Exploring Rumination in Older Adults With and Without Signs of Dementia

A Thesis
Submitted to the Faculty
of the Psychology Department

of
Washburn University

in partial fulfillment of
the requirements for

MASTERS OF ARTS

Psychology Department

By

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March 27, 2017
Thesis Approval
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March 2017

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Entitled

EXPLORING RUMINATION IN OLDER ADULTS WITH
AND WITHOUT EARLY SIGNS OF DEMENTIA

be accepted in partial fulfillment for the

MASTER OF ARTS DEGREE

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Acknowledgements

I would like to thank every member of the Washburn Psychology department who fostered my research interests and helped me develop the necessary skills to complete my thesis. I would especially like to thank Dr. Schmalzried for her indispensable support throughout the last two years and integrating me to the field of aging psychology. I have grown as a student, researcher, and future clinician under the guidance of Dr. Schamlzried. Additionally, I am thankful for all the guidance and feedback that Dr. Provorse and Dr. Wooldridge provided me in the development of my thesis. Without the help of my committee members, my thesis would not have existed. I would also like to thank Ryan Smalley and Caleb Hallauer for all the time and effort taken to collect data with me. Lastly, I am eternally grateful for the love and support my Pop, my parents, Eileen, and my cohort gave me during the highs and lows in the making of this thesis.
Abstract

**Introduction:** Little previous research has examined the connection between aging and rumination. Two seemingly opposing theories were presented as possible predictors and explanations for frequency of rumination, Socioemotional Selectivity Theory (Carstensen, 1999) and Inhibitory Deficit Framework (Hasher & Zacks, 1988). The current study connects these theoretical frameworks to examine rumination patterns in young adults compared to older adults with and without significant cognitive impairment. **Hypotheses:** It was predicted that cognitively healthy older adults would ruminate significantly less than young adults. Additionally, it was predicted that there would be a significant difference in rumination scores between cognitively healthy and impaired older adults. Lastly, it was predicted that rumination would significantly predict frequency of reported cognitive failures. **Results:** The results found that significantly predicted 13% of variance in RRS scores between cognitively healthy older and young adults. Cognitive ability predicted 28% of the variance in RRS scores of older adults with and without cognitive impairment. Lastly, cognitive failure scores significantly predicted 8% of the variance in RRS scores. **Discussion:** The results support all hypotheses and demonstrate that cognitively healthy older adults ruminate significantly less than young adults, supporting the Socioemotional Selectivity Theory (Carstensen, 1999). Yet, dementia-like cognitive impairment in some way impairs older adults’ ability to inhibit intrusive ruminative thoughts, supporting Inhibitory Deficit Framework (Hasher & Zacks, 1988).
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As the United States’ baby boom generation ages, there is more interest in understanding both the normative and abnormal changes that may occur throughout older adulthood. It is well understood that age is often accompanied by various sensory and cognitive losses, but how these vary within the aging experience is less well understood (Baltes & Lindenberger, 1997; Spencer & Raz, 1995). Western culture assumes that more negative affect and cognitions are the inevitable result of old age (Schmidt & Boland, 1986). However, research appears to provide conflicting evidence and theories surrounding this belief. Hasher’s theory of inhibition (1988) supports the idea that older adults experience negative cognition and beliefs at a rate higher than younger adults due to not being able to inhibit irrelevant information. In contrast, Carstensen’s (1999) socioemotional selectivity theory argues that older adults focus on the positive aspects of their life and have more positive cognitions than young adults. To gain greater insight into these conflicting models and aging in general, more research is needed into the interaction between aging and cognition.

Global Cognitive Impairment

The cognitive abilities, especially within older adults, have been shown to be vulnerable to impairment due to physical, psychological, and pharmaceutical factors (Kitching, 2015; Rogers, Wiese, & Rabheru, 2008; Seignourel, Kunik, Snow, Wilson, & Stanley, 2008). Global cognitive impairment is a developmentally-atypical deficit across multiple facets of cognitive abilities. The etiology of cognitive impairment within older adults can vary widely, including cardiovascular disease, traumatic brain injuries, diabetes, hypo/hyperthyroidism, depression, psychosis, and recent surgery (Liao et al., 2016). Of the causes of cognitive impairments, dementia has been a growing area of public and private concern for many older adults. Graham
et al. (1997) found that the prevalence of dementia-related cognitive impairment was approximately 8% within an older adult population. The population of adults over the age of 65 years is growing and accounts for approximately 13% of the United States population (Werner, 2011). Subsequently, research to better understand, prevent, and address dementia is imperative to the health of an aging United States.

**Dementia**

Dementia is a broad, chronic, neurologically rooted disease characterized by advancing deterioration of cognitive functioning, resulting in behavioral difficulties, memory deficits, and cognitive impairments (Alzheimer’s Disease International, 2009; van der Linde, Dening, Matthews, & Brayne, 2014). While dementia has been diagnosed in adults of varying ages, it is most commonly found in older adults (Prince et al., 2013). In recent years, the number of people worldwide diagnosed with dementia appears to be growing dramatically, creating both a public health and personal concern for many aging adults (Alzheimer’s Disease International, 2009). Within North America, the number of individuals with dementia is expected to increase by 151% by 2050; worldwide, the number of people with dementia is estimated to increase by 225% by 2050 (Prince et al., 2013). The apparent dramatic growth of dementia throughout the world calls for more research into understanding and treating the disorder.

The most common types are Alzheimer’s Disease (AD), Vascular Dementia (VaD), and Dementia with Lewy Bodies (DLB; Alzheimer’s Disease International, 2009). Of the types of dementia, AD is the most prominent, accounting for 50% to 75% of cases (Alzheimer’s Disease International, 2009; Nazark, 2011). The symptoms of each type of dementia all have common central features, but often contain symptoms unique to the specific disorder. The central features include neurodegeneration in the hippocampus via the collection of proteins and plaques.
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throughout the brain (Cras et al., 1991; Tsuboi, Uchikado, & Dickson, 2007; Zhao et al., 2014). Cognitive decline is central to the identification and diagnosis of dementia and this decline commonly takes the form of some degree of memory impairment (Alzheimer’s Disease International, 2009; American Psychiatric Association, 2013). As dementia progresses, nearly all forms of memory are impacted, including episodic, semantic, working, and remote memory (Greene, Hodges, & Baddeley, 1995). Past research has supported the idea that the global impairment associated with dementia can often result in memory failures, such as forgetting names, losing important objects, and becoming easily distracted (Rönnlund, Sundstrom, Adolfsson, & Lars-Goran, 2015). While the most pronounced features are cognitive decline and cognitive failures, various other symptoms have been identified and contribute to the overall decline of quality of life in older adults with dementia.

**Mood, Cognition, and Dementia**

In addition to the cognitive component of dementia, there are emotional and cognitive symptoms. Within symptoms related to affect, depression and anxiety are the most common, as 30% to 40% of individuals with dementia also meet diagnostic standards for depression and approximately 35% of individuals experience comorbidity with anxiety (Kitching, 2015; Seignourel, Kunik, Snow, Wilson, & Stanley, 2008). Investigation into the contributing factors to this elevation in mood disturbances has revealed numerous factors that could contribute to a decline in mood. Associated with the biology of the brain, Van der Mussele et al. (2013) found that different variations of dementia and cognitive impairment were associated with varying degrees of mood disturbances. Commonly reported reasons for worry and depressed thoughts include health difficulties, believing one is a burden to family, frustration for memory loss, and difficulties socializing (Riley, Burgener, Buckwalter, 2015). Riley et al. (2015) also found that
societal stigma against dementia and how much individuals internalized them were associated with more significant emotional difficulties. The level of impact that dementia has on the quality of life for those affected, creates a need to research and identify factors that may contribute to negative mood and cognitions. While no current research speaks to the rumination patterns within individuals with dementia, there appears to be some suggestion that if rumination follows other forms of negative affect it would be elevated as compared to less impaired demographics.

**Rumination**

Rumination is the repetitive mental action of reflecting on a self-intensified negative personal experience (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Roy et al., 2016). Based on the level of constructiveness, rumination is categorized into two subtypes, brooding and reflection (Iqbal & Dar, 2015; Olatunji, Naragon-Gainey, & Wolitzhy-Taylor, 2013). Brooding is often described as the more problematic subtype, because of the minimal problem solving skills accessed and utilized (Olatunji et al., 2013). Individuals who brood will often focus on obstacles and abstract persecutory thoughts (Nolen-Hoeksema, Wisco, Lyubomirsky, 2008). Reflection, also known by pondering, is understood as looking into the past for reasons to explain current problems (Nolen-Hoeksema et al., 2008). Rumination has often been associated with depression, acting as both a symptom and an outside influence (Lyubomirsky et al., 1998; Olatunji et al., 2013). Although brooding and reflection are both associated with depression, brooding additionally is associated with long-term depression (Nolen-Hoeksema et al., 2008). Rumination can often take the form of guilt and regret. As an outside factor, rumination can act as a mediator that transforms negative affect into even more severe depression (Iqbal & Dar, 2015). While rumination and worry are highly correlated, rumination is distinct from more general worry because of its focus on past events and tendency to lead to higher levels of
depression whereas worry is more future oriented (Olatunji et al., 2013). The tendency to ruminate is generally seen as maladaptive, and has been linked to cognitive and emotional disturbances including anxiety (Nolen-Hoeksema, 2000), anger (Rusting & Nolen-Hoeksema, 1998), shame (Cheung, Gilbert, & Irons, 2004), impaired concentration (Lyubomirsky, Kasri, & Zehm, 2003), pessimistic thinking (Lyubomirsky & Nolen-Hoeksema, 1995), and decreased feelings of control over one’s life (Nolen-Hoeksema & Jackson, 2001).

Underlying mechanisms of rumination have received relatively scant attention in scholarly research, but some hypotheses have been developed to explain why individuals engage in excessive, and therefore unhealthy, rumination. The Impaired Disengagement Hypothesis proposes that the degree of rumination experienced is moderated by conflict with schemas and level of control over attention (Koster, Lissnyder, Derakshan, & Raedt, 2011). As a result of negative thoughts, two paths can be followed; if high conflict with schemas occurs and there is high control over one’s attention, then the individual will disengage from the negative thinking and cease to ruminate (Koster et al., 2011). Alternatively, if an individual shows low conflict with existing schemas, and low control over their attention when facing negative thoughts, they will continue the negative thoughts in the form of prolonged rumination (Koster et al., 2011). From prolonged rumination, individuals experience impaired problem solving, impairment in task completion, and negative affect, which in turn creates negative self-thoughts and restarts of the ruminative cycle (Koster et al., 2011). With rumination being understood as an interaction between schemas and attention control, it can be conceptualized in the context of other theories that may help explain the application of rumination theories to older adults.
Rumination and Age

As adults age, there is some suggestion that differences in the content and prevalence of rumination exist. Limited research has been dedicated to examining differences in the prevalence of rumination throughout adulthood. The notion that older adults would experience rumination at higher levels than younger adults may stem from the fact that older adults have been alive longer, and therefore have likely accumulated a greater number of negative life events on which to dwell. Secondly, the presence and increasing awareness of normative sensory and cognitive losses experienced by older adults may facilitate negative affect and cognition. However, two studies in separate European samples cast doubt on these assumptions, and found that rumination occurs significantly less in older adults, as compared to young adults (Ricarte, Serrano, Martininez-Lorca, & Latorre, 2015; Sütterlin, Paap, Babic, Kübler, & Vögele, 2012). In addition, it was found that levels of brooding were significantly lower in older adults than in other age groups (Ricarte et al., 2015; Sütterlin et al., 2012). Similar results have been found in a United States sample (Schmalzried, 2012). While some research exists supporting the hypothesis that rumination is less prevalent in older adults, more studies are needed to explore the relationship between age and rumination. In the absence of more evidence, existing theories may provide more insight into age-related differences in the prevalence of rumination.

Conflicting Theories: Inhibitory Deficit Framework vs. Socioemotional Selectivity

With limited research on the prevalence of rumination among older adults, two conflicting theories related to older adults’ affect and thoughts provide plausible, yet contradictory, predictions for the occurrence of rumination. The Inhibitory Deficit Framework theory suggests older adults would ruminate at a level comparable or in excess to younger adults, because of an identified decrease in older adults’ ability to suppress undesired thoughts (Hasher,
Zacks, & May, 1999). In contrast, Socioemotional Selectivity Theory suggests that older adults would ruminate at a level significantly lower than young adults, due to a cognitive preference for positive thoughts and emotions (Carstensen, Isaacowitz, & Charles, 1999; Carstensen, Pasupathi, Mayr, & Nesselroade, 2000). While both of these theories give potential insight into the prevalence of rumination in older adults as compared to younger adults, not only do they propose different explanations for rumination, they posit different outcomes that can be empirically tested.

Socioemotional Selectivity Theory (SST) was developed by Carstensen and colleagues (1999) to explain the interaction between age, perception, thoughts, and emotions. SST postulates that young adults perceive the future as expansive and, as a result, are motivated to create goals that benefit them in the far future (Carstensen et al., 1999). In contrast, older adults recognize their limited time and shift their goals to current wellbeing (Carstensen et al., 1999; Carstensen et al, 2000). The reorientation of motivation and goals towards present wellbeing in older adults may influence the cognitive processing of events, and create a cognitive preference for positive information in memory and attention over negative information (Carstensen, 2005). Therefore, SST suggests older adults would experience negative cognitions, such as rumination, significantly less frequently and severely than younger adults.

Inhibitory Deficit Framework Theory (IDFT; Hasher & Zacks, 1988) explains that older adults appear to have a greater difficulty in suppressing cognitions not consistent with their goals as compared to young adults (Hasher et al., 1999). The deficit in cognition suppression comes from a decreased efficacy of working memory, fluid cognition, and their ability to process information (Hasher et al., 1999). Mounting evidence has supported the hypothesis that a relationship exists between inhibition deficits, rumination, and other depressive symptoms;
however, the direction of a causal relationship has not yet been clarified (Davis & Nolen-Hoeksema, 2000; Joormann, Yoon, & Zetsche, 2007; Gotlib & Joormann, 2010). Support for IDFT would mean older adults would ruminate at elevated levels as compared to young adults, who lack this inhibitory cognitive deficit. In addition, older adults who experience more than normative age-related deficits in cognitive suppression and fluid cognition may ruminate at a level higher than more cognitively healthy adults. While research into the interaction between normal aging and rumination is scarce, research into the interaction between individuals with abnormal cognitive impairment, such as dementia, and rumination is absent entirely.

**Hypotheses**

Based off of previous research (Ricarte et al., 2015; Sütterlin et al., 2012), it is believed that cognitively healthy older adults will report significantly lower levels of rumination than younger adults, supporting SST. Secondly, due to both potential risk and resilience factors described, it is predicted there will be a significant difference in frequency of rumination between cognitively healthy and cognitively impaired older adults. Finally, with the tendency to ruminate, which would presumably take significant cognitive resources, it is expected that individuals who report higher levels of rumination will report experiencing more every day cognitive failures than individuals who do not ruminate. This hypothesis is founded on the assumption that as greater working memory capacity is devoted to the ruminative activity, less is available for other cognitive tasks.
Method

Participants

A total of 97 individuals participated in this study. For the purpose of analysis, the participants were categorized into three different groups: cognitively healthy older adults (n = 31, $M_{age} = 75.45$ years, $range_{age} = 63-88$, $SD_{age} = 6.52$), cognitively impaired older adults (n = 24, $M_{age} = 80.25$ years, $range_{age} = 63-97$, $SD_{age} = 8.87$), and younger adults (n = 42, $M_{age} = 20.64$ years, $range_{age} = 17-40$, $SD_{age} = 6.89$). Consistent with the World Health Organization’s definition of an older adult (2015), participants over the age of 60 were categorized in the older adult groups, while participants under the age of 60 years were placed in the younger adult groups. Older adults with scores under 31 on the MMSE and Clock Drawing Tests were categorized as cognitively impaired for the purposes of this study. The combined administration of the MMSE and Clock Drawing Test replicated a previous study of older adults with dementia and was chosen for its sensitivity to detecting less impairing degrees of cognitive impairment (Ravona-Springer et al., 2009). Older participants were recruited from a support group for memory-related difficulties, senior recreational centers, independent living facilities, local church groups, and assisted living residential facilities. The support group, senior centers, and living facilities were located in a medium-sized Midwest city and a small rural Midwest town. Young adult participants were recruited from a medium-sized Midwest university.

Materials

Cognitive assessments.

Mini-Mental State Examination and Clock Drawing Test [MMSE and CDT; Folstein & Folstein, 1975]. To screen for cognitive impairment, the study utilized joint administration of the Mini-Mental State Examination (Folstein & Folstein, 1975; see Appendix A) and Clock
Drawing Test (Cacho et al., 2010; Sunderland et al., 1989; see Appendix B). The Sunderland method of administering the CDT and the Folstein method of MMSE administration were utilized in the present study (Folstein & Folstein, 1975; Sunderland et al., 1989). The Sunderland method of scoring the CDT produces a minimum score of 0 and a maximum score of 10, paying special attention to more minor mistakes in the drawing of a clock face set to a specific time (Sunderland et al., 1989). The highest score possible on the MMSE is a 30, with scores of 24 or lower within the range of cognitive impairment (Cacho et al., 2010). Based off of Cacho et al. (2010) findings of optimal sensitivity and specificity, the cutoff score used to determine cognitive impairment was scores below 31. Scoring of the combined tests was calculated by grading each of the tests separately and summing the scores, creating a potential score range of 0 to 40 on the combined MMSE/CDT (Cacho et al., 2010). The reliability of the combined scoring of the MMSE and CDT was found to be strong. The test-retest and interrater reliability in patients with mild Alzheimer’s Disease versus those who are cognitively healthy was found to be .99 and .87, respectfully (Cacho et al., 2010). In regards to the MMSE/CDT’s ability to detect mild Alzheimer’s Disease in contrast to cognitively healthy individuals, a sensitivity of 89.4% and specificity of 95.4% was reported (Cacho et al., 2010). In distinguishing between patients with mild cognitive impairment (MCI) and cognitively healthy adults, Cacho et al. (2010) found a sensitivity of 76.2% and specificity of 77.3%.

**Rumination and Mood Assessments.**

**Ruminative Response Scale** [RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003]. The Ruminative Response Scale is a 22-item self-reported measure of rumination and depressive symptoms on a 5-point Likert scale, ranging from “1- Never” to “5- Very Often” (Treynor, Gonzalez, & Nolen-Hoeksema, 2003; see Appendix C). The RRS can be scored through the sum
of all questions, and through two subscales, Brooding and Reflection (Treynor et al., 2003). The RRS total score reflects a participant’s general level of repetitive negative thoughts (Treynor et al., 2003). The subscale of Brooding reflects the frequency of depressive negative thoughts, while Reflection scores reflect the participant’s frequency of purposeful contemplation of their mood. High scores on the RRS suggest higher levels of rumination and depressive symptoms (Treynor et al., 2003). The RRS has been shown to have modest test-retest reliability for rumination and depression, with correlation coefficients of $r = .67$ and $r = .60$, respectively (Treynor et al., 2003). Internal consistency was strong for both measures of rumination, $\alpha = .90$, and depression, $\alpha = .82$ (Treynor et al., 2003). The RRS contains two factors, brooding and reflection (Treynor et al., 2003). This measure was chosen because of its ability to detect rumination and negative thinking when strongly connected to clinical levels of depression.

**Geriatric Depression Scale (Short Form): Self-Rated Version** [GDS; Sheikh, & Yesavage, 1986]. The Geriatric Depression Scale is a 15-item self-report questionnaire that required the participant to answer “yes” or “no” to a series of items related to depression in older adults (Sheikh, & Yesavage, 1986; see Appendix D). Scores were calculated by the total symptoms endorsed. Participants with overall scores of 5 or higher are considered to have a high likelihood for meeting a diagnosis of depression (Marc, Raue, & Bruce, 2008). As compared to the original 30 item questionnaire, the GDS has been shown to be a valid substitute to the longer form (Aikman & Oehlert, 2000). Validity and reliability of the GDS has shown the GDS to be an adequate measurement of depression in elderly adults (Aikman & Oehlert, 2000). Internal reliability has been shown to be strong, $r = .80$ (Marc, Raue, & Bruce, 2008). The sensitivity and specificity of the GDS with a cutoff score of 5 were 71.8% and 78.2%, respectively (Marc,
Raue, & Bruce, 2008). The GDS was used to determine if participants are experiencing depressive symptoms regardless of rumination.

**The Cognitive Failures Questionnaire** (CFQ: Broadbent, Cooper, FitzGerald, & Parkes, 1982). The CFQ is a 25-item self-reported questionnaire asking participants to rate their level of frequency on a five point Likert Scale, answers ranging from “1 - Never” to “5 - Very Often” (see Appendix E). The items of the CFQ refer to possible areas one could make mistakes in motor functioning, memory, or perception. The maximum score achievable in the CFQ is 100 (Broadbent et al., 1982). Higher scores indicate more frequent errors in motor functioning, memory, or perception. The reliability of the CFQ has been shown to be strong, with test-retest reliability values of $r = .82$ and internal consistency values ranging from $\alpha = .79$ to $=.96$ (Broadbent et al., 1982). Moderate levels of convergent validity have been reported when compared with the Hermann & Neisser Memory Questionnaire, $r = .57$ to $.62$ (Broadbent et al., 1982). The CFQ provided the participants’ subjective perspective of behaviors that often are considered symptoms of cognitive impairment.

**Procedure**

All participants were given the opportunity to read over the informed consent and given a brief description of each section; older adult participants were asked two screening questions to assess ability to provide informed consent to participate in this study (see Appendix F). If the participant answers “No” to both screening questions on the informed consent, but still wanted to participate, then the signature of a caregiver was also acquired. The younger adult participants were not expected to have a caregiver’s permission, unless under the age of 18 years. The researcher administered all measures to the participants in person in paper or interview format. Participants were first asked demographics questions related to gender, age, years of education,
and ethnicity (see Appendix G). The researcher then administered the MMSE, CDT, RRS, and WBSI. After the fixed break of 10 minutes, the RDS, NART-R, SDMT, GDS and Stroop Task were administered. To counterbalance into two orders, the halves of the battery were interchanged after each participant. In addition to previously stated assessments the White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994), Reliable Digit Span (RDS; Shipley, 1946), North American Reading Test Revised (NART-R; Nelson & Willison, 1991), Symbol Digit Modality Test (SDMT; Smith, 1982), and the Stroop (Trenerry, Crosson, DeBoe, & Leber, 1989) were administered, but not part of any analyses in the present study. The dementia status of the individuals of this study was not able to be confirmed. Individuals’ cognitive statuses were classified by their scores on the MMSE and Clock Drawing Test.

All participants in the study were given the same battery and established break. So not to over-strain any participants, opportunities to take additional breaks were provided as needed. Extra rest time within the breaks were allotted upon request. The procedure alternated between the cognitive and mood components of the survey to keep attention and interest. The RRS, WBSI, GDS, NART-R, and CFQ were administered in an exclusively paper-and-pencil format, while the MMSE, CDT, RDS, SDMT, and Stroop were administered by the researcher. At the end of the battery, participants were debriefed and given a list of community resources related to mental health service and dementia care provider (see Appendix H).

**Results**

**Counter-Balance Check and Bonferroni Correction**

To assess if the counterbalanced administration of the two halves affected performance, mean scores were compared between the counterbalanced condition A and B. An independent
samples t-test analysis was used to measure mean differences between the two conditions in RRS scores. The analysis demonstrated no differences in mean RRS between condition A ($M = 46$, $SD = 12.964$) and condition B ($M = 51$, $SD = 16.369$); $t(95) = 0.422$, $p = .674$. An independent samples t-test analysis was also used to measure any mean differences between the two conditions in combined MMSE and CDT scores. No statistical difference was found between condition A ($M = 46$, $SD = 7.099$) and condition B ($M = 51$, $SD = 9.523$); $t(95) = 1.416$, $p = .160$.

A Bonferroni Correction was calculated to adjust for the introduction of error for each of the three hypotheses tested below. The $p$ value threshold after the Bonferroni Correction was $p = .0125$.

**Rumination in Cognitively Healthy Older Adults and Younger Adults**

A regression analysis was used to test the first hypothesis, if the age of the participant was predictive of RRS for participants without significant cognitive impairment (figure 1). The results indicated that age ($\beta = -.362$, $p = .002$) predicted 13% of variance in RRS total scores ($R^2 = .13$, $F(1, 70) = 10.547$, $p = .002$). The scores indicate that as the age of the participant increases, RRS scores decrease. To examine the subscales of the RRS, a regression analysis was used to test if the Brooding and Reflection subscales were significantly predicted by the age of the participant. It was found that age ($\beta = -.379$, $p = .001$) predicted 14% of the variance in Brooding scores ($R^2 = .144$, $F(1, 70) = 11.732$, $p = .001$). The results indicate as the age of the participant increases, Brooding scores decrease. A regression analysis was conducted to examine if the age of the participant significantly predicted Reflection scores. Age ($\beta = -.385$, $p = .001$) was found to predict 14.8% of the variance in Reflection scores ($R^2 = .148$, $F(1, 70) = 12.167$, $p = .001$). It was found that as the age of the participant increased, Reflection scores decreased.
Rumination in Older Adults

To test the second hypothesis, a linear regression analysis was used to test if the combined scores of the MMSE and CDT ($\beta = -.533, p < .001$) significantly predicted the total scores on the RRS within participants over the age of 60 years. The results indicated that the combined scores of the MMSE and CDT predicted 28% of the variance in RRS scores of older adults, as shown in figure 2, ($R^2 = .28, F(1, 53) = 21.04, p < .001$). The results indicate that lower RRS scores are significantly predicted by higher combined MMSE and CDT scores. To examine the subscales of the RRS, a regression analysis was used to test if the Brooding and Reflection subscales were significantly predicted by the combined scores of the MMSE and CDT. It was found that the combined scores of the MMSE and CDT ($\beta = -.566, p < .001$) predicted 32% of the variance in Brooding subscale scores ($R^2 = .32, F(1, 53) = 24.954, p < .001$). The results indicate that as MMSE and CDT combined scores rise, Brooding scores decrease. The analysis also found that 20.3% of the variance of Reflection subscale scores ($\beta = -.450, p = .001$) were predicted by the combined scores of the MMSE and CDT ($R^2 = .203, F(1, 53) = 13.491, p = .001$). The results indicate that for older adults, as MMSE and CDT combined scores increase, Reflection scores decrease.

Cognitive Failures Across All Ages and Cognitive Abilities

A regression analysis was conducted to examine the final hypothesis if CFQ scores predicted RRS scores (figure 3). The results of the analysis revealed CFQ scores significantly predicted 8% of the variance in RRS scores ($R^2 = .082, F(1, 95) = 8.461, p = .005$). The results indicated that as CFQ score increased, RRS scores increased as well. A bivariate correlation revealed a significant correlation between RRS scores and CFQ scores, suggesting that as age increases CFQ scores decrease ($R^2 = -.303, p = .010$).
Additional Analyses

To analyze depressive symptoms across the cognitively healthy older adults and young adults of the sample, a regression analysis was used to test if age was significantly predictive of GDS scores (figure 4). It was found age ($\beta = -0.231, p = 0.051$) did not significantly predict the variance in GDS scores ($R^2 = 0.053, F(1, 70) = 3.944, p = 0.05$).

For all participants over the age of 60 years, a regression analysis was used to test if combined scores of the MMSE and CDT predicted GDS scores (figure 5). The results indicated that combined MMSE and CDT scores ($\beta = -0.359, p = 0.007$) predicted 12% of the variance in GDS scores ($R^2 = 0.129, F(1, 53) = 7.837, p = 0.007$). These results suggest that for older adults as combined MMSE and CDT scores increase, GDS scores decrease.

To examine if age, across the whole sample, significantly predicted RRS scores, a linear regression analysis was used. The results of the regression showed that age ($\beta = -0.099, p = 0.334$) was not a significant predictor of RRS ($R^2 = 0.01, F(1, 95) = 0.943, p = 0.334$). To test if the age of the participant was predictive of GDS scores, a regression analysis was used. It was found that age does not significantly predict variance in GDS scores ($R^2 = 0.035, F(1, 95) = 3.419, p = 0.068$).

Discussion

The results of this study provided insight into a largely under-researched matter within the larger topic of aging. Using a sample that recruited young adults, cognitively healthy older adults, and cognitively impaired older adults, this study provides a comprehensive perspective of rumination across the lifespan instead of focusing primarily on only young adults and cognitive healthy older adults as previous research has done. The results are considered within the
exploring frameworks of the Socioemotional Selectivity Theory (Carstensen et al., 1999) and Inhibitory Deficit Framework (Hasher et al., 1999).

In order to replicate a finding from previous literature that cognitive healthy older adults would ruminate less than young adults, the study first compared RRS scores in young and older adults. The results supported the first hypothesis, as cognitively healthy older adults reported lower levels of rumination as compared to young adults. From the results of the initial analyses, it appears that the Socioemotional Selectivity Theory has been supported in its assertion that older adults experience significantly lower levels of negative thoughts, including rumination (Carstensen et al., 1999). Instead, Carstensen’s framework (1999) suggests the older adults prefer to focus on positive thoughts and therefore ruminate less often.

The second hypothesis was exploratory in nature and required several regression analyses to determine the relationship between cognitive abilities and rumination and whether or not the Socioemotional Selectivity Theory would hold even when older adults were showing signs of cognitive impairment. First, a linear regression analysis across all ages and cognitive abilities was done and found an inverse relationship with cognitive scores and rumination scores. These results indicate that participants with higher cognitive scores are more likely to report less rumination. Due to the potential for younger adults influencing the trend in data, the same analysis was run for exclusively participants over the age of 60 years. The results of this analysis suggest that older adults with cognitive impairment are more likely to report higher rumination levels as compared to cognitively healthy older adults. When facing cognitive impairment, the positivity hypothesis did not continue to predict lower rumination scores and instead, older adults could not block out the intrusive ruminative thoughts. These analyses provide insight into an area of aging previously unexplored. The Inhibitory Deficit Framework Hypothesis suggests
that due to an overall decline in cognitive ability within normal aging, an older adult may be more susceptible to unwanted thoughts including ruminative thoughts (Hasher et al., 1999). While the first hypothesis did not support this model within the context of cognitively healthy older adults, it appears that the Inhibitory Deficit Framework Hypothesis may explain the relationship between abnormal cognitive impairment and rumination in older adults.

The last hypothesis predicted that higher rumination scores would predict higher reported cognitive failures through the CFQ. The results of the regression analysis conducted including all participants found that CFQ scores were a significant predictor of RRS scores, with higher cognitive failures predicting greater rumination. These findings are consistent with existing research which found that increased cognitive loads, such as what happens when ruminating, were associated with a deficit cognitive ability in healthy older adults (Block, Hancock, Zakay, 2010; Whitmer and Gotlib, 2012). What was somewhat unexpected, however, is the significant negative correlation between age and CFQ scores, where older adults were reporting fewer cognitive failures than young adults. This discrepancy from what would be expected could be a result of differences in interpretation of the Likert scale anchors such as “occasionally” and “sometimes” and the subjective estimates between young and older adults but more research would need to be conducted in this area to better understand this relationship.

With rumination consistently being found as a predictor with a lower quality of life and depression within existing literature, it is important better understand the mechanisms behind the mental action and how it impacts people throughout the lifespan (Guastella & Moulds, 2006; Kuehner & Buerger, 2005; Papageorgiou & Wells, 2003). The present study suggests that there is a cognitive or environmental mechanism that protects cognitively healthy older adults from repetitive negative thinking, such as rumination. A possible explanation for the results of the
first hypothesis testing, as discussed previously, is the Socioemotional Selectivity Theory. Consistent with the present study, repetitive negative thinking, in the form of worry, has been found to be significantly lower in older adults (Wisocki, 1988; Wolitzky-Taylor et al., 2010). From the existing literature and results of the current study, it appears that older adults may have an implicit avoidance of both future and past focused repetitive negative thinking, consistent with the Socioemotional Selectivity Theory. While the results of the first hypothesis’ testing may be explained through a preference for more positive thoughts in older adults, it does not explain the results of analyses for hypothesis two.

The results of hypothesis two testing suggests that abnormal cognitive impairment, at least in part, leaves older adults more vulnerable to experiencing ruminative thoughts. The Inhibitory Deficit Framework Hypothesis provides a possible explanation for older adults with cognitive impairment reporting a higher rumination than cognitively healthy older adults and younger adults. In the last several decades, there has been an increase of research dedicated to the effects repetitive negative thinking, in the form of worry, on cognitive resources. Attentional Control Theory argues as worry and anxiety increases, performance on measures of working memory, explicit, and implicit memory decreases (Eysenck, Derakshan, Santos, & Calvo, 2007; Yantis, 1998). As another alternative to Inhibitory Deficit Framework Hypothesis, the experience of having significant cognitive impairment may act as a major stressor and produce more negative affect and cognitions. However, no indication was given through the Geriatric Depression scales to indicate older adults with cognitive impairment experience any higher level of depressive symptoms as compared to healthy older adults and younger adults.

In testing the third and final hypothesis, it was found that among the whole sample, cognitive failure scores were significantly predicted by reported frequency of ruminative
thoughts. As previously discussed, the Attentional Control Theory may provide an explanation for these results of the present study. With the increase of cognitive resources dedicated to ruminative thoughts, Attentional Control Theory would argue fewer resources would be available to dedicate to other tasks, which may result in increases in common cognitive mistakes accounted for in the CFQ (Yantis, 1998).

Several limitations have been recognized within the current study and should be addressed in future research. The most prominent limitation of this study is sample size of cognitively impaired older adults. Additionally, the power of the analysis may be positively impacted by an increase in participants. With this population experiencing a great variety of functionality, finding appropriate sources of participants poses a significant barrier in recruitment. The present study obtained the majority of its sample from a predominantly rural and racially homogeneous state; future studies should seek to diversify its sample. The cross-sectional nature of the current study leaves for the possibility of fluctuating cognitive and rumination scores between groups; future studies may find a longitudinal design a more accurate means of observing data of aging populations. The young adult sample came from college students, which may provide a limitation in the generalization to the larger population. College students may not accurately represent their age demographic because of unique stressors within an academic setting. Despite the limitations of the current study, the results provide an important perspective on aging in the context of negative affect and cognitive impairment.

The results of the present study also offer a unique perspective on rumination’s interaction with aging and may contribute to an under-researched aspect of human resiliency. Expanding the literature surrounding the Socioemotional Selectivity Theory, the present study illustrated how the theory may extend to rumination and how some mechanisms within
cognitive-impairment may hinder the theory’s effects. In addition, consistent with growing attentional research, the possible negative effect of ruminative thinking on performance on tasks related to attention was supported.

From the current study, future research should direct focus towards exploring the protective cognitive mechanisms explained by Socioemotional Selectivity Theory and potentially harmful factors that are introduced by cognitive impairment. It has been long understood that pathological cognitions in older adults often have different etiologies, presentations, and consequences as compared to younger adults (Wisocki, 1988; Wolitzky-Taylor et al., 2010). The benefits of understanding the underlying emotional resilience or risk factors within aging may inform future clinical conceptualizations and interventions. Understanding how the diversity of cognitive status within older adults can directly impact natural resilience may positively influence and encourage treatment for an already vulnerable population. Finding protective factors within normal aging may also influence psychological treatment for younger adults in finding more effective patterns of cognitions. The benefit from future research in this field has the potential to drastically increase the quality of life for not only older adults with and without cognitive impairment, but also adults of all ages.
References


Cacho, J., Bentio-León, J., Garcia-Garcia, R., Fernandez-Calvo, B., Vicente-Villardon, J., & Mitchell, A. J. (2010). Does the combination of the MMSE and Clock Drawing Test (Mini-Clock) improve the detection of mild Alzheimer’s Disease and mild cognitive


doi:10.3390/ijms150712631
Figure 1. The relationship between age and GDS total scores between cognitive healthy older adults and young adults.
Figure 2. The relationship between MMSE/CDT scores and RRS total score in older adult sample.
Figure 3. The relationship between RRS total scores and CFQ total scores in whole sample.
Figure 4. The relationship between GDS scores and Age between cognitive healthy older adults and young adults.
Figure 5. The relationship between GDS total scores and RRS total scores in older adult sample.
The Mini-Mental State Exam

<table>
<thead>
<tr>
<th>Maximum</th>
<th>Score</th>
<th>Orientation</th>
<th>Registration</th>
<th>Attention and Calculation</th>
<th>Recall</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>( )</td>
<td>What is the (year) (season) (date) (day) (month)?</td>
<td>Where are we (state) (country) (town) (hospital) (floor)?</td>
<td>Serial 7's. 1 point for each correct answer. Stop after 5 answers. Alternatively spell “world” backward.</td>
<td>Ask for the 3 objects repeated above. Give 1 point for each correct answer.</td>
<td>Name a pencil and watch.</td>
</tr>
<tr>
<td>5</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeat the following “No ifs, ands, or buts”</td>
</tr>
<tr>
<td>3</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Follow a 3-stage command:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Take a paper in your hand, fold it in half, and put it on the floor.”</td>
</tr>
<tr>
<td>1</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Read and obey the following: CLOSE YOUR EYES</td>
</tr>
<tr>
<td>1</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Write a sentence.</td>
</tr>
<tr>
<td>1</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Copy the design shown.</td>
</tr>
</tbody>
</table>

Total Score
Appendix B

The Clock Drawing Test Instructions

**General Information:** Provide the patient with an 8.5 x 11-in. blank sheet of paper and a pencil.

**Set-up:** Equipment required includes a blank sheet of paper, a sheet of paper with a clock on one side, a pen, and a chair/table for ease of drawing.

**Patient Instructions (Rouleau, Salmon et al. 1992):**
The following instructions are given:

“I would like you to draw a clock, put in all the numbers, and set the hands for 10 after 11.”

Following this condition, the patients should be instructed to copy, as accurately as possible, a clock from a model. The model should contain all the numbers on the clock, be 3 inches in diameter, and located on the upper part of an 8.5 x 11-inch sheet of paper. The hands on the model should be set for 10 after 11. The patient is then instructed to copy the model on the lower part of the same sheet of paper.

- Instructions can be repeated if necessary
- Patients may use their non-dominant hand for drawing the clock
Appendix C

Ruminative Response Scale

1- Never  2- Very Rarely  3- Occasionally  4- Fairly Often  5- Very Often

1. Think about how alone I feel
2. Think I won’t be able to do my job/work because I feel so badly
3. Think about my feelings of fatigue and achiness
4. Think about how hard it is to concentrate
5. Think about how passive and unmotivated I feel
6. Analyse recent events to try to understand why I am depressed
7. Think about how I don’t seem to feel anything anymore
8. Think why can’t I get going?
9. Think why do I always react this way?
10. Go away by yourself and think about why you feel this way
11. Write down what I am thinking about and analyze it
12. Think about a recent situation wishing it had gone better
13. Think, why do I have problems that other people don’t have?
14. Think about how said I feel
15. Think about shortcomings, failings, faults, mistakes
16. Think about how I don’t feel up to doing anything
17. Analyze my personality to try to understand why I am depressed
18. Go someplace alone to think about my feelings
19. Think about how angry you are with yourself
20. Listen to sad music
21. Isolate yourself and think about the reasons why I feel sad
22. Try to understand yourself by focusing on depressed feelings
## Geriatric Depression Scale (Short Form)

### Self-Rated Version

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Are you basically satisfied with your life?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Have you dropped many of your activities and interests?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Do you feel that your life is empty?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Do you often get bored?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Are you in good spirits most of the time?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Are you afraid that something bad is going to happen to you?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Do you feel happy most of the time?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Do you often feel helpless?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Do you prefer to stay at home, rather than going out and doing new things?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Do you feel you have more problems with memory than most people?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Do you think it is wonderful to be alive?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Do you feel pretty worthless the way you are now?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Do you feel full of energy?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Do you feel that your situation is hopeless?</td>
<td>YES/NO</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Do you think that most people are better off than you are?</td>
<td>YES/NO</td>
<td></td>
</tr>
</tbody>
</table>

(Total)

(Shelihk & Yesavage, 1966)
Appendix E

Cognitive Failures Questionnaire

1- Never  2- Very Rarely  3- Occasionally  4- Fairly Often  5- Very Often

1. Do you read something and find you haven’t been thinking about it and must read it again?
2. Do you find you forgot what you went from one part of the house to the other?
3. Do you fail to notice sign posts on the road?
4. Do you find you confuse left and right when giving directions?
5. Do you bump into people?
6. Do you find that you forget that you’ve turned off a lighter on the stove or locked the door?
7. Do you fail to listen to people’s name when you are meeting them?
8. Do you say something and realize afterwards that it might be taken as insulting?
9. Do you fail to hear people speaking to you when you are doing something else?
10. Do you lose your temper and regret it?
11. Do you leave important letters unanswered for days?
12. Do you find you forget which way to turn on a road you know well but rarely use?
13. Do you fail to see what you want in in a supermarket (although it’s there)?
14. Do you find yourself suddenly wondering whether you’ve used a work correctly?
15. Do you have trouble making up your mind?
16. Do you find you forget appointments?
17. Do you forget where you put something like a newspaper or book?
18. Do you find you accidentally throw away the think you want and keep what you meant to throw away- as in the example of throwing the matchbook and putting the used match in your pocket?
19. Do you day dream when you ought to be listening to something?
20. Do you find you forget people’s names?
21. Do you start doing one thing at home and get distracted into doing something else (unintentionally?)
22. Do you find you can’t quite remember something although it’s on “the tip of your tongue”?
23. Do you find you forget what you came to the shops to buy?
24. Do you drop things?
25. Do you find you can’t think of anything to say?
Appendix F

Informed Consent Statement

Frequency of Rumination and Its Relation to Cognitive Functioning

The Department of Psychology supports the practice of protection for human subjects participating in research. The following information is provided so that you can decide whether you wish to participate in this study. You should be aware that even if you agree to participate you can stop at any time. Participation is voluntary.

1. Purpose: The purpose of this study is to see how your memory and cognitive functioning might relate to patterns of thought that you may or may not experience. Rumination is like a sticky mind – not being able to let thoughts or ideas go and we want to know if those who experience different levels of memory challenges experience this more often than others who don’t have memory challenges.

2. Procedure: You will be given a series of surveys and cognitive tests. Each survey will ask you to report how often you engage in a behavior or how strongly you agree or disagree with a statement. The cognitive tests will ask you to do your best at a cognitive brain task of memory or executive functioning but they will also push you to see how much you can do. Just do your best and there is no right or wrong answer on the surveys – they are just asking how you feel and what you experience.

3. Time required: All together, research is estimated to take between an hour and an hour and a half. You can take breaks between some of the surveys and tasks if you need to and there is also one scheduled break in the procedure.

4. Risks: Other than the inconvenience of the time taken to participate and potential for burnout of survey questions, the risk to you as a participant is uncomfortable or sad feelings or increase in rumination and frustration with trying to do the cognitive tasks. We allow you to take breaks if you are getting overly frustrated with the tasks.

5. Your rights as a subject: (i) The information gathered will be recorded in a confidential manner. Data or summarized results will not be released in any way that could identify you and your individual results will not be shared with anyone. Only the aggregate data will be analyzed.

(ii) If you want to withdraw from the study at any time, you may do so without penalty. Again, your participation is voluntary. The information collected from you up to that point would be destroyed if you so desire.

(iii) You do not have to answer every question. If you find one too personal or regarding something you are not open to sharing, you can skip it.

(iv) At the end of the session, we will provide you with a list of community resources that could be help if you are experiencing various types of thoughts and struggles and also answer any questions you have about the experience. We won’t be able to tell you your individual scores or performance, since the tests won’t be scored but we will talk with you about why we won’t share your individual information. You can also have a copy of this form to take home with you if you like.

After you complete the testing, you can contact the researchers below if you have any other questions
I have read the above information and based on that, I wish to continue with participation in this study.

Signed ___________________________________________ Date ________________________

Printed Name: ____________________________________________________

We also have two questions for you to answer to help us determine if we need to have permission from another person to participate in this study:

1. Do you live alone?  Circle one:  YES  NO

2. Do you drive yourself to this testing location or other appointments?  YES  NO

If both questions are no, then we would also like a caregiver, spouse, or guardian to consent to your participation in this experiment.

I, _______________________________________________________, consent that the individual named above can participate in this research experiment. My relation to this individual is as follows:

Signed ________________________________ Date ________________________
Appendix G
Demographics

1. How old are you?
2. What gender do you identify with?
3. What race do you identify with?
4. How many years of school have you received (High school counts for 12 years)
Appendix H

Debriefing Statement for Frequency of Rumination and its relation to cognitive functioning

Thank you for your participation in our study. We are curious about how rumination - a pervasive, repetitive negative thought pattern may impact your experiences and cognitive abilities. We are curious if this is something that a group, individuals who are experiencing early dementia or dementia-like symptoms experience more than other older adults. Also, we are looking to see whether or not experiencing these thoughts decreases the likelihood of cognitive decline. The individual findings of the questions asked during this study are not diagnostic and are not meant to diagnose or evaluate your overall condition. They are only for research purposes.

At the end of the study, we want to remind you that we appreciate your participation. We will not share your individual scores with anyone. Those will remain confidential. However, we will share the results of the study with you if you want. You can contact us at:

Dr. RaLynn C. Schmalzried
Psychology Department (785) 670-3006
ralynn.schmalzried@washburn.edu

Brian Stran, graduate student researcher
Brian.stran@washburn.edu

Below are some community resources that could be helpful to you, depending on your experiences.

If you experience concerns related to dementia or cognitive decline, then please contact:

Alzheimer's Association
3625 SW 29th St #102
Topeka, KS 66614
(785) 271-1844

Stormont Vail Behavioral Health Center
3707 SW 6th Ave
Topeka, KS 66606
(785) 270-4600

If you experience any concerns related to substance use please contact:

Valeo Behavioral Health Center (Community Mental Health)
330 SW Oakley, Topeka KS
Drug and Alcohol: (785) 233-1730
If you there are any concerns related to depression, anxiety, and/or mood disturbances you can contact:

**KU Psychological Services Clinic**  
University of Kansas, Fraser Hall Rm. 230  
(785) 864-4121  
Fees: Sliding scale based on income

**KU Child and Family Services Clinic**  
University of Kansas, Dole HDC Rm. 2021  
(785) 864-4416

**Kansas City Center for Anxiety Treatment (KCCAT)**  
10555 Marty St. Ste. 100, Overland Park, KS  
(913) 649-8820  
Fees: Full fee, self-pay clinic, adults and children

If you are experiencing thoughts of suicide or self-harm, please call one of the following numbers:

**24 Hour Hotlines**

1.800.273.TALK  
1.800.SUICIDE (Do not need to be suicidal to utilize this line)

**Crisis Numbers**

Valeo Crisis Number: (785) 234-3300  
Headquarters Counseling: (785) 841-2345  
The Kansas Crisis Hotline: (888) 363-2287