The Bigger Picture of Being Well:

Well-Being, Rumination on Health, and Respiratory Infection in Older Adults

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Abstract

Positive well-being is highly sought after and has been shown to be important in many different fields, including aging (Plácido et al., 2022). However, it is complex, and difficult to understand on its own. The biopsychosocial model can help bring clarity to this topic. The present study aims to investigate well-being by observing the relationships between it and two areas within the psychological and biological realms of the biopsychosocial model: rumination on physical health and respiratory infection. This exploratory study used a mixed methods design where 17 participants were surveyed and interviewed. Three distinct patterns in terms of the associations between well-being, rumination, and respiratory infection were found: adaptive ruminators, avoidant ruminators, and distressed ruminators. The results suggest a speculative relationship between the three variables, and open up many different routes of possible future study.

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Introduction

Adults over the age of 65 make up 16.8% of the population in the United States, and that proportion is predicted to increase (Caplan, 2023). Between 1920 and 2020, there was approximately a 1,000% growth rate for individuals over 65, which was about five times the growth of the general population (Caplan, 2023). This growth of the elderly population is also predicted to continue by the demographic transition model, which places the United States currently in Stage 3, heading to Stage 4, which is where the birth rates will become equal to death rates, leaving a population growth of zero and an aging population, increasing the proportion of individuals over 65. This situation has already been seen in other countries in Stage 4, such as Japan (Dastrup, 2019). According to the Institute of Medicine (2008), the elderly use the most healthcare resources per capita, and there is a wide variety in the types of resources that each individual will use. Aging has been associated with the degeneration of tissues, which affects vital organs and leaves the elderly vulnerable to chronic diseases (MacNee et al., 2014). Normal aging also involves a decrease in sensory function, muscle strength, immune system function, and urological function. On top of that, 62 percent of individuals over 65 have more than one chronic illness, and more individuals are getting diagnosed with multiple illnesses (Jaul and Barron, 2017). Additionally, mental health is a large concern for those over 65, due to the high incidence of anxiety and depression, the highest rate of suicide in any age group, and a concerning treatment gap for these individuals (Mitchel, 2014). All told, the elderly population currently uses and will likely continue to rely on the healthcare system at a higher proportion than any other age group.

To manage this high and increasing utilization of healthcare resources, the healthcare system needs to adapt (Jaul and Barron, 2017). Focusing on factors that improve the well-being of older adults would reduce the burden on the health care system overall, as well as the toll on elderly adults themselves. Many have suggested that exploring a topic as complex as human well-being requires an interdisciplinary perspective. The biopsychosocial model is one of the most widely applied and empirically supported frameworks used to investigate the multitude of domains that impact, and are impacted by well-being. (Siahpush et al., 2008; Gerstenblüth and Máximo Rossi, 2013; Ohrnberger et al., 2017). The biopsychosocial model (Engel, 1977; Adler, 2009) suggests that to understand and treat disease as well as promote wellness, you must understand the biological factors related to health, as well as understand the person themselves, the person's psychological state, the social context in which they live, and how society responds to them. Thus, the current biomedical model used in medicine, which tends to focus almost exclusively on the biological domain, may not be sufficient to treat all diseases without excluding or minimizing certain diseases or patients, and will also be incomplete in addressing well-being.

The present research is focused on the connections between well-being and the biological and psychological domains of the biopsychosocial model. While social factors are important to consider in relation to well-being (Lyubomirsky et al., 2005), they are not directly investigated in the present study. Within the psychological realm, the focus of this study was on ruminatory thoughts about physical illness. Within the biological realm, the focus was on respiratory infection. While the biopsychosocial model suggests that all of the interactions between these three variables might be important (See

Appendix I for concept map), the overarching goal of the study was to explore how respiratory infection and rumination on physical health relate to each other, and how these variables, both independently and in combination with one another, relate to well-being in older adults. The discussion that follows will focus on each of these constructs in turn: well-being, rumination, and respiratory infection.

Well-Being

While many intuitively might agree that well-being is important, researchers have not always agreed on exactly what well-being is and how to best measure it. The following are different definitions and measures for well-being and how some fields have chosen to define it. The Merriam-Webster definition of well-being is the state of being happy, healthy, or prosperous. The APA Dictionary of Psychology defines it as “a state of happiness and contentment, with low levels of distress, overall good physical and mental health and outlook, or good quality of life” (American Psychological Association, 2023). In medicine, there is no consensus on a single definition of well-being. While definitions of well-being, in general, vary dramatically, most agree on a definition for emotional well-being, which is the presence of positive emotions and moods, the absence of negative emotions, satisfaction with life, fulfillment, and positive functioning. In addition to emotional well-being, there are many other specific types and aspects of well-being, including physical well-being, economic well-being, social well-being, development and activity, emotional well-being, psychological well-being, life satisfaction, domain-specific satisfaction, engaging activities, and work (CDC, 2018).

While all of the definitions of well-being discussed above may have value in specific contexts, the present research will focus on the conceptualization of the

well-being of older adults. Specifically, in many different elderly-focused healthcare settings, well-being is identified as an individual's ability to independently complete everyday tasks, such as managing medications and cooking for oneself. While the ability to complete daily tasks might be taken for granted in younger adults, it is important in older adults because of the effects of degeneration that come with aging (Mlinac and Feng, 2016). Furthermore, the capacity to complete simple tasks on one's own has implications for physical health, clinical outcomes, social functioning, quality of life, cognitive functioning, and emotional and mental health (Mlinac and Feng, 2016; Edemekong et al., 2022; Albanese et al., 2020). It has also been found that an older adult's level of functioning at one point can help predict the individual's health in the future (Brorsson and Hulter, 1984;Zhou et al., 2023). Overall, due to the relevance, usefulness, and applicability of the ability to complete daily tasks in older adults, the ability to complete daily tasks of living is the most pragmatic and applicable definition for this research.

Psychological Concept - Rumination

The psychological concept that will be focused on in the present study is rumination, specifically, rumination about physical health. There is not one universally accepted definition of rumination, thus the following discussion will give an overview of the development of the concept of rumination on depression and negative events in general, and a discussion of rumination on physical health, in particular.

Rumination On Depression and Negative Events

Rumination was initially introduced and defined by Susan Nolen-Hoeksema (1991) when developing a theory of depression. Rumination was identified as a possible cognitive response style for a sad or depressed mood that leads to an increase in the duration of depressed mood and contributes to the development of additional depressive symptoms. Rumination was defined as a maladaptive pattern of responding to distress by repetitively and passively focusing on the meanings, causes, and consequences of one's depressive symptoms rather than actively working toward a solution to resolve the circumstances surrounding these symptoms (Nolen-Hoeksema, 1991, 2008). Although Nolen-Hoeksema was the first to introduce and define rumination, other researchers have elaborated upon, and refined, her ideas (Lynn et al., 2010; Ito et al., 2006; Nolen Hoeksema et al., 2008; Hughes et al., 2008; Verkuil et al., 2011; Watkins, 2009; see Sansone and Sansone, 2012 for a recent review of the literature). This literature suggests that there are several important contradictions in the field such as: Can rumination occur before, during, and/or after a distressing event? What is the difference between rumination and worry? Is rumination one construct or is it composed of multiple subcomponents? And is rumination inherently pathological or can it sometimes lead to adaptive outcomes? These questions will be addressed below.

Timeline of Rumation

Studies vary on when, relative to the experience of a stressful or negative event, rumination occurs. Most studies have focussed on rumination that occurs during an event or negative mood (Nolen-Hoeksema 1991; Nolen-Hoeksema, 2008; Sansone and Sansone, 2012; Treynor et al., 2003; Soo et al., 2013). However, some have suggested

that rumination can also happen after an event, or affect the aftermath of an event by prolonging distress (Brosschot et al., 2006; Martin and Tesser, 1996; Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 1994; Soo et al., 2013). Finally, some research indicates that rumination may even occur before future stressors (Nasso et al., 2019), although Nolen-Hoeksema suggests that thinking repetitively about future events is more accurately defined as worry (Nolen-Hoeksema, 1991; 1994; 2008). Nolen Hoeksema et al. (2008) and Hughes et al. (2008) stated that worry and rumination were different but overlapping. Verkuil et al (2011) stated that they were both forms of perseverative cognition, and thus exist under the same umbrella. Because of these contradictions, it is challenging to take a firm stance on the relation between worry and rumination (Sansone and Sansone, 2012).

Subcomponents of Rumination

While initially proposed as one broad concept, there now seems to be a consensus that there are multiple subcomponents of rumination. Treynor et al. (2003) identified pondering and brooding as subcomponents. The pondering component of rumination involves an individual's thoughts that are focused on problem-solving while looking inward. The brooding component is thinking that is focused on the causes, symptoms, and consequences of the situation. Sansone and Sansone (2012) brought up passive brooding and active self-reflection as possible subcomponents of rumination. Soo et al. (2013) identified intrusion, brooding, instrumentality, and preventability as the main components of rumination. Intrusion involves negative dimensions including duration and lack of controllability of thoughts. Brooding involves content regarding the experience and consequences of thoughts. Instrumentality involves positive beliefs

underlying the initiation and maintenance of rumination. Preventability involves making sense of a stressor and the causality of the distress (Soo et al., 2013).

While there is no agreement on what precisely the subcomponents of rumination are, some research suggests that there are benefits in considering its different aspects. For example, some research suggests that certain subtypes of rumination may be adaptive. That is, the instrumentality, preventability, and thoughts on causes (Soo et al., 2013; Nolen-Hoeksema,1991), may serve to provide healthy problem-solving about a distressing event. Furthermore, while both components established by Treynor et al. (2003), brooding and pondering, were shown to increase depression in the short term, pondering was correlated with decreased depression in the long term.

Correlates of Rumination

Despite the possibility that some aspects of rumination may be helpful, it has more generally been agreed that rumination is associated with many negative outcomes, such as mental health conditions and physical illness. For example, as suggested by Nolen-Hoeksema, rumination has been found to predict duration and severity of depression and anxiety among college students, younger individuals, older individuals, and clinical populations (Nolen-Hoeksema et al., 2008; Hilt et al., 2010; Treynor et al., 2003; Thomsen et al., 2004; Sansone and Sansone, 2012). One study has suggested that rumination may produce these negative effects by increasing amygdala activation (Nasso et al., 2019). The amygdala is a region of the brain that is responsible for many negative emotions. Hyperactivity of this region has been shown to result in difficulty in regulating the stress response. An increase in amygdala activity has

also been seen in depressed and anxious individuals, both at baseline and in anticipation of affective images (Nasso et al., 2019).

Other types of thoughts similar to rumination, such as catastrophic thinking (thinking about the worst possible outcomes) have also been shown to be related to well-being. Sullivan et al. (2005), assessed catastrophic thinking associated with pain and disability in patients with neuropathic pain conditions. They found that catastrophic thinking is a significant determinant of pain. Additionally, the rumination subscale of the Pain Catastrophizing Scale (Sullivan et al., 1995) showed the strongest association with self-reported pain. Pain catastrophizing was also found to be a determinant of disability, impacting quality of life and serving as a greater predictor of disability than pain severity. Results also suggested that reduction in pain catastrophizing helped to improve disability. This research suggests that ruminatory thoughts about a symptom and/or disease experience may be related to poor clinical outcomes and reduced well-being among those with medical illnesses.

Rumination on Physical Health

Given that general ruminative thoughts predict the severity and duration of negative mood states and pain, rumination about physical health in particular might be an important topic to explore in relation to the connection between the duration and severity of physical illness and well-being. However, there has been limited focus on rumination on physical health in the literature. The one study addressing this topic was conducted by Soo et al. (2013), in which they articulated the concept of rumination on physical health and developed a measure to assess it. Soo et al (2013) proposed that rumination would help build on the current models of emotional responses to illness.

The measure they created, the Multidimensional Rumination in Illness Scale (MRIS), was designed to assess rumination on physical health among adults with chronic illnesses. The final questionnaire consisted of three factors: intrusion, brooding, and instrumentality/preventability (described above). The scale was found to have adequate reliability and validity, justifying the use of the MRIS scale in the present study. Soo et al. (2013), however, did not explore the clinical correlates of rumination on physical health. This study is thus the first to my knowledge, to look at the relations between MRIS scores and measures of well-being and respiratory infection (RI). Based on the literature, which indicates that rumination is related to negative psychological and clinical outcomes, I hypothesized that individuals who ruminate a good deal about their physical health might experience more respiratory infection and experience worse well-being than those who ruminate less about their health.

Biological/Physiological Concept - Respiratory Infection

The definition of respiratory infection (RI) that will be used in this study is a transmittable disease that impacts primarily the respiratory system. While many transmittable diseases are systemic and involve many different body systems, only diseases with a significant impact on the respiratory system will be considered in this study. The respiratory system includes the upper and lower respiratory tracts. The upper respiratory tract consists of the anterior nares, nasal cavity, naso- and oropharynx, larynx, and vocal cords. The lower respiratory tract consists of the trachea, branching bronchi, bronchioli, and alveoli, stopping before the blood vessels that facilitate gas exchange in the alveoli. The inclusion of the trachea in the upper versus the lower respiratory tract is inconsistent in literature and debatable, but for this study, it will be

included in the lower respiratory tract due to the difference in the composition of the microbiome in that region compared to the oropharynx, larynx, and vocal cords (Hakansson et al. 2018). Notably, this definition excludes noncommunicable respiratory diseases such as COPD and asthma, although they are prominent in the elderly population and could also be considered respiratory diseases (Rojas et al., 2015).

Pathophysiology of communicable RI

There are a variety of pathogens that can cause respiratory infections. The two main infectious agents or pathogens that will be focused on in this study are bacteria and viruses. Bacteria are living, usually single-cell organisms that can reproduce independently and that can be helpful or harmful. Viruses are nonliving, noncellular organisms that use a host cell to reproduce, which can also be helpful or harmful. Two less common pathogens can be found in respiratory infection: fungi and parasites (Dasaraju and Liu, 1996). Infection involves the acquisition, overgrowth, dissemination, and invasion of the pathogen (Barhum, 2023; Chaplin, 2010).

The first line of defense from a pathogen is the barrier systems. Pathogens cause infection when they enter the body through openings such as wounds or mucosal tissues. Epithelial barriers function to stop pathogens from invading the body and causing infection, and it is somewhat adaptive based on specific location and task (Belkaid and Artis, 2016; LeMessurier et al., 2020). Additionally, in the mucosal tissues, there are numerous microbiota that make up the microbiome. This has been found in both the gastrointestinal tract and the respiratory tract, and other mucosal tissues. It consists of many different species of bacteria, which make up the majority of the microbiome, as well as some archaea, eukaryotes, and viruses (Ursell et al., 2012).

This microbiome helps with numerous bodily functions, including the immune system and defense against disease. The microbiome does this by helping to eliminate some pathogens through competition, helping the immune system adapt to environments, assisting the immune system in differentiating between non-harmful and harmful organisms and signals, stimulating epithelial barrier function via induction of mucus and antimicrobial peptide production, by inducing downregulation of bacterial ligands, and by increasing tight junction integrity (Hakansson et al. 2018; LeMessurier et al., 2020). Another structure that prevents respiratory infection by clearing debris and pathogens is cilia. Cilia are a structure that can be found in the upper respiratory tract and are microtubule-based hairlike projections that protrude from the apical membranes of airway epithelial cells. The cilia move back and forth or “beat” continuously with airway mucus to form a mucociliary escalator that takes trapped pathogens and debris from inside the respiratory tract to be expelled before infection can occur (Kuek and Lee, 2020; LeMessurier et al., 2020).

Once there is an infection, the active immune system steps in and starts to work. There are two subcomponents of the active immune system, innate and adaptive. The innate immune system responds non-specifically to pathogens, which often allows the system to be activated before the adaptive immune system. The cells of this system are usually located near sites of infection and include cells like macrophages, natural killer cells, innate lymphatic cells, neutrophils, dendritic cells, eosinophils, basophils, and mast cells. These cells each perform different tasks, some of which include phagocytosis, antigen presentation, facilitation of inflammation, macropinocytosis, granule release, or facilitation of allergic reactions (Alberts et al., 2002; Murphy et al.,

2022; Chaplin, 2010). The adaptive immune system is specific to the pathogen and will be activated in response to a specific infection, which also is part of the reason why the response is slower than that of the innate immune system. This part of the immune system is also responsible for immunological memory, which will facilitate a strong and fast response after previous exposures to the same pathogen. The cells of this system are activated and start their response in secondary lymphoid tissues, and some, but not all will travel to the site of infection. The cells in this system are B-cells and T-cells, which will also differentiate further to create cells with more specific tasks. Some of these tasks include making antibodies, preparing for another infection of the same pathogen, and assisting other cells with their programmed tasks (Alberts et al., 2002; Murphy et al., 2022; Chaplin, 2010).

Relevance in Elderly Population

On an epidemiological scale, RI is important to the population of focus because there is a higher incidence in older adults compared to the general population. This higher incidence is seen for both viral and bacterial infections such as RSV and pneumonia. Additionally, older adults are more likely to be hospitalized and die from contracting the diseases (Shi et al., 2020; Watson and Wilkinson, 2021; Meyer, 2005). The relevance of this is also increased if one considers the large burden that is placed on the healthcare system by older adults due to the increase in number of individuals and health issues that come with aging (Meyer, 2005).

On a physiological scale, RI is important because older adults have weakened immune systems, relating to almost all the different components outlined above. First, lung function as a whole decreases with age. This includes increased work of

respiration, decreased air exchange, and less sensitivity to hypoxia. These effects come from deformities in the chest wall, weakening of respiratory muscles, increased alveolar dead space, loss of lung parenchyma supporting structures, and a general decrease in lung function with age (Sharma and Goodwin, 2006; Ruivo et al., 2009; Simões et al., 2009; Zaugg and Lucchinetti, 2000).

The barriers that protect against disease are also impaired with age. The epithelial tissues and the fluid that covers them changes with age and increases susceptibility to toxic environmental exposures (Sharma and Goodwin, 2006; Zaugg and Lucchinetti, 2000). The microbiota in the respiratory tract also change with age which could be another explanation for the increased susceptibility to disease (Whelan et al., 2014). The mucociliary escalator and pathogen expulsion are also impaired in the elderly. Coughing strength is decreased as a result of the weakening of the respiratory muscles, which means that debris and pathogens cannot be expelled as well as in younger individuals (Lowery et al., 2013). It has also been found that the respiratory tract experiences increasing chronic inflammation as it ages, which can lead to impairment of the epithelial cilia that are responsible for the movement of the mucociliary escalator (Lowery et al., 2013; Sharma and Goodwin, 2006).

Aging also affects the active immune system, both in the adaptive and innate systems. There is an overall term for this dysfunction that results in increased mortality and morbidity: immunosenescence (Lee et al., 2022; Lowery et al., 2013). First, immunosenescence is tied in with many different changes in the innate immune system. The increased inflammation is a result of the actions of the innate immune system and the release of cytokines by innate immune cells. This increase of constant cytokines

leads to the system being unable to activate in the presence of a real threat and also results in decreased pathogen recognition, chemotaxis, and phagocytosis (Lowery et al., 2013). Immunosenescence also involves dysfunction of the adaptive immune system. One of the issues is the decrease in the ability of the cells to migrate to the site of infection from the lymphoid tissue that they reside and activate in as well as decreased production in both primary and secondary lymphoid tissues (Montecino-Rodriguez et al., 2013; Lowery et al., 2013). In T-cells specifically, there is a low number of naive, or not activated T-cells and a high number of memory T-cells due to the change of the thymus into fatty tissue, which results in a decreased ability to respond to unknown pathogens (Lowery et al., 2013). T-cells themselves age, which involves the shortening of telomeres (protective regions in DNA) and they also lose costimulatory ability over time, which is seen in the loss of CD28, and decreases the function of the cells (Weyand and Goronzy, 2016). In B-cells specifically, there is a decrease in the amount and quality of the antibodies that they are responsible for producing (Lowery et al., 2013).

Respiratory Illness and Well-Being

Illness can temporarily limit an individual's ability to function and perform daily tasks. This is made worse by the increased severity of the infection, and older adults statistically have a higher chance of increased severity and progression into pneumonia (Shi et al., 2020; Watson and Wilkinson, 2021; Meyer, 2005). After an infection, you can also be vulnerable to another infection. Short term, after an infection the microbiome may still be in disequilibrium, and therefore be more vulnerable to infection right after recovery (Hakansson et al. 2018). Over time, different infections can cause damage to

the system and lead to an individual being more vulnerable to future infection, which goes along with aging (Lowery et al., 2013). As well-being in older adults relies heavily on the ability to complete daily tasks, and the fact that respiratory illness may limit that, respiratory infection is likely to play a part in the well-being of older adults.

RI and Rumination

Rumination has also been found to have an impact on physical health. One of the most common pathways that rumination affects physical health is through stress. It has been found to be highly correlated with anxiety, as well as other disorders that involve stress such as post-traumatic stress disorder and obsessive-compulsive disorder (Sansone and Sansone, 2012; Watkins, 2009). There are many different types of stress, for example chronic or acute stress, and rumination has been shown to play a role in most if not all of them (Yaribeygi et al., 2017; Sansone and Sansone, 2012; Watkins, 2009; Soo et al., 2013; Nolen-Hoeksema et al., 1994; Nolen-Hoeksema et al., 2008; Treynor et al., 2003; Nasso et al., 2019). Some of the effects of stress include neurodegeneration, decreased immune function, increased risk of cancer, imbalanced hormone secretion, production, and response, issues with growth and metabolism, extensive cardiovascular issues, and decreased digestive system function (Yaribeygi et al., 2017). Studies have investigated the connection between rumination and recovery after a stressful event, and it was found that rumination was associated with decreased cardiovascular recovery (Nasso et al., 2019). It has also been found that rumination in the elderly can negatively impact immune ability as well as sleep quality and has been generally associated with symptom magnification and poorer clinical outcomes

(Thomsen et al., 2004; Sansone and Sansone, 2012). Thus, the literature suggests that high rumination will be associated with a higher incidence of RI.

Research Questions and Hypotheses

The studies reviewed above support the basic predictions of the biopsychosocial model: that physical health is connected to mental health, and both are connected to well-being. However, there is a gap in the literature on more precisely how a specific psychological construct, like rumination on physical health, might relate to a specific disease state, like respiratory illness. There is also a gap in how rumination on physical health and respiratory illness, individually and together, might relate to overall well-being in older adults. The present study will explore these connections using a mixed methods study design in a sample of older adults living in residential facilities in Boulder, CO. The results will be analyzed and speculative conclusions will be made. Based on the literature, two pathways were expected between well-being, rumination, and RI: (1) high rumination would be related to high RI and low well-being and (2) low rumination would be related to low RI and high well-being.

Method

Research Design

The data were collected using both an open-ended, semi-structured interview and a paper and pencil, self-report survey, providing opportunities for both quantitative and qualitative analysis and thus constituting a mixed methods design. The interview

consisted of a total of twenty questions assessing rumination on physical health, respiratory illness, and well-being (See Appendix II). The survey consisted of thirty-two questions on rumination on physical health (see Appendix III) and was completed on paper.

Participants

Participants included seventeen adults, two male and fifteen female, with an age range of 70-89 (*M*= 80.1, *SD*= 6.2), who were recruited from two assisted/independent living facilities in Boulder, Colorado. These facilities were chosen due to their similarity in the socioeconomic status of the residents (both included residents of medium to high socioeconomic status), similar availability of services such as physical therapy and meal service, and the cooperation and willingness of the administration and the residents to participate in the present research. Participants did not receive any incentive to participate in the study.

In facility 1, the participants were recruited by administration staff based on the recruitment requirements and screening questions (See Appendix VII). There were nine participants from this facility, two male and seven female, with an age range of 70-89 (*M*= 80.2, *SD*= 7.4).

In facility 2, the participants were recruited during a tabling event where the participants were screened and then scheduled for an interview. There were eight participants from this facility, eight female, with an age range of 71-86 (*M*= 79.8, *SD*= 5.2).

Measures

Rumination on Physical Health

Multidimensional Rumination in Illness Scale (MRIS). Participants completed the paper-and-pencil, Multidimensional Rumination in Illness Scale (MRIS, Soo et al., 2013). The MRIS consists of 32 items assessing rumination as a cognitive style in the context of illness and it identifies and asks questions relating to three subcomponents: intrusiveness (e.g., “Once I am thinking about my illness, I cannot seem to do anything else”), brooding (e.g., “I think about what life would have been like if I had not become ill”), and instrumentality (e.g., “Thinking about my illness helps me work out what I need to do to manage it”) (Soo et al., 2013). Participants responded on a five-point Likert scale from zero, meaning not at all, to four, meaning almost always. The scores were summed to yield the total score, the possible range was between one and 160. A high score indicated greater rumination on illness and a lower score indicated little to no rumination on illness. The scale demonstrated adequate validity, reliability, and internal consistency ($\alpha = .96$) among a sample of adults with medical illnesses (Soo et al., 2013).

Semi-Structured Interview. The first seven questions of the semi-structured interview were about rumination on physical health. These questions were devised for this study and were based on the three factors of rumination from the Multidimensional Rumination on Illness Scale described above (instrumentality/preventability, intrusion, and brooding, Soo et al., 2013). These questions were included to provide an assessment of rumination when participants are not actively ill and to enable qualitative

exploration of rumination on physical health. A sample question from this section is “Do you ever have uncontrollable thoughts on your physical health?” Follow-up and clarification questions were asked to fully explore the participant’s thoughts on their physical health.

Well-Being

Semi-Structured Interview: Instrumental Activities of Daily Living (IADL). Questions eight through fifteen of the semi-structured interview were the eight questions of the Lawton-Brody Instrumental Activities of Daily Living Scale (IADL, Lawton and Brody, 1969), used to assess well-being. A sample question from this section is “Are you able to use public transportation by yourself or drive your own car when you need to go somewhere?” Follow-up or clarification questions were also asked to better understand the participant's ability to complete the tasks in the scale. The scale results in scores between zero and eight with zero being the lowest score representing low IADL and little to no independent functioning and eight being the highest score representing a high IADL with the individual having the skills to function almost or completely independently. Each decrease in integer indicated that the individual was not able to complete one of the IADLs. The inter-rater reliability score for the scale is .85. The validity of the scale was verified by observing significant correlations between IADLs and four other scales that measure domains of functional status (Graf, 2009).

Respiratory Infection (RI)

Semi-structured interview. Questions sixteen through twenty in the interview assessed participants’ experience with respiratory infection. The questions were

developed for this study to determine the incidence and severity of respiratory infection in the past year. A question from this section was “How many times in the last year have you had a respiratory illness?” Follow-up or clarification questions were also asked when necessary to better understand the incidence and experience of the infection. The responses to the respiratory infection questions of the interview were used to make an index for severity and incidence. The incidence score consisted of the number of times the participant had a respiratory infection in the last year. There was a severity score for each time the participant got sick and ranged from one, which means that the participant was not hospitalized, did not have any medications prescribed, and did not subsequently get pneumonia, to four, which means that the participant was hospitalized, was prescribed medication, and subsequently got pneumonia. All of the severity scores for the participants' respiratory infections in the past year were averaged to make the severity index score, with the lowest possible score being one and the highest four.

Procedure

Seventeen interviews were conducted in person at the residential facilities in which the participants resided. The location of the interview varied between the participants, however, all took place in a location that was private and considered comfortable for the participant. First, several screening questions were asked to ensure participants were not included in any vulnerable populations. Next, the participants were given an IRB-approved informed consent form (See Appendix VI) and asked to read it and ask any questions that they may have before beginning the study and signing the form. A copy of the consent form was given to the participants for later reference. All participants were informed that the interviews would be recorded and transcribed for

later use. To protect the privacy of the participants, the recordings were password-protected, all identifying information was removed during transcription, transcriptions were password-protected, and audio recordings were deleted after transcription and analysis. The recordings were not shared or distributed. Next, the interview was conducted and recorded. Follow-up questions and requests for elaboration were interspersed throughout the interview to provide a more complete picture of the variables being studied. After the interview was completed, the participant was asked to complete the survey, and told to ask any questions that they may have. After the survey was completed, the participants were told that was the end of data collection and asked again if they had any questions. Data collection took between 15 and 45 minutes depending on the depth of answers given during the interview and the understanding of the survey.

Positionality and Reflexivity

Reflexivity was important to take into consideration in this research because of the subjective nature of the interview and the qualitative analysis of the results (Braun and Clarke, 2006; Dowling, 2006). I am in a career in healthcare, with experience as an EMT and in public health research, and place a lot of weight on taking into account the whole person when providing treatment. This has led me to my interest in the topics of this research. It is also part of my motivation for studying physiology, psychology, and public health. From my experience as both a patient and a caregiver, I have grown to believe that health is not nearly as simple and single-faceted as the biomedical model for healthcare might suggest.

I chose to be reflexive in my research to be aware and critical of my position and past experiences and how they might affect my data collection and analysis, not to discredit my results, but to give them added value and bring deeper meaning to my conclusions. I began the research process with a few biases. One was that the current healthcare system in the United States is flawed. I have learned in many classes since my freshman year of high school about the inequity in access and quality of care and how it has ultimately become a business. The studies and statistics that I studied shaped the way that I perceive how healthcare is provided. I have also seen this in my job as an EMT in the city of Boulder. I have seen a clear divide when it comes to the health and wellness of people of different socioeconomic statuses. Boulder has an interesting demographic because there are a lot of wealthy people as well as a large number of people experiencing homelessness. The health issues that I witness and help treat people for within these different social classes are completely different, as well as the outcomes and treatments. This has been one of the things that greatly bothers me about my career. The ambulance company for which I work is private and for profit, which means that I have to fulfill many different requirements and tasks, such as collecting extra paperwork or asking for things like emails, addresses, and phone numbers while also providing patient care, to make sure that the patient or their insurance will be billed, and that my company gets paid. So not only have I studied and been shown evidence of the inequity and capitalist nature of healthcare, but I have also seen it in my own life. I acknowledge that this makes me critical of the healthcare system. Finally, I have never had a chronic illness or experienced a health issue that caused me any serious personal distress. Many of the participants who were

interviewed have experienced more health issues than I have, which might limit my ability to fully understand and relate to the participants' experiences. I however have been able to witness many health issues in patients, friends, and family.

During the interviews, my biases and past experiences possibly influenced the data that was collected. First, I have limited experience interviewing people for research purposes. I am also invested in the health of others and the research that I am conducting. While measures were taken to avoid priming and actions that may influence a participant’s response, some body language and responses might have made an impact. I found it difficult to not show any sympathy for participants when they spoke about difficult topics such as the death of a spouse. Positive language such as “thank you” and “wonderful” were also used after a participant elaborated on an answer when asked to do so, or when they spoke in depth about a question. I also was intentionally friendly with the participants to make the process more comfortable and enjoyable for the participants. I am also a young, white, woman, which may have influenced the participant's responses due to their own individual perspective of me as an interviewer and researcher.

Results

Descriptive Data for Well-Being, Rumination on Physical Health, and Respiratory Infection (RI)

Well-Being

The sample reported a relatively high level of well-being as assessed by the Instrumental Activities of Daily Living (IADL) scale. The mean IADL scores were 7.7, out of a maximum possible of 8.0 (See Appendix IV). These scores were fairly consistent in the sample, with the standard deviation being 0.59.

When asked the question “How do you think your physical health impacts your quality of life?”, 100% of respondents agreed that these constructs were inextricably linked. Specifically, all participants stated that their physical health strongly impacts their quality of life. They proceeded to provide a specific example of the things that they can still do or can no longer do as a result of their health. Thus, it appears that the measure of well-being used in this study, the IADL scale, resonated strongly with these older adults. Their physical health and subjective assessment of their quality of life revolve around their ability to perform various tasks and activities independently. For example, one participant stated, “Because of [my good health], I have a really good quality of life”, and another said, “[my physical health and ability impacts my quality of life] greatly…if I wasn't physically healthy, I couldn't do the things that bring me joy.” Similarly, but in a more negative direction, some stated that their poor quality of life was related to their lack of health. For example, one participant stated, “My health limits the kinds of things I can do… (such as) my favorite things: skiing, hiking, bicycling.”

Rumination on Physical Health

Rumination on physical health, as assessed by the Multidimensional Rumination in Illness Scale (MRIS), had a mean of 28.4 and a standard deviation of 20.2. The mean is fairly low, considering the highest possible score for the measure is 128. The positive skew of the scores also is supported by the limited range, with the highest recorded MRIS score being 69. The standard deviation also suggests that there is a very high level of variation between the participants, as its value is almost as large as the mean. Of the subscales in the MRIS (brooding, instrumentality and preventability, intrusion), instrumentality and preventability had the highest mean of 14.9 (*SD* =10.1), compared to brooding mean of 8.8 (*SD* = 7.5) and intrusion mean of 4.8 (*SD* = 6.2). All of these means were relatively low, less than half of compared to the maximum possible score for the subscale. This reflects the low scores for the MRIS in general. There was also a lot of variation in the subscales as the standard deviations were all almost the size of the mean or larger than the mean.

Rumination was also assessed qualitatively during the interview. The greatest commonality to emerge from the interview data about rumination was that 100% of participants responded “no” to the question “Do you ever have uncontrollable thoughts on your physical health?” Some participants elaborated with statements like “No...I don't think about it [my physical health] at all” or “I don't have those kinds of [uncontrollable] thoughts about my health. Other things, but not my health”. These findings are intriguing given that even when the frequency of thoughts on physical health and rumination were high, all participants’ responses indicated that they were not uncontrollable. While it is not known precisely why participants universally denied the uncontrollability of their

thoughts on health, the qualitative data does suggest a few possible explanations for this intriguing finding. First, the lack of acknowledgment of uncontrollability might be attributable to social desirability. Saying that you might have uncontrollable thoughts on physical health could be perceived as negative and indicative of the individual needing psychiatric help. Thus, participants might not have felt comfortable expressing the sense that their thoughts were out of their control. Second, participants may believe that their thoughts are normal for their age, which is seen in responses to the question “Do you feel that you think about your health a healthy amount?” One participant noted, “I think [my thoughts on physical health are healthy] for my age, yeah.” This suggests that social context might influence the degree to which participants understand the frequency, controllability, and acceptability of their thoughts about health.

Respiratory Infection

The incidence of respiratory infection (RI) was relatively low, with a mean of 0.65. However, there were a few people (N = 8) with high RI and there was a max score of 3 in the dataset. There was a good bit of variation in the incident of RI, with a standard deviation of 0.86, exceeding the mean. The RI severity score had a smaller range than the incidence score with a max of 2 in the dataset. The mean for the severity score was 0.71 with a standard deviation of 0.85, so the central tendency was fairly low with a lot of variability. Both RI scores are interesting, as they suggest that the overall sample is healthy, despite some variability.

The Association Between Rumination, Respiratory Infection, and Well-Being

In order to explore the relations between rumination, respiratory infection, and well-being, the data for the IADL, RI questions, MRIS, and interview questions (see Appendix IV) were examined to determine cutoff scores to divide the sample into those high or low on each variable. The IADL scores ranged from 6 - 8, with a majority of the participants (76.5%) scoring 8, the maximum possible. Thus a cutoff score of 8 was used in this sample. A score of 8 was considered “high” well-being and any score below 8 was considered “low” well-being. This cutoff score is in line with other research that has used the IADL, demonstrating that a cutoff score of 6/7 can be used to help diagnose dementia with a sensitivity of 89% and specificity of 81% (Mao et al., 2018). None of the participants in the current study had dementia, and that was reflected in the high trend of the IADL scores in this sample.

The range of RI scores was between 0 and 3. The respiratory infection (RI) score was based on the incidence, rather than severity of RI reported in the last year. Severity was not taken into account due to the limited range in this sample. Participants who reported at least one RI in the last year were considered “high” on RI. 47% of the sample fell into the high category. Participants who did not report any instances of RI in the past year were considered “low.” 53% of the sample reported no respiratory infections in the past year.

The rumination cutoff was determined by a combination of the MRIS score and qualitative analysis. Participants who scored above the mean on the MRIS (M = 28.4) were preliminarily considered to be “high” ruminators. To supplement the MRIS score, other qualities such as reluctance to answer open-ended questions about rumination

during the interview, and the content of the answers to these questions, were also taken into account. Reluctance was determined through evaluation of detail and elaboration of answers. Participants who answered more than 3 rumination questions with simply “yes”, “no” or similarly provided little to no justification or elaboration, even when asked to do so, were determined to be reluctant, and resulted in a more critical review of rumination scores. One other way that participants were determined to be reluctant was if their actions and other answers were contradictory to responses to questions asking about the quantity of their thoughts on physical health and ability. There was also some determination of rumination scores from the open-ended responses from the interview. Some individuals responded to the survey differently compared to the interview. In these cases, interview responses were given more weight than the survey, as there was a greater opportunity for depth in the responses, and it seemed that participants as a whole found the interview questions easier to understand and respond to. In summary, participants who scored above the mean on the MRIS and were considered to be medium to high based on the qualitative analysis of rumination were considered “high” on rumination. Those below the mean and low on the qualitative data were considered “low” ruminators.

The cutoff scores described above resulted in three distinct groups of participants (See Appendix V). The majority of participants (53%) fell in the group with high well-being, low RI, and high rumination. These individuals were classified as adaptive ruminators. The other two groups were less common among the sample. 23.5% of individuals were high on well-being, high on RI, and low on rumination. These individuals were classified as avoidant ruminators. The last group, also 23.5% of the

sample, were referred to as distressed ruminators. Distressed ruminators were high on RI and rumination and low on well-being. Together, these three groups classified 100% of the participants in this study (See Appendix V).

Adaptive ruminators

Among the adaptive ruminators (high IADL, low RI, and high rumination), high well-being and low RI might be expected based on the literature. Well-being is dependent upon the ability to function independently in older adults, and that is highly affected by health, including respiratory infection which can have long-term effects (Mlinac and Feng, 2016; Edemekong et al., 2022; Albanese et al., 2020; Shi et al., 2020; Watson and Wilkinson, 2021; Meyer, 2005). The adaptive ruminator group, with a low incidence of RI, may have been less affected by negative health outcomes and their well-being would seem to reflect this fact. However, the high rumination score in these adaptive ruminators was unexpected. The literature suggests that high rumination would more likely be related to worse well-being and high RI because of the increased stress that the rumination causes, which has a variety of negative effects on mental and physical health (Yaribeygi et al., 2017; Sansone and Sansone, 2012; Watkins, 2009; Soo et al., 2013; Nolen-Hoeksema et al., 1994; Nolen-Hoeksema et al., 2008; Treynor et al., 2003; Nasso et al., 2019).

Exploration of the open-ended questions about rumination shed some light on these unexpected findings. One unique aspect of the adaptive ruminator's responses was that when they talked about their health, they had a positive perspective. The participants said “(I am) pretty lucky about health”, “We (participant and her husband) are thinking, oh, gosh, we're lucky [with our current health]”, “I guess I'm just lucky”, “I'm

an active person in pretty good health", and "My good health… because of that I have a really good quality of life".

Another unique aspect of adaptive ruminators' thoughts is that although these individuals tend to think about their health a great deal, their thoughts were frequently initiated by pain or other reminders of their health-related issues. Participants exhibited this pattern when they said, in response to "How often do you think about your physical health?": "Fairly often, Only when it may interfere with my activities", "Not very often… Unless someone asks I don't really discuss it at all", "Unfortunately, because I keep getting a prompt from my doctors that reminds me of appointments. I probably think about it once a day", "fairly often, because I have a bad ankle. So walking is often uncomfortable...But when it's hurting, then yeah, there's a lot of awareness", "I think about it to stay healthy and you know when the doctor's appointments come up and like that sort of thing", "the only time I would think about it is when I see people here who are disabled", and "when I feel off? Yeah...yeah, there is an awareness".

The last unique point that was discerned was that all the adaptive ruminators felt that their thoughts on their physical health were productive. In response to the question "Do you feel that your thoughts on your health are productive?" adaptive ruminators said things like "Yes. They get me to evaluate where I am and see if there's anything I can do about it" and "yeah… I value independence...I'd rather be cautious about stuff". These responses also reflect a sense of self-efficacy, enabling their productive thoughts to translate into actions that they take to feel better or prevent further decline.

Avoidant Ruminators

The well-being and RI scores among avoidant ruminators (high IADL, high RI, and low rumination) were interesting and not entirely expected, as high RI has been found to be a contributor to low well-being (Mlinac and Feng, 2016; Edemekong et al., 2022; Albanese et al., 2020; Shi et al., 2020; Watson and Wilkinson, 2021; Meyer, 2005). The low rumination among these individuals was also unexpected as literature suggests that low rumination scores would be associated with lower RI. Many of the participants who fell in this group state that they don't think about their physical health, or they accept it for what it is. This can be seen in the following quotes from participants: “I just take my pill every night and I don't think about it”, ”I don't really think about it.”, and ”I accept it for what it is”. When considering these responses in concert with the well-being and respiratory infection data, it is possible that these participants may avoid thoughts of illness as a way of trying to cope with the more distressing thoughts or feelings that may exist below the surface. This kind of avoidance or repression may be allowing these individuals a good quality of life at the moment but may result in inner turmoil and stress, although the individual does not acknowledge it. This stress might be contributing to their higher RI. It is possible that, over time, this way of coping may become ineffective, with their stress and physical illness eventually negatively impacting their well-being. Thus, while their rumination score may be low, it might still be contributing to the high RI found in the group.

Distressed Ruminators

The low well-being, high RI, and high rumination found among distressed ruminators were expected based on the literature. Yet, it is interesting to compare the

pattern observed in this group, to that of the adaptive ruminators, as both groups were high on rumination but had different connections to well-being and RI. A closer examination of the qualitative data on rumination suggested that the nature of the rumination was different among the two groups. First, in contrast to adaptive ruminators who tended to think about their health only when prompted by health-related reminders, distressed ruminators tended to think about their physical health quite a bit, stating that “[their thoughts are] constant”, happen ”Multiple times a day”, and are “pretty miserable”. Additionally, when they are asked if they feel they think about their health a healthy amount, the responses are affirmative, but not confident. The participants respond by saying “I've learned to accept it”, ” I try not to dwell on it”, ”Yeah, I guess so”, and ”Yeah, because I guess I do things”. Second, distressed ruminators used strong language when talking about the way that their health affected their quality of life. They said things like “Yes (Laugh)… My entire life changed (after traumatic leg fracture)", "immensely ", and ”Enormously… if I just was lackadaisical, didn't do anything I don't think it'd be happy very long”. Finally, they state that their thoughts are productive, but they lack the self-efficacy characteristic of the adaptive ruminators. Their responses to “Do you feel that your thoughts on your health are productive?” consist of “This is not fixable. It is the way it is and any more surgery means the leg is removed”, ” I think about death. A lot”, ”I'm getting myself in a better shape because I know I'm going to need it later.", ”I sure wish I wasn’t in so much pain”. Their responses highlight their perspective on their physical health, showing that they believe that there is no room for improvement, but instead just management and prevention and the negativity of the future. The language also suggests that they feel they don't have significant control.

Discussion

The results of this study provide some insight into the factors that are associated with well-being in older adults and allow for some speculative conclusions and thoughts about the impacts of the study. First and foremost, the findings suggest that there is a fundamental connection between the independence afforded by physical health and well-being in older adults. One of the common themes that applied to all the participants was that the ability to complete tasks independently and be able to function in a way that does not limit their activities was important to their quality of life. This suggests that the IADL scale was appropriate to use as a measurement of well-being in this population as it was intuitive for all individuals in the sample to relate physical capacity with well-being. It also might suggest that to improve the quality of life for these individuals, more accessible activities should be provided, and that physical and occupational therapy should be provided to help improve or eliminate the limitations that they face.

The results of this study also highlight the value of using the biopsychosocial model to explore well-being, rumination, and respiratory infection in older adults. The quantitative and qualitative data suggest that for older adults, there was not one pathway that connected well-being to biological and psychological phenomena, but rather, there were three distinct patterns. Distressed ruminators showed the most anticipated pattern, with high rumination related to high RI and low well-being. Adaptive ruminators showed high rumination in conjunction with low RI and high well-being, which was surprising. Finally, there were unexpected relations among the avoidant

ruminators as well, who had low rumination but high RI and high well-being. It is only through the lens of the biopsychosocial model that we can see these complex and important relations between physical and mental health and overall well-being.

The adaptive ruminator group is particularly important to consider because of its prevalence. More than half of the participants fell into this group, which suggests that not only can rumination on physical health be adaptive, but that it is also somewhat common in older adults. This adaptive rumination also seems to be naturally occurring, and could possibly be misidentified as distressed rumination. The MRIS and a cursory view of the interview responses would suggest that the adaptive ruminators had the same amount of rumination as the distressed ruminators, and while that may be true, the quality of the rumination seemed to be quite different and may have contributed to the difference in the other variables (RI and well-being). The difference between adaptive and distressed rumination had to do with differences in self-efficacy, initiation of thoughts, and perspective. Adaptive rumination involved high self-efficacy, initiation of thoughts when the individual encountered something that reminded them of their physical health, and a positive and manageable perspective on their health. Distressed rumination was characterized by a lack of self-efficacy and more constant thoughts on physical health which took place in the context of a more globally negative perspective on health. The avoidant ruminators also seemed to have a non-adaptive form of rumination, which suggested that avoiding thoughts about health might be damaging to the health and well-being of older adults.

One might speculate that these rumination patterns, found among this older sample, may not be the same for younger individuals, highlighting how social aspects

can relate to biological and psychological domains. The fact that the mean rumination score on the MRIS for this sample of older adults (*M* = 28.4) was lower than what was found in Soo et al. (2013), a study of younger participants (*M* = 52.75) with chronic illnesses adds to the possibility that rumination may be different when compared across social groups. The situational context between an ill younger person versus an ill or even normally impaired older adult is different. The fact that none of the participants in this agreed with the statement that at times, their rumination about health was uncontrollable, might suggest that these older participants believed that rumination about health was expected for their age group. Thus, the social context could have played a role in participants' understanding of rumination on physical health, reinforcing the importance of using the biopsychosocial model to understand well-being and why the use of this model might be beneficial to integrate into healthcare settings. Future studies about rumination, RI, and well-being may benefit from more explicitly exploring the social component of the biopsychosocial model.

Limitations

There are a variety of limitations of the study. One limitation is the sample size and generalizability. The total sample size was 17 participants, which was not a highly powerful sample and limited the qualitative and statistical analysis of the data. The number of residential facilities was also limited to two, which was fairly narrow. The general demographics of the participants also limited the generalizability as they were mostly of high or middle socioeconomic status, female, white, highly educated, English-speaking, and lived in Boulder. In future studies, this can be rectified by finding a larger sample with broader demographics, which will likely require funding and a

larger research team. Alternatively, it may be interesting for future studies to look at smaller or more narrow populations similar to the present study, but different regarding the population.

Another limitation of the study is that all the data was collected on a self-report basis. This opens up the possibility of common method bias, as well as inaccurate reporting. Although the participants were selected to exclude individuals with significant memory or other cognitive impairments, there is still the chance that the responses given were based on biased or misremembered information. Social desirability might have also affected some of the participant's responses, as the questions addressed some relatively sensitive subjects. Some participants apologized for not choosing higher values on the Likert scale, which suggests there was at least some effect of social pressure and desire to answer in a way that was desirable for the researcher. To adjust for this, future studies could observe IADL and use medical records and/or laboratory data on respiratory infection instead of using self-report. Gaining access to participant's official medical records would improve the reliability, although there may be privacy barriers and space for other inaccuracies, such as clinical or clerical errors, to be introduced.

Another limitation is that causal conclusions cannot be drawn from the results of this study. The data that was collected was correlational, so no causal relationships can be established. Any suggestions regarding causal relationships between the variables in this study are highly speculative and meant only as possible interpretations to help raise hypotheses about the clinical relevance of the findings.

Future Directions

While the present study cannot support any causal conclusions, it highlights many possible routes for future research. First, it would be necessary to replicate the findings about the adaptive and possibly protective nature of rumination, using a larger and more generalizable sample. If a similar pattern of results to those found in this study were obtained, then it might be beneficial to conduct an intervention study. The intervention could consist of guiding and teaching participants how to reframe their ruminatory thoughts in a way that would make them more adaptive rather than distressed (Querstret and Cropley, 2013). This approach could potentially determine if there is a causal relationship between rumination and physical health and well-being. The results of such a study could also support a change in how healthcare is approached, as it challenges the current biomedical model of healthcare. It would encourage care providers to see thoughts and other psychological variables as potential contributors to health, rather than focusing on purely biological factors. This suggestion is influenced by my positionality, as the results supported the observations that I have made while working in healthcare and processing and dealing with health issues in myself and those close to me. From my experiences, I am of the opinion that there needs to be some form of change in the healthcare system to better serve patients in a way that takes biology, psychology, and sociology into account. This future study could potentially provide evidence-based support for the observations that I have made in my life and my work.

Another route for future research would be to further investigate the cultural context of rumination. The present study suggests that rumination on physical health in

older adults is different than in younger individuals. This possibility is only suggested, as there was no investigation of younger individuals' rumination on physical health, other than what was found in literature. However, the results of this study potentially suggest that exploring the unique aspects of rumination in older, versus younger, adults may deserve further study. It has been previously shown that culture can influence the way that older adults perceive aging, such as in the realm of personal growth and purpose in life (Kitayama et al., 2020). This effect of culture may also influence the perception of quality of life and its contributors in older adults. At this point, there is little to no research examining the different cultural or social differences in rumination, or in rumination on physical health. Examining the differences between ages, cultures, religions, socioeconomic statuses, genders, languages, locations, and more would help develop a better understanding of rumination, mental health, physical health, and well-being as a whole. This would also be significant in healthcare, as having specific care and providers that understand the uniqueness of older individuals would greatly improve their care as a whole. Additionally, it would help ensure that proper diagnosis is given and ensure that we know what different measurements and scores, such as the MRIS, mean for different individuals. My positionality likely plays a role in this suggestion. In my classes and my life, I have learned about how medicine and science are mostly based on a white male model, with most research being on specifically that population. This can be seen in diagnosis and common signs of heart attacks, which are different in men and women, but the more commonly known symptoms are the ones that men experience. There has been progress made in understanding differences between individuals, but it is still somewhat new. With the large amount of diversity in

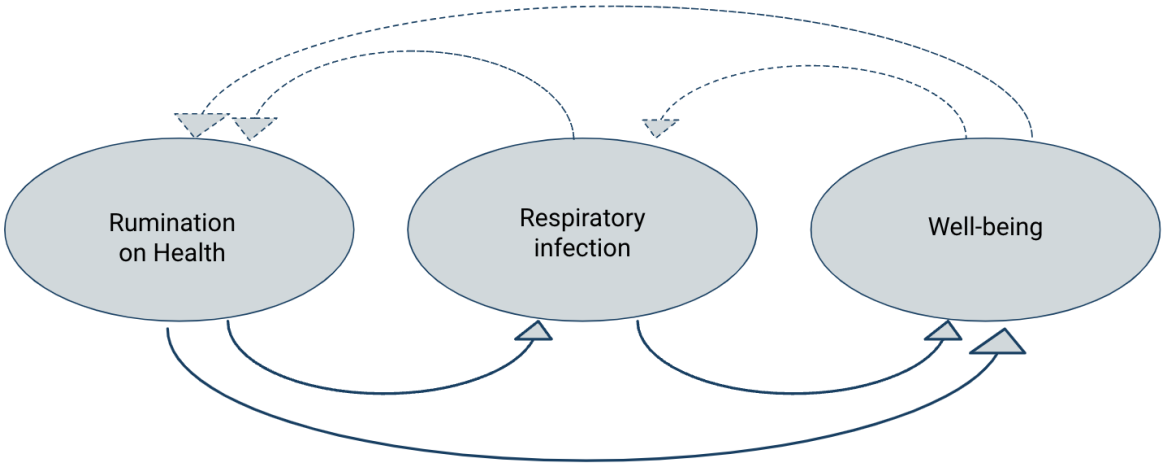
America and around the world, the many different facets of individuals cannot be overlooked by healthcare providers or psychologists, or things will be missed or misunderstood. This perspective has led to my suggestion of this possible future study.

Personal Takeaways

The results of the study have reinforced and slightly altered my past assumptions. The study supported the biopsychosocial model, which I have seen past evidence to support and believed to be a valuable approach based on the experience I have in medicine. Speaking with the participants also reminded me why I did the research in the first place, which was to contribute to the knowledge on health and well-being to better be able to serve those who need it. I deeply enjoyed the conversations that I had with all of the participants and felt blessed to have the opportunity to learn from them. It slightly altered my perception of older adults in general by showing me the broad and vibrant different personalities and life experiences of the participants in a context that wasn't in healthcare or family. I feel that I have gained a larger appreciation of the lives and things that we can learn from different generations, and hope to continue to seek out similar experiences.

Appendices

Appendix I - Concept Map



Solid lines: relationships directly investigated in the study

Dotted lines: relationships suggested based on the biopsychosocial model

Appendix II - Semi-Structured Interview Content

Interview Questions: Well-being, rumination, and respiratory illness in older adults

Description of the interview questions:

- Questions 1-7 are about rumination on physical health. They are derived from the Multidimensional Rumination in Illness Scale (Soo et al., 2014). They

represent the four factors of rumination: instrumentality, intrusion, brooding, and preventability (Soo et al., 2014).

· Questions 8-15 are asked to determine the participants activities of daily living. The questions will start out broad and then narrow down on the tasks to determine scoring for the individual, and the content of the questions and for the scale is from the Lawton-Brody instrumental activities of daily living scale (Lawton-Brody Scale).

· Questions 16-20 will be about the participant's experience with respiratory illness.

Interview Questions (with follow-up questions):

1. How often do you think about your physical health?
    a. Ask them to elaborate on something that they said. "Please elaborate on ___"
2. How often do you think about your physical ability?
    a. Ask them to elaborate on something that they said. "Please elaborate on ___"
3. Do you feel that your thoughts on your health are productive?
    a. Ask them to elaborate on something that they said. "Please elaborate on ___"
4. Do you feel that you think about your health a healthy amount?
    a. Ask them to elaborate on something that they said. "Please elaborate on ___"

5. Do you ever have uncontrollable thoughts on your physical health?

    a. Ask them to elaborate on something that they said. “Please elaborate on ___”

6. How do you think your physical health impacts your quality of life?

    a. Ask them to elaborate on something that they said. “Please elaborate on ___”

7. What do you think has led to your current physical health (Can be replaced by ailments that have been discussed previously in the interviews of each participant)?

    a. How much do you think about negative health outcomes?

    b. What do you do a lot to prevent negative health outcomes?

    c. Ask them to elaborate on something that they said. “Please elaborate on ___”

8. Are you able to use the telephone to call people? Including people who you do not know and whose number you might need to look up?

    a. If not, are you able to use the phone to call a few well known numbers?

    b. If not, are you able to answer the phone?

    c. If not, are you able to use the phone in any way?

    d. What limits your ability to complete these tasks?

    e. Ask them to elaborate on something that they said. “Please elaborate on ___”

9. Are you able to take care of all your shopping by yourself?

a. If not, are you able to manage small purchases by yourself?

b. If not, are you able to go on shopping trips if you are accompanied?

c. If not, are you able to shop in any way?

d. What limits your ability to complete these tasks?

e. Ask them to elaborate on something that they said. “Please elaborate on ___”

10. Are you able to plan, prepare, and serve three meals a day by yourself?

a. If not, are you able to prepare meals if you are given the ingredients?

b. If not, are you able to heat, serve, and prepare a few or smaller meals?

c. If not, do you have to have your meals prepared and served for you?

d. What limits your ability to complete these tasks?

e. Ask them to elaborate on something that they said. “Please elaborate on ___”

11. Are you able to maintain your home alone or with occasional assistance with larger tasks?

a. If not, are you able to do light daily tasks like dish washing and bed making?

b. If not, are you still involved in household tasks but need assistance with all tasks?

c. If not, do you participate at all in housekeeping tasks?

d. What limits your ability to complete these tasks?

e. Ask them to elaborate on something that they said. “Please elaborate on ___”

12. Are you able to do all of your personal laundry?

a. If not, are you able to wash smaller items?

b. If not, is all of your laundry done by others?

c. What limits your ability to complete these tasks?

d. Ask them to elaborate on something that they said. “Please elaborate on ___”

13. Are you able to use public transportation by yourself or drive your own car when you need to go somewhere?

a. If not, are you able to get a taxi for yourself?

b. If not, are you able to use public transportation with someone with you?

c. If not, are you able to use a taxi or a car with assistance?

d. If not, do you travel at all?

e. What limits your ability to complete these tasks?

f. Ask them to elaborate on something that they said. “Please elaborate on ___”

14. Do you manage all of your own medications, taking them at the right time and at the right dosages?

a. If not, are you able to take medications that have been prepared or set aside for you to take?

b. If not, how do you get your medications?

c. What limits your ability to complete these tasks?

d. Ask them to elaborate on something that they said. “Please elaborate on ___”

15. Are you able to manage all of your finances independently (budgets, writes checks, pays rent, bills, goes to bank) and keep track of your income?

a. If not, are you able to manage day to day purchases and only need some assistance with banking, major purchases, and other complex financial tasks?

b. If not, do you handle money at all?

c. What limits your ability to complete these tasks?

d. Ask them to elaborate on something that they said. “Please elaborate on ___”

16. How many times in the last year have you had a respiratory illness?

a. Ask them to elaborate on something that they said. “Please elaborate on ___”

17. How many of these required hospitalizations?

a. Ask them to elaborate on something that they said. “Please elaborate on ___”

18. How many of these required prescribed medications?

a. Ask them to elaborate on something that they said. “Please elaborate on ___”

19. How many of these led to pneumonia?

a. Ask them to elaborate on something that they said. “Please elaborate on ___”

20. Is contracting a respiratory illness a large concern for you?

a. Ask them to elaborate on something that they said. “Please elaborate on ___”

Appendix III - MRIS Survey Content

Survey Questions: Well-being, rumination, and respiratory illness in older adults

Description of the Survey: After the interview, the participants will be asked to fill out a survey on paper. The survey will include the following questions which are from the Multidimensional Rumination in Illness Scale (Soo et al., 2014). The responses will be a Likert scale with a range of 0 = not at all and 4 = almost always.

Survey Questions:

First, think about a time when you were ill. If you are currently ill, please use this illness as your reference. If you are not currently ill, please try to recall a time in the recent past when you were ill.

Now, please answer each of the following questions:

When I am ill:

1. Once I start thinking about my illness, I find it hard to think of other things.

2. It often requires a real effort to stop myself thinking about my illness.
3. Once I'm thinking about my illness, I can't seem to do anything else.
4. Sometimes I become lost in thought about my illness.
5. Once started, I can spend considerable time thinking about my illness.
6. I find myself unexpectedly thinking about my illness.
7. I have trouble sleeping because of thinking about my illness.
8. I can't seem to control thinking about my illness.
9. I exhaust myself thinking about the reasons for my illness.
10. I believe that people would think negatively about me if they realized how much I think about my illness.
11. I often feel the need to be by myself to think about my illness.
12. Thinking helps me understand my illness.
13. Thinking about my illness helps me work out what I need to do to manage it.
14. Thinking about my illness helps me focus on what is important to me.
15. Thinking about my illness is helpful in terms of protecting my health.
16. Thinking about my illness helps me work out how to cope.
17. Thinking about my illness helps me focus on what is still good in my life.
18. Thinking about my illness helps me understand its cause.
19. Thinking helps me work out what I need to do to regain a sense of 'normality'.
20. I think about whether I could have avoided my illness if I'd taken better care of myself.
21. I think about whether I might have done anything to cause my illness.
22. I think about where things went wrong.

23. I repeatedly go over possible causes for my illness.
24. I think about the impact the illness will have on my life.
25. I think about the things I can no longer do.
26. I think about what life would have been like if I had not become ill.
27. I think about the things my illness might stop me doing.
28. I think about the seriousness of my illness.
29. I think about the goals I had that I may no longer be able to reach.
30. I think about how little I can do to improve my situation.
31. I think that no matter what I do now, my life will never get better.
32. I think that trying new things may be pointless.

Appendix IV - Descriptive Data

	Min-Max (for measure)	Range (recorded)	Mean	Standard deviation
MRIS	0-128	0-69	28.4	20.2
–Brooding	0-36	0-21	8.8	7.5
–Instrumentality and preventability	0-48	0-32	14.9	10.1
–Intrusion	0-44	0-18	4.8	6.2
IADL	0-8	6-8	7.7	0.59
RI incidence	0-inf	0-3	0.65	0.86
RI severity	0-inf	0-2	0.71	0.85
Age	70-90	70-89	80.1	6.2

Appendix V - Patterns in Relations Between Variables

Group Name	IADL	RI	Rumination*	N=17
Adaptive ruminators	High	Low	High	9
Avoidant ruminators	High	High	Low	4
Distressed ruminators	Low	High	High	4

Appendix VI - Informed Consent Form

Permission to Take Part in a Human Research Study

Title of research study: Well-being, rumination, and respiratory illness in older adults

IRB Protocol Number: 23-0295

Investigator: Zoey Shutes

Sponsor: Abby Hickcox

Key Information

This research is about the mental and physical health of older adults. It will involve a single interview that will last between 45 and 90 minutes. There are not costs or significant risks involved with this study. The benefits include increased

understanding of the relationship between physical and mental health through examination of respiratory illness, repetitive thoughts on health, and well-being. This may help inform health care institutions on how to better serve their patients. The researchers may follow up to thank you for your participation and provide you with the results of the study.

Purpose of the Study

The purpose of this study is to explore the connection between physical and mental health in the elderly population through an interdisciplinary and holistic approach. It will focus on thoughts about physical health for the psychological aspect and respiratory illness for the physical aspect. The intersection of how both relate to general well-being will be measured with the Activities of Daily Living scale, which is a commonly used tool in healthcare that shows an individual's general level of functioning. Previous research has shown that repetitive thoughts can have many health impacts, including decreased immune system function and sleep quality. Repetitive thoughts are also associated with many negative mental health outcomes such as anxiety and depression. It has also been found that healthier people tend to have a greater life satisfaction and are "happier". There are many studies that support the concept that physical health is connected to mental health, as well as how they are connected to well-being. However, there is a gap in the literature on how repetitive thoughts on physical health specifically might affect well-being and physical health, including respiratory illness. There is also a gap in the literature on how respiratory illness affects well- being and repetitive thoughts on physical health. This study may

increase our understanding of the relationship between physical and mental health and may help inform health care institutions on how to better serve their patients.

We expect that you will participate in this research study for a maximum of 2 hours. We expect about 15-45 people will be in this research study.

Explanation of Procedures

Participating in this research will include one interview that will take place in a private area within the participant's residence. The interview will take place at the scheduled time and will last between 45-90 minutes. The interview will be performed by the PI, Zoey Shutes, and will be audio recorded to be later transcribed. The interview will involve verbal responses to 20 questions posed by the interviewer. After the interview there will be a paper survey that involves 32 questions with responses that range from 0 = not at all and 4 = almost always. The end of the survey will indicate the end of data collection, and the PI will be available for questions in person immediately following the interview, and later by phone or email.

Voluntary Participation and Withdrawal

Whether or not you take part in this research is your choice. You can leave the research at any time and it will not be held against you. You can choose not to

answer questions in the interview and survey. If you choose to withdraw from the study, your previous responses will be deleted immediately in all forms.

The person in charge of the research study can remove you from the research study without your approval. Possible reasons for removal include if you are unable to give informed consent, have a respiratory chronic illness (such as COPD or asthma), have a significant cognitive and/or memory impairment, or have a hearing impairment that is not corrected by a hearing aid or other device.

Risks and Discomforts

It is important that you tell the Principal Investigator, Zoey Shutes if you think you have been injured as a result of taking part in this study. ***You can call her at (720) 557-9272.***

Potential Benefits

We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include increased understanding of the relationship between physical and mental health through examination of respiratory illness, repetitive thoughts on health, and well-being. This may help inform health care institutions on how to better serve their patients.

Alternatives

This research is not designed to diagnose, treat, or prevent any disease. Your alternative is to not take part in the research.

Confidentiality

Information obtained about you for this study will be kept confidential to the extent allowed by law. Research information that identifies you may be shared with the University of Colorado Boulder Institutional Review Board (IRB) and others who are responsible for ensuring compliance with laws and regulations related to research, including people on behalf of the Office for Human Research Protections. The information from this research may be published for scientific purposes; however, your identity will not be given out.

The interview will be recorded, and the audio may be identifiable. The recordings will be kept on a password protected device that can only be accessed by the PI (Zoey Shutes) and will be deleted from the device in all its forms 1 month after the initial recording. The responses will be transcribed and all identifying information will be removed.

There are some things that you might tell us that we CANNOT promise to keep confidential, as we are required to report information like:

- Abuse or neglect
- A crime you or others plan to commit
- Harm that may come to you or others

Payment for Participation

You will not be paid to participate in this study.

Questions

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at zoey.shutes@colorado.edu or (720) 557-927. This research has been reviewed and approved by an IRB. You may talk to them at (303) 735-3702 or irbadmin@colorado.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

Signatures

Your signature documents your permission to take part in this research.

Signature of subject_____ Date_____ Printed name of subject_____

Signature of person obtaining consent_____ Date _____

Printed name of person obtaining consent_____

Appendix VII - Screening Script

Thank you for your interest in this study. Before you come in to learn more about the study, it would be helpful to see if you are likely to qualify to be in the study. In order to do this, I would like to ask you some eligibility questions, which will include questions about age, cognitive ability, hearing ability, language you speak, and medical history. It

should take about 10 minutes to go through these questions. Might there be a better time for you to answer these questions? Some of the questions may make you uncomfortable; you do not have to answer any question that you would not like to answer, but without answers to these questions, you will not be eligible to participate in the study. I will not record your name or any other information that would identify you on the form I use to record your answers until I know you have qualified for the study; at that time, I will keep this information secure. If you do not qualify for this study, I will immediately destroy any information I have collected. I am also required to give you the number of University of Colorado – Boulder IRB, the Ethics Board that oversees our research: it is (303) 735-3702, in case you have any questions or concerns for them.

Do you have any questions about the screening questions I will ask you?

Would you prefer to complete the pre-screening in person?

Do I have your permission to begin the questions?

Are you between the ages of 70 and 85?

Do you speak English?

Do you have a respiratory chronic illness, such as but not limited to COPD or asthma?

Do you have a significant cognitive and/or memory impairment?

Do you have a significant hearing impairment that is not corrected by a hearing aid or other device?

We invite you to take part in a research study because you are between the ages of 70 and 85, speak English, do not have a respiratory chronic illness (such as COPD or asthma), do not have a significant cognitive and/or memory impairment, and do not have a hearing impairment that is not corrected by a hearing aid or other device.

What should I know about a research study?

The purpose of this study is to explore the connection between physical and mental health in the elderly population through an interdisciplinary and holistic approach. It will focus on rumination and thoughts about physical health for the psychological aspect and respiratory illness for the physiological aspect. The intersection of how both contribute to general well-being will be measured with the Activities of Daily Living scale. Previous research has shown that rumination has many health impacts, including decreased immune system function and sleep quality. Rumination is also highly associated with many negative mental health outcomes such as anxiety and depression. It has also been found that healthier people tend to have a greater life satisfaction and are “happier”. There are many studies that support the concept that physical health is connected to mental health, as well as how they are connected to well-being. However, there is a gap in the literature on how rumination on physical health specifically might affect well-being and physical health, including respiratory illness. There is also a gap in the literature on how respiratory illness affects well-being and rumination on physical health. This study may increase our understanding of the relationship between physical and mental health and may help inform health care institutions on how to better serve their patients.

Participating in this research will include one interview that will take place in a private area within the participant's residence. The interview will take place at the scheduled time and will last between 45-90 minutes. The interview will be performed by the PI, Zoey Shutes, and will be recorded to be later transcribed. The interview will involve verbal responses to 20 questions posed by the interviewer. After the interview there will be a paper survey that involved 32 questions with responses that range from 0 = not at all and 4 = almost always. The end of the survey will indicate the end of data collection, and the PI will be available for questions in person immediately following the interview, and later by phone or email.

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