

THE RELATIONSHIP BETWEEN RUMINATION AND SELF-CONCEPT CLARITY

DANIELLE KATZ

A DISSERTATION SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

GRADUATE PROGRAM IN CLINICAL PSYCHOLOGY

YORK UNIVERSITY

TORONTO, ONTARIO

February 2016

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Abstract

The quest for self-clarity, coherence, and consistency is thought by some to be a frequent motivating factor. Historically, self-focused thought and self-monitoring have been seen as means of increasing self-clarity. However, cross-sectional research has found a negative correlation between one specific type of self-focused thought, rumination, and self-concept clarity. The purpose of the following two research papers was to further examine the relationship between these two variables. The first paper consisted of a laboratory experiment in which rumination was induced and its effects on self-concept clarity were measured. The second paper consisted of an experience sampling study in which the relationship between rumination and self-concept clarity (SCC) was observed over time. Granger Causality Analysis was then used to infer temporal precedence of the variables. Together, these two experiments provide information on both the causal relationship between the variables as well as their naturalistic progression. The results have implications for the study of self-clarity as well as for the clinical treatment of rumination.

Acknowledgments

Thank you to my supervisor Dr. John Eastwood for the many years of insightful and respectful guidance; his enthusiasm and curiosity have been a great source of inspiration. I would also like to thank my committee members for their feedback and suggestions throughout the dissertation process. In particular, I would like to thank Dr. Georges Monette. Without his extensive statistical knowledge and generosity with his time I quite simply would not have had the information or tools necessary to complete this dissertation.

I would like to express my deep gratitude to my parents Robin and Milton, stepfather Frank, and sister Sarah Rachel for their patient, unwavering support throughout my graduate degree.

Many, many thanks to my partner Kevin for his endless supply of kindness and humour.

Lastly, I would like to thank the Social Sciences and Humanities Research Council for providing the generous award that funded this dissertation.

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General Introduction

The topic of this dissertation is the relationship between self-concept clarity (SCC) and self-focused rumination. As both high rumination (e.g. Butler & Nolen-Hoeksema, 1994; Nolen-Hoeksema, 2000; Nolen-Hoeksema, Morrow, & Fredrickson, 1993) and low SCC (e.g. Bigler, Neimeyer, & Brown, 2001; Campbell et al., 1996; Chang, 2001; Lee-Flynn, Pomaki, DeLongis, Biesanz & Puterman, 2011; Schwartz, Klimstra, Luyckx, Hale & Meestra, 2012) have been linked to aspects of low mood and psychopathology, further information on the relationship between these variables could have clinical import. Self-concept clarity refers to the structure of the self-concept and describes the extent to which the self-concept is clearly defined, internally consistent, and stable across time (Campbell, Trapnell, Heine, Katz, Lavalley, & Lehman, 1996). The maintenance of a sense of self-clarity and coherence has been posited to be a universal motivating factor by several separate personality and social psychology theories (Hogg, 2012; Landau, Greenberg, Sullivan, Routledge, & Arndt, 2009; McAdams, 2001; Swann & Burhmester, 2012). We define self-focused rumination as repetitive or intrusive thoughts about the self. Theoretical and research literature has presented multiple definitions and models of rumination (e.g., Nolen-Hoeksema, 1991; Martin & Tesser, 1996; Matthews & Wells, 2004; Watkins, 2008; Watkins & Nolen-Hoeksema, 2014). There are, however, areas of overlap. Each theory describes a thinking pattern that is repetitive in nature, occurs without environmental demands, and is to a certain extent automatic rather than purposeful. Though both SCC and rumination are frequently studied as personality traits, they can also be conceived as states that fluctuate over time (Moberly & Watkins, 2008; Nezlek & Plesko, 2001, Schwartz et al., 2011; Takano & Tanno. 2011).

We predicted that a reciprocal relationship exists between the variables, such that a high frequency of rumination leads to low self-concept clarity, and a high degree of self-concept clarity leads to a lower frequency of rumination. In order to examine this relationship, two research studies were designed. The first study was a laboratory-based experiment. In this study, participants were randomly assigned to engage in either a rumination induction or distraction task. Their level of self-concept clarity was then measured and compared. The second study used experience sampling methodology in order to observe the relationship between the variables as they fluctuate during everyday life. Though presented sequentially, in actuality the studies were analyzed in tandem. The combination of the two methodologies allowed for the study of both the causal relationships between rumination and self-concept clarity as well as their progression in an ecologically valid setting.

This dissertation is organized as two papers, each describing one of the studies. The papers have been formatted in order to meet the requirements for a standard psychology journal. The introduction to the second paper has been abbreviated for the sake of the dissertation in order to avoid unnecessary repetition. Following the two papers, a general discussion addresses the issues that the two papers raise when viewed together, as well as the overall conclusions that can be reached.

The Effect of Rumination on Self-Concept Clarity

The addition of metacognitive theory to the study of rumination has added to our understanding of the mechanisms behind this potentially harmful thought process (Matthews & Wells, 2004; Papageorgiou & Wells, 2001, 2003). Though rumination is frequently experienced as repetitive thoughts that are unintentional or beyond an individual's control, and chronic rumination has been linked to depression (Butler & Nolen-Hoeksema, 1994; Nolen-Hoeksema, 2000; Nolen-Hoeksema, Morrow, & Fredrickson, 1993), people who ruminate often cite reasons to continue ruminating (Papageorgiou & Wells, 2001). One such reason is the belief that ruminating on the self might increase self-insight and clarity (Watkins & Baracaia, 2001). Further exploration of the relationship between self-clarity and rumination may provide important information for clinical interventions that mitigate the effects of harmful rumination.

The link between rumination and self-clarity is not without historical and theoretical precedence. Introspection and self-focused thought have traditionally been seen as one pathway towards self-knowledge. This is a significant motivating factor, as in Western culture a clear and coherent sense of self is highly prized (Peng & Nisbett, 1999). Despite historical precedence, the nature of the relationship between rumination and self-clarity is uncertain. Correlational research has found a negative association between the variables (Campbell et al., 1996; Simsek, 2013). As of yet, no experimental study has examined the causal effect of rumination on self-clarity.

Self-Concept Clarity

Self-concept clarity (SCC) refers to the extent to which an individual's self-beliefs are clearly and confidently defined, internally consistent, and stable (Campbell 1990; Campbell, et al., 1996). As such, SCC refers to perceptions of the structure rather than the content of the self-concept: an individual can have high SCC and yet have consistently negative beliefs about the

self. Despite the theoretical distinction between SCC and self-concept content, high levels of SCC have consistently been associated with high levels of self-esteem (Campbell, 1990; Campbell et al., 1996; Nezlek & Plesko, 2001; Stinson, Wood, & Doxey, 2008). Self-concept clarity has also been negatively associated with aspects of psychopathology, such as depression (Bigler, Neimeyer, & Brown, 2001; Campbell et al., 1996; Chang, 2001; Lee-Flynn, Pomaki, DeLongis, Biesanz & Puterman, 2011; Schwartz, Klimstra, Luyckx, Hale & Meestra, 2012), neuroticism (Campbell et al., 1996), anxiety (Bigler et al., 2001; Schwartz et al., 2012), psychotic-like experiences (Cicero, Becker, Martin, Cocherty, & Kerns, 2013) and prolonged grief disorder (Boelen, Keijsers, & van den Hout, 2012).

State SCC

Self-concept clarity can be considered a trait, or relatively enduring psychological characteristic, as well as a state that changes according to situation and time (Nezlek & Plesko, 2001). Though the majority of studies on SCC conceptualize it as a personality trait, studies that have measured daily changes in SCC (Schwartz et al., 2011) or twice-weekly changes in SCC (Nezlek & Plesko, 2001) have found that SCC levels fluctuate within individuals from one measurement to the next. Given that SCC in part measures stability of the self-concept over time, it is not surprising that low levels of trait SCC have been linked to higher levels of variability in state SCC (Nezlek & Plesko, 2001). Other psychological and social phenomena have also been linked to intra-individual variation in SCC. For example, previous research has found social events, such as the termination of a romantic relationship, can lead to decreases in SCC over time (Slotter, Gardner, & Finkel, 2010; Slotter, Emery, & Luchies, 2014). Another study in which SCC was measured twice-weekly found that negative daily events led to increased negative affect and decreased self-esteem, which in turn predicted decreased state SCC (Nezlek & Plesko,

2001). Thus, in addition to being a personality trait, SCC has been shown to be a state that can fluctuate over time in response to social and psychological variables.

Motivation, Culture and SCC

Several theorists have posited that individuals have an inherent motivation to strive for self-clarity, coherence, and consistency (Hogg, 2012; Landau, Greenberg, Sullivan, Routledge, & Arndt, 2009; McAdams, 2001; Swann & Burhmester, 2012). According to the uncertainty-identity theory, people are motivated to reduce feelings of uncertainty about their identities (Hogg, 2007, 2012). In order to ameliorate self-uncertainty, individuals may increase their identification with social groups (Hogg, 2007, 2012). Rather than stemming from individual differences, uncertainty theory maintains that enduring differences in self-uncertainty are due to social contexts that give rise to self-confusion (Hogg, 2007). Similarly, self-verification theory describes individuals as motivated to maintain a sense of coherence in their self-views (Swann & Burhmester, 2012; Swann & Reed, 1981). People achieve self-coherence through cognitive biases that favour their self-views, as well as by seeking social environments that provide self-confirming feedback (Swann & Burhmester, 2012). Terror management theory (TMT) focuses more specifically on reasons for maintaining self-clarity. Based on TMT, humans use cultural worldviews as protection against thoughts of their own mortality and the terror that such thoughts would cause (Solomon, Greenberg, & Pyszczynski, 2004). The creation of a clear and consistent self-concept would be one such means of denying their own mortality and the self's eventual destruction (Landau et al., 2009). Studies have shown that increasing mortality salience led participants with high need for structure to increase their SCC ratings (Landau et al., 2009).

Despite the aforementioned theories, there are several reasons to question the universality of the drive for self-clarity. Indeed, the past three decades have seen a rise in literature on

cultural differences in self-representation, including in the emphasis on coherence and consistency of the self. The desire for a clear, consistent self may be more strongly emphasized in Western cultures. According to Peng & Nisbett (1999), Western cultures emphasize an Aristotelian approach to logic and contradiction. Individuals in these cultures are more likely to believe that no statement or event can be both true and false, and that every statement is either true or false. In other words, contradictions must be resolved in favour of one argument through the use of logic. Some Eastern cultures may encourage individuals to address contradiction using an entirely different approach, naïve dialecticism. The folk epistemology of naïve dialecticism is comprised of three principles: the world is in constant flux, reality is naturally full of contradictions, and everything is connected (Peng & Nisbett, 1999). These global approaches to processing contradiction can also be applied to how the self is construed. While individuals in Western cultures might emphasize a unitary, consistent and clearly defined self, individuals in naïve dialectical cultures might tolerate selves that have greater amounts of contradictions and are less stable across roles or situations (Spencer-Rodgers, Williams, & Peng, 2010).

The research literature has provided some support for lower SCC in cultures with high naïve dialecticism (Campbell, 1996; English & Chen, 2007; Church, 2008; Suh, 2002). However, findings on culture and SCC depend on context in which SCC is considered. For example, English and Chen (2007) measured self-consistency across social roles and across different types of situations within social roles. They found that Asian Americans showed less self-consistency across social relationships compared to European Americans. On the other hand, there was no significant difference between Asian and European Americans in consistency across situations within specific social roles (English & Chen, 2007). Though SCC is still related to self-esteem and psychological wellbeing in cultures high in naïve dialecticism (Spencer-Rodgers, Peng,

Wang, & Hou, 2004), some studies have found that it is less predictive of these variables than in cultures low in naïve dialecticism (Campbell, 1996; Suh, 2002). Indeed, higher self-esteem ratings in cultures that have low dialecticism could be due to members' need to synthesize self-related information in favour of information that has a positive valence, whereas individuals with high naïve dialecticism may be more tolerant of a self-concept that is simultaneously composed of both positive and negative self-attributes (Spencer-Rodgers et al., 2004).

Self-concept clarity is therefore both a trait and a state that can be influenced by culture, relationships, and life events. What remains uncertain is whether patterns of self-focused thinking, such as rumination, also influence SCC.

Rumination

Rumination is a frequent topic of study in clinical, personality, and cognitive research. Perhaps because of this proliferation of research, rumination has been defined and modeled in many different ways. In the response styles theory (RST) of rumination, Nolen-Hoeksema (1991) defined rumination as repetitive thoughts regarding the symptoms, causes, and consequences of depressive mood. According to RST, ruminating on negative affect and negative cognition creates a maladaptive cycle that amplifies negative mood and impairs problem-solving abilities that might otherwise ameliorate the distress. The degree to which individuals engage in a ruminative response style is viewed as an individual difference. Now occasionally termed “depressive rumination,” this type of rumination predicts onset, severity, and duration of depressive episodes (Butler & Nolen-Hoeksema, 1994; Nolen-Hoeksema, 2000; Nolen-Hoeksema, Morrow, & Fredrickson, 1993).

Other theories of rumination have focused less on the depressive content of ruminative thought and more on discrepancies between an individual's current situation and goal. Based on

control theories of behavior (Carver & Scheier, 1981), these theories stipulate that rumination occurs when goal attainment is frustrated on some level (Martin & Tesser, 1996; Matthews & Wells, 2004; Watkins, 2008). According to Martin and Tesser (1996), ruminative thoughts include any conscious thoughts that revolve around a common instrumental theme in the absence of any immediate environmental demands. These thoughts are unintentional and are believed to arise in response to discrepancy between a goal and a current situation. Though unintentional or repetitive thoughts may cause distress, in general rumination is seen as independent of mood or affect (Martin & Tesser, 1996). In terms of trait-level rumination, Martin and Tesser maintain that individuals differ in their abilities to generate alternate thoughts or alternative paths to goals as well as their ability to relinquish unattained goals. Rumination, on the other hand, is seen as a process that occurs in all individuals when goal attainment is threatened (Martin & Tesser, 1996).

Martin and Tesser's model of rumination is mirrored in several subsequent theories. Matthews and Wells' (1996; 2004) self-regulatory executive function (S-REF) model of rumination expands on Martin and Tesser's theories. According to the S-REF model, ruminative thoughts occur as an attempt to cope with a discrepancy within the self between a current state and a goal state. However, the S-REF model adds a metacognitive component to the theory, namely individuals who ruminate may hold the belief that rumination is an important and effective coping mechanism (Wells & Matthews, 1996). Once they begin ruminating, they might shift to negative metacognitive beliefs, such as that rumination is uncontrollable (Papageorgiou & Wells, 2003). In the S-REF model, rumination is a multifaceted phenomenon that has both a controlled quality as well as an involuntary aspect (Matthews & Wells, 2004). The S-REF models also rejects Martin and Tesser's contention that rumination can be positively-valenced.

Like Martin and Tesser, Matthews and Wells (2004) believe that rumination occurs in non-clinical populations. Rumination contributes to clinical disorders when the individual lacks other coping strategies and the rumination becomes self-perpetuating (Matthews & Wells, 2004).

The goal-discrepancy theory of rumination was further developed by Watkins (2008). Watkins' elaborated control theory (ECT) of rumination includes information about the level of construal in the ruminative thoughts. Individuals who habitually use higher level, abstract construal tend to be more behaviourally consistent across situations as their behaviour is always being aimed towards the same superordinate goals. Individuals who use more situation-specific, concrete construal may be less consistent but more adaptive. Higher-level construals can become problematic when they are not properly operationalized on more concrete levels. Maladaptive rumination might occur when higher level, superordinate goals are not being reached but there is no clear way to operationalize behaviour in order to reach them.

Separate from the goal-disruption theories of rumination are those that emphasize self-focused attention (SFA) and the motivation for rumination. Ingram (1990) defined SFA as awareness of internally generated information. Self-focused attention has since been linked to many types of distress and psychopathology (Ingram 1990; Mor & Winquist, 2002). However, in psychotherapy research, self-focused reflection has been theorized to lead to increased self-awareness, self-knowledge, agency, and positive therapeutic change (e.g., Gendlin, 1962; Miller, Isaacs, & Haggard, 1965; Rennie, 2000; Rogers, 1958). In response to these divergent findings, Trapnell and Campbell (1999) attempted to define what distinguishes adaptive from non-adaptive SFA. They concluded that SFA can be helpful or unhelpful depending on the processes that motivate it. They defined unhelpful SFA as rumination, a series of chronic, repetitive thoughts about the self that are motivated by neurosis rather than by epistemological curiosity

(Trapnell & Campbell, 1999). Furthermore, they conceptualized rumination as a trait-level individual difference (Trapnell & Campbell, 1999). In the questionnaire devised to measure this self-focused rumination, items emphasize the intrusiveness of ruminative thoughts and the individual's lack of control over their ruminative thinking (Trapnell & Campbell, 1999). Subsequent studies have linked this self-focused rumination to depression, anxiety, and other measures of distress (Allan, 2010; Joireman, 2004; Joireman, Parrot, & Hammerslaw, 2002; Simsek, 2013; Takano & Tanno, 2009).

Though the models and definitions of rumination differ, there is also overlap. Each describes a pattern of thinking that is repetitive in nature, that can persist without immediate environmental demands, and that can be unintentional or automatic. Depressive rumination and self-focused rumination also stipulate that the focus of the ruminative thoughts must be the self or aspects of internal experience.

State Rumination

In addition to being studied at the level of individual differences, rumination is also frequently studied as a temporary state. Many studies have used an experience sampling design, in which participants are signaled at multiple time points to indicate their degree of rumination along with other variables (Moberly & Watkins, 2008; Takano & Tanno, 2011) or daily diary methods (Brinker & Dozois, 2009; Ciesla, Reilly, Dickson, Emanuel, & Updegraff, 2012; Dickson, Ciesla, & Reilly, 2012; Gunthert, Cohen, Butler, & Beck, 2005; Puterman, Delongis, & Pomaki, 2010; Starr & Davila, 2012) in order to measure the intra-individual fluctuations of rumination within a day or a week. Across studies, state rumination was found to be predictive of negative affect (Brans, Koval, Verduyn, & Lim, 2013; Brinker & Dozois, 2009; Dickson, Ciesla, & Reilly, 2012; Moberly & Watkins, 2008; Genet & Seimer, 2012; Puterman, Delongis,

& Pomaki, 2010; Takano & Tanno, 2011). Several studies also found that negative affect predicted state rumination (Brans, Koval, Verduyn, & Lim, 2013; Moberly & Watkins, 2008). The relationship between state rumination and negative affect is stronger in individuals who rate themselves high in trait rumination (Puterman, Delongis, & Pomaki, 2010). Experience sampling methodology has also allowed researchers to examine the diurnal shape of rumination change. Specifically, for individuals from a non-clinical population, rumination tends to have a U-shaped pattern with high points in the morning and evening (Moberly & Watkins, 2008; Takano & Tanno, 2011). In individuals who rate themselves as highly depressed, rumination tends to gradually increase throughout the day (Takano & Tanno, 2011).

Relationship between self-concept clarity and rumination

Though self-focused attention has been thought to contribute to self-concept, few studies have examined the relationship between rumination and self-concept clarity. In a self-report study, roughly 25% of individuals who endorsed high amounts of rumination as a coping strategy said that they ruminated in order to understand themselves better (Watkins & Baracaia, 2001). In a separate study, participants who engaged in a rumination induction rated themselves as having gained more self-insight than those who engaged in a distraction induction, suggesting that individuals view rumination as a means of learning about the self and perhaps gaining self-clarity (Lyubomirsky & Nolen-Hoeksema, 1993). However, cross-sectional research has found that trait rumination has a negative association with SCC (Boelen et al., 2012; Campbell et al., 1996; Simsek, 2013). Despite individuals' metacognitive beliefs about the benefits of rumination, self-report trait measures suggest that rumination may have a negative effect on self-clarity or vice versa.

As of yet, no study has observed the causal relationship between rumination and SCC. Instead, we must look to related research literature on rumination. Several studies have linked rumination to types of uncertainty. For example, experimental studies have found that inducing rumination in dysphoric (Lyubomirsky, Tucker, Caldwell, & Berg, 1999) and nondysphoric (Di Schiena, Luminet, Chang, & Philippot, 2013) individuals causes them to voice more uncertainty about their solutions to problems, reduces their decisional confidence following decision making, and increases the degree to which they perceive decision making as difficult (Lyubomirsky et al., 1999; van Randenborgh, de Jong-Meyer, & Huffmeier, 2010). Correlational studies have also shown that trait ruminators tend to be more uncertain and less satisfied with their problem solving while frequently desiring more time to further consider solutions, and that trait ruminators display more decisional dissonance (De Los Reyes, Aldao, Kundey, Lee, & Molina, 2012; Ward et al., 2003). Both trait and state rumination have therefore been linked to increases in uncertainty and decreases in confidence.

While the research on rumination has not specifically studied self-confusion and uncertainty, it is reasonable to expect that ruminating about the self-concept may lead to lower certainty or confidence about the components of the self. It has been found that encouraging participants to think about why they are a certain way, rather than concretely about how they are, causes participant self-ratings to be less consistent and more in line with socially desirable responding, perhaps due to the higher cognitive load that more abstract “why” questions require (Hixon & Swann, 1993). Although this research was concerned with accuracy over time, it also suggests that ruminative self-questioning may cause discrepancies in how individuals view themselves, leading to a lower sense of temporal stability of the self.

Further perspective on the relationship between rumination and SCC can be gained from the developmental literature. When writing about identity formation, Luyckx et al., (2007, 2008) posited that discrepancies between the real and ideal self could spark ruminative exploration in which individuals continue to ask the same identity-focused questions without finding solutions or achieving identity commitment. In turn, people may feel more uncertain about themselves than they did initially. Studies have since found that ruminative exploration is positively associated with identity diffusion and negatively associated with identity commitment (Luyckx, Schwartz, Berzonsky, Soenens, Vansteenkiste, Smits, & Goossens, 2008). Although they describe different self-structures, self-concept clarity and identity commitment have been shown to have a positive reciprocal relationship (Schwartz et al., 2011). One could therefore surmise that the experience of uncontrollable and unproductive rumination could lead individuals to feel less certain about themselves, in turn reducing self-concept clarity.

The question of how self-clarity and self-knowledge is formed has guided psychology since early in the discipline's inception (James, 1892). With more recent research suggesting that lower self-concept clarity is associated with several types of psychopathology, knowledge of the factors that influence self-clarity would have potential clinical benefits. The purpose of this research was to examine the effect of rumination on SCC. We predicted that engaging in a self-focused ruminative task will lead to lower reported levels of SCC compared to engaging in a distraction task. Furthermore, we predicted that the effects of the task will be greater for individuals who were already experiencing some degree of self-confusion.

Method

Participants

Participants consisted of psychology undergraduate students recruited through the undergraduate research participant pool (URPP). Participants were offered one credit towards their final grade in an Introduction to Psychology course. A total of 245 individuals (76% female) completed the online demographic and trait surveys. Of this number, 192 individuals (80% female) participated in the laboratory portion of the study. As the laboratory portion is of particular interest, the remaining demographic information will be provided for those who participated in the laboratory portion. The age range of those who participated in the laboratory study ranged from 17 to 36 years old, with the average age being 19.64 years. See Table 1 for information on participant ethnicity.

Materials

Self-Concept Clarity Scale (SCCS; Campbell et al, 1996). The SCCS is a 12-item measure of the amount to which self-concept is clearly defined, consistent, and stable. Respondents indicated how much they agreed or disagreed with each statement using a five-item scale (1= Strongly Disagree to 5 = Strongly Agree). Example items include, “My beliefs about myself often conflict with one another; reverse scored.” Initial studies of the SCCS have shown the average alpha reliability coefficient to be 0.86 (Campbell et al., 1996). We obtained a Cronbach’s alpha of 0.85 for the SCC scale, 95% CI [0.80, 0.90].

Dialectical Self-Concept. The Dialectical Self Scale (DSS; Spencer-Rodgers et al., 2010) is a self-report measure of naive dialecticism. The DSS has 32 items rated on a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree). Examples of items include “I often find that my beliefs and attitudes will change under different contexts.” Cronbach’s alphas across cultures have been

found to fall in the 0.69 to 0.87 range (Spencer-Rogers et al., 2009). We obtained a Cronbach's alpha of 0.84 for the DSS, 95% CI [0.80, 0.88].

State Self-Concept Clarity. State self-concept clarity was measured in two different formats. The first format ("twoQ SCC") measured state SCC with two self-report items: "I have a clear sense of who and what I am" and "I am not really the person I appear to be." Participants rated the extent to which they agreed with each statement on a 5-point scale (1 = Strongly disagree, 5 = Strongly agree). Participants were instructed to respond to each item based on how they feel in the moment, even if it does not reflect how they generally feel. The items were selected from the Self-Concept Clarity Scale based on their face validity and their adaptability to present-moment experiences. Each item has also been shown to have relatively high factor loadings within the SCCS (Campbell et al., 1996). In a previous study on daily SCC, only the first item was used as a measure of state SCC (Schwartz et al., 2011). We wished to add an item in order to increase reliability of the state SCC measurements. We also successfully used this measure of state SCC in a previous study on daily fluctuations in SCC (Katz & Eastwood, manuscript in preparation). The two items were intermixed amidst three other unrelated items asking about the sharpness of sensations and thoughts, in keeping with the cover story. As the scale consisted of two items, the Spearman Brown coefficient was calculated for reliability (Eisinga, te Grotenhuis, & Pelzer, 2013). The two items had a Spearman Brown coefficient of 0.622.

The second format ("confidence SCC") measured state SCC using a method developed by Campbell (1990) before the SCCS was developed. Based on Campbell's protocol, participants were asked to rate themselves on 15 personality traits. They were then asked to indicate how confident they were in their ratings. As confidence in self-attributes is an aspect of SCC, we used

the confidence ratings as another means of measuring SCC. Cronbach's alpha for the sample was 0.84, 95% CI [0.79, 0.89].

State Rumination. The state rumination measurement was adapted from Takano and Tanno (2011). Participants were asked to briefly record their current thought. They were then asked to rate on 5-point scales whether the thought was about them or something else (1 = Not at all about me, 5 = Entirely about me), the extent to which the thought was intrusive (1 = Very intrusive, 5 = Not at all intrusive), and whether the thought was positive or negative (1 = Very Negative, 5 = Very positive).

Procedure

Participants were told that they were participating in a study examining the relationship between imagination and other personality variables. After providing their consent, they completed the SCCS online as part of a larger series of questionnaires. Participants then attended a laboratory session. They sat in individual rooms. They provided their consent to engage in the research, and then were asked to engage in an "imagination exercise." They were randomly assigned to the rumination or distraction induction condition. Each condition required the participants to focus on a series of statements for eight minutes (See Appendices A and B). In the rumination condition, the statements directed the participant's focus to their physical sensations, emotions, and cognitions (e.g. "Think about trying to understand your feelings"). The distraction induction statements directed participants' attention to objects other than themselves (e.g. "Think about a puddle in the middle of the sidewalk"). Both rumination and distraction induction statements were adapted from Lyubomirsky and Nolen-Hoeksema (1995). The statements differed from Lyubomirsky and Nolen-Hoeksema's inductions in that one rumination statement that seemed to directly focus attention on self-concept clarity was removed, and a distraction

statement was chosen at random and removed in order to maintain an equal number of statements in both inductions. In each condition, the statements were on a series of PowerPoint slides that the participants could flip through at their own rate. Following the inductions, participants completed a manipulation check in which they responded to the state rumination measure. They then completed the two state SCC measures. Finally, participants reported what they believed the study was examining. Participants were then debriefed as to the purpose of the experiment.

Results

The principal investigator coded participant responses on their beliefs regarding the purpose of the experiments. Responses that indicated any kind of relationship between thinking about the self and self-knowledge or clarity were coded as seeing the true purpose of the experiment. Seven participants in total guessed the purpose of the experiment based on these criteria. In order to determine the effect of guessing correctly on the outcome of the study, twoQ SCC was regressed on to the manipulation condition and a variable representing whether or not participants guessed the true purpose of the study correctly (“guessing”). An interaction term between condition and “guessing” was added. A Wald test demonstrated that whether or not participants guessed the true purpose did not add significantly to the model, $F(2, 183) = 0.814, p = 0.445$. Therefore, the responses for the participants who guessed the experiment’s true purpose were included in all analysis.

See Table 2 for information on means and standard deviations of all variables.

A manipulation check was conducted in which state rumination following the manipulation was regressed on manipulation group. Participation in the rumination induction predicted a 1.90 higher level of state rumination compared to participation in the distraction group, $t(188) = 7.60$,

$p < 0.001$. Therefore, the rumination induction appears to have led to higher levels of rumination than the distraction induction. Engagement was added to the model in order to see if it moderated the effect of the rumination manipulation on state rumination. In other words, did the amount to which participants reported engaging in the induction tasks moderate the amount to which the inductions led to rumination. Engagement did not significantly moderate the effect between rumination manipulation and state rumination, $t(164) = -1.814, p = 0.07$.¹

The relationship between the two measures of state SCC was explored. TwoQ SCC was significantly correlated with confidence SCC, $r = 0.250, p < 0.001, 95\% \text{ CI } [0.112, 0.378]$. Responses on twoQ SCC measures were significantly correlated with trait SCC, $r = 0.572, p < 0.001, 95\% \text{ CI } [0.468, 0.660]$. However, responses on confidence SCC were not significantly correlated with trait SCC, $p = 0.124, 95\% \text{ CI } [-0.031, 0.250]$. A regression of twoQ SCC on confidence SCC demonstrated that confidence SCC explained only 6% of the variance in twoQ SCC, ($R^2 = 0.063, F(1, 190) = 12.67, p < 0.001$). As the two measures of state SCC did not seem to be equivalent, they were analyzed separately.

In order to determine the effect of the rumination manipulation on state SCC, twoQ SCC was regressed on manipulation group. A Cook's Distance test indicated that no observations had a distance greater than 0.10, therefore no observation had a large amount of influence on the regression parameters. Manipulation group did not significantly predict level of state SCC in

¹ Of note, engagement was added as a variable after data from 20 participants had already been collected, thus we were unable to calculate the effects of engagement for the entire sample. Nevertheless, these results suggest that the rumination induction increased state rumination regardless of participants' self-reported level of engagement in the manipulation.

participants, $t(188) = -0.319, p = 0.75, 95\% \text{ CI } [-0.563, 0.406]$. Manipulation group also did not predict confidence in self-reported personality traits using confidence SCC measures, $t(188) = 0.658, p = 0.511, 95\% \text{ CI } [-1.819, 3.64]$. Thus, our hypothesis for a main effect of the rumination induction on SCC was not supported.

To test our hypothesis that the rumination induction would affect individuals low in trait SCC to a larger extent than those high in trait SCC, twoQ SCC was regressed on manipulation condition and trait SCC, with an interaction term for manipulation and trait SCC. There was a significant interaction between trait SCC and manipulation condition, $B = 0.063, t(185) = 2.491, p = 0.014$. To further probe the interaction, an L matrix was created that included values of trait SCC at various percentiles. A Wald test indicated that for participants at the fifth percentile of trait SCC, the rumination condition resulted in a 1.047 decrease in state SCC level, $t(185) = 2.622, p = 0.009, 95\% \text{ CI } [-1.836, -0.259]$. For participants at the 25th percentile of trait SCC, the rumination condition still resulted in lower state SCC levels than the distraction condition, $B = -0.515, t(185) = -2.148, p = 0.033, 95\% \text{ CI } [-0.987, -0.042]$. However, for participants at the 50th percentile of trait SCC, there was no significant difference in state SCC following rumination versus distraction inductions, $t(185) = -1.006, p = 0.316, 95\% \text{ CI } [-0.596, 0.194]$. The same could be said for participants at the 75th percentile of trait SCC, $t(185) = 0.708, p = 0.480, 95\% \text{ CI } [-0.312, 0.662]$. Therefore, the rumination induction led to lower state SCC for participants with lower trait SCC, but not for those with higher trait SCC.

The “confidence” measure of state SCC was not significantly predicted by manipulation ($t(183) = 0.419, p = 0.675, 95\% \text{ CI } [0-9.786, 15.068]$) or trait SCC ($t(183) = 0.350, p = 0.727, 95\% \text{ CI } [-0.467, 0.654]$). Trait SCC did not significantly moderate the relationship between

manipulation condition and confidence scores ($t(183) = -0.369, p = 0.713, 95\% \text{ CI} [-0.409, 0.280]$).

Exploratory analysis was then conducted in which DSS was added as a variable to the regression equation. In the new equation, twoQ SCC was regressed on manipulation condition, trait SCC, and DSS score, with an interaction term for manipulation and trait SCC. Dialectical self-concept did not significantly predict changes in state SCC when controlling for all other variables, $t(184) = -1.685, p = 0.0936, 95\% \text{ CI} [-0.024, 0.002]$.

Discussion

The results of this study failed to find evidence that rumination has a universal effect on self-concept clarity. Individuals who were low in trait SCC and were induced to ruminate showed a lower state SCC rating than individuals who were low in SCC and not induced to ruminate. However, the same was not true for individuals with medium or high levels of trait SCC. For individuals with low trait SCC, engaging in rumination may have increased their awareness of their lack of self-clarity. Previous research has shown that rumination can reduce some individuals' sense of certainty (Nolen Hoeksema, 2000; Yook, Kim, Suh, & Lee, 2010; Lyubomirsky et al., 1999; Ward et al., 2003). If we assume that individuals with low SCC experience their lack of clarity as distressing or a problem, then ruminating about themselves might lead them to have a decreased confidence in their ability to know themselves clearly and an increased sense of uncertainty about their self-concept. Beyond drawing attention to pre-existing low SCC, the act of ruminating may have further aggravated the self-confusion. In contrast, individuals with medium or high trait SCC who ruminated about themselves may have had their attention drawn to their strong self-clarity. As their self-clarity is not a problem or a

frustrated goal, the act of ruminating would not have led to increased uncertainty or lack of confidence.

There were no significant interactions when confidence in personality ratings was used as a measure of SCC. Perhaps this can be due to the wording of the personality and confidence items. The two Q SCC items were carefully worded in order to measure state SCC: they asked the participants to rate themselves based on how they felt in the present moment, regardless of how they usually felt. In contrast, the personality traits and confidence questions were not worded to measure here-and-now judgments. They instead asked participants to simply rate themselves on the items and then rate their confidence in their responses. It is therefore very likely that participants were using their knowledge of their personality traits to respond to these items rather than their experiences in the present moment. These confidence ratings would therefore be less likely to be affected by a state rumination induction. One potential flaw in this explanation is that the confidence ratings were also not correlated with trait SCC. Perhaps confidence in personality trait ratings measures only a specific aspect of SCC. If self-concept clarity is the extent to which an individual's self-beliefs are clearly and confidently defined, internally consistent, and stable, confidence in personality trait ratings only partially capture SCC as a concept.

The results of this study have several interesting implications. The research literature on the effects of rumination on certainty has been limited to studies examining decisional dissonance or certainty in self-generated solutions. The decisions and problems that have been studied have concerned events and situations external to the individual. As of yet, no studies have examined the effect of rumination on certainty about the self-concept. Previous research has posited that rumination might be a maladaptive attempt to cope with uncertainty (de Jong-Meyer, Beck, & Riede, 2009; Liao & Wei, 2011). Combined with the existing literature on decisions and

problem solving, the results of this study suggest that ruminating on a topic can inadvertently increase the amount of uncertainty one experiences rather than the reverse. Individuals who ruminate in response to uncertainty about the self-concept may spark a ruminative cycle in which the rumination leads to further self-confusion, leading to further rumination.

Additional knowledge about the mechanisms behind a sense of self-concept clarity can also guide attempts at increasing SCC. Since many Western cultures place a premium on a clear and stable sense of self (Peng & Nisbett, 1999), a low SCC may be a distressing experience for individuals within these cultures. Despite SCC being a culturally located phenomenon, low SCC has also been linked to psychological wellbeing in individuals in more dialectical cultures (Spencer-Rodgers, Peng, Wang, & Hou, 2004), though the predictive ability of SCC in these cultures may be weaker (Campbell, 1996; Suh, 2002). Therefore, for individuals who accept that a high SCC is of value, increasing SCC may influence their sense of wellbeing. Several interventions exist for reducing rumination (e.g. Segal, Williams, & Teasdale, 2013); it is possible that these interventions may also be a means of increasing SCC, or at least prevent further reductions in self-clarity.

There are several limitations to this study. State SCC was not measured prior to the rumination or distraction manipulations. We chose not to measure state SCC before the manipulation as an attempt to minimize the likelihood that participants guess the true purpose of the study. Though we were able to compare state SCC between manipulation groups, we were unable to analyze change in state SCC caused by the rumination induction. As well, we only tested the effect of state rumination on state SCC and not the reverse; it is possible that the two variables have a reciprocal relationship that was not captured in this research. Indeed, a separate study using Granger Causality Analysis on experience sampling data has suggested that when

occurring naturally, fluctuations in SCC temporally precede changes in state rumination (Katz & Eastwood, manuscript in preparation). Finally, this study's sample consisted of undergraduate students, thus potentially limiting the generalizability of these findings. The effect of rumination on SCC may differ for those of older ages that were not captured in our sample, or for individuals from clinical populations.

The findings from this study point to interesting future directions in research. First, researchers can test whether manipulating SCC influences the degree to which individuals ruminate. Such a study would help us understand the nature of the relationship between SCC and rumination, whether it is unidirectional or reciprocal. Applying the study to a clinical sample would also further elucidate the effect of rumination on SCC. For example, does rumination in individuals with depression have a larger effect on SCC than rumination in individuals without depression? Alternately, future research can include a larger range of ages. Young adulthood is a time in which identity and self-concept is explored (Arnett, 2007; Gore & Cross, 2014). It is possible that SCC is less reactive to rumination in individuals of older ages. Lastly, studies can further delineate whether the nature of self-focused attention affects SCC. For example, if the rumination induction was preceded by instructions on how to mindfully and nonjudgmentally direct attention to the self, would individuals with low trait SCC still experience a decrease in state SCC? The results of such a study would have implications for clinical interventions, particularly if the study included participants from a clinical sample.

Conclusion

Self-examination has a history of being viewed as a process towards achieving self-knowledge (e.g., Foucault, 1988). However, the relationship between self-focused thought and self-clarity may be more complex than initially believed. Individuals who ruminate often believe

that it is a helpful coping strategy, and rumination has been thought to be a response to intolerance of uncertainty. Despite these beliefs, the results of this study suggest that self-focused rumination can lead to increased self-confusion in individuals who were already low in self-concept clarity. Rather than solve the self-confusion, rumination appears to aggravate uncertainty about the self-concept.

The Relationship between Self-Concept Clarity and Rumination: An Experience Sampling Study

The definition, composition, and structure of the self have long been a focus of psychological inquiry (Baumeister, 1987). Since the early days of the discipline (James, 1890), psychologists have sought to describe how the self is organized and how the individual experiences the self. Based on current understanding, the self-concept is a multifaceted and dynamic phenomenon that influences information processing, motivation, and behaviour (Markus & Wurf, 1984). Significant amounts of research have focused on the content of the self-concept: is the content an accurate reflection of the self, is it accessible, is it evaluated as positive or negative? Compared to the content of the self-concept, the structure of the self-concept has received less attention. Self-concept structure refers to the clarity and consistency of self-attributes (Campbell, Trapnell, Heine, Katz, Lavalee, & Lehman, 1996). It is the self-concept structure that provides individuals with a sense of clarity about themselves and the perception of consistency within their self-concept and stability over time. Factors that may increase or decrease self-structure coherence are of great interest, as low amounts of self-concept coherence, consistency, and clarity have been linked to negative psychological outcomes (Campbell, Trapnell, Heine, Katz, Lavalee, & Lehman, 1996). Beyond clinical research, information on the factors that influence self-concept structure would provide insight into how individuals gain a sense of clarity and continuity of self.

Self-representations that compose the self-concept are thought to arise partly through self-reflection, self-monitoring, and interactions with others (Markus & Wurf, 1984). However, the relationship between self-focused attention and the perceived clarity of the self-concept is unclear; increased self-focused thinking may consolidate individuals' sense of self, or it may

alert individuals to inconsistencies across their different self-representations, thus decreasing the amount to which they believe they clearly know themselves. Equally, as the self-concept in part motivates behaviour, the degree to which individuals believe they clearly perceive themselves might influence the amount to which they engage in self-focused attention. The purpose of our research is to determine the relationship between one particular type of self-focused thought, namely rumination, and the clarity, confidence, and consistency with which individuals view their self-attributes. This research will in turn help us understand the pathways to self-clarity, and the effects of self-clarity on the way in which we engage in self-focused thought.

The Influence of SCC on Rumination

There are several reasons to predict that rumination may influence SCC (see Paper 1). Of course, the relationship between rumination and SCC may also be reciprocal. The influence of SCC on rumination may be deduced if we return to the original definitions of the variables. According to the self-regulation or goal-discrepancy theories (Martin & Tesser, 1996), rumination occurs when individuals becomes aware of unexpected progress towards their goals. Rumination on the goal will then continue until the individuals achieve their goals or are distracted. Negative rumination occurs when there is a negative discrepancy between a person's ideal self and actual self. Rumination can become additionally maladaptive when the ruminative thoughts are abstract rather than concrete, as they would be less likely to lead to problem solving (Watkins, 2008). By impeding problem solving, abstract ruminative thoughts might therefore decrease the chance of goal attainment, leading to further rumination. Given that in Western culture a unitary, coherent, and stable sense of self is prized (Peng & Nisbett, 1999), one could expect that individuals who are aware of this emphasis on self-clarity but perceive a lack of clarity in themselves would be led to ruminate on this goal discrepancy. As determining a sense

of self-clarity involves higher order, abstract self-evaluations, one could further predict that the self-focused rumination would be unproductive and lead to further negative repetitive thought. Low self-concept clarity combined with an awareness of the cultural importance placed on self-clarity and adoption of self-clarity as a goal could then lead to increased self-focused rumination.

The directional relationship from SCC to rumination is also supported by research on rumination and intolerance of uncertainty. Individuals who are intolerant of uncertainty perceive the state of uncertainty as a highly distressing experience that they must ameliorate or avoid. Traditionally, intolerance of uncertainty has been linked to worry and anxiety disorders (e.g. Dugas, Buhr, & Ladouceur, 2004; Holaway, Heinberg, & Coles, 2006). However, research suggests that rumination may be another maladaptive coping strategy in response to distressing uncertainty (de Jong-Meyer, Beck, & Riede, 2009; Liao & Wei, 2011). Studies have found a correlation between intolerance of uncertainty and rumination (de Jong-Meyer et al., 2009; Liao & Wei, 2011; Yook, Kim, Suh, & Lee, 2010). Though this research is correlational, one could surmise that the rumination is a response to the experience of uncertainty. Rumination may therefore be a maladaptive coping strategy to the distressing experience of uncertainty about the self.

Further elucidation on the potential causal relationship between SCC and rumination can be found in the self-affirmation literature. Self-affirmation theory states that people are motivated to maintain a sense of self-integrity. When an aspect of the self is threatened, people may respond to the threat by self-affirming, meaning that they focus on a separate aspect of the self that restores the sense of integrity (Sherman & Cohen, 2006). If rumination is instigated by a perceived discrepancy between the actual self and ideal self, self-affirmation can potentially end rumination by making other aspects of the self salient that are closer to the ideal self. Indeed,

studies have found that self-affirmation leads to less rumination following failure (Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999). Self-concept clarity and self-affirmation are separate concepts; a self-affirmation is a behaviour whereas self-concept clarity is an evaluation of the structure of the self. However, SCC has been theorized to be a mechanism behind the effects of self-affirmations (Sherman & Cohen, 2006). It is possible that strong SCC allows for greater ease in self-affirmation as alternate aspects of the self are clearer and readily accessible (Bechtoldt, De Dreu, Nijstad, & Zapf, 2010). In turn, the self-affirmation reduces the likelihood of rumination as the goal discrepancy becomes less salient when the focus is shifted to other self-aspects.

Measurement

One of the difficulties with describing the relationship between rumination and SCC is that they have been mainly studied together as personality traits in cross-sectional research. Though this research has suggested correlation between the variables, it cannot describe their temporal progression over time. Furthermore, much of the previous research on SCC has taken place in laboratory environments. The drawback of a laboratory setting is that it prevents researchers from analyzing participants' subjective experiences in their everyday lives. One potential solution to these difficulties would be to use experience sampling methodology (ESM; Csikszentmihalyi & Larson, 1987; Hektner, Schmidt, & Csikszentmihalyi, 2007). In ESM, participants receive multiple signals over the course of a study period. Based on the purpose and variables being studied, study periods can vary from one day to several weeks or months (Csikszentmihalyi & Larson, 1987; Hektner, Schmidt, & Csikszentmihalyi, 2007). Upon receiving each signal, participants respond to a series of items that measure the variables of interest. The benefit of using ESM is that it collects data while participants are in their natural

environments rather than in a laboratory setting (Csikszentmihalyi & Larson, 1987; Hektner, Schmidt, & Csikszentmihalyi, 2007). Further, as the data are gathered at multiple points over time, researchers using ESM are able to study longitudinal relationships between variables. The use of ESM would therefore allow us to study the relationship between rumination and SCC as it unfolds naturally over time.

The Present Research

The purpose of the present research was to examine the temporal progression of SCC and rumination as participants enact their everyday lives. We predicted a negative relationship between rumination and SCC at both the between-subjects and within-subjects level. That is, for each participant at any one time there would be negative association between SCC and rumination. As well, when aggregated across times, participants with higher SCC would have lower rumination. Furthermore, we predicted a feedback relationship between rumination and SCC, such that changes in SCC would predict later changes in rumination and vice versa. Two studies were conducted. The first was a pilot study in order to test the feasibility of the methods and provide a basis for power analysis. The second was a larger scale ESM study in which participants provided twice-daily measurements of rumination and SCC for 28 days.

Study 1: Daily Measurement Pilot

Purpose

The purpose of Study 1 was to test the feasibility of using experience sampling methodology (ESM; Hektner, Schmidt, & Csikszentmihalyi, 2007) in order to examine the relationship between rumination and self-concept clarity over time. Results from the pilot were used for power analysis in order to determine the number of participants needed for a larger scale study.

Method

Participants

Participants were first recruited through the Undergraduate Research Participants Pool (URPP) associated with the Introduction to Psychology course at York University. Students in the Introduction to Psychology course have the option of participating in three hours of psychology research or completing an essay in return for course credit. Participants completed an online survey that included personality trait measurements. At the end of the survey, an announcement appeared that invited participants to participate in a second study and included a link to the recruitment page. However, only three participants signed up after finishing the online survey. We therefore shifted recruitment methods, and recruited through posters and class announcements. Participants were required to own smartphones with Internet access. Nine participants in total were recruited, of whom eight completed the daily surveys (50% female, average age = 21.875). As incentive for completing the study, for each questionnaire participants completed in the first two weeks of data collection they had a ballot entered into a draw for a \$200 gift certificate to the York University Bookstore. For each ballot participants completed over the entire four weeks of data collection they had a ballot entered into a draw for a \$1000 gift certificate to the York University Bookstore.

Daily Measures

State Rumination. The measurement of state rumination was adapted from Takano and Tanno (2011). Participants were asked to briefly record their current thought. They were then asked to rate on a 5-point scale whether the thought was about them or something else (1 = Not at all about me, 5 = Entirely about me), the extent to which the thought was intrusive (1 = Very

intrusive, 5 = Not at all intrusive), and whether the thought was positive or negative (1 = Very Negative, 5 = Very positive).

State Self-Concept Clarity. State self-concept clarity was measured with two items: “I have a clear sense of who and what I am” and “I am not really the person I appear to be.” Participants rated the extent to which they agreed with each statement on a 5-point scale (1 = Strongly disagree, 5 = Strongly agree). Participants were instructed to respond to each item based on how they feel in the moment, even if it does not reflect how they generally feel. The items were selected from the Self-Concept Clarity Scale (SCCS; Campbell et al., 1996) based on their face validity and their adaptability to present-moment experiences. Each item has also been shown to have relatively high factor loadings within the SCCS (Campbell et al., 1996). In a previous study on daily SCC, only the first item was used as a measure of state SCC (Schwartz et al., 2011). We wished to add an item in order to increase reliability of the state SCC measurements.

Adaptation of the Affect Grid (Russell, Weiss, & Mendelsohn, 1989). The Affect Grid is a single-item measure in the form of a 9x9 grid that measures current pleasure/displeasure and arousal/sleepiness. Said to measure “core affect,” the Affect Grid is suitable for multiple daily measurements: unlike distinct emotions such as anger or happiness, core emotion is present and fluctuating throughout the day. Convergent validity for the affect grid has been found through comparisons with other frequently used affect measures, such as the Positive and Negative Affect Schedule and the Profile of Mood States (Kilgore, 1998). Due to the limitations of smartphone technology, as opposed to using a single-item Affect Grid, we deconstructed the grid into its two component concepts, pleasure and arousal. Participants used a 9-point scale in order

to indicate the extent to which they were experiencing high or low arousal, and the extent to which they were feeling pleasant or unpleasant.

Social Interaction. Social interaction was measured with a Yes/No item asking participants if they were engaging in a social interaction at the time they were signaled.

Rumination Subscale of the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999). The RRQ consists of two 12-item questionnaires measuring trait rumination and reflection. Respondents indicated how much they agreed or disagreed with each statement using a five-item scale (1= Strongly Disagree to 5 = Strongly Agree). The Rumination scale is designed to capture a tendency to self-focus that is motivated by perceptions of threat, loss, or injustice. Example items of the Rumination scale include, “Sometimes it is hard for me to shut off thoughts about myself.” The rumination subscale of the RRQ has been shown to have an alpha reliability coefficient equal to 0.90 (Trapnell & Campbell, 1999).

Self-Concept Clarity Scale (SCCS; Campbell et al., 1996). The SCCS is a 12-item measure of the amount to which self-concept is clearly defined, consistent, and stable. Respondents indicated how much they agreed or disagreed with each statement using a five-item scale (1= Strongly Disagree to 5 = Strongly Agree). Example items include, “My beliefs about myself often conflict with one another; reverse scored.” Initial studies of the SCCS have shown the average alpha reliability coefficient to be 0.86 (Campbell et al., 1996).

Procedure

Participants attended orientation sessions in order to learn about the study and consent to participate. Each orientation session had between one and three participants attend. During the orientation session, the consent form was explained in full to each participant. As well, the daily survey items were reviewed, and examples were provided in order to elucidate each item.

Participants then answered the trait questionnaires. Individuals who consented to participate registered for the study with the online program SurveySignal (Hofmann & Patel, 2013). Signals for surveys were scheduled to take place at random times within a specific two-hour time range in the morning, and again within a specific two hour time range in the evening. Participants were given four options of two-hour time ranges in the morning and evening, and were encouraged to pick the time range that would best fit their schedules. Participants then provided SurveySignal with the number for their smartphones (the number was then encrypted from the researcher). Upon registering, participants received a text message from SurveySignal to ensure that the number given was correct. The day after their registration, participants began to receive a single text message at a random time within the morning and evening time ranges specified. The text message included a link to the online survey. The survey used the online platform Qualtrics (Qualtrics, 2013). Participants answered the survey using their smartphones. Each participant answered twice-daily surveys for 28 days. On the final day, participants again completed a survey containing the RRQ and SCCS.

Results of Power Analysis

Analysis was conducted using R (R Core Team, 2013). The packages Spida (Monette, 2012) and NLME (Pinheiro, Bates, DebRoy, Sarkar, & R Development Core Team, 2012) were used for the power simulation. The date and time information from each questionnaire was converted to number of seconds from a set point. The variables of thought valence, thought direction, and thought intrusiveness were combined to create one rumination variable such that negative, intrusive thoughts about the self would result in high rumination. The SCC item “I am not really the person I appear to be” was reversed, and the two SCC items were combined to create an SCC variable. The intraclass correlation coefficients on ranks of variables for

rumination and SCC were sufficiently large to suggest that multilevel modeling was necessary (ranked ICC = 0.202, ranked ICC = 0.619 respectively). In order to obtain standard deviations and approximations of expected effect sizes, a model was created in which SCC was regressed on rumination within and between individuals. The within-individual SCC standard deviation was 1.5, and the between-individuals SCC standard deviation was 1.7. The within-individual rumination standard deviation was 2.5, and the between individual rumination variable was 0.7. The intercept used was 0, and as a starting point, the within and between person effect sizes were 0.5. A power simulation was created using a multilevel model in which a generated y variable was regressed on a generated x variable using the standard deviations obtained from the previous regression. Each simulation used 1000 iterations of the generated model. The sample size and effect sizes were manipulated in order to ascertain an appropriate sample size for the study (see Tables 4 to 11). Based on the power analysis, a sample size of at least 30 participants was determined to be sufficient to reduce the likelihood of type 2 error below 0.5% with within participant and between participant effect sizes of at least 0.3.

Study 2

Purpose

The purpose of Study 2 was to examine the relationship between SCC and rumination over time in a larger sample. The second purpose was to examine the effect of dialectical self-concept on the relationship between rumination and self-concept clarity. We predicted that SCC and rumination will have a reciprocal, negative association, such that higher levels of SCC will predict lower rumination and vice versa. We predicted that the negative relationship between rumination and SCC would be true both within individuals and between individuals. As well, based on findings from previous laboratory-based research (Katz & Eastwood, manuscript in

preparation), the relationship between experimentally-induced rumination and state SCC was moderated by trait SCC. Therefore, we predicted that rumination will be a stronger predictor of changes in state SCC for participants low in trait SCC. Finally, we predicted that self-concept clarity would be lower in individuals with high amounts of naive dialecticism.

Method

Participants

Participants were recruited using two methods. The first method was identical to the more successful recruitment and reward method of Study 1, in that announcements were made in various psychology classes and posters were hung in the psychology building on York University Campus. A total of eight further participants were recruited using this method (62.5% female, average age = 20.5). The second method recruited participants from the Undergraduate Research Participants Pool at York University. Each student had access to a course website that contained a list of recruiting experiments. Students could then use the website to sign up for different studies. To recruit students, we placed a description of this study on the website. Students who participated received three course credits towards their final grade. The description informed students that they needed a smartphone with Internet access in order to participate. A total of 30 participants were recruited using this method (70% female, average age = 20.00).

Daily Measures

The daily measures were identical to those used in Study 1.

Trait Measures

Dialectical Self-Concept. The Dialectical Self Scale (DSS; Spencer-Rodgers et al., 2010) is a self-report measure of Naive Dialecticism. The DSS has 32 items rated on a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree). Examples of items include “I often find that my

beliefs and attitudes will change under different contexts.” Cronbach’s alphas across cultures have been found to fall in the 0.69 to 0.87 range (Spencer-Rogers et al., 2009).

Rumination Subscale of the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999).

Self-Concept Clarity Scale (SCCS; Campbell et al, 1996).

Procedure

For participants recruited through posters and class announcements, procedure was identical to that of Study 2. Participants recruited through the Introduction to Psychology Course’s research website attended two laboratory sessions. During the first session, participants provided verbal and written consent to participate in the study. The study methods were then explained to the participants, and each item from the daily measures questionnaire was reviewed. Participants then completed the trait measures, and signed up with SurveySignal in order to receive the twice-daily text messages that linked to the daily questionnaire. After four weeks, participants in the URPP participant pool returned to the laboratory in order to complete the final survey.

Data Analysis

Multilevel longitudinal analysis was conducted in order to examine the relationship between state SCC and state rumination over time (Verbeke & Molenberghs, 2009; Snijders & Bosker, 2012). The NLME package (Pinheiro, Bates, DebRoy, Sarkar, D., & R Development Core Team, 2012) was used within R (R Development Core Team, 2012) for all model building and regression analyses.

Granger Causality Analysis was used to examine the temporal progression of SCC and rumination (Granger, 1969). Granger causality remains one of the most consistently used

approaches to causal relations between time series (von Eye, Wiedermann, & Mun, 2014). The basis for Granger Causality is that the effect of a variable cannot precede the cause (Lutkepohl, 2005). Granger Causality interprets variable x_t as “causing” variable y_t if the inclusion of former predicts the latter over and above variable y_t 's ability to predict itself (Granger, 1969). If the prediction of variable x_t is also improved with the inclusion of variable y_t , then the relationship between the variables are said to have a feedback relationship (Granger, 1969). If the “causal” relationship is limited to time points in the present such that y_t predicts x_t over and above x_t 's ability to predict itself but y_{t-1} does not, then y_t is said to have an instantaneous causal effect on variable x_t (Granger, 1969).

To help describe his approach, Granger provided the following models:

$$x_t = \sum_{j=1}^m a_j x_{t-j} + \sum_{j=1}^m b_j y_{t-j} + \varepsilon_t$$

$$y_t = \sum_{j=1}^m c_j x_{t-j} + \sum_{j=1}^m d_j y_{t-j} + \eta_t$$

Where where ε_t and η_t are uncorrelated white noise series, and m is a finite number shorter than the given times series. According to Granger Causality, X_t would “cause” Y_t if c_j does not equal zero, and Y_t would cause X_t if b_j does not equal zero. If both c_j and b_j do not equal zero, then it would be a feedback relationship. The instantaneous model would be as follows:

$$x_t = \sum_{j=1}^m a_j x_{t-j} + b_0 y_t + \sum_{j=1}^m b_j y_{t-j} + \varepsilon_t$$

$$y_t = \sum_{j=1}^m c_j x_{t-j} + c_0 x_t + \sum_{j=1}^m d_j y_{t-j} + \eta_t$$

As it is predicated on the notion that cause temporally precedes effect, Granger Causality is perhaps at its most persuasive when the relationship is not merely instantaneous, but rather when

past values of one variable predict present values of the second over and above the second variable's ability to predict itself.

Results

Data from participants in Study 1a was added to the total data, resulting in fifteen individuals recruited for the draw-based study and 30 recruited for the course-credit based study. Participants in the course-credit based study did not significantly differ from those recruited in the draw-based study in terms of gender, $t(31.05) = -0.747$, $p = 0.4606$, 95% CI [-0.417, 0.193], or age, $t(39.83) = 1.160$, $p = 0.253$, 95% CI [-0.655, 2.420]. Due to an error in the SurveySignal software, one participant was signaled five times within an hour on his first day of data collection and then withdrew from the study. His results were therefore removed from the final analysis. The final number of participants in the analysis was therefore 44 (70.4% female). Age of participants ranged from 17 – 29 years old, $M = 20.17$, $SD = 2.51$. Participants from the draw-based group responded to on average 41.13 surveys, while participants in the credit-based group responded to 37.66 surveys. The difference in response rates was not significant, $t(29.30) = 1.05$, $p = 0.30$, 95% CI [-3.28, 10.23]. The draw-based and credit-based groups were combined for further analysis. Of note, a small number of participants in both groups responded to the same survey multiple times without being signaled, perhaps in a mistaken attempt to boost the number of draw ballots or credits they could receive. In these cases, only the data from surveys that responded directly to a signal were included in the analysis. Furthermore, results from all surveys that were completed more than 30 minutes after signal time were removed from the data (44 surveys, or roughly 2.6% of total surveys answered). This resulted in a total of 1645 completed surveys.

Trait Measures

Based on the trait measures taken using the SCCS and RRQ before the daily surveys began, there was a significant negative correlation between trait SCC and trait rumination between participants, $r = -0.507$, $p = 0.007$, 95% CI [-0.743, -0.157]. Due to an error with the signaling software, we were only able to obtain data on the final survey (the 28th survey that included the RRQ and SCCS) for 26 participants. For those participants, there was no significant change in trait rumination, $t(26) = -1.209$, $p = 0.238$, 95% CI[-2.801, 0.727], or trait SCC, $t(26) = -1.683$, $p = 0.104$, 95% CI[-3.538, 0.352] from before to after participation in the ESM study. Participation in the study did not appear to affect trait measures. See Table 3 for means and standard deviations of trait measures.

Model Creation

In order to examine the instantaneous relationship between state SCC and state rumination, a multilevel model was created in which state rumination was first regressed on state SCC. A “time” variable was added in order to control for time since the first survey was administered for each participant. A contextual variable was added in order to represent possible difference between the SCC-rumination relationship at the within-person and between-person levels. Variables with random effects (i.e. the effect of the variable is modeled as varying randomly from participant to participant) included intercept and “time.” A non-parametric smoothing spline with 28 knots was also added as a variable with random effects in order to control for general trend over time. When compared to a model that did not allow for the relationship between the variables over time to differ between participants (i.e. “time” as a variable with random effects), a likelihood ratio test demonstrated a significant difference between the models ($p < 0.001$), and the AIC suggested that the model with “time” as a variable with random effects

was the better fit compared to the model without “time” as a variable with random effects (7338.701 and 7355.318 respectively). An AR(1) term was added to the model in order to account for autoregression within the error term of the model. A likelihood ratio test suggested that the model with an AR(1) did not differ significantly from the model that excluded the AR(1) term, $p = 0.5854$. An AIC comparison indicated that a model including the AR(1) term (7340.403) was a worse fit than a model without the AR(1) term (7338.701). The AR(1) term was subsequently dropped. An unconditional model was tested in which intra-individual slope was added to intercept as a random factor. This model did not differ significantly from the random intercepts model, $p = 0.323$, and an AIC comparison indicated that the random intercepts model was a better fit for the data than an unconditional model (AIC = 6871.556 and AIC = 6875.019 respectively). The random intercepts model was therefore used for all future analysis.

Regression Without Lags

Within individuals, clarity significantly predicted rumination such that a single unit increase in clarity predicted a 0.36 decrease in rumination, $t(1629) = -7.12$, $p < 0.001$, 95% CI [-0.46, -0.27]. This result remained significant when controlling for gender, mood valence, trait SCC, trait rumination, and engagement in social interaction. The contextual variable suggested a “contextual effect” of the clarity variable beyond the within-person effect. Indeed, there was a significant difference in the relationship between SCC and rumination within individuals, and the relationship between SCC and rumination between individuals, $t(42) = 4.24$, $p < 0.001$, 95% CI [0.34, 0.96]. When examining the effect of SCC on rumination between individuals, the variables had a positive relationship that approached significance, $B = 0.29$, $t(42) = 1.90$, $p = 0.05$, 95% CI [0.00, 0.58], thus creating an example of Robinson’s Paradox (Kievit, 2013). Therefore, adjusting for linear effects of time since sampling began and non-linear slow moving changes in

the variables, at any one time increases in SCC predict decreases in rumination. However, individuals who across time tend to be higher in SCC also show a trend towards being higher in rumination.

In order to test our hypothesis that a greater degree of dialectical self as measured by the DSS would predict lower SCC, SCC was regressed on trait DSS in a random intercepts multilevel model. A non-parametric smoothing spline with 28 knots was included as a variable with random effects in the model in order to adjust for the possible effects of slow trends in the variables over time. Time was also included as a variable with random effects. Responses on the DSS did not significantly predict state SCC, $p = 0.834$. Our hypothesis that higher scores on the DSS would be linked to lower SCC was not supported.

Analysis of Lagged Effects

Rumination Regressed on Clarity. In order to determine if lagged clarity predicted present rumination over and above the contribution of past values of rumination, rumination was regressed on lagged and instantaneous values of rumination and clarity. The initial model had three lags of clarity and three lags of rumination. Rumination was also regressed on the “time” variable in order to control for the effect of time when examining the relationship between rumination and clarity. In terms of random effects, a random intercept model was used. A non-parametric smoothing spline with 28 knots was included as a variable with random effects in the model in order to adjust for the possible effect of slow trends in the variables over time. We assume that these slow trends are due to confounding factors and include the spline in order to control for these slow trends when examining the lagged relationship between clarity and rumination. The variable “time” was also included as a variable with random effects in order to adjust for possible differences between participants in the linear relationship between rumination

and time. Finally, the model included a continuous AR(1) term in the error term in order to account for additional autocorrelation in the error term.

In order to reach a satisfactory final model, we examined whether the continuous AR term, the inclusion of time as a variable with random effects, and each lag of rumination and clarity significantly contributed to the model. In terms of the lags, a Wald test indicated that clarity at lags of 2 and 3 and rumination at a lag of 3 did not significantly add to the model, $F(3, 635) = 0.867, p = 0.458$. Clarity at lags 2 and 3 and rumination at lag 3 were subsequently dropped from the model.

Using the new model, a likelihood ratio test comparing the new model with and without the continuous AR indicated no significant difference between the models, $p = 0.874$ and AIC comparisons indicated the model without a continuous AR(1) term was a better fit than the model with AR (AIC = 3114.753, 3116.728 respectively), so the continuous AR term was subsequently dropped from the model. As well, a likelihood ratio test indicated that the models with and without “time” included as a variable with random effects did not differ significantly, $p = 0.192$, and the AIC values indicated that the model without time as a variable with random effects was a better fit (AIC = 3991.482 vs AIC = 3992.177). Time was therefore not included as a variable with random effects.

The final model therefore regressed rumination on instantaneous rumination and clarity, as well as on clarity at a lag of one, rumination at lags one and two, and “time.” Variables with random effects included the smoothing spline.

Controlling for lagged rumination, instantaneous clarity significantly predicted rumination, such that a one point increase in clarity predicted a 0.423 point decrease in rumination, $t(898) = -6.263, p < 0.001$. Clarity at a lag of one also predicted rumination when controlling for lagged

rumination and instantaneous clarity, such that a one point increase in clarity predicted a later 0.204 increase in rumination, $t(898) = 2.935, p = 0.003$. Together, these results suggest that a decrease in clarity from one time point to the next would result in higher rumination than if clarity had stayed constant. Equally, an increase in clarity from one time point to the next would predict lower rumination than if clarity had remained constant.

Clarity Regressed on Rumination. In order to determine if lagged rumination predicted clarity over and above lagged values of clarity, instantaneous clarity was regressed on lagged clarity, instantaneous rumination, and lagged rumination. A random intercept multilevel model was used. Once again, the initial model contained three lags of clarity and three lags of rumination, as well as “time” as a variable with fixed effects. Variables with random effects included rumination, “time” and a smoothing spline with 28 knots. Lastly, a continuous AR(1) term was again added in the error term.

A Wald test indicated that rumination at lags 1, 2, and 3 do not significantly add to the model, $F(3, 635) = 1.515, p = 0.209$. The lagged rumination variables were therefore removed from the model. A subsequent Wald test indicated that clarity at a lag of 3 did not significantly add to the model, $F(1, 642) = 3.382, p = 0.06$. Clarity at a lag of 3 was therefore removed from the model. Using the new model, a likelihood ratio test comparing the new model with and without the continuous AR term indicated no significant difference between the models, $\chi^2 = 1.477, p = 0.224$. A likelihood ratio test demonstrated that the models with and without “time” included as a variable with random effects did not differ significantly, $p = 0.1021$. Time was therefore not included as a variable with random effects.

The final model therefore regressed clarity on instantaneous rumination, clarity at lags of 1 and 2, and time. Variables with random effects included the smoothing spline.

Instantaneous rumination significantly predicted clarity within individuals controlling for all other variables, such that a one point increase in rumination predicted a 0.103 point decrease in clarity, $t(840) = -6.254, p < 0.001$.

Addition of Trait SCC

For the instantaneous model, state SCC was regressed on the “time” variable, state rumination and trait SCC. An interaction term was added between state rumination and trait SCC. The smoothing spline, intercept, and “time” were added as variables with random effects. The interaction between state rumination and trait SCC was significant, $B = 0.02, t(1488) = 2.990, p = 0.003$. Three subsequent regression analyses were used with trait SCC centred around the values 31, 35.5 and 41, representing the first quartile, median, and third quartile scores. All three regression analyses showed a significant, negative relationship between state rumination and state SCC at low ($B = -0.118, t(1488) = -8.532, p < 0.001$), medium ($B = -0.080, t(1488) = -6.729, p < 0.001$), and high ($B = -0.033, t(1532) = -2.141, p = 0.032$) levels of trait SCC. The effect seemed to be stronger at lower levels of trait SCC. Our hypothesis of a stronger negative relationship between state rumination and state SCC in individuals low in trait SCC was therefore supported at the instantaneous level.

Next, a lagged model was created in order to see if the predictive power of lagged rumination was moderated by trait SCC. State SCC was regressed on state rumination, rumination at a lag of one, state SCC at a lag of one, the “time” variable, and trait SCC. An interaction term was added between state rumination at a lag of one and trait SCC. A smoothing spline and the intercept were added as variables with random effects. A likelihood ratio test indicated a significant difference between a model with a continuous AR(1) model versus a model without a continuous AR(1) model, $\chi^2 = 15.573, p < 0.001$. An AIC comparison indicated

that the model with the continuous AR(1) was a better fit than the model without it (AIC = 3215.634, AIC = 3229.209 respectively). The AR(1) model was therefore retained. The interaction between state SCC and lagged rumination was not significant, $B = 0.002$, $t(1042) = 1.157$, $p = 0.247$. In other words, while trait SCC moderates the instantaneous relationship between state rumination and state SCC, state rumination does not predict later changes in state SCC after controlling for all other variables, and trait SCC does not moderate this relationship.

Discussion

The results of Study 2 suggest that within individuals, decreases in clarity predict higher levels of rumination. This supports our hypothesis of a negative relationship between the variables at the within-person level. However, between individuals there is a trend towards a positive relationship between clarity and rumination. The results therefore fail to support our hypothesis that the negative relationship between SCC and rumination would persist when aggregated across time points. One potential reason for these results could be that individuals with low SCC may avoid thinking about themselves in general. Previous research has linked low trait SCC to passive, avoidant coping strategies (Smith, 1996, 2006). While typically rumination is seen as a passive coping strategy associated with avoidance (Moulds, Kandris, Starr, & Wong, 2007; Wenzlaff & Luxton, 2003) when the issue at hand is confusion about the self then highly avoidant individuals may not think about themselves at all, and thus report on average lower rumination levels.

Another potential explanation for these results can be found in Watkins (2008) ECT theory of rumination. According to this theory, rumination is characterized by a tendency to use higher-level, abstract construal when processing information or problem solving (Watkins, 2008). This higher-level construal is also thought to lead the individual to show a greater degree

of behavioural consistency across situations (Watkins, 2008). If an individual is able to perceive their behavior as consistent, they may gain an increased sense of SCC even as their tendency to engage in abstract construal is conducive to rumination.

These results of a trend towards a positive relationship between state SCC and state rumination when aggregated across time contradict previous cross-sectional findings that indicated a negative association between trait SCC and trait rumination (Campbell, 1996). They also contradict the negative correlation that we obtained using the SCCS and RRQ trait measures before the daily measurements were taken. The difference in results may be due to differences in methodologies. Campbell's study (1996) also used the SCCS and RRQ. These questionnaires ask participants to make generalizations about themselves across time and across situations. As they require a degree of abstraction about the self, the measures may have been partly registering a negative or self-deprecating style of response. Using these measures, individuals with negative self-evaluations or self-derogating response style may be more likely to indicate low SCC together with high rumination. In contrast, the state measures in this study asked participants to pay attention to their internal experiences in the here-and-now and disregard how they typically feel. The responses may have therefore been less influenced by participants' general beliefs about themselves and more reflective of how frequently the variables actually co-occur.

The results from the Granger Causality Analysis suggest that changes in SCC temporally precede changes in rumination, supporting our hypothesis. However, our prediction of a feedback relationship between SCC and rumination was not supported. Indeed, while rumination predicted instantaneous SCC (particularly for individuals lower in trait rumination), it did not predict SCC at a lag. As a prediction at a lag is necessary to infer temporal progression, it appears that changes in SCC may precede changes in rumination, but not vice versa. These

results are consistent with the goal-processing or control theories of rumination (Martin & Tesser, 1996). If one accepts the premise that human beings have an inherent motivation to achieve self-clarity, then low state SCC could be perceived as a frustrated goal. Rumination would then occur in response to this goal discrepancy. That lagged rumination did not also significantly predict later SCC is surprising. These findings suggest that a sense of self-knowledge is independent at any one time from the preceding thoughts patterns one had, and instead may be influenced by other factors, such as positive or negative events or mood. Another possibility is that rumination did affect later SCC, but that the effect passed too quickly to be detected by our measures.

Our hypotheses regarding high dialectical self-concept predicting lower state SCC were not supported. Previous research has found that individuals high in naïve dialecticism show SCC equal to those low in naïve dialecticism when asked about their self-clarity in specific relational roles or contexts (English & Chen, 2007). As the state SCC measures used in this study asked participants to focus on how they felt in the moment rather than across all situations, perhaps participants high in naïve dialecticism were focusing on their situation-specific or role-specific sense of themselves. In that case, we would not expect their SCC to diverge from those of participants low in naïve dialecticism. Indeed, this study has provided valuable insight into the effect (or lack thereof) of naïve dialecticism on state self-clarity; while individuals who are high in naïve dialecticism may report lower trait SCC when asked to generalize, at any one time they appear to experience equal levels of state SCC to those who are low in naïve dialecticism.

The results of this study have several important implications. Self-focused rumination has been linked to depression and anxiety, and reducing rumination has been an aim of several types of therapy (e.g.: Segal, Williams, & Teasdale, 2013). Studies 1 and 2 have provided temporal

information about a phenomenon that appears to precede rumination, namely change from high to low state SCC. Indeed, our findings provide additional support for the theory that rumination is a coping response to sensations of uncertainty, in this case uncertainty about the self-concept. While frequent rumination did not appear to affect long-term SCC in our study, other research has described several negative outcomes of habitual rumination. As such, clinicians could explore the presence of any metacognitive beliefs surrounding rumination and self-clarity, as well as introduce other coping mechanisms. Another option would be to introduce the notion of achieving greater tolerance towards the momentary experience of self-uncertainty, such as through mindfulness training.

On a more general note, this study has provided us with real-time information on how individuals react to self-confusion and attempt to make meaning. The search for self-cohesion and consistency has been posited by some theorists to be a universal motivating factor (Heine, Proulx, & Vohs, 2006). Many research studies have examined how self-uncertainty influences group identification, extreme attitudes, or behaviours that affirm the self. This study has added to the existing literature by demonstrating the existence of other internal coping responses to self-confusion, namely changes in the frequency and manner in which the individual thinks about herself.

This study has several limitations. Granger Causality Analysis, despite the name, can at best infer temporal progression. A true experimental study is necessary to infer causation. Despite this limitation, the benefit of an ESM study is that it allows us to observe a person's subjective experiences as they unfold in everyday life (Hektner, Schmidt, & Csikszentmihalyi, 2007); what is lost in causal inference is gained in validity. As well, the sample in this study was limited to undergraduate students, all under the age of 30 with the majority in their early

twenties. University and young adulthood can be a time of identity exploration and shifting (Arnett, 2007; Gore & Cross, 2014). This may reduce our ability to generalize these findings to a population of adults more diverse in age, education, or socioeconomic status. Our choice of signal period can also be a limitation. We chose to use two signals a day rather than more in order to reduce participant burden and prevent response fatigue, particularly to the SCC variable, which in the past has only been studied on a once daily basis. It is possible that further fluctuations in the variables were lost in the time periods between signals. Lastly, this study relied on self-report measures. Future studies may attempt to use less direct measures in order to study the relationship between rumination and SCC.

Based on our results, there are several directions for future research. An experimental study in which self-concept clarity is manipulated and subsequent changes in rumination measured would provide more definitive support for changes from high to low state SCC leading to high state rumination. Equally, additional ESM studies using shorter signal scheduling periods could allow researchers to examine whether important fluctuations in the variables were missed in this study. Researchers could also expand the sample to include a wider demographic of participants in order to observe whether the relationship between rumination and SCC is constant through developmental stages or changes based on age. Lastly, an interesting area of research would be to include a clinical sample in the study, as the relationship between the variables might differ in the presence of psychopathology such as depression.

Conclusions

Based on an experience sampling methodology study, rumination and SCC have a significant negative relationship when viewed within each subject, but across time and subjects there was a trend of state SCC positively predicting state rumination. These results suggest that

the immediate and cumulative impact of the variables might differ. Further, Granger Causality Analysis suggested that changes in SCC temporally precede changes in rumination. Self-focused rumination may therefore be an attempt to cope with self-confusion. The results of this study have provided information as to how a sense of self influences self-focused cognitive patterns. As rumination has been linked to several types of psychopathology, the results of the study could have important implications for clinical interventions.

General Discussion

The purpose of the two papers included in this dissertation was to describe the nature of the relationship between self-concept clarity and rumination using distinct but complementary methodologies. The first paper used a rumination manipulation in order to measure the effect of rumination on SCC compared to distraction. The second paper used ESM in order to describe the temporal relationship between rumination and SCC as they fluctuate during everyday life. The questions addressed in this dissertation arose from a review of the research literature, in which there was evidence to suggest that people believe rumination leads to self-insight (Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2001), as well as findings suggesting a link between uncertainty and rumination (De et al., 2012; Lyubomirsky, Tucker, Caldwell, & Berg, 1999; van Randenborgh, de Jong-Meyer, & Huffmeier, 2010; Ward et al., 2003).

The findings of the two papers suggest that the relationship between SCC and rumination is more complex than a mere negative association. The laboratory study found that state rumination influenced state SCC only when the individual was already low in trait SCC. These results make intuitive sense, as we would expect that individuals who habitually have low confidence in their personal attributes and low sense of stability and coherence in the self-concept would have state SCC that is more reactive. Previous research has shown that those with low trait SCC have greater fluctuations in state SCC (Nezlek & Plesco, 2001). On the other hand, the ESM study found that while there was an instantaneous causation relationship from rumination to SCC that was moderated by trait SCC, based on lagged analysis state SCC seemed to temporally precede state rumination. Furthermore, the ESM study found that while the within-subjects relationship between SCC and rumination was negative, between subjects there was a trend towards SCC positively predicting rumination.

How to interpret these seemingly contradictory results? There are several possible explanations. One potential reason for the difference in results between the laboratory study and ESM findings is that the studies operationalized state rumination differently. In the laboratory study, participants were guided in a self-focusing exercise that lasted eight minutes prior to the measurement of state SCC. In the ESM study, participants were asked about the self-focus, valence, and intrusiveness of the thought they were having prior to being signaled. Both methods have precedence in the research literature (Lyubomirsky & Nolen-Hoeksema, 1995; Takano & Tanno, 2011). The strength of the ESM study was its ability to tap into immediate present-moment experience, without relying on participant recall. However, this meant that the ESM study did not collect information on the duration of the ruminative episode; participants could have been having self-focused thoughts for some time before and after the signal, or the thought could have been fleeting. It is therefore possible that only particularly long sessions of rumination affect SCC levels. Another related explanation for the findings is that the ESM study measured how individuals actually self-focus in everyday life, while the laboratory study required participants to engage in a task that may not actually represent their typical pattern of self-focus. For example, the rumination manipulation directed participants' attention to their physical sensations and emotions, and asked them to think quite deeply about themselves, such as "whether [they] are fulfilled" or "why [they] turned out this way." While we did not attempt a qualitative analysis of the content of the ESM participants' thoughts, it seems unlikely that many were frequently having thoughts on this level of abstraction and self-exploration before being signaled. We could hypothesize that prolonged, intense self-focused rumination leads to shifts in state SCC for individuals low in trait SCC, but that this degree of rumination does not occur frequently during everyday life for a non-clinical undergraduate sample.

Lastly, an explanation for the moderated causal relationship from rumination to SCC found in Paper 1 and the temporal progression from SCC to rumination and lack of feedback relationship found in Paper 2 could be due to the difference in measurement times between the two studies. In the laboratory induction study, the effect of rumination on SCC was measured almost immediately after the induction, following a quick manipulation check. In the ESM study, participants were only signaled twice a day, so the length of time between the measurement of rumination and measurement of its lagged effect on SCC spanned several hours. It is possible that the effect of rumination on state SCC is swifter than our ESM schedule was able to capture. This explanation is supported by the finding that state rumination demonstrated instantaneous causation with state SCC in the ESM study. On the other hand, the lagged effect of state SCC on rumination appears to be long lasting, and could be captured by our sampling methods.

When viewing the two papers simultaneously, we could conclude that a prolonged period of rumination in which individuals are induced to think about themselves quite deeply influences state SCC when state SCC is measured immediately following the rumination induction, though only for participants already low in trait SCC. On the other hand, when viewing rumination as it actually unfolds in the lives of a nonclinical sample, changes in state SCC predict later changes in state rumination, while changes in state rumination only predicts immediate measurements of state SCC. The effects of rumination on SCC may be swift, while changes in SCC appear to have longer lasting effects on patterns of rumination.

Based on the findings of these papers, rumination appears to be used as a coping response to low self-clarity, and is present several hours after the downward shift in self-clarity occurred. This finding is consistent with previous research in which rumination was associated with intolerance of uncertainty, or the tendency to find uncertainty distressing and unacceptable (de

Jong et al., 2009; Liao & Wei, 2011). Given the high importance placed on self-clarity and strong motivation to achieve it, self-uncertainty may be uncomfortable even for those who are usually tolerant of uncertainty. As many people seem to believe that self-focus leads to self-insight, many may have the metacognitive belief that ruminating about the self will lead to greater self-clarity. The negative instantaneous relationship between rumination and SCC as well as the lack of lagged effects of rumination on SCC suggest that this metacognitive belief is incorrect.

Our results also suggest that prolonged, intense periods of rumination lead to immediate and temporarily decreased self-clarity in individuals already low in trait SCC. These results support previous research demonstrating that rumination increases uncertainty, but adds the qualification that uncertainty only increased for those who habitually experience uncertainty about the topic. Rumination does not cause uncertainty about the self if the person feels confident about the self-concept. Instead, rumination appears to leave those with high trait SCC unaffected, and increases uncertainty that is already present in those with low SCC.

The implications and limitations of these papers have already been discussed. However, after considering the papers in unison it becomes additionally evident that this research would be completed by a study in which SCC is experimentally manipulated in order to measure changes in rumination. Such a study would allow us to reach stronger conclusions about the nature and direction of the relationship between the two variables.

Conclusion

The findings of this research suggest that induced rumination leads to lower state SCC in individuals who rate themselves as having low trait SCC. When viewed without manipulation, changes in state SCC appear to have long lasting effect on state rumination, while changes in state rumination appear to only affect instantaneous SCC. Together, these results suggest that rumination could be a coping strategy in response to the experience of self-uncertainty.

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Table 1*Ethnicity Information for Study 1*

Ethnicity	Number	Percentage
Aboriginal	0	0
Arab/West Asian	22	11.458
Black	27	14.062
Chinese	14	7.292
Filipino	9	4.688
Korean	2	1.042
Japanese	0	0
South Asian	47	24.479
Southeast Asian	6	3.125
Latin American	6	3.125
White	51	26.563
Other	8	4.167

Table 2*Means and Standard Deviations for Measures Used in Study 1*

Measure	Mean	Standard Deviation
SCC	35.24	7.947
RRQ	42.08	7.698
DSS	122.6	18.424
Confidence SCC	85.93	9.483
TwoQ SCC	7.182	1.679
State Rumination	8.682	1.968

Note: SCCS = Self-Concept Clarity Scale. RRQ = Rumination-Reflection Questionnaire. DSS = Dialectical-Self Scale. Confidence SCC = Measure of self-concept clarity derived from confidence in personality ratings. TwoQ SCC = measure of state self-concept clarity based on two item questionnaire.

Table 3*Means and Standard Deviations of Trait Measures Used in Study 2*

Measure	Mean	Standard Deviation
SCC	35.88	7.164
RRQ	52.45	6.724
DSS	120.6	18.310

Note: SCCS = Self-Concept Clarity Scale. RRQ = Rumination-Reflection Questionnaire. DSS = Dialectical-Self Scale.

Table 4

Power Simulation Results for $N = 40$, Between Group Effect Size = -0.5, Within Group Effect Size = 0.5

p	Within	Between	Contextual
0.05	1	1	1
0.01	1	0.999	1
0.001	1	0.995	1
1E-04	1	0.977	1

Note: simulation results based on 1000 iterations. Within = likelihood of avoiding Type II error when measuring within subject effects. Between = likelihood of avoiding Type II error when measuring between subject effects. Contextual = likelihood of avoiding Type II error in determining significant difference in slopes between within group effects and between group effects. p = significance criterion. The numbers in the charts represent the proportion of cases where you would reject the null hypothesis.

Table 5

Power Simulations Results for $N = 20$, Between Group Effect Size = -0.5, Within Group Effect Size = 0.5

p	Within	Between	Contextual
0.05	1	0.985	1
0.01	1	0.932	1
0.001	1	0.745	1
1E-04	1	0.487	0.989

Note: simulation results based on 1000 iterations.

Table 6

Power Simulation Results for $N = 20$, Between Group Effect Size = -0.2 Within Group Effect Size = 0.2

p	Within	Between	Contextual
0.05	0.962	0.437	0.889
0.01	0.879	0.219	0.677
0.001	0.651	0.066	0.338
1E-04	0.425	0.015	0.107

Note: simulation results based on 1000 iterations.

Table 7

Power Simulation Results for $N = 20$, Between Group Effect Size = -0.3 Within Group Effect Size = 0.3

p	Within	Between	Contextual
0.05	1	0.733	0.997
0.01	0.999	0.521	0.961
0.001	0.986	0.248	0.806
1E-04	0.949	0.092	0.539

Note: simulation results based on 1000 iterations.

Table 8

Power Simulation Results for $N = 20$, Between Group Effect Size = 0.0, Within Group Effect Size = 0.2

p	Within	Between	Contextual
0.05	1	0.067	0.677
0.01	1	0.02	0.392
0.001	0.99	0	0.121
1E-04	0.946	0	0.025

Note: simulation results based on 1000 iterations.

Table 9

Power Simulation Results for $N = 30$, Between Group Effect Size = -0.3, Within Group Effect Size = 0.3

p	Within	Between	Contextual
0.05	1	0.917	0.999
0.01	1	0.769	0.991
0.001	1	0.493	0.989
1E-04	1	0.262	0.934

Note: simulation results based on 1000 iterations.

Table 10

Power Simulation Results for $N = 40$, Between Group Effect Size = -0.2, Within Group Effect Size = 0.2

p	Within	Between	Contextual
0.05	1	0.756	0.998
0.01	0.997	0.52	0.975
0.001	0.983	0.246	0.885
1E-04	0.926	0.098	0.697

Note: simulation results based on 1000 iterations.

Table 11

Power Simulation Results for $N = 30$, Between Group Effect Size = -0.2, Within Group Effect

Size = 0.2

p	Within	Between	Contextual
0.05	0.999	0.615	0.97
0.01	0.982	0.379	0.876
0.001	0.918	0.139	0.681
1E-04	0.764	0.042	0.402

Appendix A

Distraction induction (Lyubomirsky et al., 1998)

Instructions:

For the next few minutes, try your best to focus your attention on each of the ideas on the following pages. Read each item slowly and silently to yourself. As you read the items, use your imagination and concentration to focus your mind on each of the ideas. Spend a few moments visualizing and concentrating on each item.

- Think about:* and imagine a boat slowly crossing the Atlantic
- Think about:* the layout of a typical classroom
- Think about:* the shape of a large black umbrella
- Think about:* the movement of an electric fan on a warm day
- Think about:* raindrops sliding down a windowpane
- Think about:* a double-decker bus driving down a street
- Think about:* and picture a full moon on a clear night
- Think about:* clouds forming in the sky
- Think about:* the layout of the local shopping center
- Think about:* and imagine a plane flying overhead
- Think about:* fire darting around a log in a fire-place
- Think about:* and concentrate on the expression on the face of the Mona Lisa
- Think about:* a parking lot at a drive-in
- Think about:* two birds sitting on a tree branch
- Think about:* the shadow of a stop sign
- Think about:* the layout of the local post office
- Think about:* the structure of a high-rise office building
- Think about:* and picture the Eiffel Tower
- Think about:* and imagine a truckload of watermelons
- Think about:* the pattern on an Oriental rug
- Think about:* the “man in the moon”
- Think about:* the shape of the continent of Africa
- Think about:* a band playing outside
- Think about:* a group of polar bears fishing in a stream
- Think about:* the shape of the torch on the Statue of Liberty
- Think about:* the shape of the state of California
- Think about:* the way the Grand Canyon looks at sunset
- Think about:* the structure of a long bridge
- Think about:* a train stopped at a station
- Think about:* a lone cactus in the desert
- Think about:* the shape of the country of Italy
- Think about:* a row of shampoo bottles on display
- Think about:* a gas station on the side of a highway
- Think about:* the fuzz on the shell of a coconut
- Think about:* the Presidents' faces on Mount Rushmore

Think about: and picture the UCR watch tower

Think about: a band playing "The Star Spangled Banner"

Think about: the shape of a cello

Think about: a puddle in the middle of a sidewalk

Think about: the shape of the United States

Think about: the baggage claim area at the airport

Think about: the size of the Statue of Liberty

Think about: the shape of a baseball glove

Think about: a freshly painted door

Think about: the shiny surface of a trumpet

Appendix B

Rumination Induction (Lyubomirsky et al., 1998)

Instructions:

For the next few minutes, try your best to focus your attention on each of the ideas on the following pages.

Read each item slowly and silently to yourself. As you read the items, use your imagination and concentration to focus your mind on each of the ideas. Spend a few moments visualizing and concentrating on each item.

Think about: the physical sensations you feel in your body

Think about: your character and who you strive to be

Think about: the degree of clarity in your thinking right now

Think about: why you react the way you do

Think about: the way you feel inside

Think about: the possible consequences of your current mental state

Think about: how similar/different you are relative to other people

Think about: what it would be like if your present feelings lasted

Think about: why things turn out the way they do

Think about: trying to understand your feelings

Think about: how awake/tired you feel now

Think about: the amount of tension in your muscles

Think about: whether you are fulfilled

Think about: your physical appearance

Think about: whether you feel stressed right now

Think about: the long-term goals you have set

Think about: the amount of certainty you feel

Think about: your present feelings of fatigue/energy

Think about: possible explanations for your physical sensations

Think about: how hopeful/hopeless you are feeling

Think about: the level of motivation you feel right now

Think about: the degree of helplessness you feel

Think about: the degree of calmness/restlessness you feel

Think about: the possible consequences of the way you feel

Think about: what your feelings might mean

Think about: how sad/happy you are feeling

Think about: the expectations your family has for you

Think about: why your body feels this way

Think about: why you get this way sometimes

Think about: how passive/active you feel

Think about: what people notice about your personality

Think about: the kind of student you are and wish you were

Think about: how weak/strong your body feels now

Think about: the degree of relaxation/agitation you feel

Think about: the kind of person you think you should be

Think about: the degree of control you feel right now

Think about: what would happen if your current physical state lasted

Think about: sitting down and analyzing your personality

Think about: why you turned out this way

Think about: the things that are most important in your life

Think about: how quick/slow your thinking is right now

Think about: the degree of decisiveness you feel

Think about: trying to understand who you are

Think about: how you feel about your friendships

Think about: whether you have accomplished a lot so far

Appendix C

The Rumination and Reflection Questionnaire

(Trapnell & Campbell, 1999)

For each of the following statements, please indicate your level of agreement or disagreement by clicking one of the scale categories underneath the statement.

1. My attention is often focused on aspects of myself I wish I'd stop thinking about.
2. I always seem to be "re-hashing" in my mind recent things I've said or done.
3. Sometimes it is hard for me to shut off thoughts about myself.
4. Long after an argument or disagreement is over with, my thoughts keep going back to what happened.
5. I tend to "ruminate" or dwell over things that happen to me for a really long time afterward.
6. I don't waste time re-thinking things that are over and done with.
7. Often I'm playing back over in my mind how I acted in a past situation.
8. I often find myself re-evaluating something I've done.
9. I never ruminate or dwell on myself for very long.
10. It is easy for me to put unwanted thoughts out of my mind.
11. I often reflect on episodes in my life that I should no longer concern myself with.
12. I spend a great deal of time thinking back over my embarrassing or disappointing moments.
13. Philosophical or abstract thinking doesn't appeal to me that much.
14. I'm not really a meditative type of person.
15. I love exploring my "inner" self.
16. My attitudes and feelings about things fascinate me.
17. I don't really care for introspective or self-reflective thinking.
18. I love analyzing why I do things.
19. People often say I'm a "deep," introspective type of person.
20. I don't care much for self-analysis.
21. I'm very self-inquisitive by nature.
22. I love to meditate on the nature and meaning of things.
23. I often look at my life in philosophical ways.
24. Contemplating myself isn't my idea of fun.

Participants respond on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Self-Concept Clarity Scale

(Campbell & Trapnell, 1996)

For each of the following statements, please indicate your level of agreement or disagreement by clicking one of the scale categories underneath the statement.

1. My beliefs about myself often conflict with one another
2. On one day I might have one opinion of myself and on another day I might have a different opinion.
3. I spend a lot of time wondering about what kind of person I really am.
4. Sometimes I feel that I am not really the person I appear to be.
5. When I think about the kind of person I have been in the past, I'm not sure what I was really like.
6. I seldom experience conflict between the different aspects of my personality.
7. Sometimes I think I know other people better than I know myself.
8. My beliefs about myself seem to change very frequently.
9. If I were asked to describe my personality, my description might end up being different from one day to another.
10. Even if I wanted to, I don't think I could tell someone what I'm really like.
11. In general, I have a clear sense of who and what I am.
12. It is often hard for me to make up my mind about things because I don't really know what I want.

Participants respond on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

State Rumination Measure (Takano & Tanno, 2011):

In a brief sentence, what were you thinking about before you were signaled?

To what extent were you....

1. Thinking about yourself?
2. Having thoughts that were difficult to control?
3. Having thoughts that were unpleasant?

Participants respond on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*very much*).

State Self-Concept Clarity (adapted from Campbell & Trapnell, 1996):

Please respond to the following statements based on how you feel right now about yourself and your life, even if it does not reflect how you usually feel:

1. You had a clear sense of who and what you were
2. You are not really the person you appear to be

Participants respond on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*)

Social Interaction

Were you engaging in a social interaction at the time you were signaled?

Affect

On a scale from 1 – 9, how high is your current arousal level? (1 = very low arousal, 9 = very high arousal)

On a scale from 1 – 9, with 1 being "Very unpleasant" and 9 being "Very pleasant," how pleasant or unpleasant are you currently feeling?

- DT30 I have a hard time making up my mind about controversial issues.
- DT31 When two of my friends disagree, I usually have a hard time deciding which of them is right.
- DT32 There are always two sides to everything, depending on how you look at it.

OFFICE OF
RESEARCH

Appendix D

Certificate #: 2013 -
241

Approval Period: 08/30/13-
08/30/14

ETHICS

Memo

(ORE)

To: Ms. Danielle Katz, Faculty of Health
Professor John Eastwood, Faculty of Health

5th Floor,

Kaneff Tower

From: Alison M. Collins-Mrakas, Sr. Manager and Policy Advisor, Research Ethics
(on behalf of Duff Waring, Chair, Human Participants Review Committee)

Date: **Friday, August 30, 2013**

Re: Ethics Approval

The relationship between self-concept clarity, rumination, reflection and affect
over time

I am writing to inform you that the Human Participants Review Sub-Committee has reviewed and approved the above project.

Should you have any questions, please feel free to contact me at: [REDACTED] or via email at: [REDACTED]

Yours sincerely,

Alison M. Collins-Mrakas M.Sc., LLM
Sr. Manager and Policy Advisor,
Office of Research Ethics

Memo

Certificate #: 2014 -
014

Approval Period: 01/13/14-
01/13/14

ETHICS To: Ms. Danielle Katz, Graduate Student of Psychology, Faculty of Health,
(ORE) [REDACTED]
Professor John Eastwood, Psychology, Faculty of Health, [REDACTED]

5th Floor, From: Alison M. Collins-Mrakas, Sr. Manager and Policy Advisor, Research Ethics
(on behalf of Duff Waring, Chair, Human Participants Review Committee)

Kaneff Tower Date: **Monday, January 13, 2014**

Re: Ethics Approval

The relationship between self-concept clarity, rumination, reflection and affect over time (part 2)

I am writing to inform you that the Human Participants Review Sub-Committee has reviewed and approved the above project.

Should you have any questions, please feel free to contact me at: [REDACTED] or via email at: [REDACTED].

Yours sincerely,

Alison M. Collins-Mrakas M.Sc., LLM
Sr. Manager and Policy Advisor,
Office of Research Ethics

**Memo**

Certificate #:	2014 - 246
Approval Period:	08/29/14-08/29/15

To: Ms. Danielle Katz, Graduate Student of Psychology, Faculty of Health, [REDACTED]

OFFICE OF RESEARCH ETHICS
From: Alison M. Collins-Mrakas, Sr. Manager and Policy Advisor, Research Ethics
(on behalf of Duff Waring, Chair, Human Participants Review Committee)

Date: **Friday, August 29, 2014**

ETHICS Re: Ethics Approval

(ORE)

The relationship between self-concept clarify and rumination: Which comes first?

5th Floor,

Kaneff Tower

I am writing to inform you that the Human Participants Review Sub-Committee has reviewed and approved the above project.

Should you have any questions, please feel free to contact me at: [REDACTED] or via email at:

[REDACTED]

Yours sincerely,

Alison M. Collins-Mrakas M.Sc., LLM
Sr. Manager and Policy Advisor,
Office of Research Ethics