Cracking The Repetitive Negative Thinking Code: Keys To Understanding Anxiety And Depression

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Abstract

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Cracking the repetitive negative thinking code: keys to understanding anxiety and depression. There is significant debate as to whether certain cognitive components of anxiety and depression, specifically worry, post-event processing (PEP), and rumination, are best understood as independent constructs (i.e., disorder-specific) or rather, one transdiagnostic construct, so called repetitive negative thinking (RNT), that predicts symptoms of generalized anxiety, social anxiety, and depression respectively. Additionally, it is poorly understood whether the content of RNT related thoughts, or the process of thinking such thoughts, is relevant to understanding how RNT is associated with psychological symptom severity. The current thesis sought to investigate: 1) whether studying worry, PEP, and rumination as one transdiagnostic predictor of psychological symptoms explains additional variance in symptom severity compared to studying worry, PEP, and rumination as individual predictors of psychological symptoms, and 2), whether the content of RNT related thoughts, or the process of engaging in RNT is associated with greater psychological symptom severity. Results indicated that the transdiagnostic measurement of RNT explained additional variance above and beyond disorder-specific measures when predicting participants' (n = 646) symptom severity. Additionally, both RNT content and process are important factors in understanding how RNT is associated with greater psychological symptom severity. Taking into account the methodological strengths and limitation of the current study, such findings lend support to the transdiagnostic model of RNT, and illustrate how the content and process of RNT are relevant to understanding psychological distress.

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Psychopathologies are pervasive and debilitating disorders that can affect individuals at biological, psychological, and societal levels. Although disorders are categorized as distinct entities, they often share similar symptoms that can operate and affect individuals differently, which in turn may lead to the development of distinct disorders despite their shared features. (Bringmann et al., 2022; Nolen-Hoeksema & Watkins, 2011). Among psychological disorders, major depressive disorder (MDD) and anxiety disorders (e.g., social anxiety disorder (SAD) and generalized anxiety disorder (GAD)) have garnered particular scientific and therapeutic interest as they are among the most common and burdensome psychological disorders with shared features (Dattani et al., 2021, Ormel & VonKorff, 2021). Although MDD, SAD, and GAD are conceptualized as distinct pathologies, a major similarity among them appears to be thinking styles. Diagnostically, individuals with symptoms of such disorders often present with an unhelpful thinking component characterized by repetitive, negative thoughts about the past, present, or future, defined as repetitive negative thinking (RNT; Ehring & Watkins, 2008). Due to its broad description, RNT is best characterized as an umbrella term that encapsulates any thinking style or cognitive pattern that both focuses on negative perspectives and is repetitious in nature.

Given that RNT is a common feature of some of the most pervasive psychological disorders, there is a plethora of research concerning RNT styles. However, the idea that RNT should be considered a common (i.e., transdiagnostic) process among MDD, SAD and GAD was only strongly proposed as recently as 15 years ago by Ehring & Watkins (2008), although suggestions were made earlier (e.g., Nolen-Hoeksema, 2000; Nolen-Hoeksema & Morrow, 1991). Prior to the transdiagnostic proposal, many clinicians and scientists understood RNT

styles as sharing common features, but remaining ultimately distinguishable based on the disorder-specific content displayed by patients or clients. For example, the content of repetitive negative thoughts of an individual with SAD may focus on a previous social interaction (Clark & Wells, 1995). Conversely, an individual with MDD may experience the same kind of pervasive negative thinking, however the content of their thoughts may concern the causes and consequences of their depressive symptoms (Nolen-Hoeksema, 2004). As such, each RNT type or style was referred to by its own name, which led to subsequent scientific inquiry about disorder-specific thinking rather than the possibility of a common, underlying type of RNT that permeates anxiety and depressive disorders.

As Ehring & Watkins' (2008) review marked a transition point of conceptualizing RNT transdiagnostically, older and newer attempts to study RNT as a transdiagnositc process began to coalesce. For instance, the creation and validation of psychometric tests (Ehring et al., 2011; Rachman et al., 2000) helped accelerate the examination of RNT as a latent construct in psychopathology in general. Systematic reviews and meta-analyses have documented how features of RNT can lead to attentional biases (Goodwin et al., 2017) and cognitive deficits (Zetsche et al., 2018). Similarly, many researchers have examined how disorder-specific types of RNT (e.g., rumination in depression, worry in GAD) may be stable traits that are associated with increased likelihood of developing symptoms of anxiety (Dar et al., 2017) and/or depression (Nolen-Hoeksema, 2000; Segerstrom et al., 2000) However, it is still unclear if distinguishing between disorder-specific or transdiagnostic measurements of RNT offers any added value in predicting psychological symptom severity. To that end, the current thesis aims to address whether a transdiagnostic approach to measuring RNT explains an additional proportion of variance in psychological symptom severity compared to disorder-specific approaches.

To begin, I will discuss how MDD, SAD, and GAD are understood diagnostically. I will then discuss the disorder-specific understanding of RNT styles, that is, the belief that each disorder is best understood as having one specific RNT style. Similarly, a discussion of the transdiagnostic understanding of RNT will be presented to compare and contrast both approaches to studying RNT with empirical evidence of psychodiagnostic outcomes. Lastly, I will present the results of a study aimed at answering 1) whether a transdiagnostic measure of RNT, compared to disorder-specific measures, explains an additional proportion of the variance in symptom severity, and 2) whether the content of repetitive negative thoughts, or the process of thinking those thoughts is associated with psychological symptom severity.

Major Depressive Disorder (MDD)

According to the Diagnostic and Statistical Manual (5th edition, text revision), MDD is characterized by clearly defined episodes of at least 2 weeks, during which time the individual must experience five or more of the following nine symptoms: experiences intense feelings of sadness or hopelessness, reduced interest or ability to take pleasure in regular activities, marked changes in weight (either gains or losses) without dieting, disruptions in their sleep cycle nearly every night, marked changes in physical movements (either slowed down or sped up) compared to normal, changes in their cognition (e.g., ability to concentrate, decreased attentional control), feelings of worthlessness or excessive guilt, suicidal ideation (American Psychiatric Association, 2022). To warrant an official diagnosis of MDD, such symptoms must cause clinically significant distress or impairment to the individual in important areas of their daily functioning (e.g., ability to work and/or socialize).

The development of MDD is multifaceted, and as such it is difficult to point to any one cause (e.g., genetics or personality) that leads to the onset of MDD. However, it is more common

for symptoms to develop during or after puberty, and in females (4.1%) compared to males (2.7%; Dattani et al., 2021). Additionally, the course of MDD is varied, such that some individuals may only experience one major depressive episode in their life, while others may have multiple episodes (American Psychiatric Association, 2022). Kessler et al. (2012) estimate that the lifetime morbidity risk of MDD is roughly 30%. Similarly, 8.6 % of people are likely to experience a major depressive episode within a given year. As such, depression is one of the most burdensome disorders worldwide, and the single most burdensome mental health disorder in Canada with a disability adjusted life year (DALY) of 556, whereby one DALY is equal to a one year loss of living at full health caused by premature death, weakened health, or disability (Dattani et al., 2021). Cognitive behavioural therapy (CBT) is the most common psychotherapeutic intervention to treat MDD, and has been shown to mitigate acute distress caused by depressive symptoms. (Gautam et al., 2020; López-López et al., 2019).

Social Anxiety Disorder (SAD)

Like depressive disorders, anxiety disorders are associated with clinically significant distress that can lead to major impairments in an individual's daily living. Unlike depressive disorders, anxiety disorders are thought to arise from fear-based emotional responses to cues in an individual's environment (American Psychiatric Association, 2022). Whereas a fear response is a reaction to a stimulus in the present moment, anxiety is thought to be the interaction between negative expectation of a feared stimuli in the future, and the interpretation of otherwise ambiguous stimuli as threatening (Goodwin et al., 2017; Hirsch & Mathews, 2012). As such, what distinguishes anxiety disorders from one another is the types of stimuli that are feared or misinterpreted.

SAD, previously called social phobia, is characterized by fear or anxiety about social situations where the individual's social abilities have the potential to be scrutinized by others. For example, individuals may become fearful of meeting new people or speaking in public. Such fears often lead to avoidance and intense fear of future social situations, thus further limiting the individual's opportunities to engage socially (American Psychiatric Association, 2022). When it is not possible to avoid the social situation, the individual will endure the situation with intense feelings of fear and/or anxiety that are generally disproportionate to the actual level of threat posed by the social situation in question.

The onset of SAD tends to coincide with puberty, with 75% of individuals experiencing the emergence of symptoms between the ages of eight and thirteen (American Psychiatric Association, 2022). Likewise, the emergence of symptoms during adulthood is rare, but may occur after intensely stressful social situations or changes to one's social status. SAD is a burdensome psychological disorder, with an estimated lifetime morbidity risk of 13% and a twelve-month prevalence rate of 7.4% (Kessler et al., 2012). In Canada, it has been estimated that the disease burden of all anxiety disorders combined was 412 DALYs in 2019 (Dattani et al., 2021). Unfortunately, there are no available data on the disease burden for individual anxiety disorders. Meta-analytic results suggest that CBT is the most effective non-pharmacological treatment at reducing symptoms of SAD (standard mean difference of -0.56 compared to placebo treatment; Mayo-Wilson et al., 2014), as it can promote improved quality of life for twelve months or longer (Kindred et al., 2022).

Generalized Anxiety Disorder (GAD)

Different from SAD, GAD is characterized by intense worry or fear about numerous stimuli (e.g., job performance, daily stressors) where the individual finds it difficult to control the

worry. Patients with GAD tend to experience the physiological symptoms of anxiety, such as feeling restless or on edge, fatigue, irritability, difficulty concentrating, muscle tension, or even disturbances in their sleep. Similar to SAD, the fear or anxiety causes clinically significant distress which is often debilitating and makes it difficult for individuals to accomplish their tasks of daily living. Common topics of worry for individuals with GAD can include their health, their work/careers, or their loved ones (American Psychiatric Association, 2022). The lifetime morbidity risk of GAD is approximately 9%, with a twelve-month prevalence statistic of around 2% (Kessler et al., 2012). The development of GAD tends to occur later in life, with the median age of symptom onset hovering around thirty (American Psychiatric Association, 2022).

Like most anxiety disorders, CBTs are the recommended therapeutic intervention for GAD, regardless of the CBT modality used by the therapist. For example, in a recent randomized controlled trial, cognitive therapy, emotive behaviour therapy, and acceptance and commitment based behavioural therapies all performed similarly in reducing GAD symptoms in a clinical sample (N = 75; Stefan et al., 2019). Unfortunately, GAD remains difficult to treat in the long term and is considered a chronic disorder with low rates of remission (American Psychiatric Association, 2022; Kessler et al., 2012).

Disorder-Specific Models of Repetitive Negative Thinking

Rumination

The RNT style that is associated with MDD is rumination. Nolen-Hoeksema's Response Styles Theory (Nolen-Hoeksema, 1991) defines rumination as a passive and repetitive way for individuals to reflect on the causes and consequences of their depressive symptoms. For example, when experiencing symptoms such as chronic fatigue, sleep disturbances, low motivation and anhedonia, an individual may ask themselves "Why can't I accomplish this

task?" or "What's wrong with me?". Additionally, rumination is abstract in nature and not focused on finding solutions to problems (e.g., "why can't I accomplish this task?" vs. "how can I better accomplish this task?"). As such, rumination often perpetuates cycles of perseverative thinking about abstract and negative thoughts, and those who ruminate more are more likely to develop MDD (Nolen-Hoeksema, 2000; Vidal-Arenas et al., 2022). Moreover, the extent to which an individual ruminates appears to be a stable personality difference, whereby the engagement in rumination differs between individuals, but is consistent within individuals over time (Nolen-Hoeksema, 2004; Nolen-Hoeksema et al., 2008).

When Aaron Beck proposed the cognitive model of depression, he suggested that individuals process stimuli based on prior experiences or beliefs, so-called schemas, rather than objective accounts of their environments (Beck, 1979). Accordingly, individuals are biased towards interpreting information that is congruent with their schemas, while disregarding schema-inconsistent information. Importantly, Beck proposed that depressed individuals tend to have negative schemas about themselves, the world, and the future, which he referred to as the cognitive triad. As such, individuals with MDD have a bias towards negative information within their environments which in turn strengthens their pessimistic schemas. In Beck's model, rumination serves to maintain such schemas by automatically and repetitively dwelling on schema-congruent information. As such, CBT is often the first line psychotherapeutic treatment option for MDD (Gautam et al., 2020; López-López et al., 2019). Evidence from systematic reviews suggest that cognitive-behavioural and mindfulness interventions, compared to other psychotherapeutic modalities (e.g., psychodynamic) or interventions (e.g., worry exposure), are successful in reducing rumination because they help individuals develop an awareness of cognitive biases that promote RNT (Querstret & Cropley, 2013).

Rumination has been studied psychometrically since the early 1990's with the development of the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991). Although originally containing 4 subscales (distracting response scale, problem-solving scale, dangerous activities scale, and ruminative response scale), the 22-item Ruminative Response Scale (RRS) quickly gained traction among researchers for its strong predictive validity for psychological symptoms of anxiety (Cox et al., 2001; Nolen-Hoeksema, 2000) and depression (Nolen-Hoeksema, 1991, 2000; Treynor et al., 2003). However, certain research groups (e.g., Segerstrom et al., 2000) aptly noted that the high concurrent validity between RRS and the Beck Depression Inventory (BDI; Beck et al., 1961) was likely due to items that had a strong conceptual or thematic overlap. To attenuate artificially inflated reliability metrics, Treynor et al. (2003) removed 12 items that were similar to questions posed on the BDI, thus making a 10-item version of the RRS. Using a principal component analysis, the authors discovered a two-factor solution of the RRS, specifically the reflection subscale and the brooding subscale. Both subscales display good reliability (reflection, α = .72; brooding α = .77), and the authors note that because alpha values are sensitive to the number of items included in scales, such coefficients are quite high given that both subscales contain five items each.

The RRS remains the main psychometric tool to study rumination today, as both subscales offer researchers insight into the phenomenology of rumination itself. Research suggested that rumination involved both self-reflection (Morrow & Nolen-Hoeksema, 1990) and a repetitive and passive focus on one's negative emotions (Nolen-Hoeksema, 1991). Consequently, the RSS contains two subscales that measure both components of rumination. In particular, the reflection subscale is thought to measure an individual's engagement in self-contemplation in a less critical or negative way. Alternatively, the brooding subscale measures

an individual's engagement in the act of gloomy or sad self-focused thinking. Together, high scores on the reflection and brooding scales, combined, are associated with increased rumination, which in turn predict greater depressive symptoms (Just & Alloy, 1997).

Further evidence suggests that rumination contributes to increased levels of depressive symptoms. For example, Cox et al. (2001) set out to examine whether anxiety sensitivity (measured as the fear of losing cognitive control in this study) predicted elevated symptoms of depression in a sample of depressed outpatients (n = 142). Cox et al. discovered that rumination (as measured by the RRS) fully mediated the relationship between anxiety sensitivity and depression, such that anxiety sensitivity no longer predicted the severity of symptoms of depression after rumination was entered into their model as a mediator. Such results suggest that rumination not only captures a type of "cognitive incapacitation" (p. 532) due to the repetitiveness of thought, but also a sense of fear about depressive symptoms themselves. Such findings offer an insight into the phenomenological experience of rumination, whereby individuals may be dwelling on their depressive symptoms as an attempt to resolve their fear. However, the abstract nature of rumination renders such thoughts inadequate, thus perpetuating the cycle of hopelessness.

Evidence in support of the cognitive model of depression suggests that rumination may operate at the level of attention, which may help explain why individuals can recall and attend to schema congruent information more easily. More specifically, research has demonstrated that individuals with greater symptoms of depression do not show an outright attentional bias towards negative emotional stimuli. Instead, individuals have more difficulty disengaging from negative emotional stimuli once they have begun attending to it (Caseras et al., 2007). Given the cognitive model of depression's emphasis on rumination maintaining negative self-schemas, this difficulty

with attentional shifting helps explain why it is difficult for ruminators to stop processing information that is consistent with their negative self-schemas. Such attentional patterns can become reinforced over time, making rumination more likely to occur. Attentional biases also reflect the working memory aspect of cognition, such that individuals with depressive symptoms retain more information pertaining to their negative self-schemas (Caseras et al., 2007). It is important to point out the methodological constraints of Caseras et al.'s findings. Specifically, the authors used a median split to differentiate between high and low levels of depressive symptoms, making it difficult to determine the expected degree of attentional and working memory deficits that would be reflected in a clinical population. However, Caseras and colleagues' results still help explain the largely negative emotional content of ruminatory thoughts, and how patterns of rumination may persist.

Similar findings further illustrate the relationship between rumination and cognitive deficits that are associated with depressive disorders (Gotlib & Joormann, 2010). For instance, results have shown that higher scores on the RRS are associated with deficits in cognitive control, such as reductions in the ability to inhibit negative emotional stimuli (Joormann, 2006), difficulty discarding irrelevant, negatively-valenced information from working memory (Joormann & Gotlib, 2008), and an increased propensity to recall negative-self-relevant adjectives (Joormann & Tran, 2009). Recent neuroimaging evidence also suggests that higher scores on the RRS are associated with unique functional connectivity patterns between regions of the brain associated with self-focused thought, which are in turn predictive of depressive symptoms in a clinical sample (n = 21; Kim et al., 2023).

In sum rumination is a core feature of MDD and is characterized by a repetitive and passive reflection on negative thoughts and feelings. Rumination is associated with the

maintenance of negative schemas and cognitive biases, and with the later development and persistence of depressive symptoms.

Worry

Worry is a core criterion of GAD that has been described as an uncontrollable chain of negative thoughts and images (Borkovec et al., 1983). Phenomenologically, worry has been shown to display similar characteristics to depressive rumination. For example, both worry and rumination generally consist of verbal thoughts rather than mental imagery, of abstract thoughts rather than concrete thoughts, and of "over general autobiographical memory" (i.e., less focused and specific, greater focus on broad aspects of memories; Watkins, 2004; Watkins, 2008; Watkins & Teasdale, 2001). Meta-analytic evidence suggests that like rumination, individuals who worry also display deficits in working memory, whereby they have difficulty in discarding irrelevant information from working memory (Fisher's $Z = -0.06$, $p = 0.027$; Zetsche et al., 2018). However, whereas individuals with MDD tend to ruminate about past threats, people with GAD tend to worry about future threats. Thus, one well established characteristic of worry is temporality, such that worrying is repetitive thinking about future oriented stressors rather than past oriented ones (Ehring & Watkins, 2008).

The cognitive avoidance theory of worry (Borkovec et al., 2004) proposes that worry is a cognitive avoidance response that helps individuals reduce their emotional reactivity to uncontrollable negative events. In a related vein, Dugas et al. proposed that cognitive avoidance is merely one factor that contributes to worry (Dugas et al., 1998). In their view, Dugas et al. suggested that intolerance to uncertainty is the most important factor in explaining the acquisition, maintenance, and function of worry. Consistent with this theory, experimental results show that when intolerance to uncertainty was manipulated using a computerized

gambling paradigm, participants in the increased uncertainty group reported having more worries about the outcome of their wagers (Ladouceur et al., 2000). More recent evidence suggests that intolerance to uncertainty is a disposition stemming from negative beliefs about uncertainty (Robichaud et al., 2019), often that uncertainty has negative consequences, is "unfair and spoils everything" (Sexton & Dugas, 2009).

The cognitive model of pathological worry suggests that worry is a multimodal cognitive process that involves negative biases towards the interpretation of emotional information and deficits in attentional control (Hirsch & Mathews, 2012). As such, worry has also been operationalized as uncontrollable attention towards threatening information. For example, a systematic review of experimental studies found that the majority of studies reviewed (22 of 32) provided evidence that adults with a diagnosis of GAD do indeed attend to threatening stimuli more than healthy controls as a consequence of their worrying tendencies (Goodwin et al., 2017). Furthermore, worriers are not only more likely to detect threat, but to infer threat from emotionally ambiguous information (Eysenck et al., 1991; Hayes et al., 2010). Findings from the field of cognitive neuroscience have also provided evidence that the induction of worry is directly related to specific activation of brain regions involved in threat detection. When participants with GAD were asked to listen to their previously provided personal worry statements, researchers observed concurrent activation in the thalamo-striatal regions (Hoehn-Saric et al., 2004). Researchers then provided participants with an eight-week course of antidepressant medication (citalopram), which attenuated the severity of GAD symptoms. Post pharmacological intervention, the same thalamo-striatal regions of the brain showed decreased activity compared to baseline after listening to worrying statements.

Although such evidence suggests worriers display working memory deficits and are chronically engaged in threat detection, the cognitive model of pathological worry doesn't offer any practical reason why worriers might be convinced of the benefits of worrying, or the reasons they might endorse for their sustained worrying. The contrast avoidance model of worry (Newman & Llera, 2011) posits that worrying serves the specific purpose of maintaining negative emotional states to buffer against possible increases in negative emotional states in the future. In this way, the individual is less likely to experience a sharp drop from a positive emotional state to a negative state (i.e., negative emotional contrast; NEC) when faced with stimuli or circumstances they interpret as distressing. Indeed, research has shown that worry promotes the avoidance of NECs after being exposed to negative emotional experiences (Jamil & Llera, 2021; Kim & Newman, 2022). Moreover, individuals with symptoms of GAD endorsed worrying as being a preferred method to avoid NECs compared to healthy controls. Furthermore, when a state of worry is experimentally induced, individuals with GAD and healthy controls experience greater states of negative emotionality as well as increases in physiological symptoms of worry, such as heart rate (Llera & Newman, 2010), suggesting that worrying is an effective method for engineering heightened states of negative emotional arousal. Similarly, worrying can actually maintain physical symptoms associated with negative states after individuals stop worrying. Pieper et al. (2010) found that worrying led to sustained increases in heart rate and heart rate variability up to two hours after individuals stopped worrying, even after controlling for participants' emotional states, physical activity levels, and posture. Together, such findings that support the contrast avoidance model help explain why individuals with symptoms of GAD are likely to worry, find it difficult to stop worrying, and have difficulty relaxing when they do stop worrying.

Post-Event Processing

Historically, RNT research has concentrated on MDD and GAD, because prominent models of both disorders documented rumination and worry as RNT styles that are prime targets for cognitive therapies (Hirsch & Mathews, 2012; Watkins, 2015). However, SAD is also similarly characterized by an RNT style, yet has not traditionally been studied alongside MDD and GAD within the corpus of RNT research. Nonetheless, conceptual models propose that as rumination is to MDD and as worry is to GAD, post-event processing (PEP) is the RNT style most closely associated with SAD. In particular, PEP constitutes negative self-evaluations and memories of past social interactions. PEP then maintains SAD symptoms through the continual negatively biased recollection of social interactions (Brozovich & Heimberg, 2011; Clark & Wells, 1995).

Clark and Wells (1995) posited that individuals with SAD possess unrealistic social beliefs about themselves (e.g., I'm strange), how others evaluate them (e.g., If I appear strange, others won't like me), and their own social performance (e.g., I must be liked by everyone). Such beliefs become salient in the individual's mind when they engage (or think about engaging) in social situations, thus making the individual fearful about being in social situations all together. Importantly, Clark and Wells (1995) were among the first to suggest how PEP may be a mechanism that could promote feelings of anxiety about social situations. Specifically, they proposed that negative thoughts about previous social interactions may in turn lead to feelings of social inadequacy and hypervigilance in future social interactions in an attempt to prevent social blunders.

Indeed, experimental evidence suggests that PEP maintains symptoms of SAD. For example, after having undergone a psychosocial stressor task, participants who were asked to

focus on their social performance during the task showed elevated levels of anxiety immediately after, and one day after the task compared to participants who were given a distraction task (Rowa et al., 2014). Secondary analysis revealed a strong positive correlation between PEP engagement and levels of anxiety over a 24-hour period regardless of whether participants were in the focus or distraction group. Other results have demonstrated that the more symptoms of SAD participants had, the more they engaged in PEP when recalling both pleasant and stressful social interactions (Kane et al., 2023). Additionally, SAD symptoms and poor performance appraisals after a public speaking task predicted PEP engagement over a four-day period (Kane & Ashbaugh, 2022). Similar results were found when participants with symptoms of SAD were asked to hold either a negative or control (i.e., neutral) self-image as they performed a public speaking task (Makkar & Grisham, 2011). Results indicated that participants who were instructed to hold a negative self-image experienced greater subjective feelings of anxiety, experienced more self-focused attention, had more negative thoughts, believed their anxiety to be more visible to others, appraised their performance more negatively, and engaged in more negatively valanced PEP compared to participants in the control condition twenty-four hours after giving their speech (Makkar & Grisham, 2011). Further evidence suggests that individuals with SAD reported increased PEP and persistent negative self-evaluation of their performance on a speech task for up to one week (Abbott & Rapee, 2004).

PEP has also been associated with memory deficits. In one study, researchers recruited a sample of participants with greater levels of SAD symptoms (i.e., high SAD group) and participants with lower levels of SAD symptoms (i.e., low SAD group). All participants completed a speech task and were provided with standardized positive and negative feedback on their performance, as well as feedback of a confederate's performance on the same task. Results

indicated that participants in the high SAD group remembered the confederate's feedback more positively, and remembered their own feedback more negatively compared to participants in the low SAD group (Cody & Teachman, 2010). Moreover, the memory biases displayed in the high SAD group were mediated by PEP engagement during the 48 hour period between the speech task and memory testing.

Longitudinal research has also demonstrated that clients who present exclusively with symptoms of SAD experience greater levels of PEP compared to participants with comorbid SAD or no SAD symptoms (Perera et al., 2016). In particular, the results suggested that levels of state anxiety after one session of group CBT strongly predicted engagement in PEP up to one week later. However, the authors noted that all participants engaged in PEP regardless of their psychological diagnoses, suggesting that PEP may operate as a maintenance factor for other disorders besides SAD.

In sum, there is strong evidence that PEP maintains SAD by prolonging the subjective experience of anxiety, by facilitating the negative re-analysis of social events, and by mediating the storage and retrieval of social memories. Individuals may then display a bias towards remembering social interactions more negatively. However, because PEP, like worry and rumination, predicts psychological symptom severity and is related to deficits in memory, it stands to reason that all three RNT styles may share considerable overlap in their function.

Transdiagnostic Models of Repetitive Negative Thinking

Much of the early research surrounding rumination, worry, and PEP focused on how these specific RNT styles are associated with increased symptom severity of MDD, GAD, and SAD respectively. Such research follows the theoretical assumption that individual disorders can be thought of as categories which can each be described by unique criteria and caused by specific

symptoms (Fried, 2022). Although such categories are helpful in rendering diagnoses and communication, they often fail to account for how symptoms *across* disorders can overlap and interact with one another (Borsboom & Cramer, 2013; Kotov et al., 2017). As such, more recent efforts have been made to study how rumination, worry, and PEP share features that predict similar symptoms that characterize MDD, GAD, and SAD.

The transdiagnostic model of RNT has gained increasing attention among researchers (Ehring et al., 2011; Ehring & Watkins, 2008) who have proposed that worry, rumination, and PEP are subtypes of RNT, and should be considered as one transdiagnostic construct. For example, experimental studies have shown that worrying predicts symptoms of both anxiety and depression (Dar et al., 2017). Longitudinal results indicate that when measured as a general factor, RNT engagement predicted the severity of symptoms of depression and anxiety more robustly than rumination or worrying alone over a nine year period (Spinhoven et al., 2018). Furthermore, meta-analytic evidence suggests that CBT aimed at treating SAD attenuates symptoms SAD (Hedges g =.74), GAD (g = .69) and depression (g = .52; Kindred et al., 2022). Although Spinhoven et al., (2018) did not included measures of PEP within their factor structure of RNT, a recent systematic review suggests that the neuroanatomical correlates or worrying, rumination, and PEP are best studied as a single concept captured by RNT engagement which is associated with activation of brain networks involved in cognitive control and emotional processing (Demnitz-King et al., 2021).

According to Nolen-Hoeksema and Watkins' transdiagnostic model of psychopathology (2011), a construct like RNT can be considered transdiagnostic if it meets the criteria of a) multifinality (i.e., can lead to multiple disorders), b) divergent trajectories (i.e., can promote the development of different permutations of symptoms in different individuals through moderation

effects), and c) be linked to interactions between proximal, distal, and moderating factors. In their model, Nolen-Hoeksema and Watkins (2011) propose that proximal risk factors explain multifinality, and moderators explain how individuals with proximal risk factors develop specific disorders (i.e., divergent trajectories).

Psychometric evidence has suggested that RNT can fulfill the criterion of multifinality. In particular, the development of two distinct measures of RNT (the Perseverative Thinking Questionnaire and the Repetitive Thinking Questionnaire) have independently found that scores on such measures are strongly associated with the severity of symptoms of MDD, GAD, and SAD (Ehring et al., 2011; McEvoy et al., 2010, 2014; McEvoy & Kingsep, 2006). In their validation study, Ehring et al. (2011) discovered that their measure, the Perseverative Thinking Questionnaire (PTQ) showed strong convergent validity with popular measures of worry and rumination. Such results demonstrated that using a single psychometric tool to measure RNT sufficiently captures how RNT is related to both MDD and GAD. Similarly, McEvoy et al. (2010) found that higher scores on clinical measures of anxiety and depression equally predicted higher scores on their RNT scale, the Repetitive Thinking Questionnaire (RTQ), suggesting that RNT is a proximal factor in explaining symptoms of both anxiety and depression.

According to Nolen-Hoeksema and Watkins (2011), the criteria of divergent trajectories can be met if RNT can be shown to interact with moderating variables that lead to different sets of symptoms in different individuals. Nolen-Hoeksema and Watkins (2011) suggest that, in interacting with rumination, moderators like experiences of loss, failure, or rejection may lead to depression, whereas experiences of uncontrollable stress or panic attacks may lead to anxiety. There is also evidence that genetic factors may serve as moderating factors. For example, evidence suggests that a polymorphism to a brain derived neurotrophic factor (BDNF) allele

(Val66Met) may moderate the relationship between life stress and rumination (Clasen et al., 2011). In particular, individuals with the BDNF polymorphism engage in more rumination when undergoing life stress compared to individuals without the polymorphism. Similar results have shown that the presence of the BDNF polymorphism is predictive of higher levels of worrying in individuals with concurrent polymorphisms to a serotonin transporter-linked polymorphic region (5-HTTLPR; Bredemeier et al., 2014), whereas the absence of the BDNF polymorphism was not positively associated with increased engagement in worrying. Moreover, there is evidence that the BDNF polymorphism moderates the relationship between working memory and rumination, such that the more one struggles to discard irrelevant emotional information from working memory, the more one experiences negative emotions (e.g., anger and anxiety) while ruminating (Pe et al., 2013). More research is needed to demonstrate the link between the presence of a BDNF polymorphism and increased engagement in rumination, worry, or PEP however. Nevertheless, such evidence suggests that combinations of moderators, like experiences of uncontrollable stress and genetic polymorphisms, may render certain individuals more likely to develop certain psychological symptoms compared to others when they engage in RNT.

In Nolen-Hoeksema and Watkins' (2011) model, distal factors such as gender norms should also have the potential to interact with proximal (i.e., RNT engagement) and moderating factors (i.e., genetics). Epidemiological data suggests that females are more likely to develop symptoms of depression and anxiety compared to males (American Psychiatric Association, 2022; Farhane-Medina et al., 2022; Salk et al., 2017). Meta-analytic evidence suggests that women are more likely to ruminate (d = .24; Johnson & Whisman, 2013), possibly about interpersonal stressor more so than achievement related stressors (Simonson et al., 2011). Women are also more likely to worry than men (Robichaud et al., 2003), and there is evidence

that gender influences PEP engagement after alcohol consumption in individuals with SAD, whereby women show lower levels of PEP after drinking alcohol in a social environment, and men show higher levels of PEP (Battista et al., 2014). Relatedly, there is evidence of BDNF as a moderator interacting with gender as a distal factor. One meta-analysis concluded that although BDNF polymorphisms are more common in women, and the presence of the polymorphism is significantly associated with elevated risk of developing depression in men (*OR* = 1.67; Verhagen et al., 2010), although there is controversy surrounding the measurement of BDNF (e.g., genotyping vs. blood serum level; Ryan et al., 2018). Despite the paucity of evidence linking gender to transdiagnostic RNT, it is plausible that the gender differences observed in disorder-specific RNT would also be found in relation to transdiagnostic RNT given the conceptual overlap between such constructs.

Overall, there is evidence to suggests that RNT can be considered a transdiagnostic construct, as based upon Nolen-Hoeksema and Watkins' (2011) outline for trandiagnostic models of psychopathology. Specifically, that RNT engagement as a proximal risk factor interacts with moderators (i.e., genetics) and distal risk facotrs (i.e., gender norms) to explain how RNT can lead to both multifinality and divergent trajectories.

Transdiagnostic Measures of Repetitive Negative Thinking

Different psychometric scales have been developed to measure and quantify the extent to which individuals engage in RNT. One such measure, the Repetitive Thinking Questionnaire (RTQ) was developed based on the rationale that worry, rumination and PEP share considerable overlap in their essence (McEvoy et al., 2010). To that end, the RTQ is simply a composite of items from pre-existing measures that are widely used to study worry (Penn State Worry Questionnaire), rumination (Ruminative Response Scale), and PEP (Post-Event Processing

Questionnaire) respectively. All items on the RTQ are adapted to exclude disorder-specific language in an attempt to measure the process of RNT related thoughts. A major strength of the RTQ was that it offered researchers and clinicians a way to measure RNT more expediently without sacrificing any psychometric accuracy. However, a major limitation of this questionnaire is its psychometric overlap with related measures. Although the RTQ was originally designed to advance the transdiagnostic hypothesis of RNT, it simultaneously furthers the transdiagnostic debate given the likelihood that the test's concurrent validity may be artificially inflated. Similarly, any attempt to compare the predictive power of the RTQ with the diagnostic specific measures from which it is drawn will violate the statistical premise of multicollinearity, thus yielding non-robust results.

A second limitation of the RTQ is that it measures content and process simultaneously. The RTQ includes four items that have high face validity to measure the content of RNT related thoughts (e.g., " I have thoughts or images about all my shortcomings, failings, faults, and mistakes"). These items solicit information about RNT content because they ask respondents if they "think about" certain topics or themes when they are engaging in RNT. Conversely, the remaining six items on the RTQ contain process related language (e.g., "I have thoughts or images that are difficult to forget") that more accurately assesses the process of engaging RNT without prompting respondents to reflect on the content of their thoughts. All items are given equal weight, and a total score is acquired by summing all of the responses together. As such, a total score on the RTQ does not indicate how much RNT related distress is explained by the content of RNT related thoughts, or the process of engaging such thoughts.

Similar to the RTQ, the Perseverative Thinking Questionnaire (PTQ; Ehring et al., 2011), was developed based on the premise that RNT consists of three main characteristics. Firstly, the

thinking must be repetitive, partly intrusive, and hard to disengage from. Secondly, the individual considers it to be unproductive. Lastly, it expends a disproportional amount of mental/cognitive effort. Using such characteristics as a guide, Ehring and colleagues constructed a 15-item questionnaire to measure RNT, with three items dedicated to repetitiveness, intrusiveness, disengagement, unproductiveness, and cognitive expenditure respectively. Unlike the RTQ, a major strength of the PTQ is that its items were generated to capture the process of RNT engagement independently from the content of the thoughts (e.g., "thoughts intrude into my mind" and "I keep asking myself questions without finding an answer"). Additionally, all items on the PTQ were created independently from items in measures of worry, rumination, and PEP. However, a simultaneous weakness of the PTQ is that it is the only RNT measure that assumes RNT is fundamentally based on Ehring et al.'s three main characteristics. Although confirmatory factor analysis lends support of Ehring et al.'s theoretical supposition, it remains difficult to discern how best to theoretically measure RNT transdiagnostically when different RNT measures are based on different theoretical criteria.

Research findings suggest that disorder-specific and transdiagnostic measures of RNT alike are useful in predicting symptom severity (McEvoy et al., 2013, 2014). However, it remains unclear whether transdiagnostic measures offer additional utility in predicting psychological symptom severity compared to disorder-specific measures. This distinction is relevant, as transdiagnostic measures should, in theory, explain additional variance in predicting symptom severity above and beyond the diagnostic specific measures given that they encapsulate more aspects of the phenomenon of RNT. Similarly, there is currently no data regarding whether items that measure the *process* of engaging in RNT (i.e., how individuals are thinking) or items that measure the *content* of RNT (i.e., what individuals are thinking about) are more strongly

associated with psychological symptom severity. Nevertheless, it is clinically important to delineate between such aspects of RNT when picking intervention techniques that may favour a focus on RNT process or content.

To that end, the current study aims to understand whether a transdiagnostic measure of RNT, compared to disorder-specific RNT measures, explains an additional proportion of the variance in psychological symptom severity. Similarly, we seek to explore whether the content of RNT, or the process of engaging in RNT is associated with symptom outcomes.

Our hypotheses are as follows: 1.1) the transdiagnostic measure of RNT (PTQ) will explain an incremental amount of variance in predicting the severity of social anxiety symptoms above and beyond the PEPQ; 1.2) the PTQ will explain an incremental amount of variance in predicting the severity of generalized anxiety symptoms above and beyond the PSWQ; 1.3) the PTQ will explain an incremental amount of variance in predicting the severity of depressive symptoms above and beyond the RRS. If the PTQ explains additional variance in predicting symptom severity compared to disorder-specific measures, and if the disorder-specific measures explain less or no incremental variance, it would suggest that the transdiagnostic model of RNT explains more of the phenomenon of RNT. Additionally, such evidence would suggest that transdiagnostic measures of RNT offer an additional level of subtlety and nuance to measurement instruments used to evaluate multiple RNT styles at once. Conversely, if the PTQ does not explain incremental variance above and beyond the disorder-specific questionnaires in predicting symptom severity, it would suggest that the transdiagnostic model of RNT is insufficient at measuring all aspects of RNT pertaining to depression and anxiety compared to individual disorder-specific measures.

Our second hypothesis is to explore if items contained in the RTQ and PTQ that measure RNT content or RNT process are similar in their ability to predict psychological symptom severity. If process items reliably predict symptom severity, this would suggest that the theoretical basis of RNT being a process of thinking is correct. Conversely, if the content items reliably predict psychological symptoms, such results would indicate that the phenomenon of RNT is more than a process, and that the content of RNT related thoughts should not be neglected when considering how RNT is related to psychological symptom severity.

Method

Participants

The current study received ethics approval from the University of Ottawa research ethics board (# H-10-23-9639) and was pre-registered through Open Science Framework (doi:10.17605/OSF.IO/GS4NQ) prior to data analysis. The original sample included 709 participants. Sixty-three participants were excluded from the analysis due to failed attention and/or effort checks imbedded within the questionnaire battery. The final sample consisted of 646 (72.9% female) participants between the ages of 17 and 54 (M = 19.7, SD = 3.4, see Table 1 for sample demographics). Participants were undergraduate students recruited using the University of Ottawa's Integrated System of Participation in Research (ISPR) participant pool. Inclusion criteria for participation included: (1) being at least 17 years of age, (2) being able to read, write, and communicate in English. Participants all received course credit as compensation.

Table 1

Frequency Table of Participant Race and Ethnicity

Ethnicity	Frequency	Percent (%)
Asian - East	54	7.19
Asian - South	54	7.19
Asian - South East	25	3.33
Black - African	57	7.59

Black - Caribbean	27	3.60
Black - North American	12	1.60
First Nation	6	0.80
Indian - Caribbean	8	1.07
Indigenous/Aboriginal	2	0.27
Inuit	1	0.13
Latin American	20	2.66
Métis	9	1.20
Middle Eastern	59	7.86
White - European	101	13.45
White - North American	283	37.68
Mixed Heritage	12	1.60
Other	12	1.60
Prefer Not Answer	8	1.07
Do Not Know	1	0.13

Note. Participants can select multiple categories

Measures

Clinical Severity Questionnaires

Generalized Anxiety Disorder 7 (GAD-7). The GAD-7 is a 7-item questionnaire used to assess the severity of generalized anxiety disorder symptoms (Spitzer et al., 2006). The measure shows strong levels of sensitivity (89%) and specificity (82%), and demonstrates strong procedural validity with self-report scores and scores provided by mental health professionals showing strong overlap (interclass correlation = .83). Participants were asked to answer items based on the previous two-week period. Items are rated on a 4-point Likert scale ranging from 0 (“not at all”) to 3 (“nearly every day”). Scores range from 0 to 21 with higher scores reflecting greater symptom severity. Cronbach’s alpha of the GAD-7 for the current sample can be found in Table 2.

Patient Health Questionnaire (PHQ-8). The PHQ-8 is a self-administered 8-item measure of depression symptoms that is adapted from the original 9-item version (Kroenke et al.,

2001). Given that the current study recruited a non-clinical sample online, we have omitted one item which measures suicidality for ethical reasons. The measure shows strong sensitivity (88%) and specificity (88%), and has also been shown to have strong predictive validity in distinguishing between minimal, mild, moderate, and severe levels of depression (Kroenke et al., 2001). Participants were asked to answer items based on the previous two-week period. Responses are scored on a 4-point Likert scale ranging from 0 ("not at all") to 3 ("nearly every day"). Scores range from 0 to 24 with higher scores reflecting greater symptom severity. Cronbach's alpha of the PHQ-8 for the current sample can be found in Table 2.

Social Phobia Inventory (SPIN). The SPIN is a 17-item questionnaire designed to identify individuals with social anxiety (social phobia) by measuring fear, avoidance, and physiological arousal (Connor et al., 2000). Although the SPIN is typically used for measuring SAD symptoms in clinical samples, it has been successfully used to measure such symptoms in non-clinical samples of university students (Ashbaugh et al., 2005; Radomsky et al., 2006). The SPIN displays excellent discriminant, and convergent validity for social anxiety symptoms. Respondents are asked to respond to questions about how much they were bothered by certain social events over the last week. Each item is measured on a 5-point Likert scale, ranging from 0 ("not at all") to 4 ("extremely"). Cronbach's alpha of the SPIN for the current sample can be found in Table 2.

Disorder-specific Questionnaires

Post-Event Processing Questionnaire - Revised (PEPQ). The PEPQ is a 9 item questionnaire that measures the extent to which respondents engage in post-event processing during a particular event. The PEPQ shows good convergent validity and discriminant validity for highly comorbid disorders such as depression in clinical and non-clinical samples (McEvoy

& Kingsep, 2006; Rachman et al., 2000). Items are rated on an agreement scale of 0 (“not at all”) to 100 (“totally agree”) using a visual analogue scale. Cronbach’s alpha of the PEPQ for the current sample can be found in Table 2.

Penn State Worry Questionnaire (PSWQ). The PSWQ is a 16-item questionnaire designed to measure an individual’s engagement in worrying (Meyer et al., 1990). The measure shows strong convergent and discriminant validity, with scores ranging from 16 to 80 (higher scores indicate higher levels of trait worry). Items are scored on a 5-point Likert scale from 1 (“not at all typical of me”) to 5 (“very typical of me”). Cronbach’s alpha of the PSWQ for the current sample can be found in Table 2.

Ruminative Response Scale – Short Form (RRS). The RRS is a 10-item questionnaire that measures two factors associated with rumination: reflection and brooding (Treynor et al., 2003). Items measuring reflection are neutrally valanced and are meant to capture the extent to which an individual contemplates their difficulties. Conversely, the items measuring brooding possess a more negative valence, and measure the extent to which an individual engages in “moody pondering” about a recent situation (Treynor et al., p. 251, 2003). The RRS shows strong internal consistency in its original validation study ($\alpha = .85$) after correcting for a small number of items in each subscale. Similarly, the RRS shows strong convergent validity with questionnaires measuring the severity of depressive symptoms. Participants rated the frequency of their engagement in behaviours on a 4-point Likert scale ranging from 1 (“almost never”) to 4 (“almost always”). Cronbach’s alpha of the RRS for the current sample can be found in Table 2.

Transdiagnostic Questionnaires

Perseverative Thinking Questionnaire (PTQ). The PTQ is a 15-item scale that measures the repetitiveness, intrusiveness, unproductiveness, and difficulty of disengagement

from thoughts, all of which are assumed to underlie the processes of RNT (Ehring et al., 2011). The PTQ has demonstrated excellent convergent validity with similar, albeit non transdiagnostic measures of RNT. Likewise, the PTQ has also shown good predictive validity in its ability to predict symptoms of anxiety and depression respectively. Items are rated on a 5-point Likert scale ranging from 0 ("never") to 4 ("very true"). Cronbach's alpha of the PTQ for the current sample can be found in Table 2.

Repetitive Negative Thinking Questionnaire (RTQ-10). The RTQ-10 contains the 10 items with the highest factor loadings from the original 31-item RTQ developed by McEvoy et al. (2010). The RTQ-10 is highly correlated with the original RTQ (r = .95). and has been shown to reliably distinguish between non-clinical and clinical samples of participants with anxiety and/or depression (McEvoy et al., 2014). Responses are measured on a 5-point Likert scale ranging from 1 ("not at all true") to 5 ("very true"). Cronbach's alpha of the RTQ-10 for the current sample can be found in Table 2.

Procedure

All participants provided informed consent before completing the study. Questionnaires were completed online using Qualtrics. In total, participants complete eight questionnaires: three measuring the psychological symptom severity of depression (PHQ-8), social anxiety (SPIN), and generalized anxiety (GAD-7) respectively; three measuring the extent to which participants engage in rumination (RRS), post-event processing (PEPQ), and worry (PSWQ) respectively; and two measuring the process and content of participants' repetitive negative thoughts (PTQ and RTQ) respectively.

Results

Data Analysis & Integrity

Data were analyzed using JASP (version 18.3; JASP Team, 2024). All variables of interest were assessed to ensure that the data met the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Upon visual inspection of histograms all variables of interest, except one, appeared normally distributed with skewness and kurtosis values all between +/- 1.5. A square root transformation was computed for total scores on the PEPQ, after which visual inspection of the histogram was normal with skewness and kurtosis values of -0.87 and -0.15 respectively. All independent variables (IVs) appeared linearly related to their respective dependant variables (DVs) of interest. All variables of interest met the assumption of multicollinearity and homoscedasticity. Descriptive data was computed (Table 2; see Appendix A for correlation matrix).

Next, three separate hierarchical regressions were calculated to test whether the PTQ as a transdiagnostic questionnaire explains more variance in symptom severity of social anxiety, generalized anxiety, and depression compared to the PEPQ, PSWQ, and RRS respectively.

Table 2

Descriptive Statistics and Cronbach's alpha of Final Sample

Measure	Mean	*SD*	Min. – Max.	Cronbach's alpha (95% CI)
GAD-7	10.116	5.801	0 - 21	.90 (.89, .84)
PHQ-8	11.406	6.145	0 -24	.88 (.87, .89)
SPIN	29.542	15.8	0 - 68	.93 (.92, .94)
PSWQ	58.057	13.77	0 - 63	.93 (.92, .94)
RRS	25.337	6.513	0 - 30	.84 (.82, .87)
PEPQ	437.262	251.698	0 - 900	.93 (.92, .94)
PTQ	34.661	13.737	0 - 60	.96 (.95, .96)
RTQ	34.037	9.896	0 - 40	.93 (.92, .94)

In each model, the disorder-specific questionnaire was entered in the first step of the model, and the PTQ in the second step. The DVs were the SPIN, GAD-7, and PHQ-8 respectively. Though it was not part of our pre-registration plan, we also conducted three additional hierarchical regressions to examine the incremental contribution of the PEPQ, PSWQ, and RRS above and beyond the PTQ. This was done in order to explore the psychometric utility of both sets of questionnaires, by examining if the transdiagnostic and disorder-specific questionnaires explain similar amounts of additional variance in symptom severity. In each of these additional models, the PTQ was entered in the first step of the model, and the disorder-specific questionnaire was entered in the second step. The DVs were the SPIN, GAD-7, and PHQ-8 respectively.

Finally, a structural equation model was created as part of an exploratory analysis to investigate whether the content of RNT related thoughts, or the process of engaging in RNT was more strongly associated with psychological symptom severity. The model has three latent factors: 1) RNT process, 2) RNT content, and 3) psychological symptom severity. The indicators for RNT process included all items contained within the PTQ, which measures RNT as a process (e.g., “my thoughts repeat themselves”). Based on Ehring et al.’s (2011) criteria of RNT, items were deemed to focus on process when they ask about how thinking about one’s problems leads to distress. The indicators for RNT content included all items contained within RTQ that measure RNT content (e.g., “I have thoughts or images about the situation and wish it would go better”). Questionnaire items were deemed to focus on content when they asked about the distress caused by what the participant thinks about. Because the PTQ measures process, all fifteen items were deemed to measure process, and only four items from the RTQ were used to compute the factor of RNT content. The two factors of RNT process and content were used to predict the third factor, psychological symptom severity, which was comprised of total scores

from the PHQ-8, the GAD-7, and the SPIN. Fit indices included the chi-square ($\chi 2$) test ($p > 0.05$), Standardized Root Mean Square Residual (SRMR < 0.08), Tucker-Lewis Index (TLI > 0.90), Comparative Fit Index (CFI > 0.90), and Root Mean Square Error of Approximation (RMSEA < 0.08). Values of comparative fit index (CFI) and Tucker-Lewis index (TLI) which exceed the threshold of .90 indicate an acceptable model fit. Similarly, values of RMSEA and SRMR that are lower than .08 are indicative of an acceptable model fit (Fan et al., 2016).

Hierarchical Regressions: Transdiagnostic Results

Social Anxiety Symptoms

Overall, the final model was a good fit ($F_{(2, 643)} = 202.67$, $p < .001$, see Table 3). The PEPQ predicted SAD symptoms ($b_1 = 1.16$, $SE = 0.07$, $t = 16.79$, $p < .001$, $R^2 = .31$). Together, the PTQ and the PEPQ accounted for 39% of the variance in symptom severity. The PTQ explained an additional 8% of the variance in the severity of SAD symptoms above and beyond the PEPQ. Specifically, for every one unit increase in PTQ score, there was a 0.39 unit increase in SPIN score ($b_1 = .39$, $SE = .04$, $t = 9.28$, $p < .001$, R^2 change = .08).

Generalized Anxiety Symptoms

The model was a good fit ($F_{(2, 643)} = 467.57$, $p < .001$, see Table 3), with the first step explaining roughly half of the variance of GAD symptoms ($b_1 = 0.3$, $SE = 0.01$, $t = 25.78$, $p < .001$, $R^2 = .51$). Together, the PTQ and the PSWQ accounted for 59% of the variance in symptom severity. The PTQ explained an additional 9% of the variance in the severity of GAD symptoms above and beyond the PSWQ, where one unit increase in PTQ score led to a 0.18 unit increase in GAD-7 score ($b_1 = .18$, $SE = .02$, $t = 11.56$, $p < .001$, R^2 change = .09).

Major Depression Symptoms

Overall, the model was a good fit ($F_{(2, 643)} = 277.96$, $p < .001$, see Table 3), and the RRS explained roughly 30% of the variance of GAD symptoms ($b_1 = 0.51$, $SE = 0.03$, $t = 16.12$, $p < .001$, $R^2 = .29$). Together, the PTQ and the RRS accounted for 46% of the variance in symptom severity. The PTQ explained an additional 18% of the variance in the severity of MDD symptoms above and beyond the RRS. Specifically, for every one unit increase in PTQ score, there was a 0.23 unit increase in PHQ-8 score ($b_1 = .02$, $SE = .02$, $t = 14.53$, $p < .001$, R^2 change = .18).

Table 3

Regression Coefficients Social Anxiety

							95% CI			
Model		*B*	*β*	*SE*	*t*	*p*	Lower	Upper	R^2	R^2 change
H_0	(Intercept)	6.90		1.44	4.78	< .001	4.07	9.74	0.31	
	PEPQ	1.16	0.55	0.07	16.79	< .001	1.02	1.30		
H_1	(Intercept)	0.77		1.51	0.51	0.61	-2.20	3.74	0.39	
	PTQ	0.39	0.34	0.04	9.28	< .001	0.31	0.47		0.08
	PEPQ	0.78	0.37	0.08	10.25	< .001	0.63	0.94		

Note: Null model includes PEPQ; PEPQ scores were square-root transformed.

Regression Coefficients Generalized Anxiety

							95% CI			
Model		*B*	*β*	*SE*	*t*	*p*	Lower	Upper	R^2	R^2 change
H_0	(Intercept)	-7.31		0.70	-10.53	< .001	-8.68	-5.95	0.51	
	PSWQ	0.30	0.71	0.01	25.78	< .001	0.28	0.32		
H_1	(Intercept)	-5.89		0.65	-9.13	< .001	-7.15	-4.62	0.59	
	PTQ	0.18	0.43	0.02	11.56	< .001	0.15	0.21		0.09
	PSWQ	0.17	0.40	0.02	10.72	< .001	0.14	0.20		

Note: Null model includes PSWQ.

Regression Coefficients Major Depression

Model		*B*	*β*	*SE*	*t*	*p*	95% CI Lower	95% CI Upper	R^2	R^2 change
H_0	(Intercept)	-1.41		0.82	-1.72	0.085	-3.03	0.20	0.29	
	RRS	0.51	0.54	0.03	16.12	< .001	0.44	0.57		
H_1	(Intercept)	-2.33		0.72	-3.26	0.001	-3.74	-0.93	0.46	
	PTQ	0.23	0.51	0.02	14.53	< .001	0.20	0.26		0.18
	RRS	0.23	0.24	0.03	6.88	< .001	0.16	0.29		

Note: Null model includes RRS.

Exploratory Hierarchical Regressions: Disorder-specific Results

Given that our initial set of regressions indicated that the transdiagnostic questionnaire explained additional variance in psychological symptom severity above and beyond disorder-specific questionnaires, we explored the extent to which the disorder-specific questionnaires accounted for additional variance in symptom severity above and beyond the transdiagnostic questionnaire (see Table 4). In the first model, the PEPQ ($F_{(2, 643)} = 202.67$, $p < .001$) explained an additional 10% of variance in symptom severity above and beyond the PTQ. In the second model, the PSWQ ($F_{(2, 643)} = 467.57$, $p < .001$) explained an additional 7% of the variance in symptom severity above and beyond the PTQ. In the third model, the RRS ($F_{(2, 643)} = 277.96$, $p < .001$) explained an additional 4% of the variance in symptom severity above and beyond the PTQ.

Structural Equation Model

The *a priori* exploratory model fit our data well, with the values of CFI = .92, TLI = .91, RMSEA = 0.08, and SRMR = 0.04 indicating the model was a good fit. A significant *p* -value on the chi-squared test indicated that the model was a poor fit ($\chi^2 = 1048.94$, $p < 0.001$). However, because the chi-squared test is sensitive to large sample sizes, and because our study was appropriately powered, we continued with the analysis. Both paths within the model were

significant (see Figure 1), indicating that both RNT process (β = 2.76, $p < .001$, 95% CI [2.08, 3.44]) and RNT content (β = 2.30, $p < .001$, 95% CI [1.67, 2.92]) are predictors of psychological symptom severity (see Appendix B for detailed output).

Table 4

Regression Coefficients Social Anxiety

							95% CI		
Model		*B*	*β*	*SE*	*t*	*p*	Lower	Upper	R^2 change
H_0	(Intercept)	8.21		1.23	5.75	< .001	5.40	11.01	
	PTQ	0.62	0.04	0.54	16.08	< .001	0.54	0.69	0.29
H_1	(Intercept)	0.77		1.51	0.51	0.61	-2.19	3.74	
	PTQ	0.39	0.34	0.04	9.28	< .001	0.31	0.47	
	PEPQ	0.78	0.37	0.07	10.25	< .001	0.63	0.94	0.10

Note: Null model includes PTQ.

Regression Coefficients Generalized Anxiety

							95% CI		
Model		*B*	*β*	*SE*	*t*	*p*	Lower	Upper	R^2 change
H_0	(Intercept)	-0.44		0.43	-1.01	0.311	-1.28	0.41	
	PTQ	0.30	0.72	0.01	26.40	< .001	0.28	0.33	0.52
H_1	(Intercept)	-5.89		0.65	-9.13	< .001	-7.15	-4.62	
	PTQ	0.18	0.43	0.02	11.56	< .001	0.15	0.21	
	PSWQ	0.17	0.40	0.01	10.72	< .001	0.14	0.20	0.07

Note: Null model includes PTQ.

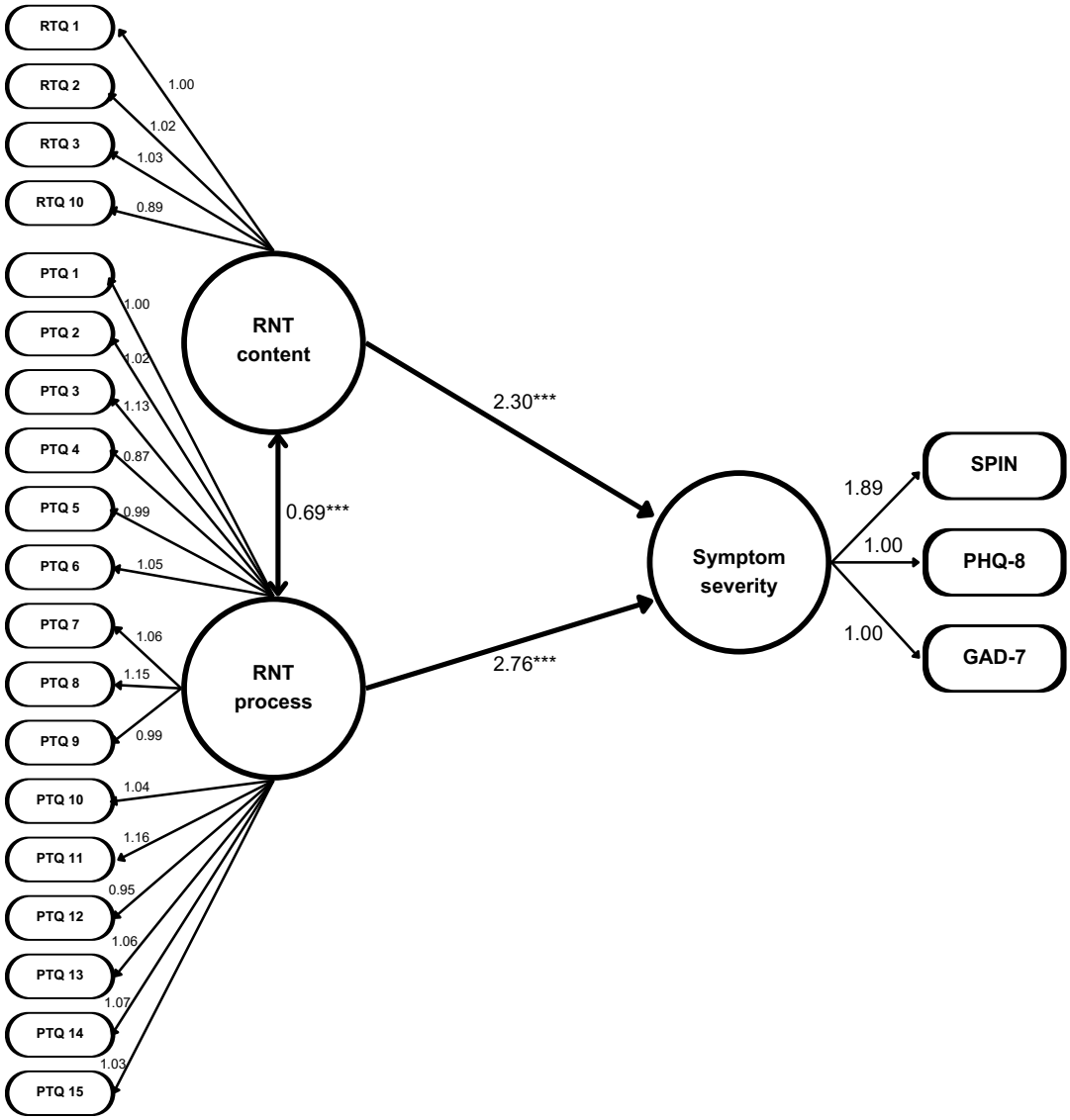
Regression Coefficients Major Depression

							95% CI		
Model		*B*	*β*	*SE*	*t*	*p*	Lower	Upper	R^2 change
H_0	(Intercept)	1.31		0.50	2.62	0.009	0.33	2.29	
	PTQ	0.29	0.65	0.01	21.78	< .001	0.27	0.32	0.42
H_1	(Intercept)	-2.33		0.72	-3.26	0.001	-3.74	-0.93	
	PTQ	0.23	0.51	0.02	14.53	< .001	0.20	0.26	
	RRS	0.23	0.24	0.03	6.88	< .001	0.16	0.29	0.04

Note: Null model includes PTQ.

Figure 1

Structural Model of RNT Content vs. RNT Process



$p < .05$*, $p < .01$**, $p < .001$***

Note. Single arrow line indicates regression coefficient. Double arrow line indicates covariance.

Exploratory Hierarchical Regressions

Given that the results of the structural equation model demonstrate that RNT content is a reliable predictor of transdiagnostic symptom severity, we conducted three additional hierarchical regressions to assess the impact of measures of content above and beyond the impact of measure of process on symptom severity. Each model included the PTQ in the first step, and all three disorder-specific questionnaires (i.e., PEPQ, PSWQ, and RRS) in the second step to test if RNT content explained additional variance in symptom severity above and beyond the PTQ. In our first model, we found that after accounting for the variance explained by the PTQ ($F_{(4, 641)}$ = 113.78, $p < .001$, $R^2 = .29$, see Table 5 for more details), the disorder-specific questionnaires reliably predicted SPIN scores ($F_{(4, 641)} = 113.78$, $p < .001$, R^2 change = .13), while explaining an additional 13% of the variance above and beyond the PTQ. The same pattern was found with GAD symptoms whereby after accounting for the variance explained by the PTQ ($F_{(1, 644)}$ = 696.99, $p < .001$, $R^2 = .52$), the disorder-specific questionnaires reliably predicted GAD-7 scores ($F_{(4, 641)} = 255.55$, $p < .001$, R^2 change = .1) while explaining an additional 10% of the variance in anxiety symptoms above and beyond the PTQ. Similarly, after accounting for the variance explained by the PTQ in depression symptoms PTQ ($F_{(1, 644)} = 474.52$, $p < .001$, $R^2 = .42$), the disorder-specific questionnaires predicted PHQ-8 scores ($F_{(4, 641)} = 146.86$, $p < .001$, R^2 change = .05) while explaining an additional 5% of the variance above and beyond the PTQ.

Table 5

Exploratory Analysis – Regression Coefficients Social Anxiety

							95% CI		
Model		*B*	*β*	*SE*	*t*	*p*	Lower	Upper	R^2 change
H_0	(Intercept)	8.21		1.43	5.75	< .001	5.40	11.01	0.29
	PTQ	0.62	0.54	0.04	16.08	< .001	0.54	0.69	
H_1	(Intercept)	-9.67		2.45	-3.96	< .001	-14.47	-4.87	0.13
	PTQ	0.18	0.15	0.06	3.15	0.002	0.07	0.29	
	PSWQ	0.26	0.23	0.05	5.04	< .001	0.16	0.37	
	PEPQ	0.68	0.32	0.08	8.70	< .001	0.52	0.83	
	RRS	0.18	0.18	0.09	1.98	0.048	0.00	0.36	

Note: Null model includes PTQ.

Exploratory Analysis – Regression Coefficients Generalized Anxiety

							95% CI		
Model		*B*	*β*	*SE*	*t*	*p*	Lower	Upper	R^2 change
H_0	(Intercept)	-0.44		0.43	-1.01	0.311	-1.28	0.41	0.52
	PTQ	0.30	0.72	0.01	26.40	< .001	0.28	0.33	
H_1	(Intercept)	-7.98		0.73	-10.96	< .001	-9.41	-6.55	0.10
	PTQ	0.14	0.33	0.02	8.40	< .001	0.11	0.17	
	PSWQ	0.15	0.35	0.02	9.54	< .001	0.12	0.18	
	PEPQ	0.07	0.09	0.02	2.85	0.004	0.02	0.11	
	RRS	0.13	0.15	0.03	4.78	< .001	0.08	0.18	

Note: Null model includes PTQ.

Exploratory Analysis – Regression Coefficients Major Depression

							95% CI		
Model		*B*	*β*	*SE*	*t*	*p*	Lower	Upper	R^2 change
H_0	(Intercept)	1.31		0.50	2.62	0.009	0.33	2.29	0.42
	PTQ	0.29	0.65	0.01	21.78	< .001	0.27	0.32	
H_1	(Intercept)	-3.91		0.90	-4.35	< .001	-5.67	-2.14	0.05
	PTQ	0.18	0.41	0.02	8.93	< .001	0.14	0.22	
	PSWQ	0.03	0.08	0.02	1.79	0.074	0.00	0.07	
	PEPQ	0.10	0.12	0.03	3.42	< .001	0.04	0.15	
	RRS	0.20	0.21	0.03	5.93	< .001	0.13	0.27	

Note: Null model includes PTQ.

Discussion

The present study had two stated goals: 1) to determine whether the transdiagnostic model of RNT explained additional variance in psychological symptom severity compared to disorder-specific measures of RNT, and 2) to explore whether the content of RNT related thoughts, or the process of RNT was associated with psychological symptom severity. With regards to our first set of hypotheses, we found that transdiagnostic measure of RNT accounted for an additional amount of variance when predicting the symptom severity of GAD, and MDD as compared to disorder-specific questionnaires that measure worry, and rumination. Specifically, the PTQ explained an additional 9% of the variance in GAD symptoms when controlling for the PSWQ compared to 7% of additional variance explained by the PSWQ above the PTQ. Similarly, the PTQ explained an additional 18% of the variance in MDD symptoms when controlling for the RRS, as compared the 4% of additional variance explained by the RRS above the PTQ. However, we found that the disorder-specific questionnaire accounted for more additional variance in social anxiety symptoms compared to the transdiagnostic questionnaire. The PEPQ explained an additional 10% of the variance in SAD symptoms when controlling for the PTQ, as compared to the 8% of additional variance explained by the PTQ. In relation to our second hypothesis, we found that both the content and process of RNT related thoughts are predictive of psychological symptoms. Specifically, the more one engages in RNT, and engages with the content of such thoughts, the more likely one is to experience symptoms of SAD, GAD, and MDD.

Our results illustrate the utility of measuring RNT as a transdiagnostic process. Firstly, our findings demonstrate that the transdiagnostic measure of RNT can simultaneously predict symptoms of SAD, GAD, and MDD. Although the disorder-specific measures, when combined,

explained additional variance in symptom severity above and beyond the PTQ, the PTQ still manages to capture the variance in symptom severity that is shared between SAD, GAD, and MDD. If such disorders did not share an underlying cognitive mechanism of RNT, then we would not expect the transdiagnostic measure of RNT to predict symptoms of SAD, GAD, and MDD at all. However, the transdiagnostic questionnaire predicted symptoms of all three disorders. Similarly, we would expect the disorder-specific questionnaires to uniquely predict symptoms of the disorders they purport to measure if PEP, worry, and rumination were independent phenomena. Yet, our second set of exploratory results demonstrate that PEP, worry, and rumination questionnaires all predict symptoms of disorders other than the ones they were created to measure (see Table 5). Contrary to prior evidence (e.g., Dar et al., 2017), the only instance in which we did not find evidence of the transdiagnostic nature of disorder-specific questionnaires was the PSWQ did not play an incremental role in predicting symptoms of MDD after controlling for the RRS and the PEPQ. However, we did find evidence in the opposite direction, whereby the RRS predicted symptoms of generalized anxiety. Nevertheless, our secondary set of exploratory analyses demonstrate the transdiagnostic nature of RNT, such that the disorder-specific measures predicted symptoms of psychological disorders other than the disorders they were designed to measure.

In a taxonomical sense, our findings also cohere with the network perspective of psychopathology, which posits that psychological disorders are better conceptualized as co-occurring symptom groupings rather than distinct disorders which are assumed to cause observable symptoms (Borsboom & Cramer, 2013; Fried, 2022; McNally, 2021). If the medical model approach to symptom classification were true, then we would expect the disorder-specific questionnaires to predict specific symptoms of specific disorders. Conversely, our results add to

prior experimental evidence (McLaughlin et al., 2007) by demonstrating that PEP, worry and rumination can all simultaneously predict psychological distress, which suggests that they may not be discrete phenomena but rather different permutations of the same underlying construct.

The results from our structural equation model add to prior research by highlighting the importance of measuring RNT content in relation to psychological symptoms. Specifically, our results show that *p* value associated with RNT content is as statistically significant a predictor of psychological symptom severity as the *p* value associated with RNT process. Historically, PEP, worry, and rumination have all been studied in relation to the content *and* process of the repetitive negative thoughts. That is because the content of the thoughts is presumed to be thematically related to the disorder which it maintains, such that the content of RNT cannot be divorced from the disorder it is associated with. Yet, research based on the transdiagnostic proposal has neglected RNT content as an important mechanism in explaining symptom severity. Researchers have argued (e.g., McEvoy et al., 2014) that studying RNT content only serves to conflate the true relationship between the underlying transdiagnostic process and disorder-specific features. Therapeutically, others have argued that if clinicians can help clients to stop engaging in RNT, then the issue of whether the content of repetitive negative thoughts is associated with psychological distress is moot. For instance, metacognitive therapy (MCT) has been forwarded as an alternative to CBT for anxiety and depressive disorders as it seeks to target the transdiagnostic process of RNT which is assumed to maintain psychological symptoms (McEvoy, 2019). As such, investigations of the transdiagnostic proposal have largely ignored RNT content as an important variable in understanding why RNT predicts psychological symptom severity.

Conversely, the results from our structural equation model line up with well-established clinical findings, which suggest that addressing RNT content through techniques such as cognitive restructuring are an effective intervention for attenuating psychological symptoms (Clark, 2013; Querstret & Cropley, 2013). Similarly, other interventions like mindfulness-based stress reduction (e.g., Robins et al., 2012) and mindfulness-based cognitive therapy (e.g., Aalderen et al., 2012) are effective therapies for reducing RNT given their emphasis on accepting the negative content of one's thoughts, while also recognizing the patterns associated with RNT processes (Seshadri et al., 2021). Taken together, our results suggest RNT content plays an important role in understanding the relationship between RNT engagement and symptoms of anxiety and depression, and need not be neglected in understanding the essence of RNT.

Although our findings are well powered and statistically significant, there are aspects of our methodology which could be improved upon. Firstly, it is possible that our results are limited by sampling and psychometric constraints. Our structural equation model showed scores on the SPIN contributed the most weight to the factor of symptom severity, followed by PHQ-8 and GAD-7 scores which contributed an equal amount. As such, it is possible that our sample, specifically a non-clinical student sample, biased our results in favour of positive findings relating to social anxiety. Prior research has indicated that levels of social anxiety are often higher in undergraduate samples (Carleton et al., 2010), possibly due to the social pressures of university life (Purdon et al., 2001; Russell & Topham, 2012). However, if our study utilized a clinical sample, it is possible that GAD and MDD symptoms may have contributed more weight to the factor of symptom severity, potentially changing the overall results of the content and process paths within our model. Additionally, and as previously mentioned, the RRS short form

scale that was used in our study demonstrated the weakest internal consistency value of all the measures in our sample (see Table2). Treynor et al. (2003) note that the low internal consistency value is due to the low overall number of items contained within the test. Despite the RRS being a valid measure of depression symptoms, it is possible that use of the short form rather than full scale RRS is in part responsible for the larger *p* values associated with the statistically significant relationship between the RRS scores and SPIN scores. Similarly, it is possible that the PTQ may have accounted for less additional variance over and above the RRS when explaining depression symptoms had we used the full scale RRS.

Secondly, our study employed a cross sectional design as a means to test whether a transdiagnostic measure of RNT would explain more variance than disorder-specific questionnaires of RNT when predicting symptom severity. As such, our findings do not assess the causal nature of this relationship. Future research should build upon our findings by employing experimental and longitudinal designs to evaluate causality over time. For instance, Kim and Newman (2023) recently employed a paradigm to evoke symptoms of worry and rumination in a non-clinical sample of undergraduates. Specifically, participants were asked to write down five stories that made them ruminate, worry, or relax depending on which experimental condition they were assigned to. Participants then engaged with those stories for one minute, and rated their levels of rumination, worry, or relaxation on a 9-point Likert scale from 0 (not at all) to 8 (extremely). If the stories successfully evoked worry, rumination, and relaxation (i.e., score of at least 4 out of 8, and at least 3 points higher than non-desired cognitive processes), then they were used in the experimental manipulation. An experimental manipulation of this nature could easily be adapted to include PEP as an RNT subtype to be explored, thus furthering evidence that PEP, worry, and rumination are all manifestations of the same

underlying cognitive process. Similarly, Kim and Newman's (2023) design benefits from displaying high ecological validity, such that researchers can appropriately evaluate how individual participants process personally relevant stimuli as emotionally salient or non-salient (Ashbaugh & Radomsky, 2007; Radomsky et al., 2001).

Thirdly, the inclusion of a network analysis is another possible avenue by which our analysis plan could be improved upon. Using an analysis of this kind to visualize changes in co-occurring symptom networks before and after experimental manipulation of RNT would provide further evidence that the transdiagnostic model of RNT is better understood from a network perspective of psychopathology rather than the more traditional medical model. Future research may wish to include a network analysis as part of their data analysis plan when using an experimental design.

Lastly, it should be noted that our study was based on the transdiagnostic model of RNT. Yet, symptoms of other disorders such as obsessive compulsive disorder (OCD) are also characterized by similar repetitive and uncontrollable thoughts. These thoughts, clinically referred to as obsessions (Singh et al., 2023), are not assumed to be theoretically associated with the transdiagnostic conception of RNT, nor are they measured by the likes of the PTQ or RTQ which were designed to measure worry, rumination, and PEP, not OCD. However, research has documented that obsessions and worries share similar features. Neuroimaging data has documented decreased functional connections between areas within the default mode network (DMN), which is associated with self-referential thought and the attentional salience network (Geffen et al., 2022; Gerlach et al., 2021) such that the more one worries or obsesses, the less one is able to shift attention away from internal experience. Similarly, findings from clinical samples reveal that individuals diagnosed with GAD engage in more checking behaviours,

typically associated with OCD, as a potential means to mitigate feelings of anxiety (Schut et al., 2001). Meta-analytic evidence also suggests that intolerance to uncertainty, a hypothesized maintenance factor of worry, displays a statistically significant association with symptoms of OCD (r = .50), and MDD (r = .53; Gentes & Ruscio, 2011). Because transdiagnostic questionnaires of RNT were not intended to measure symptoms of OCD, and because of the stated aims of our study, we did not include any measures of OCD symptoms. As such, a final limitation of our study was the absence of OCD related symptoms in our predictive models.

The current study has several implications for future research. First, we believe future experiments should operationalize and quantify RNT as a transdiagnostic construct. It is still common for researchers to use disorder-specific questionnaires to measure RNT. For example, Mısır et al. (2023) found that 29 out of 36 studies included in their systematic review on the functional neurological basis of rumination used some form of the RRS (i.e., either short form of full scale). However, the adoption of transdiagnostic RNT questionnaires may aid researchers in creating more powerful research designs, given that using multiple disorder-specific questionnaires to measure RNT may needlessly increase risks of committing a type I error and inflating multicollinearity metrics. Second, future research should seek to generate transdiagnostic measures of RNT which include content-focused items. Specifically, content-focused items without the use of disorder-specific language. Such tests could further our understanding of the factor structure of RNT, and how both RNT content and processes are associated with transdiagnostic symptoms. Third, future research should also seek to adapt transdiagnostic measures of RNT to include items which measure obsessive thinking, and to establish if such measures reliably explain similar amounts of variance between obsessive thinking and psychological symptom severity. If RNT is truly a transdiagnostic phenomenon as

proposed by Nolen-Hoeksema and Watkins (2011), it would be helpful to know if OCD symptoms are also explained by such transdiagnostic features. Fourth, practitioners (i.e., clinicians, physicians, psychotherapists) should consider administering transdiagnostic RNT questionnaires to their clients if they do not do so already. Using one questionnaire such as the PTQ to assess levels of PEP, worry, and rumination simultaneously provides practitioners with the ethical benefit of not subjecting clients to superfluous testing (Allen et al., 2022). Lastly, future clinical research may wish to investigate the efficacy of different therapeutic modalities which target RNT content and/or process, such as mindfulness-based cognitive therapy (MBCT), acceptance-commitment therapy (ACT), MCT, and CBT. Although it may be beneficial to target RNT related processes first, encouraging clients to address how the content of their thoughts may be associated with different emotional states may help attenuate the severity of anxiety and depression symptoms.

Overall, our study suggests that RNT is a transdiagnostic, cognitive factor which explains how unhelpful, negative, repetitive thoughts are associated with symptoms of psychological disorders such as SAD, GAD, and MDD. Our findings also highlight how RNT can be understood as being comprised of two key sub-factors. The first, that the process of engaging in RNT is related to worse psychological symptoms in and of itself. The second, that the more one thinks about information related to one's symptoms, the more severe one's symptoms are. Although RNT is a powerful explanatory factor in understanding how symptoms of common psychological disorders are related, continued psychometric developments are warranted so as to expand our understanding of how RNT may underlie psychological symptoms of other anxiety and mood disorders.

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Appendices

Appendix A: Correlation Matrix

Correlation Matrix

Variable	PTQ	SPIN	GAD-7	PHQ-8	PSWQ	RRS	PEPQ	RTQ-10
1. PTQ	—							
2. SPIN	0.535***	—						
3. GAD-7	0.721***	0.503***	—					
4. PHQ-8	0.651***	0.487***	0.746***	—				
5. PSWQ	0.735***	0.543***	0.713***	0.543***	—			
6. RRS	0.574***	0.415***	0.547***	0.536***	0.49***	—		
7. PEPQ	0.564***	0.572***	0.547***	0.499***	0.543***	0.457***	—	
8. RTQ-10	0.805***	0.544***	0.685***	0.622***	0.71***	0.633***	0.585***	—

* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix B: Structural Equation Model Output

Factor Loadings

						95% Confidence Interval		Standardized		
Latent	Indicator	Estimate	Std. Error	z-value	*p*	Lower	Upper	All	LV	Endo
RNTcont	RTQ_10_1	1.00	0.00			1.00	1.00	0.78	0.98	0.78
	RTQ_10_2	1.03	0.05	21.19	< .001	0.94	1.13	0.81	1.01	0.81
	RTQ_10_3	1.02	0.05	19.06	< .001	0.92	1.13	0.74	1.00	0.74
	RTQ_10_10	0.89	0.05	18.71	< .001	0.80	0.99	0.73	0.88	0.73
RNTpro	PTQ_1	1.00	0.00			1.00	1.00	0.81	0.86	0.81
	PTQ_2	1.03	0.04	25.42	< .001	0.95	1.10	0.83	0.88	0.83
	PTQ_3	1.13	0.04	25.72	< .001	1.04	1.22	0.84	0.97	0.84
	PTQ_4	0.87	0.05	17.84	< .001	0.77	0.96	0.64	0.75	0.64
	PTQ_5	0.99	0.05	20.04	< .001	0.90	1.09	0.70	0.85	0.70
	PTQ_6	1.05	0.04	25.49	< .001	0.97	1.13	0.84	0.90	0.84
	PTQ_7	1.06	0.04	25.37	< .001	0.98	1.14	0.83	0.91	0.83
	PTQ_8	1.15	0.05	24.01	< .001	1.05	1.24	0.80	0.99	0.80
	PTQ_9	0.99	0.05	19.98	< .001	0.89	1.08	0.70	0.85	0.70
	PTQ_10	1.04	0.05	22.05	< .001	0.95	1.13	0.76	0.89	0.76
	PTQ_11	1.16	0.05	24.70	< .001	1.07	1.25	0.82	1.00	0.82
	PTQ_12	0.95	0.04	21.58	< .001	0.87	1.04	0.74	0.82	0.74
	PTQ_13	1.06	0.05	20.43	< .001	0.96	1.16	0.71	0.91	0.71
	PTQ_14	1.07	0.05	21.14	< .001	0.97	1.17	0.73	0.92	0.73
	PTQ_15	1.03	0.05	21.34	< .001	0.94	1.13	0.74	0.89	0.74
Symp	GAD_To	1.00	0.00			1.00	1.00	0.88	5.10	0.88
	PHQ_To	1.00	0.04	25.50	< .001	0.92	1.07	0.83	5.08	0.83
	SPIN_To	1.89	0.11	16.68	< .001	1.67	2.11	0.61	9.63	0.61

Note. RNTcont = RNT content, RNTpro = RNT process, Symp = Symptom severity, LV = Latent Variable, Endo = Endogenous Variable

Regression Coefficients

						95% Confidence Interval		Standardized		
Predictor	Outcome	Estimate	Std. Error	z-value	*p*	Lower	Upper	All	LV	Endo
RNTpro	Symp	2.762	0.346	7.976	< .001	2.083	3.441	0.47	0.47	0.47
RNTcont	Symp	2.295	0.318	7.217	< .001	1.672	2.918	0.44	0.44	0.44

Note. RNTcont = RNT content, RNTpro = RNT process, Symp = Symptom severity, LV = Latent Variable, Endo = Endogenous Variable

Factor Variances

					95% Confidence Interval		Standardized		
Predictor	Estimate	Std. Error	z-value	*p*	Lower	Upper	All	LV	Endo
RNTpro	0.74	0.06	12.45	< .001	0.62	0.86	1	1	1
RNTcont	0.96	0.09	11.24	< .001	0.79	1.13	1	1	1
Symp	6.61	0.75	8.81	< .001	5.14	8.08	0.25	0.25	0.25

Note. RNTcont = RNT content, RNTpro = RNT process, Symp = Symptom severity, LV = Latent Variable, Endo = Endogenous Variable

Factor Variances

					95% Confidence Interval		Standardized		
Variables	Estimate	Std. Error	z-value	*p*	Lower	Upper	All	LV	Endo
RNTpro - RNTcont	0.69	0.04	12.83	< .001	0.58	0.79	0.82	0.82	0.82

Note. RNTcont = RNT content, RNTpro = RNT process, Symp = Symptom severity, LV = Latent Variable, Endo = Endogenous Variable

Residual Variances

					95% Confidence Interval		Standardized		
Variable	Estimate	Std. Error	z-value	*p*	Lower	Upper	All	LV	Endo
PTQ 1	0.38	0.02	16.62	< .001	0.34	0.43	0.34	0.38	0.34
PTQ 2	0.34	0.02	16.37	< .001	0.30	0.38	0.30	0.34	0.30
PTQ 3	0.39	0.02	16.28	< .001	0.34	0.44	0.29	0.39	0.29
PTQ 4	0.80	0.05	17.48	< .001	0.71	0.89	0.59	0.80	0.59
PTQ 5	0.75	0.04	17.29	< .001	0.66	0.83	0.51	0.75	0.51
PTQ 6	0.35	0.02	16.35	< .001	0.31	0.39	0.30	0.35	0.30
PTQ 7	0.36	0.02	16.38	< .001	0.32	0.41	0.31	0.36	0.31
PTQ 8	0.54	0.03	16.71	< .001	0.48	0.60	0.36	0.54	0.36
PTQ 9	0.74	0.04	17.30	< .001	0.66	0.83	0.51	0.74	0.51
PTQ 10	0.60	0.04	17.05	< .001	0.53	0.67	0.43	0.60	0.43
PTQ 11	0.49	0.03	16.55	< .001	0.43	0.55	0.33	0.49	0.33
PTQ 12	0.54	0.03	17.11	< .001	0.48	0.61	0.45	0.54	0.45
PTQ 13	0.81	0.05	17.25	< .001	0.71	0.90	0.49	0.81	0.49
PTQ 14	0.73	0.04	17.17	< .001	0.65	0.82	0.46	0.73	0.46
PTQ 15	0.66	0.04	17.14	< .001	0.59	0.74	0.46	0.66	0.46
RTQ 1	0.64	0.04	14.49	< .001	0.55	0.72	0.40	0.64	0.40
RTQ 2	0.54	0.04	13.55	< .001	0.46	0.62	0.34	0.54	0.34
RTQ 3	0.84	0.06	15.24	< .001	0.73	0.95	0.46	0.84	0.46
RTQ 10	0.69	0.05	15.43	< .001	0.60	0.78	0.47	0.69	0.47
GAD-7 Total	7.56	0.74	10.24	< .001	6.11	9.00	0.23	7.56	0.23
PHQ-8 total	11.88	0.91	13.09	< .001	10.10	13.66	0.32	11.88	0.32
SPIN Total	156.53	9.36	16.72	< .001	138.18	174.88	0.63	156.53	0.63

Note. LV = Latent Variable, Endo = Endogenous Variable

Appendix C: Consent Form

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CONSENT FORM FOR RESEARCH PARTICIPATION

Title:
Cracking The Repetitive Negative Thinking Code: Keys To Understanding Anxiety And Depression

Researchers

Andrea R. Ashbaugh, Ph.D., C.Psych
Associate Professor
School of Psychology
University of Ottawa

Ryan Aberback (B.A. Hons)
Master's Student
School of Psychology
University of Ottawa

Invitation to Participate: I am invited to participate in the abovementioned research study conducted by Co-investigators Andrea R. Ashbaugh, Ph.D., and Ryan Aberback (B.A.). Portions of this study will be used in Ryan Aberback's Master's Thesis.

Purpose of the Study: The purpose of this study is to better understand how people feel and think about their symptoms of psychological disorders. Data collected during this study will be used to advance the study of thinking styles commonly associated with various mental health conditions including Major Depressive Disorder, and Anxiety Disorders.

Participation: My participation will consist of answering questions about (1) myself, such as my age, self-identified gender, and family income, (2) provide information about my experience with a variety symptoms related to depression and different types of anxiety, as well as my thoughts and feelings surrounding these symptoms. This study will take about 40-50 minutes to complete.

Risks: My participation in this study will entail that I volunteer personal information about my thoughts, feelings, and actions. It is possible that I may experience some emotional discomfort when answering questionnaires related to my thoughts, feelings, and actions. If this is the case, I am encouraged to seek help in my area and/or to email the research assistant (Ryan Aberback) of this study for further assistance. I am also encouraged to consult any of the mental health resources found at the end of the consent form.

Benefits: I can expect no personal benefit from participating in this study. Information gathered in this study will help researchers better under how the ways in which people think and feel about their mental health symptoms affects the severity of such symptoms.

Anonymity: I understand that my identity will remain strictly confidential, and the information collected will be used strictly for research purposes. I understand that an anonymized dataset containing only key study variables may be made available online on a scientific research platform to promote transparency in research. Results will be published in pooled (aggregate) format and presented at professional conferences and in academic journals. The only people who will have access to my identifying information are the research team of Dr. Andrea Ashbaugh at the University of Ottawa. No identifying information, beyond your ISPR number will be collected. Qualtrics, the online survey platform, will also be managed to protect my anonymity. In order to minimize the risk of security breaches and to help ensure my confidentiality, I am encouraged to use standard safety measures such as signing out of my account, closing my browser, and locking my screen or device when I have completed the study.

Conservation of data: The data collected from the questionnaires will be kept in a secure manner. Specifically, it will be stored on Qualtrics servers located in Canada. Electronic data will also be stored on the University of Ottawa server, located on the University of Ottawa campus. More specifically, the data will be saved on a subfolder of the server which is only accessible by members of Dr. Ashbaugh's research team and University of Ottawa IT personnel who might need to manage the server. A regular backup of electronic data will be made onto a password-protected external hard drive. Data may be stored on password protected laptops; only completely anonymized information will be stored in this manner. Anonymized datasets with key study variables may also be placed on a scientific research platform, such as the Open Science Framework, to promote transparency in research. My anonymous data will be stored in these manners indefinitely.

Compensation: In return for my participation in this study, I will be compensated with 1 participant pool credit through ISPR. I will be compensated even if I choose to withdraw from this study.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time without any negative consequences. I can request that my data be removed from the study by e-mailing the principal investigator, Dr. Andrea Ashbaugh

Funding sources: No funding has been received for this research project.

Contacts:
If I have any questions about the study, I may contact the main researcher:
Andrea Ashbaugh

If I have any questions regarding my rights as a study participant, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5

Tel.: (613) 562-5387
E-mail: ethics@uottawa.ca

Consent:
Participants should print a copy of the consent form to keep for their personal records by using the printing function of their browser (**File > Print**).

I confirm that I have read the consent form and understand that I may stop participating in the study at anytime by selecting the "Withdraw" option at the bottom of any page, without loss of compensations. I confirm a) I am at least 17 years old, b) I am proficient in English, and c) that I have read and understand the consent form. By clicking on the button below the list of statements below, I confirm that I am meeting the inclusion criteria and agree to participate in the above-mentioned study.

- Yes, I consent to participate.
- No, I do not consent to participate.

Useful Mental Health Resources:

You can find out more information about mood and anxiety disorders and other mental health problems at the following websites:

- https://mdsc.ca
- https://www.anxietycanada.com/
- https://cmha.ca
- https://cpa.ca/psychologyfactsheets/

If you would like to receive support or help for psychological problems in the Ottawa area, the following resources may be of use:

- Ottawa Distress Centre, 613-238-3311
- Tel-Aide Outaouais, 613-741-6433
- Centre d'Aide 24-7, 819-595-9999

If you are interested in seeking self-help resources, the Association of Behavioral and Cognitive Therapies maintains a searchable database of recommended books for a series of concerns, which can be found online: http://www.abct.org/SHBooks/

Appendix D: Debrief Form

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DEBRIEFING FORM FOR RESEARCH PARTICIPATION

Thank you for participating in our research! Please read the following information and answer the last questions below to submit your data.

Title: Cracking the Repetitive Negative Thinking Code: Keys to Understanding Anxiety and Depression

INVESTIGATORS AND INSTITUTION:
The study you just participated in is being conducted at University of Ottawa by Andrea R. Ashbaugh, Ph.D, C.Psych and Ryan Aberback, B.A. (Hons).

STUDY PURPOSE AND IMPLICATIONS:
The purpose of this study is to better understand the relationship between different types of repetitive negative thinking styles, such as worry and rumination, and symptoms of anxiety and/or depression. Some models of anxiety and depression suggest that there are specific negative thinking styles of different disorders. For example, rumination is believed to be most relevant to depression. Other models of anxiety and depression suggest that a general, common negative thinking style is related to depression and anxiety. The aim of this study is to examine if specific versus general negative thinking styles is predictive of symptoms of depression, generalized anxiety, and social anxiety. Additionally, we are interested in exploring whether the content of those thoughts or the act of thinking those thoughts is associated with more severe psychological symptoms. We are also interested in understanding if one's sensitivity to sharp decreases in mood, such as rapidly going from a happy mood to a sad mood, helps explain why repetitive negative thinking predicts the severity of symptoms of anxiety and/or depression.

We hypothesize that when repetitive negative thinking styles are measured as one overall concept rather than multiple concepts we the severity of an individual's symptoms of anxiety and/or depression can be more accurately predicted. Furthermore, we expect that the more sensitive one is to sharp decreases in mood, the more they will engage in repetitive negative thinking, and the worse their symptoms of anxiety and/or depression will be. Lastly, we are exploring whether the content of someone's repetitive negative thoughts, or the process of thinking those thoughts, leads to more severe psychological symptoms. This research will advance our understanding of the role of negative repetitive thoughts in the maintenance of anxiety and depressive disorders.

Because this is an ongoing study, and some of the information you have learned could bias other people's responses if they knew it at the beginning of the study, we ask you not to discuss the full content of the study to anyone. Thank you!

Thank you again for your participation.

For Further Reading, if interested:

Ehring, T., & Watkins, E. (2008). Repetitive Negative Thinking as a Transdiagnostic Process. *International Journal of Cognitive Therapy - INT J COGN THER*, *1*, 192–205. https://doi.org/10.1521/ijct.2008.1.3.192

Newman, M. G., Rackoff, G. N., Zhu, Y., & Kim, H. (2023). A transdiagnostic evaluation of contrast avoidance across generalized anxiety disorder, major depressive disorder, and social anxiety disorder. *Journal of Anxiety Disorders*, *93*, 102662. https://doi.org/10.1016/j.janxdis.2022.102662

Spinhoven, P., Drost, J., van Hemert, B., & Penninx, B. W. (2015). Common rather than unique aspects of repetitive negative thinking are related to depressive and anxiety disorders and symptoms. *Journal of Anxiety Disorders*, *33*, 45–52. https://doi.org/10.1016/j.janxdis.2015.05.001

Zetsche, U., Bürkner, P.-C., & Schulze, L. (2018). Shedding light on the association between repetitive negative thinking and deficits in cognitive control – A meta-analysis. *Clinical Psychology Review*, *63*, 56–65. https://doi.org/10.1016/j.cpr.2018.06.001

In the course of completing the questionnaires, you may have noticed some emotional discomfort, or become aware of difficulties you are experiencing with anxiety and/or depression. You can find out more information about mood and anxiety disorders and other mental health problems at the following websites:

- https://mdsc.ca
- https://www.anxietycanada.com/
- https://cmha.ca
- https://cpa.ca/psychologyfactsheets/

If you would like to receive support or help for psychological problems in the Ottawa area, the following resources may be of use:

- Ottawa Distress Centre, 613-238-3311
- Tel-Aide Outaouais, 613-741-6433
- Centre d'Aide 24-7, 819-595-9999

If you are interested in seeking self-help resources, the Association of Behavioral and Cognitive Therapies maintains a searchable database of recommended books for a variety of concerns, which can be found online: http://www.abct.org/SHBooks/

If you have any questions related to this study, please contact the researcher:
Andrea Ashbaugh

If you have any questions concerning your rights as a research participant please contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5.
Tel: (613) 562-5387
Email: ethics@uottawa.ca

If you would like to print this page for your records and for future reference, you may do so by using the printing function of your browser (**File > Print**).

Appendix E: ISPR Recruitment Text

Have you ever had thoughts that just seem to play on repeat in your head? Are those thoughts ever negative and directed at yourself? The aim of this study is to better understand the relationship between symptoms of anxiety and depression and patterns of negative thinking.

This study can be completed online through a smart phone or computer. In this study, you will be asked to answer some questionnaires relating to your emotions, thoughts, and times when you felt anxious or sad. Some of these questions may cause you mild discomfort. Please note that for this study, participants should understand written English well. This study will take 40 to 50 minutes to complete

You will receive 1 ISPR credit for participating in this study.

If you would like to receive more information about participating, please contact our research assistant Ryan Aberback

This study is being conducted by Dr. Andrea R. Ashbaugh, Ph.D., C. Psych. and Ryan Aberback, B.A. (Hons).

Appendix F: Sociodemographic Questionnaire

Please read and answer the following questions as honestly and accurately as possible.

1. Age: _____

2. The sex you were assumed at birth:
    - Female
    - Intersex
    - Male
    - Other, please specify… _____
    - I prefer not to answer

3. My gender identity (e.g., gender fluid, gender queer, man, transgender man, transgender woman, woman, etc.) is: _____. Please note that you may leave this section blank if you prefer not to disclose your gender identity.

4. Which ethnic or racial background(s) best describes you (check all that apply)?
    - Asian - East (e.g., Chinese, Japanese, Korean)
    - Asian - South (e.g., Indian, Pakistani, Sri Lankan)
    - Asian - South East (e.g., Malaysian, Filipino, Vietnamese)
    - Black - African (e.g., Ghanaian, Kenyan, Somali)
    - Black - Caribbean (e.g., Barbadian, Jamaican)
    - Black - North American (e.g., Canadian, American)
    - First Nations
    - Indian - Caribbean (e.g., Guyanese with origins in India)
    - Indigenous/Aboriginal not included elsewhere
    - Inuit
    - Latin American (e.g., Argentinean, Chilean, Salvadorian)
    - Métis
    - Middle Eastern (e.g., Egyptian, Iranian, Lebanese)
    - White - European (e.g., English, Italian, Portuguese, Russian)
    - White - North American (e.g., Canadian, American)
    - Mixed heritage (e.g., Black - African and White - North American)
    - (Please specify) _____
    - Other(s) (Please specify) _____
    - Prefer not to answer
    - Do not know

5. Marital Status (select all that apply):
    - Single
    - Common Law or Living together
    - Committed relationship
    - Engaged
    - Married
    - Divorced

- Widowed
- Other, please specify… _____
- I prefer not to answer

6. Number of children: _____

7. Household annual income before taxes:
   - Less than 20,000$ CAD
   - 20,000-39,999$ CAD
   - 40,000-59,999$ CAD
   - 60,000-79,999$ CAD
   - 80,000$ + CAD
   - I prefer not to answer

8. What is your university student status?
   - I am not a student
   - Part-time student (less than 12 credits per semester)
   - Full-time student (12 credits or more per semester)
   - I prefer not to answer

9. What is your occupational status?
   - Not currently employed
   - Part-time employed (25 hours of paid work or less per week)
   - Full-time employed (more than 25 hours of paid work per week)
   - I prefer not to answer

10. Have you *ever* been diagnosed with any of the following mental disorders by a physician or mental health care professional? (Check all that apply)
    - Trauma- or stressor-related disorder (e.g, posttraumatic stress disorder)
    - An anxiety disorder
    - A mood disorder
    - Other, please specify: _____
    - Not applicable. I have never been diagnosed with a mental disorder.
    - I prefer not to answer

11. What is your first language?
    - English
    - French
    - Other, please specify: _____

12. How fluent do you consider yourself to be in English?
    - I am a native speaker or am totally fluent (100%)
    - I understand almost everything (>90%)
    - I understand a lot (>80%)
    - I understand about 70-80%
    - I understand about 50-70%

- I understand less than 50%
-

13. Please indicate the extent to which you agree with the following statement “I feel confident in my driving abilities”.
    - Strongly Agree
    - Agree
    - Somewhat Agree
    - Disagree
    - Strongly Disagree

14. On an average week, I use instant messaging (i.e., SMS, FB messenger, WhatsApp, etc.) to communicate with others.
    - 1-2 days per week
    - 3-4 days per week
    - 5-6 days per week
    - 7 days per week
    - I don’t use text messaging to communicate with others.

15. Please indicate the extent to which you agree with the following statement “I have a lot of experience texting while driving”.
    - Strongly Agree
    - Agree
    - Somewhat Agree
    - Disagree
    - Strongly Disagree

Appendix G: Generalized Anxiety Disorder (GAD- 7)

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

Appendix H: Post-Event Processing Questionnaire - Revised (PEPQ)

During the past few weeks, have you experienced anxiety in a social situation (such as at a party, public speaking, dating, etc.)? If yes, than please answer the questions below. (Respondents will answer using a digital visual analogue scale 0±100)

1) How much anxiety did you experience?
2) After the event was over, did you find yourself thinking about it a lot?
3) Did your memories and thoughts about the event keep coming into your head even when you did not wish to think about it again?
4) Did the thoughts about the event ever interfere with your concentration?
5) Did you find it difficult to forget about the event?
6) Did you try to resist thinking about the event?
7) If you did think about the event, over and over again, did your feelings about the event get worse and worse?
8) Did you ever wish that you could turn the clock back and do it again, but do it better?
9) As a result of the event, do you now avoid similar events and did this event reinforce a decision to avoid similar situations?

Appendix I: Patient Health Questionnaire (PHQ-8)

Over the *last 2 weeks*, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3

Appendix J: Penn State Worry Questionnaire (PSWQ)

Instructions: Rate each of the following statements on a scale of 1 ("not at all typical of me") to 5 ("very typical of me"). Please do not leave any items blank.

	Not at all typical of me				Very typical of me
1. If I do not have enough time to do everything, I do not worry about it.	1	2	3	4	5
2. My worries overwhelm me.	1	2	3	4	5
3. I do not tend to worry about things.	1	2	3	4	5
4. Many situations make me worry.	1	2	3	4	5
5. I know I should not worry about things, but I just cannot help it.	1	2	3	4	5
6. When I am under pressure I worry a lot.	1	2	3	4	5
7. I am always worrying about something.	1	2	3	4	5
8. I find it easy to dismiss worrisome thoughts.	1	2	3	4	5
9. As soon as I finish one task, I start to worry about everything else I have to do.	1	2	3	4	5
10. I never worry about anything.	1	2	3	4	5
11. When there is nothing more I can do about a concern, I do not worry about it any more.	1	2	3	4	5
12. I have been a worrier all my life.	1	2	3	4	5
13. I notice that I have been worrying about things.	1	2	3	4	5
14. Once I start worrying, I cannot stop.	1	2	3	4	5
15. I worry all the time.	1	2	3	4	5
16. I worry about projects until they are all done.	1	2	3	4	5

Appendix K: Perseverative Thinking Questionnaire (PTQ)

In this questionnaire, you will be asked to describe how you typically think about negative experiences or problems. Please read the following statements and rate the extent to which they apply to you when you think about negative experiences or problems.

		never	rarely	sometimes	often	almost always
1.	The same thoughts keep going through my mind again and again.	0	1	2	3	4
2.	Thoughts intrude into my mind.	0	1	2	3	4
3.	I can't stop dwelling on them.	0	1	2	3	4
4.	I think about many problems without solving any of them.	0	1	2	3	4
5.	I can't do anything else while thinking about my problems.	0	1	2	3	4
6.	My thoughts repeat themselves.	0	1	2	3	4
7.	Thoughts come to my mind without me wanting them to.	0	1	2	3	4
8.	I get stuck on certain issues and can't move on.	0	1	2	3	4
9.	I keep asking myself questions without finding an answer.	0	1	2	3	4
10.	My thoughts prevent me from focusing on other things.	0	1	2	3	4
11.	I keep thinking about the same issue all the time.	0	1	2	3	4
12.	Thoughts just pop into my mind.	0	1	2	3	4
13.	I feel driven to continue dwelling on the same issue.	0	1	2	3	4
14.	My thoughts are not much help to me.	0	1	2	3	4
15.	My thoughts take up all my attention.	0	1	2	3	4

Appendix L: Repetitive Negative Thinking Questionnaire (RTQ-10)

In this questionnaire we are interested in understanding how you respond to distressing situations. Please recall how you tend to respond when you feel distressed or upset.

How true (1-5) are each of these statements with respect to your experience **when you are distressed or upset**?

1 Not true at all	2	3 Somewhat true	4	5 Very true

1. I have thoughts or images about all my shortcomings, failings, faults, mistakes.	1	2	3	4	5
2. I have thoughts or images about events that come into my head even when I do not wish to think about them again	1	2	3	4	5
3. I have thoughts or images that "*I won't be able to do my job/work because I feel so badly.*"	1	2	3	4	5
4. I have thoughts or images that are difficult to forget.	1	2	3	4	5
5. Once I start thinking about the situation, I can't stop.	1	2	3	4	5
6. I notice that I think about the situation.	1	2	3	4	5
7. I have thoughts or images of the situation that I try to resist thinking about.	1	2	3	4	5
8. I think about the situation all the time.	1	2	3	4	5
9. I know I shouldn't think about the situation, but can't help it	1	2	3	4	5
10. I have thoughts or images about the situation and wish it would go better.	1	2	3	4	5

Appendix M: Ruminative Response Scale (RRS)

People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you almost never, sometimes, often, or almost always think or do each one when you feel down, sad, or depressed. Please indicate what you generally do, not what you think you should do

1)	Analyze recent events to try to understand why you are depressed	1	2	3	4
2)	Go away by yourself and think about why you feel this way	1	2	3	4
3)	Write down what you are thinking and analyze it	1	2	3	4
4)	Analyze your personality to try to understand why you are depressed	1	2	3	4
5)	Go someplace alone to think about your feelings	1	2	3	4
6)	Think “What am I doing to deserve this?”	1	2	3	4
7)	Think “Why do I always react this way?”	1	2	3	4
8)	Think about a recent situation, wishing it had gone better	1	2	3	4
9)	Think “Why do I have problems other people don’t have?”	1	2	3	4
10)	Think “Why can’t I handle things better?”	1	2	3	4
	Sum = _____	☐	☐	☐	☐

Appendix N: Social Phobia Inventory (SPIN)

Please indicate how much the following problems have bothered you during the past week. Mark only one box for each problem, and be sure to answer all items.

		Not at all	A little bit	Somewhat	Very much	Extremely
1.	I am afraid of people in authority	☐	☐	☐	☐	☐
2.	I am bothered by blushing in front of people	☐	☐	☐	☐	☐
3.	Parties and social events scare me	☐	☐	☐	☐	☐
4.	I avoid talking to people I don't know	☐	☐	☐	☐	☐
5.	Being criticized scares me a lot	☐	☐	☐	☐	☐
6.	Fear of embarrassment causes me to avoid doing things or speaking to people	☐	☐	☐	☐	☐
7.	Sweating in front of people causes me distress	☐	☐	☐	☐	☐
8.	I avoid going to parties	☐	☐	☐	☐	☐
9.	I avoid activities in which I am the center of attention	☐	☐	☐	☐	☐
10.	Talking to strangers scares me	☐	☐	☐	☐	☐
11.	I avoid having to give speeches	☐	☐	☐	☐	☐
12.	I would do anything to avoid being criticized	☐	☐	☐	☐	☐
13.	Heart palpitations bother me when I am around people	☐	☐	☐	☐	☐
14.	I am afraid of doing things when people might be watching	☐	☐	☐	☐	☐
15.	Being embarrassed or looking stupid is among my worst fears	☐	☐	☐	☐	☐
16.	I avoid speaking to anyone in authority	☐	☐	☐	☐	☐
17.	Trembling or shaking in front of others is distressing to me	☐	☐	☐	☐	☐