variance was reduced by approximately 7% from the previous model. Again, the addition of predictors somewhat improved fit.

Table 61

Fixed and random effects (standard error) for models with Daily existential rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-Existential as predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	1.92***(.15)	1.92***(.13)	1.93***(.13)
RDQ		.17***(.03)	.14***(.03)
RRS			.06(.04)
RRQ			.02(.02)
Random effects			
L1 residual	1.25***(.07)	1.25***(.07)	1.26***(.07)
L2 residual	2.37***(.33)	1.83***(.26)	1.70***(.25)
Model summary			
Deviance	2,738.93	2,710.58	2,684.30
k	3	4	6

Note: ICC = .65; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Sociopolitical. The RDQ sociopolitical subscale was significantly positively correlated with aggregated daily sociopolitical rumination ($r = .25$, $p < .05$), which was stronger than the correlation between RRQ-rumination and daily sociopolitical rumination ($r = .15$, p = ns; though this difference in correlations was not significant according to Steiger's z, z = .91, *ns*) and similar to the correlation between RRS-brooding and daily sociopolitical rumination ($r = .27$, $p < .01$). This pattern of results supported the hypotheses that the sociopolitical subscale will be positively correlated with the criterion.

Regarding the multilevel models (Table 62), the ICC for the intercept-only model demonstrated that approximately 67% of the variance in daily sociopolitical-related rumination

occurred between subjects. For this model, the intercept was estimated at 1.31 indicating the mean of daily sociopolitical rumination scores across all participants and daily diary entries. This estimate does not change substantially in the second and third models. The within-person residual variance was significant, indicating that participants varied in their initial levels of the criterion, and this did not change substantially in later models. In model 2, the sociopolitical subscale of the RDQ significantly predicted daily sociopolitical-related rumination, supporting the hypotheses. The level-two residual variance fell by approximately 12% from the first model but was still significant. The deviance statistic improved from the first model, indicating a better fit to the data. In the third model, where the RRS-brooding and RRQ-rumination were added as predictors, the effect of RDQ-sociopolitical was mitigated, but still significant, indicating that the RDQ subscale predicted the criterion beyond the effect of other measures of rumination, supporting the hypotheses. The RRS and RRQ did not significantly predict daily sociopolitical rumination in this model. In this model, the level-two residual variance fell by approximately 3% from the previous model. Again, the addition of predictors somewhat improved the deviance statistic.

Table 62

Fixed and random effects (standard error) for models with Daily sociopolitical rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-Sociopolitical as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	1.31***(.10)	1.31***(.10)	1.32***(.09)
RDQ		.09***(.02)	.07**(.03)
RRS			.05(.03)
RRQ			-.01(.01)
Random effects			
L1 residual	.54***(.03)	.54***(.03)	.54***(.03)
L2 residual	1.12***(.16)	.99***(.14)	.96***(.14)
Model summary			
Deviance	2,081.42	2,068.66	2,051.02
k	3	4	6

Note: ICC = .67; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Appearance. Examination of bivariate correlations revealed that RDQ appearance subscale was significantly positively correlated with aggregated daily appearance rumination ($r = .36$, $p < .001$). This relationship was stronger than the relationship between RRQ-rumination and daily appearance rumination ($r = .22$, $p < .05$; though this difference in correlations was not significant according to Steiger's z, z = 1.37, *ns*) and comparable to the relationship between RRS-brooding and daily appearance rumination ($r = .40$, $p < .001$). Overall, these results supported the hypotheses that the appearance subscale will be positively correlated with the daily appearance rumination.

Examination of the multilevel models (Table 63) revealed that 71% of the variance in daily appearance-related rumination occurred between subjects. For the first model, the intercept was estimated at 1.57 and did not change much in the subsequent models. The within-person residual variance was significant, and this did not change substantially in later models. In the second model, the appearance subscale significantly predicted daily appearance-related rumination, as expected. The level-two residual variance fell by approximately 16% from the previous model but remained significant. Fit was improved relative to the previous model. In the final model, the effect of RDQ-appearance was mitigated, but still significant, indicating that the RDQ subscale predicted the criterion beyond the effect of other measures of rumination, as expected. The RRS also independently predicted daily appearance rumination, whereas the RRQ failed to do so. The level-two residual variance fell by approximately 10% from the previous model. Again, the addition of predictors somewhat improved the deviance statistic.

Table 63

Fixed and random effects (standard error) for models with Daily Appearance rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-Appearance as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	1.57***(.11)	1.57***(.10)	1.58***(.01)
RDQ		.11***(.02)	.08**(.02)
RRS			.10**(.03)
RRQ			-.01(.01)
Random effects			
L1 residual	.58***(.03)	.58***(.03)	.58***(.03)
L2 residual	1.42***(.20)	1.19***(.17)	1.07***(.15)
Model summary			
Deviance	2,159.32	2,140.09	2,113.33
k	3	4	6

Note: ICC = .71; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Cleanliness. The RDQ cleanliness subscale was significantly positively correlated with aggregated daily cleanliness rumination ($r = .63$, $p < .001$), which was stronger than the correlation between RRQ-rumination and daily cleanliness rumination ($r = .17$, p = ns; this difference in correlation strength was significant according to Steiger's z, z = 4.61, $p < .001$) and similar to the correlation between RRS-brooding and daily cleanliness rumination ($r = .54$, $p < .001$). This pattern of results supported the hypotheses that the cleanliness subscale will be positively correlated with the criterion.

Regarding the multilevel models (Table 64), the ICC for the intercept-only model demonstrated that approximately 52% of the variance in daily cleanliness-related rumination

occurred between subjects. For this model, the intercept was estimated at 2.02 indicating the mean of daily cleanliness rumination scores across all participants and daily diary entries. This estimate does not change substantially in the second and third models. The within-person residual variance was significant, indicating that participants varied in their initial levels of the criterion, and this did not change substantially in later models. In model 2, the cleanliness subscale of the RDQ significantly predicted daily cleanliness-related rumination, supporting the hypotheses. The level-two residual variance fell by approximately 40% from the first model but was still significant. The deviance statistic improved from the first model, indicating a better fit to the data. In the third model, where the RRS-brooding and RRQ-rumination were added as predictors, the effect of RDQ-cleanliness was mitigated, but still significant, indicating that the RDQ subscale predicted the criterion beyond the effect of other measures of rumination, supporting the hypotheses. The RRS also independently predicted daily cleanliness rumination., whereas the RRQ did not. In this model, the level-two residual variance fell by approximately 10% from the previous model. Again, the addition of predictors somewhat improved the deviance statistic.

Table 64

Fixed and random effects (standard error) for models with Daily cleanliness rumination as a criterion

	(1) Unconditional	(2) Adding RDQ-Cleanliness as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	2.02***(.16)	2.02***(.13)	2.04***(.13)
RDQ		.22***(.03)	.16***(.03)
RRS			.15**(.05)
RRQ			-.02(.02)
Random effects			
L1 residual	2.55***(.14)	2.55***(.14)	2.57***(.14)
L2 residual	2.80***(.41)	1.67***(.27)	1.45***(.24)
Model summary			
Deviance	3,244.28	3,192.15	3,156.71
k	3	4	6

Note: ICC = .52; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Sleep quality. The RDQ was not significantly correlated with aggregated daily sleep quality (r = -.08, p = *ns*). This was also the case for both the RRQ (r = .01, p = *ns*), and the RRS (r = -.03, p = *ns*). This pattern of results went against hypotheses regarding the RDQ subscale being correlated with sleep quality.

Regarding the multilevel models (table 65), the ICC for the intercept-only model demonstrated that approximately 1% of the variance in daily sleep quality occurred between subjects. For this model, the intercept was estimated at 5.42 indicating the mean of sleep quality scores across all participants and daily diary entries. This estimate does not change substantially in the second and third models. The within-person residual variance was significant, indicating

that participants varied in their initial levels of the criterion, and this did not change substantially in later models. The level-two residual was not significantly different from 0 and did not change substantially in subsequent models. In model 2, the RDQ significantly predicted daily sleep quality, supporting our hypothesis, albeit weakly. The deviance statistic improved from the first model, indicating a better fit to the data. In the third model, where the RRS-brooding and RRQ-rumination were added as predictors, the effect of the RDQ remained significant, indicating that the RDQ subscale predicted the criterion beyond the effect of other measures of rumination, supporting hypotheses. Again, the addition of predictors somewhat improved the deviance statistic.

Table 65

Fixed and random effects (standard error) for models with daily Sleep quality as a criterion

	(1) Unconditional	(2) Adding RDQ as predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	5.42***(.06)	5.42***(.06)	5.42***(.06)
RDQ		-.01***(.01)	-.01***(.01)
RRS			.03(.02)
RRQ			-.01(.01)
Random effects			
L1 residual	2.92***(15)	2.87***(.15)	2.87***(.15)
L2 residual	.01(.08)	.01(.10)	.01(.11)
Model summary			
Deviance	3,106.61	3,092.11	3,063.97
k	3	4	6

Note: ICC = .01; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Amotivation. Bivariate correlations revealed that the RDQ was positively correlated with aggregated daily amotivation ($r = .39$, $p < .001$). This relationship was stronger for the RDQ than for the RRQ ($r = .02$, $p = ns$; the difference in correlation strength was significant according to Steiger's z, z = 3.65, $p < .001$) and the RRS ($r = -.18$ $p = ns;$ the difference in correlation strength was significant according to Steiger's z, z = 6.18, $p < .001$), supporting our expectations.

The multilevel models (Table 66) revealed that 72% of the variance in daily amotivation occurred between subjects. The intercept was estimated at 11.85 and did not change substantially in the second and third models. The within-person residual variance was significant, and this was also the case in later models. In the second model, the RDQ significantly predicted daily amotivation, as expected. The level-two residual variance fell by approximately 16% from the

first model but remained significant. Model fit was improved. In the third model, the effect of the RDQ was slightly increased (suggesting a suppressor effect) and still significant. The RRS also independently predicted daily amotivation, however in the opposite direction (i.e., higher scores on RRS predicted lower scores on amotivation), whereas the RRQ did not significantly predict amotivation. In this model, the level-two residual variance fell by approximately 16% from the previous model. Again, the addition of predictors somewhat improved fit.

Table 66

Fixed and random effects (standard error) for models with Daily amotivation as a criterion

	(1) Unconditional	(2) Adding RDQ as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	11.85***(.52)	11.86***(.48)	11.81***(.44)
RDQ		.06***(.01)	.09***(.01)
RRS			-.59***(.14)
RRQ			.05(.06)
Random effects			
L1 residual	11.79***(.64)	11.79***(.64)	11.84***(65)
L2 residual	29.98***(4.13)	25.06***(3.49)	21.15***(3.00)
Model summary			
Deviance	4,554.83	4,534.73	4,478.83
k	3	4	6

Note: ICC = .72; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

Mood. The RDQ was significantly positively correlated with aggregated daily negative mood ($r = .69$, $p < .001$), which was stronger than the correlation between RRQ-rumination and daily negative mood ($r = .23$, $p < .05$; the difference in correlation strength was significant according to Steiger's z, z = 5.40, $p < .001$) and the correlation between RRS-brooding and daily negative mood ($r = .13$, p = ns; the difference in correlation strength was significant according to Steiger's z, z = 7.03, $p < .001$). This pattern of results supported the hypotheses that the RDQ will be positively correlated with the criterion.

Regarding the multilevel models (table 67), the ICC for the intercept-only model demonstrated that approximately 59% of the variance in daily negative mood occurred between subjects. For this model, the intercept was estimated at 8.19 indicating the mean of daily negative mood scores across all participants and daily diary entries. This estimate does not change

substantially in the second and third models. The within-person residual variance was significant, indicating that participants varied in their initial levels of the criterion, and remained significant in later models. In model 2, the RDQ significantly predicted daily negative mood, supporting the hypotheses. The level-two residual variance fell by approximately 48% from the first model but was still significant. The deviance statistic improved from the first model, indicating a better fit to the data. In the third model, where the RRS-brooding and RRQ-rumination were added as predictors, the effect of the RDQ became slightly stronger and was still significant, indicating that the RDQ predicted the criterion beyond the effect of other measures of rumination, supporting the hypotheses. The RRS also independently predicted negative mood, albeit in the opposite direction than what was expected (negatively) whereas the RRQ did not independently predict negative mood. In this model, the level-two residual variance fell by approximately 9% from the previous model. Again, the addition of predictors somewhat improved the deviance statistic.

Table 67

Fixed and random effects (standard error) for models with Daily negative mood as a criterion

	(1) Unconditional	(2) Adding RDQ as a predictor	(3) Adding RRS-brooding and RRQ-Rumination
Fixed effects			
Intercept	8.19***(.25)	8.20***(.19)	8.17***(.18)
RDQ		.05***(.01)	.06***(.01)
RRS			-.18**(.06)
RRQ			.05(.06)
Random effects			
L1 residual	4.65***(.25)	4.65***(.25)	4.68***(.26)
L2 residual	6.76***(97)	3.50***(.55)	3.19***(.51)
Model summary			
Deviance	3,753.68	3,686.01	3,648.38
k	3	4	6

Note: ICC = .59; RDQ = Rumination Domains Questionnaire; RRS = Ruminative Response Scale; RRQ = Rumination-Reflection Questionnaire; L1 residual = level one residual; L2 residual = level two residual; *k* = number of estimated parameters; * $p < .05$; ** $p < .01$; *** $p < .001$

4.4. Study 3 Discussion

The present study was concerned with the predictive validity of the RDQ. Specifically, this study assessed the performance of the RDQ total and subscales in predicting daily diary measures of rumination in life domains corresponding to the subscales of the RDQ, as well as in the realms of daily sleep quality, amotivation, and negative mood. Daily diary methods were used to get more nuanced data (compared to cross-sectional methods) of the dependent variables.

In the present study, similarly to previous studies, the RDQ total and domain subscales have shown strong reliability and strong correlations with the RRS brooding and RRQ rumination scales, replicating Study 2 of this dissertation and providing evidence for concurrent validity of the RDQ. Further, hypotheses regarding criterion validity were mostly supported. Specifically, all RDQ domain bivariate correlations were significantly positively correlated with aggregated daily rumination in the relevant domains, indicating that the RDQ domains do tap into the construct that they are intended to measure. Further, these correlations were often comparable to other or higher than the correlations between other rumination measures and daily rumination in these domains, however, there were domains where the RRS outperformed the RDQ domains saliently (e.g., health, family, financial) and where the RRQ outperformed the RDQ domains more saliently (e.g., family). In comparison to the RRS, the RDQ subscales had higher correlations with aggregated daily rumination in the realms of romantic, existential, and cleanliness, and had comparable (within $r = .04$) relations with achievement, social, sociopolitical, and appearance. In comparison to the RRQ, the RDQ subscales had higher correlations with aggregated daily rumination in the realms of achievement, social, romantic, sociopolitical, existential, appearance, and cleanliness and had similar (i.e., within $r = .04$) relations to aggregated daily rumination in the domains of health and finance. Overall, these

results support the validity of the RDQ. Moreover, it should be noted that the RRS also performed well.

With respect to the multilevel models of the RDQ domains, the RDQ subscales predicted daily rumination in all the corresponding domains. More importantly, the RDQ independently (i.e., beyond the effect of the RRQ and RRS) predicted daily rumination in the realms of achievement, social, romance, finance, existential, sociopolitical, appearance and cleanliness. The RDQ failed to independently predict daily rumination in the realms of health and family. Overall, these results largely support the hypotheses that the RDQ subscales will independently predict daily rumination in the corresponding domains. It should be noted that the RRS also performed well in this regard, as it independently predicted rumination in all domains with the exceptions of social, existential, and sociopolitical. The RRQ did not incrementally predict daily rumination in any of the domains.

As for the correlations between the RDQ total scores and the aggregated daily outcomes, the RDQ was not significantly correlated with sleep quality. This result goes against predictions, as well as findings in previous research (e.g., Jiang & Poon, 2021; Nota & Coles, 2015; Ottaviani et al., 2015; Slavish et al., 2018; Thomsen et al., 2003; You et al., 2021). Although this was the case, this result should not be interpreted as evidence against the validity of the RDQ, as the RRS and RRQ were also not significantly correlated with sleep quality. Therefore, it is more likely that this unexpected result is due to other factors, although the specific cause is unclear. One potential factor is that internet usage in the evenings (as may be the case when participating in daily diary studies) may affect sleep quality negatively for a large portion of the participants (e.g., Billari et al., 2018; Kim et al., 2018), or that individuals who are likely to agree to participate in such studies may be more willing to compromise sleep in order to respond to

questionnaires at night. Both these scenarios may result in less variability in sleep quality. When it came to the multilevel models, the proportion of between-level variance was close to zero, hence even though the RDQ significantly negatively predicted sleep quality, as predicted, the amount of variance that the RDQ accounted for was negligible.

As predicted, the RDQ was positively correlated with aggregated daily amotivation. This result was consistent with previous rumination research (e.g., Lyubomirsky & Nolen Hoeksema, 1993; Means et al., 2018; Nolen-Hoeksema et al., 2008), including other daily diary studies (e.g., Riley, Cruess, et al., 2019; Riley, Park, et al., 2019) Interestingly, the RRS and RRQ were not significantly correlated with amotivation. In terms of the multilevel models, the RDQ significantly predicted amotivation, as predicted and this was the case even after controlling for the other rumination measures, supporting the validity of the RDQ. Moreover, it should be noted that the RRS also incrementally predicted amotivation, though this was in the opposite direction than what was expected. The RRQ did not independently predict amotivation.

As for mood, the RDQ was significantly correlated with aggregated daily negative mood, as expected, as were the other rumination measures, however, the relationship between negative mood and the RDQ was stronger. These findings support the validity of the RDQ, as it indicates that the relationship between the RDQ and negative mood is consistent with previous rumination research (e.g., Jiang & Poon, 2021; Mor & Winquist, 2002; Slavish et al., 2018; Thomsen et al., 2003; You et al., 2021), including another daily diary investigation (e.g., Genet & Siemer, 2012). As for the multilevel models, the RDQ was a significant predictor of negative mood and this was the case independently of the effects of the RRS and RRQ, supporting the increment validity of the RDQ when predicting negative mood. Regarding the other measures, the RRQ did not independently predict negative mood, whereas the significant effect of the RRS (when

controlling for the RRQ and RDQ) was in the opposite direction than what would be expected from previous research.

4.4.1. Limitations and future directions

Due to the daily diary nature of the present study, this study avoided many of the shortcomings of common cross-sectional self-report studies, however, there were still a few notable limitations. Firstly, the nature of this study does not allow for causal conclusions. Secondly, the sample comprised mostly men, which may limit the generalizability of the present study. Further, the present study only collected data for seven days in an interval-contingent basis and was not in real-time, which may leave the results vulnerable to some level of retrospection error (Wheeler & Reis, 1991). Future longitudinal studies should collect data for a longer period of time and use methods such as an ambulatory assessment (Trull & Ebner-Priemer, 2013) which may give more ecologically valid measures of the constructs of interest. Moreover, because of the novelty of the RDQ, more research is needed to assess the validity of this instrument more comprehensively, including replication of the present study.

Conclusion

In the present study, a seven-day daily diary study design was used to assess the criterion-validity of the RDQ, a content-dependent domain measure of rumination. Overall, the present study found compelling evidence for the ability of the domains of the RDQ to capture rumination in the domains of life that they were meant to capture. Moreover, in many cases, the RDQ incrementally predicted rumination in these domains beyond the effects of commonly used measures. Moreover, the RDQ total score predicted amotivation and negative mood, as expected and incrementally predicted these constructs beyond the effect of other measures. It should also

be noted that the RRS also performed comparably to the RDQ in most cases, whereas the RRQ seemed to perform the least well in predicting relevant outcomes.

Chapter 5: Study 4

In previous studies of this dissertation, the RDQ has been rigorously assessed for reliability and validity. Despite promising results from all three of the earlier studies, much is still needed to convincingly demonstrate validity, including the test-retest reliability indices and the need for replication of earlier results. Moreover, even though sex differences in rumination have been assessed in Study 2, other group differences have not been assessed. This is an important gap, as one of the theoretical advantages of content-based measures, is the ability to assess group differences in content of rumination. In the present study, the RDQ will be further assessed for validity, by examining the reliability, as well as replication of the criterion validity of some of the constructs from Study 2 (namely anxiety and depression). Finally, sex differences in RDQ domains will be examined in a student sample and an older sample. Further, age group differences between these samples will be assessed.

The purpose of the fourth study was to assess the RDQ by examining the possible influence of social desirability, differences among groups (by age and gender), test-retest reliability, and further evidence of criterion validity with measures of anxiety and depression. Specifically, in the present study, the validity of the RDQ and group differences were assessed in student and older samples. There are several reasons for the choice of samples. The older sample was used to assess the generalizability of the scale beyond the undergraduate sample. Undergraduate students are a very specific group that tends to be younger and may share various challenges and goals that they may not share with other people. An older sample, on the other hand, is another specific group that tends to have various goals and challenges that may not be

shared with most undergraduate students. The variety in samples will also allow us to look at qualitative differences in rumination content between groups at different stages of life.

It is predicted that the RDQ total and domain scores will be weakly (i.e., $r < .20$; Hemphill, 2003) correlated with social desirability (as measured by the BIMI total and subscales), except for the social and appearance domains, which were moderately correlated with social desirability in Study 1 of this dissertation. Moreover, it is expected that the strong correlations between rumination and anxiety and depression (as measured by the STICSA total and BDI-II, respectively) that were found in Study 2 of this dissertation will be replicated. Previous research has shown a consistent link between rumination and both anxiety (Aldao et al., 2010; Armey et al., 2009; Dar & Iqbal, 2015; Flett, et al., 2002; Muris, et al., 2005; Olatunji et al., 2013; Silvia & Phillips, 2011; Szkodny & Newman, 2019) and depression (Aldao et al., 2010; Armey et al., 2009; Hilt et al., 2010; Muris et al., 2005; Nolan et al., 1998; Nolen-Hoeksema & Harrell, 2002; Nolen-Hoeksema et al., 2007; Olatunji et al., 2013; Raes, 2010; Silvia & Phillips, 2011; Stange et al., 2017; Szkodny & Newman, 2019; Thomsen, 2006; Willem et al., 2011). Therefore, if these expected relationships did not manifest in the previous study, this would have brought up reasonable questions regarding the consistency and validity of the RDQ.

Previous research has demonstrated clear differences in overall rates of rumination across sexes and ages. For example, Butler and Nolen-Hoeksema (1994) have found that women tended to ruminate more than men. This finding has been corroborated countless times (e.g., Jose, et al., 2014; Kowalski & Schermer, 2019; Nolen-Hoeksema & Aldao, 2011; Nolen-Hoeksema & Jackson, 2001; Wupperman & Neumann, 2006), including by a meta-analysis which found a small but substantial effect size ($d = .29$; Johnson & Whisman, 2013). Further, research has also

shown that older adults tend to ruminate to a lesser degree than young adults. For example, Sutterlin and colleagues (2012) found that individuals tend to ruminate less as they age. Specifically, out of the five age cohorts in their study (i.e., 24 years of age and younger, 25-37, 38-50, 51-62, and 63 years of age and older), they found that the oldest cohort ruminated the least of all age groups, whereas the youngest cohort ruminated the most of all groups. Further, in Study 2 of the present dissertation, women (in the student sample, but not the community sample) scored higher in rumination than men. Based on these findings, it is predicted that women will score higher than men on rumination (RDQ total score) in both samples. Moreover, it is predicted that the student sample will score higher on general rumination (RDQ total score) than the older sample.

Although research has not been able to quantitatively compare the content of rumination amongst groups, because of the lack of an instrument which taps into the content of rumination, there are indications from related fields that suggest a lead in producing hypotheses. For example, in the study of sex differences in values, Schwartz and Rubel (2005) found that men value achievement more than women, suggesting that perhaps men may ruminate more about achievement than women. However, research in perseverative cognition suggests otherwise. For instance, Robichaud et al. (2003) found that women score higher than men in worrying in the domain of work incompetence, the WDQ domain most closely conceptually and empirically to the achievement domain of the RDQ (see Study 2 of the present dissertation). Wood et al. (2005) found that women worry significantly more than men about achievement and, although somewhat conflicting results, Lindesay and colleagues (2006) found that men were more likely to worry about work. More specifically to rumination, in Study 2 of the present dissertation, women scored higher than men in achievement rumination. As for age differences, Lindesay and

colleagues (2006) found that worry about work differed across the lifespan in that they were relatively high in the 16-24 aged cohort, rising slightly in the 25-34 aged cohort and then falling consistently in the older cohorts, with the oldest cohort (65-74) worrying the least about work. Similarly, Granier and Segal (2021) found that younger individuals (18-35) scored significantly higher in work-related worry than older individuals (65-79) and these differences were medium to large in effect sizes. Therefore, it is predicted that women will score higher than men in achievement rumination. Also, it is predicted that the student sample will score higher in achievement rumination than the older sample.

With respect to perseverative cognition in the domain of health, Lindesay and colleagues (2006) found that women score significantly higher than men on worrying about health. Moreover, in Study 2 of the present dissertation, it was found that women (in the student sample, but not the community sample) scored higher in health-related rumination than men. As for age differences in health-related perseverative cognition, Lindesay and colleagues (2006) did not find substantial differences in health-related rumination between the youngest cohort (16-24) and the oldest cohort (65-74) and this was also the case in the study by Powers et al. (1992). That said, Hunt et al. (2003) found that older individuals were more likely to worry about health than young adults, thus the research on this topic tends to be inconsistent and no explicit hypothesis will be formulated in the present study with regard to age differences in health rumination. It is predicted, however, that women will report higher health-related rumination than men.

In terms of perseverative cognition related to family, Lindesay et al. (2006) found that worry about relationships was more prevalent among women, compared to men. Similarly, in Study 2 of the present dissertation, it was found that women (in the student sample, but not the community sample) scored higher in family-related rumination than men. Regarding age

differences, Hunt et al. (2003) found that older individuals tended to worry more about family concerns, however Lindesay et al. (2006) found the opposite effect, where young adults scored higher on relationships/family worry compared to older individuals. Therefore, it is predicted that women will score higher in family-related rumination. Given the inconsistency in previous age-related research, no hypotheses will be offered regarding age differences in family-related rumination.

Regarding perseverative cognition in the social domain, in Study 2 of the present dissertation, it was demonstrated that women scored higher in social rumination than men. Regarding age differences, Granier and Segal (2021) found that young individuals reported more social-related worry compared to older individuals. These results were also corroborated by Powers and colleagues (1992), however, results by Hunt et al. (2003) differed in that no significant differences were found. Therefore, it is expected that sex differences will be found consistent with the results in Study 2; specifically, women will score higher in rumination in the social domain compared to men. Furthermore, because most research indicates an age difference where young adults score higher in worry in social concerns, it is expected that the student sample will report higher rumination scores in the social domain, compared to the older sample.

In the matter of the romantic domain, in Study 2 of the present dissertation, no significant sex differences were found in romance-related rumination. As for potential age differences, research has found that younger individuals tend to have more anxious attachment than older individuals (Chopik & Edelstein, 2014). Although attachment is not considered a type of perseverative cognition, anxious attachment is empirically correlated with rumination in the sense that individuals who are anxiously attached tend to ruminate more than those who are not anxiously attached (Bugay-Sökmez et al., 2023; Lanciano et al., 2012). Further, Granier and

Segal (2021) found that young adults worried significantly more about relationships than older individuals. Based on these findings, it is expected that non-significant and/or small differences will be found between men and women in romantic rumination. Moreover, it is predicted that the student sample will report higher rumination in this domain than the older sample.

Previous research gives some insight into potential group differences regarding financial rumination. For example, Beutel and Marini (1995) found that men tend to value materialism more than women. Robichaud et al. (2003) found that men and women differed only negligibly in financial worry, whereas Hunt and colleagues (2003) found that women reported higher financial worry compared to men. Concordantly, in Study 2 of the present dissertation, it was reported that women scored higher in financial rumination compared to men (in the student, but not the community sample). In terms of age differences, Granier and Segal (2021) found that young adults tended to worry more about finances compared to older individuals. Similar findings were found by Powers et al. (1992) and Lindesay et al. (2006), whereas no age differences were reported by Hunt and colleagues (2003). Despite inconsistent signals from research regarding sex differences, it is expected that sex differences in the present study will be consistent with the student sample of the Study 2 study of this dissertation; specifically, women will score higher in financial rumination compared to men. Moreover, it is expected the present study will be in line with most of the research on age differences, in that students will score higher in financial rumination than the older sample.

Research on values has also shown sex differences in valuing meaning in life (i.e., an existential concern) as women attribute significantly more value in meaning than men (Beutel & Marini, 1995). On the other hand, in terms of perseverative cognition research, Robichaud and colleagues (2003) have found no sex differences in worrying about an aimless future, which is

most closely associated with the existential domain of the RDQ (as found in Study 2 of the present dissertation). In Study 2 of the present dissertation, however, a significant difference was found in the student sample, in which women scored significantly higher than men on existential rumination. As for differences in age, research has generally found that young adults tend to worry more about having an aimless future than do older individuals (Granier & Segal, 2021). It is expected that our results regarding sex differences in the existential domain of the RDQ will be consistent with Study 2 of the present dissertation, in that women will score higher than men in existential rumination. As for age differences, it is expected that the student sample will ruminate about the existential domain more than the older sample.

In terms of sex differences in the sociopolitical domain, research has found that men tend to be more concerned with general politics than women (although there may be differences in the types of political issues about which men and women are concerned; Bennet & Bennet, 1989; Coffé, 2013), therefore, based on interest alone, it seems more likely that men will ruminate more about sociopolitical issues than do women, however, interest is not sufficient to evoke rumination, as rumination has a neurotic component. In fact, in Study 2 of the present dissertation, it was found that women score significantly higher than men in sociopolitical rumination. As for age differences, research has found that individuals become more interested in politics as they age, with the youngest cohorts (young adults) reporting the least political interest of all age cohorts, including older individuals (Glenn & Grimes, 1968), which is supported by voting rates by age in Canadian Federal elections from at least 2011-2021 (Elections Canada, 2023) and in the USA from at least 1988-2016 (Our World in Data, 2023). Likewise, research has found that older individuals tend to worry more about world issues than young adults (Hunt et al., 2003). Therefore, it is hypothesized that men will ruminate more about

sociopolitical issues compared to women, moreover, it is predicted that the older sample will ruminate more about sociopolitical issues compared to the student sample.

As for the appearance domain, research has consistently found that women tend to be more concerned with physical appearance (e.g., Harris & Carr, 2001; Strong et al., 2000). This is also reflected in Study 2 of the present dissertation, where women scored significantly higher than men on appearance rumination. Regarding age differences, appearance concerns tend to reduce as individuals age, especially once individuals reach an older age (Harris & Carr, 2001). Therefore, it is predicted that women will score higher on appearance rumination compared to men and that the student sample will score higher on appearance rumination compared to the older sample.

Regarding cleanliness, research on hygiene has shown that women report better hand hygiene than men (Eriksson et al., 2022; Kim, 2019; Suen et al., 2019). Relatedly, in Study 2 of the present dissertation, women (in the student sample, but not the community sample) scored higher in cleanliness rumination compared to men. As for age differences, Kim (2019) found that older individuals tended to have better hygiene habits than young adults. Therefore, it is expected that women will report greater cleanliness rumination than men. Furthermore, it is expected that older individuals will ruminate more about cleanliness than the student sample.

In terms of anxiety, Tindall and colleagues (2021) found significant differences in trait somatic anxiety where women reported significantly higher somatic anxiety, whereas Balsamo et al. (2015) found that women scored higher on cognitive, somatic, as well as general anxiety. Similar results were found in other research (Roelofs et al., 2008; Van Dam et al., 2013). Researchers have also demonstrated that anxiety scores are higher in younger individuals than in

older individuals (Christensen, et al., 1999). Thus, it is expected that women will score higher in anxiety compared to men and that students will score higher in anxiety than older individuals.

As for depression, research has consistently found that women report higher depression scores than men (e.g., Christensen et al., 1999; Grigoriadis & Robinson, 2007; Nolen-Hoeksema & Aldao, 2011). As well, research has also indicated that older individuals have significantly lower rates of depression compared to young adults (e.g., Kessler et al., 2010; Nolen-Hoeksema & Ahrens, 2002; Nolen-Hoeksema & Aldao, 2011). Hence, it is expected women will score higher than men in depression and that the young sample will have significantly higher degrees of depression compared to the older sample.

5.1.Method

5.1.1. Participants

In the older sample, 349 participants took part in the study. Data quality was pursued in several ways. First, 32 participants who completed their sessions in an unrealistically short amount of time (i.e., five minutes or less) were removed from the dataset. Following, participants were given the opportunity to self-report if their data would be reliable and should be used in analyses; data from five participants who indicated that their data should not be used in analyses were removed from the dataset. Moreover, three attention checks were included where participants were asked to select a specific response option. Data from four participants who failed two or more attention checks were removed, as recommended by Curran (2016).

The final older sample comprised 307 North American participants (including 185 men and 122 women) ranging from 64 years of age to 91 years of age (M_{age} = 72.05; *SD* = 5.20) who were recruited through Leger and were compensated 2500 LEO points (equivalent of $2.50 CAD) for their participation.

In the student sample, 714 participants took part in the study. Data quality was pursued in several ways. First, participants who completed their sessions in an unrealistically short amount of time (i.e., five minutes or less for the first session; two minutes or less for the second session) were removed from the data. As a result, data from 26 participants were removed completely, whereas the data from the second session were removed for 15 participants. Following, participants were given the opportunity to self-report if their data would be reliable and should be used in analyses; data from 18 participants who indicated (in their first sessions) that their data should not be used in analyses were removed from the dataset, whereas data from the second sessions of 14 participants were removed for this reason. Moreover, attention checks (three and one, in the first and second terms, respectively) were included where participants were asked to select a specific response option. Data from 12 participants who failed two or more attention checks in the first session were removed. Data from the second session of 3 participants were removed as they failed the attention check.

The final student sample comprised 658 participants (including 226 men and 423 women) ranging from 17 years of age to 29 years of age (M_{age} = 18.34; *SD* = 1.33) who were enrolled as university students at the University of Western Ontario. Out of the 658 participants, 488 participants took part in the second session. These participants were recruited through a participant pool for partial course credit. Data is publicly available at https://osf.io/dbxsq/.

5.1.2.Measures

Rumination Domains Questionnaire (RDQ): The RDQ, which was developed in Study 1 and was assessed for validity in Study 2 and Study 3, was used in the present study, as well.

Bidimensional Impression Management Index (BIMI): The BIMI, which was used to assess social desirability in Study 1, was also used in the present study.

State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA): The trait scale of the STICSA, which was used to assess anxiety in Study 2, was also used in the present study.

Beck Depression Inventory-II (BDI-II): The BDI-II, which was used to measure depression in Study 2, was also used in the present study.

5.1.3.Procedure

Participants in both samples completed the questionnaires online through a popular survey platform. After reading the letter of information, participants indicated their consent by clicking a box on the screen, after which they were allowed to take the questionnaires. Once the questionnaires were completed, participants in the older sample were shown a debriefing letter on the screen. Student participants were not shown a debriefing letter at this point. Two weeks later, student participants were invited to participate in the second session, where they completed the RDQ a second time, after which they were shown the debriefing letter. Respondents completed the questionnaires online and had the freedom to complete the study from the comfort of their own homes. Participation usually took approximately 20 minutes for the first session and 10 minutes for the second session. Ethics approval was obtained through the University of Western Ontario Research Ethics Board (REB # 122154).

5.1.4.Data analytic plan

Descriptive statistics and reliabilities (i.e., alpha, omega for both samples and test-retest reliability for the second sample) were assessed. Following, bivariate correlations between all variables were examined. Sex differences in rumination were examined using independent sample *t*-tests. Finally, differences in rumination, anxiety, and depression across samples were

assessed using *t*-tests. Effect sizes will be computed for the group differences to aid in the interpretation of the differences (i.e., Cohen's *d*; Cohen, 1988[14]).

5.2.Results

Descriptive statistics and internal consistency coefficients for all variables, as well as test-retest reliability coefficients, are available in Table 68. The RDQ and all its subscales showed acceptable to excellent internal consistency ranging from α = .73 to .96 and ω = .74 to .95 across samples. The BIMI scale's reliability was questionable in the older sample but fared slightly better in the student sample. The STICSA scales and the BDI also have high internal consistency in both samples. As for the two-week test-retest reliability of the RDQ (student sample), all scales demonstrated acceptable to good reliability (r_{tt} ranging from .71 to .87).

[14] According to Cohen (1988), *d* = .2 represents a small effect size, *d* = .5 represents a medium effect size, whereas a *d* = .8 represents a large effect size.

Table 68

Reliabilities and descriptive statistics of all measures for both samples

	Older sample			Student Sample			
	Cronbach's α	McDonald's ω	*M (SD)*	Cronbach's α	McDonald's ω	r_{tt}	*M (SD)*
RDQ total	.95	.95	90.49(19.96)	.96	.96	.87	127.12(28.93)
Achievement	.81	.81	9.86(2.72)	.87	.88	.75	17.17(4.09)
Health	.86	.87	10.48(3.37)	.81	.82	.76	11.52(3.83)
Family	.73	.74	9.17(2.56)	.80	.80	.76	12.22(3.81)
Social	.81	.81	8.90(2.73)	.89	.89	.85	14.86(4.61)
Romance	.83	.84	7.75(2.56)	.87	.88	.81	12.03(4.81)
Finance	.86	.87	9.48(3.26)	.86	.86	.82	13.09(4.36)
Existential	.86	.87	8.36(2.92)	.91	.91	.85	12.25(4.98)
Sociopolitical	.82	.83	11.65(3.56)	.81	.82	.71	10.88(3.52)
Appearance	.91	.92	9.13(3.45)	.94	.94	.87	15.22(5.25)
Cleanliness	.79	.80	6.90(1.83)	.86	.86	.77	10.34(4.09)
BIMI	.71	.72	76.87(12.33)	.74	.75		66.41(13.05)
Agentic	.66	.67	35.13(6.91)	.69	.70		32.74(7.46)
Communal	.68	.70	39.38(6.23)	.69	.70		33.66(8.86)
STICSA	.89	.89	31.68(7.52)	.91	.91		44.74(11.34)
Cognitive	.85	.85	15.75(4.34)	.86	.86		25.05(6.35)
Somatic	.86	.86	15.93(4.30)	.89	.89		19.69(6.56)
BDI	.90	.91	8.61(7.30)	.92	.92		17.81(10.87

Note: RDQ = Rumination Domains Questionnaire; BIMI = Bidemensional Impression Management Index; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

5.2.1.Bivariate correlations

As for bivariate correlations (Table 69 and 70, for the older and student samples, respectively), mostly consistent with hypotheses, in the older sample all RDQ scales were weakly (i.e., $r < .20$) correlated with social desirability, with exceptions of the social domain, which was moderately correlated (namely, with the BIMI total score and agentic scale), as well as the total score and achievement domain, which were borderline moderately correlated ($r = -.20$; namely with the BIMI total score). Results were somewhat less promising in the student sample, as the RDQ total score, social domain, and appearance domain were moderately to strongly correlated with the BIMI total score, agentic impression management, and communal

impression management, wheras the achievement, romantic, financial, and existential domains were moderately correlated with the BIMI total and one of the BIMI subscales.

Furthermore, as expected, all RDQ scales were positively strongly correlated with the STICSA total score, except for cleanliness rumination, which was borderline strong (r = .30). For the student sample, all the RDQ scales were strongly positively correlated with the STICSA total score, supporting the hypotheses and the criterion validity of the RDQ. Regarding depression, the RDQ scales were all strongly positively correlated with BDI-II scores, as expected, except for the sociopolitical subscale (in both the student and older sample; moderately positively correlated in both cases) and the cleanliness subscale (older sample; moderately positively correlated). Overall, these results support the validity of the RDQ.

Table 69

Correlations between all variables (older sample)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1.RDQ total																	
2.Achievement																	
3.Health		.53*															
4.Family		.55*	.32*														
5.Social		.62*	.39*	.69*													
6.Romance		.49*	.32*	.45*	.52*												
7.Finances		.53*	.43*	.39*	.43*	.45*											
8.Sociopolitical		.44*	.31*	.40*	.34*	.28*	.29*										
9.Existential		.63*	.46*	.42*	.51*	.48*	.54*	.45*									
10.Appearance		.55*	.48*	.49*	.62*	.48*	.48*	.30*	.54*								
11.Cleanliness		.34*	.34*	.28*	.30*	.29*	.25*	.27*	.26*	.28*							
12.BIMI	-.20*	-.20*	-.13	-.19	-.30*	-.17	-.08	-.03	-.16	-.18	-.02						
13.Agentic	-.19	-.19*	-.16	-.18	-.28*	-.10	-.11	.03	-.16	-.16	-.01						
14.Communal	.05	.06	-.11	.03	.04	.12	-.03	.08	-.03	.09	.06		-.04				
15.STICSA	.70*	.61*	.60*	.47*	.54*	.38*	.47*	.37*	.56*	.53*	.30*	-.28*	-.28*	.01			
16.Cognitive	.71*	.64*	.50*	.53*	.64*	.46*	.45*	.36*	.58*	.54*	.24*	-.27*	-.29*	.02			
17.Somatic	.50*	.42*	.55*	.29*	.30*	.19	.37*	.29*	.40*	.38*	.29*	-.22	-.20	-.02		.52*	
18.BDI	.66*	.55*	.56*	.37*	.45*	.41*	.46*	.28*	.69*	.59*	.20*	-.27*	-.26*	-.01	.73*	.69*	.58*

Note. * $p < .001$; RDQ = Rumination Domains Questionnaire; BIMI = Bidimensional Impression Management Index; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

Table 70

Correlations between all variables (student sample)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1.RDQ total																	
2.Achievement																	
3.Health		.44*															
4.Family		.48*	.49*														
5.Social		.46*	.39*	.53*													
6.Romance		.34*	.34*	.39*	.52*												
7.Finances		.46*	.36*	.43*	.38*	.29*											
8.Sociopolitical		.37*	.37*	.42*	.31*	.27*	.34*										
9.Existential		.49*	.33*	.47*	.53*	.39*	.47*	.42*									
10.Appearance		.39*	.34*	.35*	.64*	.48*	.42*	.19*	.47*								
11.Cleanliness		.32*	.38*	.34*	.34*	.32*	.36*	.22*	.27*	.41*							
12.BIMI	-.32*	-.22*	-.13	-.12	-.33*	-.25*	-.21*	.01	-.26*	-.37*	-.18*						
13.Agentic	-.24*	-.12	-.12	-.08	-.31*	-.14*	-.11	.03	-.24*	-.31*	-.12						
14.Communal	-.28*	-.22*	-.08	-.12	-.24*	-.26*	-.22*	.01	-.19*	-.29*	-.17*		.27*				
15.STICSA	.70*	.47*	.46*	.49*	.58*	.43*	.39*	.35*	.56*	.54	.39*	-.32*	-.29*	-.23*			
16.Cognitive	.71*	.53*	.45*	.47*	.63*	.44*	.39*	.31*	.59*	.56*	.37*	-.38*	-.35*	-.26*			
17.Somatic	.52*	.29*	.37*	.38*	.40*	.32*	.29*	.31*	.40*	.38*	.32*	-.19*	-.16*	-.14*		.54*	
18.BDI	.66*	.41*	.35*	.45*	.53*	.43*	.40*	.29*	.64*	.52*	.33*	-.31*	-.30*	-.20*	.69*	.66*	.55*

Note. * $p < .001$; RDQ = Rumination Domains Questionnaire; BIMI = Bidimensional Impression Management Index; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; BDI = Beck Depression Inventory II

5.2.2.Group differences

Sex differences (Table 71) were assessed using independent sample t-tests. In the older sample, women scored significantly higher on general rumination (RDQ-total), as well as rumination in the health, family, social, and appearance domains, which was consistent with hypotheses. All these differences were small-to-moderate in effect size except for appearance-related rumination, which was moderate-to-large in effect size. A similar pattern of results was found in the student sample; namely, women scored higher in general rumination, family, social, financial, sociopolitical, existential (although no hypotheses were made regarding existential rumination), appearance, and cleanliness-related rumination. It should be noted that the effect sizes for sociopolitical and existential rumination for both samples were virtually the same, however, because of the smaller sample size in the older sample relative to the student sample, they did not reach significance. Out of the significant sex differences in the student sample, all were small-to-moderate in effect size, except for sociopolitical (close to, but did not reach $d = .2$, representing a small effect), existential (small effect), and appearance-based rumination (moderate-to-large effect). As predicted, women scored higher than men on anxiety, cognitive anxiety, somatic anxiety, and depression in both samples (all small-to-medium effects in the older sample, whereas in the student sample, cognitive anxiety and depression were small-to-medium in effect and general anxiety and somatic anxiety were medium-to-large effect size). We also found that, as predicted, there was no significant sex differences in romantic rumination. Contrary to hypotheses, there were no significant sex differences in achievement in either sample, whereas no significant differences were found in financial, sociopolitical, and cleanliness domains in the older sample, and there were also no sex differences in health rumination in the student sample.

Table 71

Sex differences in RDQ scales

	Older sample					Student sample				
	Men M(SD)	Women M(SD)	F	t(df)	d	Men M(SD)	Women M(SD)	F	t(df)	d
RDQ total	87.39(18.62)	95.18(21.06)	1.78	-3.39**(302)	.39	118.95(27.97)	131.42(28.53)	.14	-5.36***(654)	.44
Achievement	9.76(2.59)	10.02(2.92)	1.25	-.84(305)	.09	16.77(4.18)	17.39(4.04)	.48	-1.85(656)	.15
Health	10.04(3.28)	11.16(3.41)	.76	-2.86**(304)	.33	11.21(3.79)	11.68(3.85)	.01	-1.49(656)	.12
Family	8.71(2.30)	9.87(2.79)	3.20	-3.96***(305)	.45	11.22(3.35)	12.74(3.93)	6.67*	-5.20***(523.61)	.42
Social	8.41(2.21)	9.64(3.23)	13.98***	-3.69***(195.03)	.44	13.47(4.47)	15.59(4.52)	.55	-5.73***(655)	.47
Romance	7.78(2.72)	7.71(2.31)	.53	.22(305)	.03	11.68(4.71)	12.21(4.85)	3.39	-1.35(655)	.11
Finances	9.29(3.14)	9.77(3.43)	1.04	-1.27(305)	.15	12.11(4.15)	13.60(4.38)	1.58	-4.22***(656)	.35
Sociopolitical	11.34(3.66)	12.11(3.38)	.22	-1.88(305)	.22	10.43(3.57)	11.11(3.47)	.61	-2.34*(656)	.19
Existential	8.10(2.77)	8.74(3.10)	.83	-1.87(305)	.22	11.59(5.15)	12.59(4.85)	1.76	-2.47*(656)	.20
Appearance	8.18(2.84)	10.56(3.80)	16.64***	-5.91***(208.14)	.71	13.38(4.96)	16.19(5.14)	1.44	-6.76***(656)	.62
Cleanliness	6.91(1.87)	6.89(1.78)	.02	.10(304)	.01	9.51(3.65)	10.78(4.24)	9.72**	-3.99***(519.20)	.32
STICSA	30.55(7.29)	33.40(7.57)	.04	-3.28**(301)	.38	40.80(10.55)	46.80(11.21)	1.22	-6.64***(655)	.55
Cognitive	15.07(4.03)	16.78(4.59)	2.63	-3.43**(301)	.40	23.24(6.44)	25.99(6.11)	2.27	-5.37***(655)	.44
Somatic	15.48(4.16)	16.62(4.44)	.01	-2.26*(301)	.26	17.56(5.72)	20.81(6.70)	8.83**	-6.51***(520.81)	.52
Depression	7.58(6.64)	10.18(7.97)	4.44*	-2.95**(222.21)	.35	15.27(10.42)	19.13(10.88)	1.32	4.39***(653)	.36

Note: *p<.05, **p<.01, *** p <.001; F = Levene's test; d = Cohen's d; d = .2 indicates a small effect size, d = .5 indicates a medium effect size, d = .8 indicates large effect size; RDQ = Rumination Domains Questionnaire; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety

Age group differences were also examined (see Table 72) between the student sample and the older sample. As expected, students scored higher on general rumination (large effect) and the achievement (large effect), social (large effect), romance (large effect), financial (large effect), existential (large effect), and the appearance (large effect) domains of rumination. As well, this was the case for all anxiety scales (STICSA total and cognitive subscale had large effects, whereas the somatic subscale had a moderate-to-large effect) and depression (large effect), whereas older individuals scored higher on sociopolitical rumination (small effect). Contrary to expectations, students scored higher on cleanliness rumination (large effect) compared to older individuals. Moreover, it was found that students scored higher on health rumination (large effect) and family rumination (small-to-moderate effect) compared to older individuals.

Table 72

Sample differences in RDQ scales and mental health variables

	Older *M (SD)*	Student *M (SD)*	*F*	*t (df)*	*d*
RDQ total	90.49(19.96)	127.12(28.93)	56.34***	-22.77***(820.26)	1.47
Achievement	9.86(2.72)	17.17(4.09)	66.05***	-32.84***(851.26)	2.10
Health	10.48(3.37)	11.52(3.83)	6.87**	-4.25***(669.56)	.29
Family	9.17(2.56)	12.22(3.81)	60.99***	-14.62***(844.07)	.94
Social	8.90(2.73)	14.86(4.61)	107.57***	-25.10***(911.03)	1.57
Romance	7.75(2.56)	12.03(4.81)	160.91***	-17.99***(946.54)	1.11
Finances	9.48(3.26)	13.09(4.36)	29.10***	-14.33***(777.08)	.94
Sociopolitical	11.65(3.56)	10.88(3.52)	.05	3.15**(963)	.22
Existential	8.36(2.92)	12.25(4.98)	110.46***	-15.22***(914.79)	.95
Appearance	9.13(3.45	15.22(5.25)	93.16***	-21.45***(854.49)	1.37
Cleanliness	6.90(1.83)	10.34(4.09)	213.69***	-18.07***(960.89)	1.09
STICSA total	31.68(7.52)	44.74(11.34)	60.87***	-21.13***(841.59)	1.71
STICSA cognitive	15.75(4.34)	25.05(6.35)	60.96***	-26.47***(823.72)	1.36
STICSA somatic	15.93(4.30)	19.69(6.56)	77.06***	-10.58***(848.37)	.68
Depression	8.61(7.30)	17.81(10.87)	60.22***	-15.39***(831.27)	.99

Note: *p<.05, **p<.01, *** p <.001; *d* = Cohen's d; d = .2 indicates a small effect size, d = .5 indicates a medium effect size, d = .8 indicates large effect size; RDQ = Rumination Domains Questionnaire; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety

5.3.Study 4 Discussion

The purpose of the present study was psychometric in nature. Specifically, the purpose of the present study was to examine the social desirability effects, criterion validity, internal consistency, and test-retest reliability of the RDQ. Overall, the present study demonstrated that the RDQ was a reliable and valid measure in that the scales have acceptable to excellent internal reliabilities and acceptable to good test-retest correlations, as well as had mostly small-to-moderate effects of social desirability. The highest correlations with social desirability were in the student sample with strong negative correlations between social desirability and the RDQ total score, social domain, and appearance domain. The latter two are perhaps not surprising considering the social and appearance domains deal with content that is intrinsically socially desirable in nature. Moreover, the RDQ, as expected, had moderate-to-high correlations with anxiety and depression, which was consistent with a large contingent of previous research (e.g., Aldao et al., 2010; Armey et al., 2009; Dar & Iqbal, 2015; Flett, et al., 2002; Hilt et al., 2010; Muris, et al., 2005; Nolan et al., 1998; Nolen-Hoeksema & Harrell, 2002; Nolen-Hoeksema et al., 2007; Olatunji et al., 2013; Raes, 2010; Silvia & Phillips, 2011; Stange et al., 2017; Szkodny & Newman, 2019; Thomsen, 2006; Willem et al., 2011). Overall, this study supports the RDQ as a valid and reliable measure of rumination.

Additionally, in the present study, we sought to investigate sex and age differences using two samples: a student sample and an older sample. Most of the hypotheses were supported. As expected, based on previous research (e.g., Butler & Nolen-Hoeksema, 1994; Johnson & Whisman, 2013; Jose, et al., 2014; Kowalski & Schermer, 2019; Nolen-Hoeksema & Aldao, 2011; Nolen-Hoeksema & Jackson, 2001; Wupperman & Neumann, 2006), it was found that women ruminated significantly more than men in both samples. Such a sex difference is

exceptionally common in the extant literature, hence this result predominantly served as an indication of known-groups validation (DeVellis, 2017). What was less known, prior to the present study, was sex differences in content, for which previous research from rumination-adjacent fields (e.g., values, worry, etc.) were relied upon to formulate hypotheses. As expected, women ruminated more about health, family, social, and appearance-related rumination in the older sample, and family, social, financial, sociopolitical, appearance, and cleanliness-related in the student sample. Women also scored significantly higher on depression and anxiety, as expected based on a plethora of previous research (e.g., Christensen et al., 1999; Grigoriadis & Robinson, 2007; Nolen-Hoeksema & Aldao, 2011; Roelofs et al., 2008; Van Dam, et al., 2013). The fact that women scored higher in the majority of these mental health variables is perhaps unsurprising considering that women generally score higher in neuroticism across most cultures (Budaev, 1999; Schmitt et al., 2008; South et al., 2018; Weisberg et al., 2011).

Age differences were found, as the student sample scored significantly higher on general, achievement, social, romance, financial, existential, and appearance rumination (all large effects), whereas older individuals tended to ruminate slightly more about sociopolitical issues. This is consistent with Sutterlin and colleagues (2012) findings that, generally, levels of rumination tend to fall across the lifespan, however, given the content-dependent nature of the RDQ, a deeper level of nuance can be examined. Unlike other measures, the RDQ can uncover domain-level group differences, hence an additional level of detail is obtained beyond that of previously used rumination measures and previous research that has employed these measures. Contrary to expectations, students reported higher cleanliness-related rumination. Interestingly, most of these differences in rumination were large in effect size. In the same vein, the student sample, as predicted, scored higher in anxiety and depression. Indeed, the average depression

score in the student sample was more than two times the average older sample depression score and would be considered indicative of mild dysphoria (Dozois et al., 1998). Such high scores on the BDI-II are concerning and perhaps are worthy of further investigation and should be addressed by practitioners, policymakers, and university administrators.

5.3.1.Limitations and Future Directions

The present study has limitations. Firstly, only two age cohorts were included, whereas more age cohorts would be far more informative as it would allow for the examination of differences across the entire range of age groups. Moreover, both samples were from North America, hence cultural differences were impossible to examine. Future research should use the RDQ to investigate group differences in other contexts, such as cultural and religious differences, as well as age differences including in cohorts that were not included in the present study. Previous research has found cultural differences in the extent to which individuals ruminate (Choi & Miyamoto, 2023; Suchday et al., 2006), but until now, there has not been sufficient measurement tools to measure rumination by content. Further, the present study is not informative in terms of the treatment of rumination and related disorders, as it is only descriptive of group differences that exist. Future research should investigate how different interventions that have been shown to have an effect on rumination or depression, such as prayer (Knabb, 2012; Knabb et al., 2020; Knabb et al., 2022; Pérez et al., 2011), expressive writing (Gortner et al., 2006; Sloan et al., 2008) mindfulness-based interventions (Deyo et al., 2009; Hawley et al., 2014; Hilt & Pollak, 2012; Querstet & Cropley, 2013), distraction (Hilt & Pollak, 2012; Lam et al., 2003), or cognitive behavioural therapy (Jacobs et al., 2016; Teisman et al., 2014; Watkins et al., 2011) may have differential effects on various domains of rumination. Especially, as many studies have suggested that targeting rumination may be an effective way of addressing various

psychopathologies (Deyo et al., 2009; Jacobs et al., 2016; Topper et al., 2017; Watkins, 2015; Watkins & Roberts, 2020). As well, the undergraduate sample had higher depression scores than found in previous research (Whisman & Richardson, 2015), hence this should be taken into consideration when generalizing the results of this study to other students. It is not clear why the student sample in the present study had such high scores relative to previous research, though it is possible that this is associated with the fact that the data were collected in the aftermath of a time that was characterized by uncertainty due to Covid-19, whereas the normative data scores formulated by Whisman and Richardson (2015) was collected before these events occurred. However, based on the current data, there is no way to know the reasons for this with any certainty.

5.3.2.Conclusion

The current study provides evidence supporting the reliability and validity of the RDQ, as well as for the existence of sex and age cohort differences in content of rumination, information that was previously unfeasible or difficult to study due to lack of appropriate measures. The RDQ is still a new measure, therefore more validity work needs to be conducted to evaluate the strengths and weaknesses of this measure, especially if mental health practitioners are to use this measure in their practice. Further, more research investigating group differences (including across age cohorts, sexes, and cultures) should be conducted to look at both quantitative and qualitative differences in rumination across these groups.

Chapter 6: General Discussion

Given the enormous negative impact of neuroticism on the individual (e.g., psychopathology; Claridge & Davis, 2001) and societal levels (e.g., economic and public health costs; Cuijpers et al., 2010; Lahey. 2009; Widiger & Oltmanns, 2017), the aim of the current

paper was to develop and provide validity evidence for a new measure of rumination, a major feature of neuroticism. Because neuroticism is an over-general indicator of psychopathology and self-generated thought has been implicated as the engine of neuroticism (Perkins et al., 2015), the RDQ was developed as a fine-grained tool that will consider the content of rumination (i.e., what do people ruminate about?), a feature of rumination that has been largely neglected in the present literature. This is not to claim that examining general levels of rumination or rumination processes is unimportant, but the additional information that could be derived from investigating rumination content may assist in understanding rumination more closely, as well as potentially lead to new findings regarding individual differences, group differences, psychopathology, and treatment.

A number of rumination measures already exist however, these scales do not specify the domain of the intrusive thoughts (e.g., RSS, RRQ, RRS), and increasingly there has been a trend in the literature to produce increasingly general and content-independent measures of rumination and perseverative thought (e.g., the Ruminative Thought Scale, Perseverative Thought Questionnaire; Brinker & Dozois, 2009; Ehring et al., 2011). These developments have undoubtedly been very useful in the study of rumination and perseverative thought, however, the benefits of such an approach produce a trade-off where the cost is that researchers do not have a tool with which to compare individuals and groups on what they ruminate about. Research has demonstrated that groups differ quantitatively in rumination (i.e., in the amount that they ruminate; Butler & Nolen-Hoeksema, 1994; Johnson & Whisman, 2013; Sutterlin et al., 2012), however, very little, if any, research has investigated the qualitative differences in rumination, and this is partly due to lack of suitable measures. At the same time, research has shown that there are cultural differences in the topics about which people are stressed (Jose et al., 2014), age

trends related to domains of worry (Basevits et al., 2008), and sex differences and age trends in values (Schwartz & Rubel, 2005; Vilar et al., 2020), hence it would follow that group differences exist in content of rumination. The RDQ is the first rumination scale designed to investigate such topics.

To achieve this aim, a large item pool was generated based on ten life domains. These were extrapolated from various psychological literatures which had employed a domain-of-life approach, and a theoretically based definition of rumination. Moreover, the remaining items were screened by experts and were subjected to rigorous empirical analyses, including examining correlations with social desirability, domain totals, and key rumination characteristics, as well as DRIs to maximize relevant content variance relative to social desirability variance. The result of this rigorous scale development regime was a 60-item measure of rumination, with ten subscales (with six items each).

In Study 2, two samples were collected (a student sample and a community sample) to assess the construct and structural validity of the RDQ. In both samples, the RDQ's strong validity was demonstrated and the RDQ demonstrated strong concurrent validity through strong correlations with other measures of rumination. Further, convergent and criterion validity were demonstrated through high correlations with worry, neuroticism, anxiety, and depression, as well as positive correlations with obsessive-compulsive behaviour, which were also quite similar to the correlations between other rumination scales and these constructs. Known-groups validity was also supported in the student sample, as sex differences emerged in rumination, as expected. This was not the case for the community sample however, similar results were found amongst the other rumination measures, hence, it is unlikely to be a result of questionable scale validity. Discriminant validity was also assessed through correlations with personality traits and interest

in gardening. Near-zero correlations were obtained between the RDQ and interest in gardening and weak correlations emerged with agreeableness, supporting the discriminant validity of the RDQ, however the correlations with extraversion, agreeableness, and conscientiousness were higher than expected, though they were similar to the other scales. Hence, legitimate questions regarding the discriminant validity of the RDQ may be reasonably asked but must be similarly asked of the other rumination measures. Support was also found for a correlated 10-factor model and a hierarchical model with 10 factors representing domains. Also, the effect of CMV was assessed and was deemed negligible. Overall, the results of these studies support the RDQ as a valid and reliable domain measure of rumination.

Of course, although cross-sectional studies of validity are helpful and have several advantages including cost-efficiency, simplicity, low participant burden, and relatively quick data collection (Taris et al., 2021), they are also limited for many reasons, including reduced ecological validity (Kramer, 1983). To address the limitations of cross-sectional data, a daily diary study was conducted to assess the predictive validity of the RDQ. In this study, the domains of the RDQ (assessed only once) successfully predictedmean daily rumination in the corresponding domains. Moreover, the RDQ significantly predicted rumination-related outcomes such as sleep quality (although weakly and the bivariate correlation coefficient did not reveal a substantial association; e.g., Jiang & Poon, 2021; Nota & Coles, 2015; Ottaviani et al., 2015; Slavish et al., 2018; Thomsen et al., 2003; You et al., 2021), amotivation (e.g., Lyubomirsky & Nolen Hoeksema, 1993; Means et al., 2018; Nolen-Hoeksema et al., 2008), and negative mood (e.g., Genet & Siemer, 2012; Jiang & Poon, 2021; Mor & Winquist, 2002; Slavish et al., 2018; Thomsen et al., 2003; You et al., 2021). Moreover, in many cases the RDQ predicted rumination

in these domains and in the outcomes, above and beyond the effect of the RRQ and RRS, indicating incremental validity.

In Study 4, the relationship between the RDQ and social desirability was shown to be weak for most of the RDQ scales, whereas the scales which had moderately strong correlations with social desirability made intuitive sense (i.e., social and appearance rumination being correlated with social desirability). The correlations between the RDQ and anxiety and depression from Study 2 were largely replicated, supporting the criterion validity of the RDQ. At least adequate reliability, from an internal consistency and test-retest reliability perspective, was demonstrated. Group differences in rumination content between sexes and between age groups were also investigated, showing mostly small-to-moderate differences between the sexes, and large differences between students and older samples – a finding that would be difficult to examine prior to the development of the RDQ due to lack of content-dependent measure. Overall, women scored higher on general rumination, most domains of rumination, as well as depression and anxiety, which is consistent with most extant research on this topic (e.g., Christensen et al., 1999; Grigoriadis & Robinson, 2007; Nolen-Hoeksema & Aldao, 2011; Roelofs et al., 2008; Van Dam, et al., 2013). The student sample scored higher on most of the rumination scales, whereas the older ruminated more about sociopolitical issues. The student sample also had much higher anxiety and depression scores, compared to older individuals, and in fact, the mean depression score of the student sample was on the high end of mild dysphoria (Dozois et al., 1998). Overall, this study supported the validity and reliability of the RDQ as a content-dependent measure of rumination and revealed group differences between sexes and age groups in the content of ruminative thought.

6.1.Limitations and future directions

The studies of this dissertation have limitations. Firstly, item removal based on empirical analyses in Study 1, was based only on student data. Although this is not uncommon, it is possible that a more diverse sample may conclude in a different final roster of items than that which was retained. Although, substantial validity evidence is provided with these studies, because of the novelty of this scale, more work needs to be done to convincingly validate this measure; future research should further psychometrically assess the RDQ and to assess its appropriateness in clinical, counselling, and practitioner contexts. Furthermore, some of the Study 2 hypotheses, which were based on previous literature, regarding the discriminant validity of the RDQ and sex differences were not supported. However, in the samples presented in this study, similar results were found for previously validated measures. Although the convergence with other measures in this way signals evidence for validity, the discrepancy with previous research may leave some ambiguity in interpretation. As for structural validity, in both Study 2 samples, the unidimensional model was not supported and this may lead to questions about the validity of the RDQ in measuring general levels of rumination (i.e., as a total, rather than by subscale). It is also possible that the 10 domains of life that are covered in the RDQ, may not provide comprehensive coverage of life domains that one may ruminate about. Future iterations of the RDQ might provide more comprehensive coverage of life domains, but at the current moment, this measure is the only domain-specific rumination measure and may open many avenues of research that were previously difficult or impossible to investigate. Future research should investigate group differences (i.e., sex, cultural, age differences) in the content of rumination using the RDQ, though a notable limitation of the present work is that the literature on which the domains are based predominantly on WEIRD samples (Henrich et al., 2010), hence

they may not carry well to countries with different characteristics. Moreover, research should investigate how treatments targeting specific domains of rumination may affect levels of psychopathology (e.g., if targeting social rumination may affect levels of social anxiety). As well, there are many tools with which validity evidence can be pursued, therefore future research should consider using approaches such as Item Response Theory and other approaches in order to assess the validity of the RDQ from diverse perspectives. Further, none of the studies in this dissertation can discern causality with respect to assessed criteria.

6.2.Conclusion

The current paper presents substantial evidence supporting the reliability and validity of the RDQ, as well as for the feasibility of measuring rumination according to life domains. Such a development will open many avenues of research, including but not limited to investigations of individual and group differences in content of rumination. With this measure, investigators will not only be able to assess general levels of rumination but will also be able to assess what people ruminate about, however, more work needs to be done to assess the validity of the RDQ. To facilitate more research on rumination content and psychometric properties of the RDQ, the RDQ will be freely available to the public, including researchers who wish to use it. The new measure may be used on its own or in tandem with other rumination scales to further the study of rumination and to generate novel research relevant to the content of ruminative cognitions.

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Appendices

Appendix A

Rumination Items

Please indicate the frequency of which you experience each statement from a scale of "Almost never" to "Almost always".

Anchors for participants: Almost Never-Sometimes--Often-Almost Always

1 2 3 4

Achievement

I have negative repetitive thoughts about….

1. my failures.
11. when I have not achieved an important goal.
21. when I haven't worked hard enough to achieve my goals.
31. missed chances for success.
41. when I couldn't finish an important task.
51. when my performance was not appreciated.
61. when my work was not taken seriously.
71. when my performance was not good enough.
81. not fulfilling my ambitions.
91. when I fell behind in my work.

Health

I have negative repetitive thoughts about….

2. symptoms of illness.
12. limitations caused by my health.
22. my fitness level.
32. my sleeping problems.
42. how tired I am.
52. regretting not taking better care of my health.
62. the time I wasted because of health issues.
72. events I missed due to health issues.
82. my overall health.
92. physical sensations in my body.
101. my mental health.

Family

I have negative repetitive thoughts about….

3. arguments I've had with my family.
13. when my family has let me down
23. when I have said hurtful words to my family.
33. problems my family has experienced.
43. having been a burden to my family.
53. why I am not closer to my family.
63. not spending enough time with my family.
73. resentment towards family members.
83. when I embarrassed my family.
102. my envy towards a family member.

Social

I have negative repetitive thoughts about….

4. when I have been treated badly by friends.
14. people not liking me.
24. when I have been bullied.
34. when I have failed to fit in.
44. grudges I have towards people.
54. my past awkward social encounters.
64. when I embarrassed myself in front of others.
74. when I was socially excluded.
84. resentment towards others.
103. people judging me.
101. when I have offended someone.
105. when I embarrassed my friends.

Romance

I have negative repetitive thoughts about….

5. a lost chance at romance.
15. when my romantic love treated me coldly.
25. not spending enough time with my romantic love.
35. resentment towards my romantic love.
45. when I embarrassed my romantic love.
55. jealousy over my romantic love.
65. not being able to keep a romantic partner.
75. being unable to maintain a relationship.
85. romantic relationships that have ended.
104. a potential romantic partner that I did not pursue.

102. regretting rejecting a potential romantic partner.

Finances

I have negative repetitive thoughts about….

6. the fact that I am not as financially secure as I would like to be.
16. my ability to afford the things I would like to buy.
26. money I have wasted.
36. missed opportunities to make money.
46. having less things or money than others.
56. my bills and expenses.
66. when I should have saved money.
76. spending money on pricey items.
86. my inability to budget finances well.
105. being financially unskilled.

Existential

I have negative repetitive thoughts about….

7. the meaning of life.
17. my life having no purpose.
27. not fulfilling my spiritual needs.
37. the meaning of my struggles and suffering.
47. failing to be a good person.
57. the immorality of others.
67. being unfulfilled with life.
77. how hopeless life seems to be.
87. my lifestyle not living up to my faith/moral beliefs.
106. how pointless existence is.
103. the meaninglessness of what I have done in life.
106. my existence not having a positive impact on the world.

Socio-political

I have negative repetitive thoughts about….

8. people struggling in the world.
18. human rights violations.
28. damage done to the environment.
38. the state of the education system.
48. the problems and suffering caused by war.
58. not being able to trust our institutions.
68. a political conflict that I have heard about or seen.
78. when I voted for the wrong person in an election.
88. poverty in our country.

107.Important political issues.

Personal physical appearance

I have negative repetitive thoughts about….

9. not being attractive.
19. the appearance of my body.
29. the appearance of my face.
39. my physical flaws.
49. my sense of fashion.
59. some of my physical features not being perfectly shaped.
69. when I looked unattractive.
79. when I had a wardrobe malfunction.
89. other people looking better than me.
108. how I look.

Cleanliness

I have negative repetitive thoughts about….

10. not having showered recently.
20. not having brushed my teeth.
30. my home not being organized.
40. unclean areas in my home.
50. my personal hygiene.
60. about not washing my bedding recently.
70. not washing my face.
80. not having washed my hair.
90. when I found a hair in my food.
109. when I saw a messy home.

Appendix B

Final Rumination Domains Questionnaire

Please indicate the frequency of which you experience each statement from a scale of "Almost never" to "Almost always".

Anchors for participants: Almost Never-Sometimes--Often-Almost Always

1 2 3 4

Achievement

I have negative repetitive thoughts about….

1. when I have not achieved an important goal.
11. when I haven't worked hard enough to achieve my goals.
21. missed chances for success.
31. when I couldn't finish an important task.
41. when my performance was not good enough.
51. not fulfilling my ambitions.

Health

I have negative repetitive thoughts about….

2. symptoms of illness.
12. limitations caused by my health.
22. regretting not taking better care of my health.
32. the time I wasted because of health issues.
42. events I missed due to health issues.
52. my overall health.

Family

I have negative repetitive thoughts about….

3. arguments I've had with my family.
13. when my family has let me down
23. when I have said hurtful words to my family.
33. problems my family has experienced.
43. resentment towards family members.
53. my envy towards a family member.

Social

I have negative repetitive thoughts about….

4. people not liking me.
14. when I have failed to fit in.
24. my past awkward social encounters.
34. when I embarrassed myself in front of others.
44. when I was socially excluded.
54. people judging me.

Romance

I have negative repetitive thoughts about….

5. a lost chance at romance.
15. resentment towards my romantic love.
25. jealousy over my romantic love.
35. not being able to keep a romantic partner.
45. being unable to maintain a relationship.
55. romantic relationships that have ended.

Finances

I have negative repetitive thoughts about….

6. the fact that I am not as financially secure as I would like to be.
16. my ability to afford the things I would like to buy.
26. having less things or money than others.
36. my bills and expenses.
46. when I should have saved money.
56. spending money on pricey items.

Existential

I have negative repetitive thoughts about….

7. the meaning of life.
17. my life having no purpose.
27. being unfulfilled with life.
37. how hopeless life seems to be.
47. how pointless existence is.
57. the meaninglessness of what I have done in life.

Socio-political

I have negative repetitive thoughts about….

8. people struggling in the world.
18. human rights violations.
28. the problems and suffering caused by war.
38. not being able to trust our institutions.
48. a political conflict that I have heard about or seen.
58. important political issues.

Personal physical appearance

I have negative repetitive thoughts about….

9. not being attractive.
19. the appearance of my body.
29. the appearance of my face.
39. my physical flaws.
49. some of my physical features not being perfectly shaped.
59. how I look.

Cleanliness

I have negative repetitive thoughts about….

10. not having showered recently.
20. not having brushed my teeth.
30. my personal hygiene.
40. about not washing my bedding recently.
50. not washing my face.
60. not having washed my hair.

Appendix C

Ethics Approval Forms

Western Research

Date: 17 March 2022

To: Prof. Julie Schermer

Project ID: 120339

Study Title: The Development and Validation of a Content-Dependent Measure of Rumination- Phase 1

Short Title: The Development and Validation of a Content-Dependent Measure of Rumination- Phase 1

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 01/Apr/2022

Date Approval Issued: 17/Mar/2022 15:43

REB Approval Expiry Date: 17/Mar/2023

Dear Prof. Julie Schermer

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. **All other required institutional approvals and mandated training must also be obtained prior to the conduct of the study.**

Documents Approved:

Document Name	Document Type	Document Date	Document Version
What_Are_You_Ruminating_About_Study_1_questionnaires	Online Survey	02/Mar/2022	1
debrief	Debriefing document	01/Mar/2022	1
SONA Script	Recruitment Materials	01/Mar/2022	1
Mass email recruitment_clean	Recruitment Materials	15/Mar/2022	2
LOI_clean	Implied Consent/Assent	15/Mar/2022	2

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Ms. Zoë Levi, Research Ethics Officer on behalf of Dr. Randal Graham, NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Western Research

Date: 27 September 2022

To: Prof. Julie Schermer

Project ID: 120938

Study Title: The Development and Validation of a Content-Dependent Measure of Rumination- Phase 2

Short Title: The Development and Validation of a Content-Dependent Measure of Rumination- Phase 2

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 07/Oct/2022

Date Approval Issued: 27/Sep/2022 11:00

REB Approval Expiry Date: 27/Sep/2023

Dear Prof. Julie Schermer

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. **All other required institutional approvals and mandated training must also be obtained prior to the conduct of the study.**

Documents Approved:

Document Name	Document Type	Document Date	Document Version
debrief2	Debriefing document	13/Sep/2022	2
Mass email recruitment2	Recruitment Materials	13/Sep/2022	2
SONA Script	Recruitment Materials	13/Sep/2022	2
LOI2_sona(1)(1)(1)	Implied Consent/Assent	20/Sep/2022	3
What_Are_You_Ruminating_About_Study_2(2)	Online Survey	20/Sep/2022	2

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Ms. Zoë Levi, Research Ethics Officer on behalf of Dr. Randal Graham, NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Western Research

Date: 22 February 2023

To: Prof. Julie Schermer

Project ID: 122102

Study Title: The Development and Validation of a Content-Dependent Measure of Rumination- Phase 3

Short Title: The Development and Validation of a content-dependent measure of rumination- Phase 3

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 03/Mar/2023

Date Approval Issued: 22/Feb/2023 09:33

REB Approval Expiry Date: 22/Feb/2024

Dear Prof. Julie Schermer

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. **All other required institutional approvals and mandated training must also be obtained prior to the conduct of the study.**

Documents Approved:

Document Name	Document Type	Document Date	Document Version
debrief2	Debriefing document	24/Nov/2022	1
Survey signal description	Recruitment Materials	09/Feb/2023	2
Diary_study_Initial_study(1)	Online Survey	09/Feb/2023	2
Diary_Day_1(1)	Online Survey	09/Feb/2023	2
LOI_ diary	Implied Consent/Assent	17/Feb/2023	3

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Ms. Zoë Levi, Research Ethics Officer on behalf of Dr. Randal Graham, NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Western Research

Date: 17 January 2023

To: Prof. Julie Schermer

Project ID: 122154

Study Title: The Development and Validation of a Content-Dependent Measure of Rumination- Phase 4

Short Title: The Development and Validation of a content-dependent measure of rumination- Phase 4

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 03/Feb/2023

Date Approval Issued: 17/Jan/2023 13:27

REB Approval Expiry Date: 17/Jan/2024

Dear Prof. Julie Schermer

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. **All other required institutional approvals and mandated training must also be obtained prior to the conduct of the study.**

Documents Approved:

Document Name	Document Type	Document Date	Document Version
SONA Script4	Recruitment Materials	23/Dec/2022	1
What_Are_You_Ruminating_About_Study_4-_PART_2(1)	Online Survey	03/Jan/2023	1
What_Are_You_Ruminating_About_Study_4(1)	Online Survey	03/Jan/2023	1
debrief4(1)	Debriefing document	03/Jan/2023	1
LOI4_sona	Implied Consent/Assent	12/Jan/2023	2

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 0000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Ms. Zoë Levi, Research Ethics Officer on behalf of Dr. Randal Graham, NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Curriculum Vitae

(February 2024)

Christopher Marcin Kowalski, B.A., M.Sc., PhD Candidate
The University of Western Ontario

Education

2015	BA (Honours) Psychology, University of Western Ontario
2018	MSc Health and Rehabilitation Sciences, University of Western Ontario
2018-2023	PhD Psychology, University of Western Ontario

Employment History

October 2023-November 30	Teacher's Assistant (King's University College), University of Western Ontario
May 2023-Present	Front Office Support (Society of Graduate Students), University of Western Ontario
September 2018-April 2023	Teacher's Assistant (Department of Psychology), University of Western Ontario
September 2017-April 2018	Teacher's Assistant (Faculty of Health Sciences), University of Western Ontario
April 2017-August 2018	Project Manager (Love Lab; Department of Psychology), The University of Western Ontario
September 2011-April 2018	IT Help Desk Consultant (Information Technology Services), The University of Western Ontario
April 2016-September 2016	Research Assistant/Co-investigator (for Dr. June Cotte; marketing), Richard Ivey School of Business, The University of Western Ontario
November 2016-April 2017	Marketing Research Assistant (Faculty of Health Sciences), University of Western Ontario

Academic Honours

(13) Canadian-Polish Millenium Fund Student Grant (2023)
(12) Dr. Sam Paunonen Award (2023/2024)
(11) CPA's Scientific Affairs Committee Student Research Grant (2023)
(10) W. Reymont Foundation Scholarship (2020/2021, 2021/2022, 2022/2023)
(9) American Psychological Association Convention (Division 52) Student Poster Contest
(8) SSHRC Doctoral Fellowship (2019-2023)
(7) Health and Rehabilitation Sciences Graduate Conference Travel Award (2017)

(6) Faculty of Health Sciences Graduate Conference Travel Award (2017)
(5) Western Graduate Research Scholarship (2016-2022)
(4) Dean's Honour List (2015)
(3) Dr. Jerzy Jarmasz Scholarship (2015)
(2) University of Western Ontario Staff Association Dependents' Scholarship (2011-2014)
(1) King's University Entrance Scholarship (2011)

Publications

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(24) Papageorgiou, K. A., Denovan, A., Dagnall, N., Artamonova, E., Gianniou, F-M., Papageorgiou, S., Plouffe, R. A., **Kowalski, C. M.**,… Costantini, G. (2023). Grandiose narcissism indirectly associates with lower psychopathology across five Countries. *Journal of Psychiatric Research, 167,* 78-85. https://doi.org/10.1016/j.jpsychires.2023.10.003

(23) **Kowalski, C. M.,** Plouffe, R. A., Rogoza, R., & Schermer, J. A. (2023). Editorial for the special issue: "Exploring the dark side of personality beyond the Dark Triad". *Acta Psychologica, 235,* 103899. Doi: 10.1016/j.actpsy.2023.103899

(22) Schermer, J. A., Branković, M., Čekrlija, Đ., MacDonald, K. B., Park, J., Papazova, E., Volkodav, T., Iliško, D., Wlodarczyk, A., Kwiatkowska, M. M., Rogoza, R., Oviedo-Trespalacios, O., Thi Khanh Ha, T., **Kowalski, C. M**.,….Kruger, G. (2023). Loneliness and vertical and horizontal collectivism and individualism: A multinational study. *Current Research in Behavioral Sciences,* 100105. Doi: 10.1016/j.crbeha.2023.100105

(21) Velji, J., **Kowalski, C. M.,** & Schermer, J. A. (2023). Are there narcissistic career choices? An investigation of narcissistic traits and vocational interests. *Personality and Individual Differences, 205,* 112071. Doi: 10.1016/j.paid.2022.112071

(20) Schermer, J. A., Rogoza, R., Branković, M., Oviedo-Trespalacios, O., Volkodav, T., Thi Khanh Ha, T., Kwiatkowska, M. M., Papazova, E., Park, J., **Kowalski, C. M.,**…, Krammer, G. (2022). Humor Styles are related to Loneliness across 15 Countries. *Europe's Journal of Psychology, 18,* 422-436. Doi: 10.5964/ejop.5407

(19) Plouffe, R. A., **Kowalski, C. M.**, Papageorgiou, K. A., Dinić, B. M., Artamonova, E., Dagnall, N., Denovan, A., Gianniou, F-M., Kyriazos, T., Saklofske, D. H., & Stalikas, A. (2022). The revised Assessment of Sadistic Personality (ASP-8): Evidence for reliability and validity across four countries. *Journal of Personality Assessment.* Advance online publication. Doi: 10.1080/00223891.2022.2055476

(18) Jain, N., **Kowalski, C. M.**, Johnson, L. K., & Saklofske, D. H. (2022) Dark thoughts, dark deeds: An exploration of the relationship between the Dark Tetrad and aggression. *Current Psychology.* Advance online publication. Doi: 10.1007/s12144-022-02993-4

(17) Rogoza, R., **Kowalski, C. M.**, Saklofske, D. H., & Schermer, J. A. (2022). Systematizing dark personality traits within broader models of personality. *Personality and Individual Differences, 186, A,* 111343. Doi: 10.1016/j.paid.2021.111343

(16) Bell, E., **Kowalski, C. M.**, Vernon, P. A., & Schermer, J. A. (2021). Political Hearts of Darkness: The Dark Triad as Predictors of Political Orientations and Interest in Politics. *Behavioral Sciences, 11,* 169. Doi: 10.3390/bs11120169

(15) **Kowalski, C. M.**, Rogoza, R., Saklofske, D. H., & Schermer, J. A. (2021). Dark triads, tetrads, tents, and cores: Why navigate (research) the jungle of dark personality models without a compass (criterion)? *Acta Psychologica, 221,* 103455. Doi: j.actpsy.2021.103455

(14) Plouffe, R. A., **Kowalski, C. M.**, Tremblay, P. F., Saklofske, D. H., Rogoza, R., Di Pierro, R., & Chahine, S. (2021). Gender differences or gender bias? Examination of the assessment of sadistic personality using item response theory and differential item functioning. *European Journal of Psychological Assessment, 37,* 440-449. Doi: 10.1027/1015-5759/a000634

(13) Rogoza, R., Danieluk, B., **Kowalski, C. M.**, Kwiatkowska, K., & Kwiatkowska, M. M. (2021). Making and maintaining relationships through the prism of the Dark Triad traits: A longitudinal social network study. *Journal of Personality, 89,* 338-356. Doi: 10.1111/jopy.12585

(12) **Kowalski, C. M.**, Simpson, B., & Schermer, J. A. (2021). Predicting donation behaviour with the Supernumerary Personality Inventory. *Personality and Individual Differences, 168,* 110319. Doi: 10.1016/j.paid.2020.110319

(11) Trahair, C., Baran, L., Flakus, M., **Kowalski, C. M.**, & Rogoza, R. (2020). The structure of the Dark Triad traits: A network analysis. *Personality and Individual Differences, 167,* 110265. Doi: 10.1016/j.paid.2020.110265

(10) **Kowalski, C. M.**, Vernon, P. A., & Schermer, J. A. (2021). The Dark Triad and facets of personality. *Current Psychology, 40,* 5547-5558. Doi: 10.1007/s12144-019-00518-0

(9) Schermer, J. A., Rogoza, R., Kwiatkowska, M. M., **Kowalski, C. M.**, Aquino, S., Ardi, R., … Krammer, G. (2019). Humor styles across 28 countries. *Current Psychology*. Doi: 10.1007/s12144-019-00552-y

(8) **Kowalski, C. M.**, Di Pierro, R., Plouffe, R. A., Rogoza, R., & Saklofske, D. H. (2020). Enthusiastic acts of evil: The assessment of sadistic personality in Polish and Italian populations. *Journal of Personality Assessment, 6,* 770-780. Doi: 10.1080/00223891.2019.1673760

(7) Rogoza, R., **Kowalski, C. M.**, & Schermer, J. A. (2019). The Dark Triad traits within the framework of the Circumplex Model of Personality Metatraits. *Journal of Individual Differences, 40,* 168-176. Doi: 10.1027/1614-0001/a000289

(6) **Kowalski, C. M.**, & Schermer, J. A. (2019). Hardiness, perseverative cognition, anxiety, and health-related outcomes: A case for and against psychological hardiness. *Psychological Reports, 122,* 2096-2118. Doi: 10.1177/0033294118800444

(5) **Kowalski, C. M.**, Kwiatkowska, K., Kwiatkowska, M. M., Ponikiewska, K., Rogoza, R., & Schermer, J. A. (2018) The Dark Triad traits and intelligence: Machiavellians are bright, and narcissists and psychopaths are ordinary. *Personality and Individual Differences, 135,* 1-6. Doi: 10.1016/j.paid.2018.06.049

(4) Rogoza, R., Kwiatkowska, M. M., **Kowalski, C. M.**, & Slaski, S. (2018). A brief tale of the two faces of narcissism and the two facets of pride. *Personality and Individual Differences, 120,* 43-47. Doi: 10.1016/j.paid.2018.01.027

(3) **Kowalski, C. M.**, Rogoza, R., Vernon, P. A., & Schermer, J. A. (2018). The Dark Triad and the self-presentation variables of socially desirable responding and self-monitoring. *Personality and Individual Differences, 120,* 234-237. Doi: 10.1016/j.paid.2017.09.007

(2) **Kowalski, C. M.**, Vernon, P. A., & Schermer, J. A. (2017). Vocational interests and dark personality: Are there dark career choices? *Personality and Individual Differences, 104,* 43-47. Doi: 10.1016/j.paid.2016.07.029

(1) **Kowalski, C. M.**, Vernon, P. A., & Schermer, J. A. (2016). The General Factor of Personality: The relationship between the Big One and the Dark Triad. *Personality and Individual Differences, 88,* 256-260. Doi: 10.1016/j.paid.2015.09.028

Published Abstracts

(5) Trahair, C., Saklofske, D. H., Plouffe, R. A., & **Kowalski, C. M.** (2020). The relationships between facets of emotional intelligence and the Dark Tetrad. *Personality and Individual Differences, 157,* 109684.

(4) **Kowalski, C. M.**, Vernon, P. A., & Schermer, J. A. (2020). The Dark Triad and facets of personality. *Personality and Individual Differences, 157,* 109684.

(3) **Kowalski, C. M.**, Di Pierro, R., Plouffe, R. A., Rogoza, R., & Saklofske, D. H. (2020). A meta-analytic investigation of the relationship of sadism and personality. *Personality and Individual Differences, 157,* 109684.

(2) Bell, E., Schermer, J. A., **Kowalski, C. M.**, & Vernon, P. A. (2020). Personality and politics beyond the Big Five: Exploring the Dark Triad's relationship with political orientations. *Personality and Individual Differences, 157,* 109684.

(1) **Kowalski, C. M.**, Vernon, P. A., & Schermer, J. A. (2016). The general factor of personality (GFP) and the dark triad. *Personality and Individual Differences*, 101, 492.

Presentations at Conferences

(12) **Kowalski, C. M.**, Daljeet, K., Johnson, L. K., Plouffe, R. A., Trahair, C., Saklofske, D. H., & Schermer, J. A. (2023). *The Dark Tetrad, aggression, and pathological personality facets.* Poster presented at the International Society for the Study of Individual Differences Conference, Belfast, Northern Ireland.

(11) **Kowalski, C. M.**, Daljeet, K., Johnson, L. K., Plouffe, R. A., Trahair, C., Saklofske, D. H., & Schermer, J. A. (2023). *Missing the trees for the forest: A narrow-bandwidth trait approach to the question of Dark Tetrad redundancy.* Oral Presentation presented at the International Society for the Study of Individual Differences Conference, Belfast, Northern Ireland.

(10) **Kowalski, C. M.**, Plouffe, R. A., Trahair, C., Daljeet, K., Johnson, L. K., Saklofske, D. H., & Schermer, J. A. (2023). *The Dark Tetrad and HEXACO facets: A narrowband approach to the redundancy question.* Poster presented at the Canadian Psychological Association Convention, Toronto, Canada.

(9) **Kowalski, C. M.**, Plouffe, R. A., Trahair, C., Daljeet, K., Johnson, L. K., Saklofske, D. H., & Schermer, J. A. (2023). *The Dark Tetrad and Supernumerary Personality Inventory traits: A narrowband approach to the redundancy question.* Poster presented at the Canadian Psychological Association Convention, Toronto, Canada.

(8) Plouffe, R. A., **Kowalski, C. M.**, Di Pierro, R., & Saklofske, D. H. (2019). *Sadism around the world: A cross-cultural validation of the Assessment of Sadistic Personality.* Poster presented at the American Psychological Association Convention, Chicago, USA.

(7) Bell, E., Schermer, J. A., **Kowalski, C. M.**, & Vernon, P. A. (2019). *Personality and politics beyond the Big Five: Exploring the Dark Triad's relationship with political orientations.* Paper presented at the International Society for the Study of Individual Differences Conference, Florence, Italy.

(6) Trahair, C., R., Plouffe, R. A., **Kowalski, C. M.**, & Saklofske, D. H. (2019) *The relationships between facets of emotional intelligence and the Dark Tetrad*. Poster presented at the International Society for the Study of Individual Differences Conference, Florence, Italy.

(5) **Kowalski, C. M.**, Di Pierro, R., Plouffe, R. A., Rogoza, R., & Saklofske, D. H. (2019). *A meta-analytic investigation of the relationship of sadism and personality*. Poster presented at the International Society for the Study of Individual Differences Conference, Florence, Italy.

(4) **Kowalski, C. M.**, Vernon, P. A, & Schermer, J. A. (2019). *The Dark Triad and facets of* . Poster presented at the International Society for the Study of Individual Differences Conference, Florence, Italy.

(3) **Kowalski, C. M.**, Rogoza, R., Kwiatkowska, M. M., Schermer, J. A., & Collaborators from the Cross-cultural study on narcissism, envy, shyness, and humor (2018). *Narcissists tend to make other people feel good as well as themselves.* Symposium presented at the 24th Congress of the Cross-Cultural Psychology, Guelph, Canada.

(2) Rogoza, R., **Kowalski, C. M.**, & Schermer, J. A. (2017). *Comparison of the Dark Triad and Narcissistic Admiration and Rivalry within the framework of the Circumplex Model of Personality Metatraits*. Poster presented at the International Society for the Study of Individual Differences Conference, Warsaw, Poland.

(1)**Kowalski, C. M.**, Vernon, P. A., & Schermer, J. A. (2015). *The General Factor of Personality: The Relationship between the Big One and the Dark Triad.* Poster presented at the International Society for the Study of Individual Differences Conference, London, Canada.

<u>Other Publications</u>

(7) Schermer, J. A., Papazova. E., Kwiatkowska, M. M., Rogoza, R., Park, J., **Kowalski, C. M.**, Branković, M., Doroszuk, M., Ha, T.K., Iliško, D., Malik, S., Ginés, S., Navarro-Carrillo, G., Oviedo-Trespalacios, O., Torres-Marín, J., Włodarczyk, A., Aquino, S., Volkodav, T., & Krammer, G. (2021). Predicting Self-Esteem using Humor Styles: A Cross Cultural Study. In E. Vanderheiden & C.-H. Mayer (Ed). *The Palgrave Handbook of Humour Research* (chapter 2). Palgrave MacMillan: Cham, Switzerland.

(6) Rogoza, R., & **Kowalski, C. M.** (2022). Assessing the Dark Triad With the Dirty Dozen Measure. In Jonason, P. K. (Editor-in-Chief), *Shining light on the dark side of personality: Measurement properties and theoretical advances.* Boston, MA: Hogrefe.

(5) Plouffe, R. A., Walker, D. L., Johnson, L. K., **Kowalski, C. M.**, & Forchuk, C. A. (2022). Assessment of Sadistic Personality. In Jonason, P. K. (Editor-in-Chief), *Shining light on the dark side of personality: Measurement properties and theoretical advances.* Boston, MA: Hogrefe.

(4) **Kowalski, C. M.,** & Schermer, J. A. (2017). Ipsative measures of personality. In Zeigler-Hill, V. & Shackelford, T. (eds.), *Encyclopedia of Personality and Individual Differences*. Springer. Doi: 10.1007/978-3-319-28099-8_695-1

(3) **Kowalski, C. M.**, & Schermer, J. A. (2017). Investigative occupational types. In Zeigler-Hill, V. & Shackelford, T. (eds.), *Encyclopedia of Personality and Individual Differences*. Springer. Doi: 10.1007/978-3-319-28099-8_771-1

(1) **Kowalski, C. M.,** & Schermer, J. A. (2017). Social occupational types. In Zeigler-Hill, V. & Shackelford, T. (eds.), *Encyclopedia of Personality and Individual Differences*. Springer. Doi: 10.1007/978-3-319-28099-8

(1) **Kowalski, C. M.**, & Czajka, J. (2015). Preventing relationship abuse with the Health Belief Model. *Western Undergraduate Psychology Journal, 3*, 104-113.

Submitted Manuscripts

Walker, D. L., Dave, H. P, **Kowalski, C. M.**, Plouffe, R. A., Saklofske, D. H., & Fiori, M. (in review). *Emotion regulation as a moderator of the ability emotional intelligence-stress reactivity relationship.*

Stefanek, F., Flakus, M., Baran, L., **Kowalski, C. M.**, & Rogoza, R. (in review). *The Dark Core and Honesty-Humility: (Nearly) perfectly correlated yet distinct constructs.*

Kowalski, C. M., Saklofske, D. H., & Schermer, J. A. (in review). *What are you ruminating about?: The development and validation of a content-dependent measure of rumination.*

Kowalski, C. M., Daljeet, K., Johnson, L. K., Plouffe, R. A., Trahair, C., Saklofske, D. H., & Schermer, J. A. (submitted). *Missing the trees for the forest: A narrow-bandwidth trait approach to the question of Dark Tetrad redundancy.*

Manuscripts in Preparation

Kowalski, C. M., Saklofske, D. H., & Schermer, J. A. (manuscript in preparation). *Assessing the validity of the Rumination Domains Questionnaire: A daily diary study.*

Kowalski, C. M., Saklofske, D. H., & Schermer, J. A. (manuscript in preparation). *Age and sex differences in the content of ruminative thought.*

Kowalski, C. M., Daljeet, K., Plouffe, R. A., & Tremblay, P. T. (manuscript in preparation). *Profiling the Dark Tetrad.*

Kowalski C. M., Plouffe, R. A., Daljeet, K., Johnson, L. K., Trahair, C., & Malesza, M. (manuscript in preparation). *The Dark Triad and procrastination.*

Tubinshlak, K., Jain, N., **Kowalski, C. M.,** Yosefov, L., & Saklofske, D. H. (manuscript in preparation). *From perfection to depression: The mediating role of perseverative thinking in the relationship between perfectionism and depression*

Trahair, C., Plouffe, R. A., **Kowalski, C. M.**, & Saklofske, D. H. (manuscript in preparation). *The Dark Tetrad of personality and facets of emotional intelligence.*

Invited Lectures

Kowalski, C. M. (Feb, 2020). *Conducting my personality research.* Theories of Personality course, Huron College.

Kowalski, C. M. (May, 2019). *Conducting personality research.* Theories of Personality course, Huron College.

Editorial Service

October 2015-present: Reviewer, *Personality and Individual Differences*
February 2019-present: Reviewer, *Psychological Reports*
June 2020-present: Reviewer, *Current Issues in Personality Psychology*
June 2021-present: Reviewer, *Behavioral Sciences & the Law*
August 2021-present: Reviewer, *Acta Psychologica*
October 2023-present: Reviewer, *Journal of Psychoeducational Assessment*

September 2015- April 2016: Editor, *Western Undergraduate Psychology Journal*
June 2021-November 2021: Special Issue Guest Editor ("Exploring the dark side of personality beyond the Dark Triad"), *Acta Psychologica*

Administrative Experience

Student Clubs, University Students' Council, University of Western Ontario
2015 – 2016: Polish Students' Union - Vice President of Finance
2013 – 2014: Polish Students' Union - President

Student Clubs, Society of Graduate Students, University of Western Ontario
2022 – Present: Western Polish Graduate Student Association – Founder and President

Non-Profit Organizations
2023 – Present: Stowarzyszenie Polskich Kombatantów (Polish Combatants' Association), Branch #2 (London, Ontario) – Board of Directors

Volunteer Research Experience

2014 –April 2016: Research Assistant, Dr. Victoria Esses's lab, Department of Psychology
Duties
- Thin slice video coding of participant interactions
- Entry of behavioural measure scores into SPSS
- Leading participants through experimental trials

2013 – 2014: Research Assistant, Dr. Lorne Campbell's lab, Department of Psychology
Duties
- Confederate in economic game study

Supervision

Psychology Honors Thesis supervision:

Cassidy Trahair (co-supervisor; 2018-2019)
Nimisha Jain (co-supervisor; 2019-2020)
Kai Tubinshlak (co-supervisor; 2020-2021)