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Loneliness and Wellbeing in Young and Older Adulthood

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Abstract

The present research investigated the relationships between loneliness and emotional, physical, and cognitive wellbeing in young and older adulthood. Self-report questionnaires were administered to 101 young and 95 older adults. Young adults reported slightly higher loneliness than older adults. Overall, young and older participants who reported the greatest amount of loneliness experienced significantly less positive affect than those reporting the least amount of loneliness. However, higher levels of loneliness were related to increased negative affect only within the older adult group. Increased loneliness was also correlated with poorer reports of physical health exclusively in older adults. No relationships were found between loneliness and fluid cognitive ability or loneliness and information processing style. The exacerbated negative impact of loneliness in older adults is interpreted as an effect of age-related changes in motivation toward socioemotional goals related to the limited future time perspective of older individuals.

Keywords: loneliness, social isolation, aging, emotions, physical health, cognition

Loneliness and Wellbeing in Young and Older Adulthood

According to the Chicago-based rock band Wilco, how to fight the loneliness “is to smile all the time”. If only it were so easy. Although most people have experienced bouts of minor loneliness at some point, feelings of chronic loneliness can seriously disrupt the functionality of a person’s life. Loneliness is a multifaceted feeling involving a mismatch between one’s desired and actual level of social connectedness and involves physiological, behavioral, and emotional effects (Cacioppo & Patrick, 2008). However, the extent to which loneliness impacts individuals’ wellbeing at different stages of life is still unclear. Loneliness may be particularly detrimental to older adults who normatively experience changes in their social networks as well as physical and cognitive declines. The present research explored the differential impact of loneliness on young and older adults’ wellbeing, specifically in the domains of emotions, physical health, and cognition.

Loneliness

Although the two terms are sometimes used interchangeably, researchers have distinguished loneliness as a separate construct from objective social isolation. Cornwell and Waite (2009) describe loneliness as subjective feelings of perceived social isolation as a result of unfulfilled social needs, such as support, intimacy, and companionship. In contrast, objective social disconnectedness refers to an absence of social contact. The two experiences are related but still distinct. A person is not defined as lonely simply because he/she is often alone. In fact, loneliness is not strongly correlated with time spent alone (Hawkley, Burleson, Berntson, & Cacioppo, 2003), size of social network, or frequency of contact (Fees, Martin, & Poon, 1999). At the core of loneliness is the sense of social deficiency. For example, it has been shown that lonely individuals did not differ from non-lonely individuals in attractiveness, wealth, or

intelligence but still experience greater pessimism, shyness, negative affect, anxiety, and fear of rejection (Cacioppo et al., 2000). Thus, perception is central to feelings of loneliness, making it a fundamentally psychological concept. Loneliness also differentially impacts mental wellbeing. Cornwell and Waite (2009) found that loneliness, unlike social isolation, is strongly associated with poorer reported mental health and higher rates of depression. We focused on the subjective experience of loneliness in our study, with some consideration of the relationship between loneliness and objective social isolation in young and older adults.

If loneliness is predominantly a psychological construct with emotional implications, how does loneliness influence affect? Researchers have linked social connectedness to reduced negative affect and more pleasurable daily social experiences. Conversely, loneliness was related to increased negativity in social interactions and affect (Hawkley, Preacher, & Cacioppo, 2007). Previous studies have also demonstrated that lonely individuals pay greater attention to negative visual social images and negative social words than positive social images or words (for a review see Cacioppo & Hawkley, 2009). It is possible that the negative affect observed in lonely individuals is associated with hypersensitivity. Those who are more sensitive in social situations may experience more negative affect with social rejection or unpleasant social encounters. Hypersensitive individuals may also develop pessimistic expectations for social interactions and behave accordingly, further promoting the actualization of these negative interactions in a reciprocal manner (Cacioppo & Hawkley, 2009). Thus, it seems that the social interactions of lonely individuals may contribute to suppressed positive affectivity and enhanced negative affectivity.

Socioemotional Selectivity Theory

Previous research has documented that loneliness generally is associated with negative outcomes (Cacioppo & Patrick, 2008). However, it is also important to consider the trajectory of these trends throughout the adult lifespan. Although some may see old age as a time of social losses, this may not necessarily be the case. Socioemotional selectivity theory (SST) may present a theoretical perspective from which one can consider the implications of loneliness in older age. According to SST, as a person's time perspective shifts from open-ended to limited, his or her motivational goals change from information seeking to emotional gratification (Carstensen & Mikels, 2005). When time is seen as limited, as many older adults view their remaining time, people tend to focus on aspects of life that promote emotional satisfaction and meaning in the present, especially intimate relationships. In contrast, young adults generally adopt an open-ended time perspective, which encourages them to allocate more attention and energy to gaining information and knowledge in order to expand their horizons for the future (Carstensen & Mikels, 2005).

The structure of older adults' social networks also reflects their motivational goals. Older adults will more often choose to spend their time with familiar people with whom they already have an established relationship. They do not value novel social partners as much as young adults. Acquiring new social connections allows young adults to explore their social options and to gain more social knowledge, which support the future-focused aims of earlier life (Fredrickson & Carstensen, 1990). Moreover, while older adults tend to have smaller social networks than young adults, their networks have higher concentrations of those who will maximize their socioemotional needs. Older adults generally have similar numbers of emotionally close social partners but fewer acquaintances and less close partner relative to young adults (Lang & Carstensen, 1994). Although loneliness is shown to be rather stable across the lifespan

(Demakakos, Nunn, & Nazroo, 2006), loneliness could still pose a serious problem in later life. If older adults are highly motivated to engage in emotionally meaningful relationships, feeling lonely signifies a failure to fulfill a goal that is paramount to a limited-time perspective. Consequently, special attention must be paid to older adults suffering from loneliness.

Aging, Emotion, and Cognition

The motivational goals of old age not only influence social networks but also how older adults attend to and handle their emotions. It has been suggested that older adults demonstrate a preference in attention and memory for positive material because it enhances emotional satisfaction, creating a “positivity effect” (Carstensen & Mikels, 2005). Older adults have consistently been found to attend to and better remember positive relative to negative information in comparison to young adults (Mather & Carstensen, 2003). Older adults may even appraise situations as more positive. For example, older couples evaluated their spouses more positively during a disagreement than middle-aged couples (Story, Berg, Smith, Beveridge, Henry, & Pearce, 2007). Furthermore, this shift towards positivity may be beyond the conscious level. For older adults, viewing positive images leads to greater activation in the amygdala than negative images, suggesting that valenced preferences exist even at a neural level for older adults (Mather, Canli, English, Whitfeld, Wais, Ochsner, Gabrieli, & Carstensen, 2004).

The increased focus on emotions in older adulthood not only impacts preferences towards valenced stimuli but also cognitive processes. Normatively, people experience cognitive declines as they age, specifically decreases in fluid intelligence such as processing speed, working memory, reasoning, and problem solving (for a review see Craik & Salthouse, 2008). However, in parallel to the greater focus on emotions, the cognitive processing of emotional material is maintained in older age, despite slower and less efficient deliberative processing. A previous

study indicated that older adults better remember and prefer emotionally stimulating advertisements relative to knowledge-related advertisements (Fung & Carstensen, 2003). Additionally, older adults are able to hold emotional information in working memory as well as young adults, despite performing worse than young adults when maintaining visual information (Mikels, Larkin, Reuter-Lorenz, & Carstensen, 2005). Older adults' preserved cognitive capacity for emotional stimuli especially holds true for positive stimuli. When asked to choose which face a dot appeared behind, older adults were much faster at responding when the dot was behind a positive face than a negative face. Their accuracy for remembering which positive faces were observed during the experiment also significantly surpassed their accuracy for negative faces (Mather & Carstensen, 2003).

The maintenance of cognitive abilities for emotional information as opposed to non-emotional information in old age is consistent with the notion that there are two distinct information-processing systems. A leading theory in dual information-processing systems is Epstein's cognitive experiential self-theory (CEST). Epstein (1994) posits that there are two systems, the rational and the experiential systems. The rational system involves deliberative, fluid processing. It is analytical, logical, abstract, verbal, and relatively independent of affect. Conversely, the experiential system relies on emotionally significant past experiences in order to build cognitive schemas. It is automatic, effortless, and holistic, while most strongly and directly relating to favorable beliefs about relationships and emotional expressivity (Epstein, 1994). The two systems are independent, but they work in parallel to each other and often interact. However, sometimes, such as with conflicts between the head and the heart, the individual functions of the experiential and rational systems become more apparent.

These disparate roles also become evident through the process of aging. Based on the increased value of emotional goals and subsequent preservation of cognitive processing for emotional stimuli in older adults, one could see how the experiential processing system may become more important in later life. Carstensen, Isaacowitz, and Charles (1999) even suggest that the change from future-focused to present-focused coincides with a shift in emphasis from the “analytical” to the “intuitive”. Evidence that older adults increase their reliance on emotion processing can be observed through young and older adults’ performance when making healthcare decisions. Young adults fared best when instructed to focus on the details of the options. In contrast, older adults who were instructed to focus on their feelings about the healthcare options made better decisions than those instructed to focus on details (Mikels, Lockenhoff, Maglio, Goldstein, Garber, & Carstensen, 2010). Therefore, as fluid processing declines through the rational system in later life, it may become more beneficial and natural for older adults to enhance their reliance on the experiential system.

Aging and loneliness

In conjunction with the impact of time perspective on motivation, research has indicated that the physical and psychological consequences of loneliness may also change throughout the life course. Despite the stability of its prevalence over time, the effects of loneliness intensify with age (Hawkley & Cacioppo, 2007). It seems that as time goes on, loneliness breaks down resilience and leads to increased emotional, physical, and cognitive problems. Because older adults are already experiencing socioemotional, physical, and cognitive changes, older adults who are also dealing with feelings of loneliness may suffer from intensified difficulties in these domains.

As previously discussed, older adults highly value emotionally charged social stimuli and experiences due to their limited time perspective. Their increased focus on achieving emotional gratification, especially through emotionally stimulating social interactions, may promote increased positivity and decreased negativity in older age (Carstensen & Mikels, 2005). For example, older adults report longer periods of positive moods and shorter periods of negative moods (Lawton, Kleban, Rajagopal, & Dean, 1992). On the other hand, lonely individuals are unable satisfy their socioemotional needs. They concentrate more heavily on negative social information and unpleasant social encounters (Hawkley et al., 2007). Affect plays an important role in both loneliness and aging; however, the affect derived from interpersonal experiences impacts those who are lonely and those who are aging in opposite ways. Thus, our research will explore how these opposing emotional forces influence affect in lonely older adults. We hypothesize that older adults will experience more positive affect and less negative affect than young adults. Moreover, we expect lonely individuals to experience less positive and more negative affect than non-lonely individuals. We also predict that lonely older adults will report more negative affect than their non-lonely peers.

In addition, loneliness has been associated with numerous negative physical health outcomes, including higher average salivary cortisol levels (Cacioppo et al., 2000), slightly greater body mass index, and greater prevalence of obesity (Hawkley & Cacioppo 2007). Lonely individuals also had significantly higher total peripheral resistance and lower cardiac output, which both indicate poorer cardiovascular health (Hawkley et al. 2003). However, other health problems and unhealthy behaviors arise once loneliness converges with older age. Researchers have found positive correlations between loneliness and poor self-assessed physical health in older adults (Cornwell & Waite, 2009; Fees et al., 1999). More specifically, while lonely and

non-lonely young adults do not differ in systolic blood pressure, levels of urinary epinephrine excretion, number of reported daily hassles, and fat and alcohol consumption, disparities across these domains exist between lonely and non-lonely older adults (for a review see Hawkey & Cacioppo, 2007). Having weaker social networks may also increase the risk for mortality, which could also be a more severe predicament for older adults (Berkman & Syme, 1979). Due to the evidence that loneliness is related to some age differences in health behaviors and physiological processes, we predict that lonely older adults will be at an even higher risk for poorer physical health than non-lonely older adults.

Cognitive decline has also been related to both aging and loneliness. Loneliness was negatively correlated with global cognition, semantic memory, perceptual speed, and visuospatial ability (Wilson, Krueger, Arnold, Schneider, Kelly, Barnes, et al. 2007). If both aging and subjective loneliness are linked to declines in fluid and deliberative cognitive processes, it is possible that lonely older adults would have worse fluid cognitive performances than both non-lonely older adults and young adults. In support of this claim, Wilson and colleagues (2007) found that loneliness accelerates fluid cognitive declines in older adults and predicts the onset of Alzheimer's disease. Longitudinal studies also exhibited that loneliness significantly related to decreases in IQ across the lifespan (Gow et al. 2007). Considering these findings, we predict that young adults will perform better on fluid cognitive ability tasks than older adults and that loneliness will be negatively correlated to fluid cognitive performance in older age. The consequent reduction in fluid cognitive abilities may be associated with limited rational processing, such that we predict loneliness to be inversely associated with rational processing in older adults. Furthermore, we hypothesize that older adults will rely more heavily on experiential processes than young adults due to increased salience of emotions and emotional

stimuli in later life. Because loneliness does not obstruct the informational, horizon-broadening goals of younger adulthood as strongly, we do not predict a relationship between loneliness and either of the cognitive processing styles in young adults. However, lonely older adults' inability to cultivate close, emotionally meaning social relationships interferes with the fulfillment of their limited-time perspective goals. Since these same goals would normatively promote the use of the experiential system, we believe that loneliness will debilitate older adults from relying on experiential processing. Therefore, we predict negative correlations between loneliness and experiential and rational processing in older age.

Thus, it seems that the level at which loneliness penetrates various aspects of one's wellbeing may vary with age. This may be particularly true taking into account the postulates of SST. In a limited time perspective, the social situations and factors involved with loneliness directly impede individuals from achieving their central motivational goals. If lonely older adults cannot actualize their emotion-focused goals and satisfy their need for meaningful social relationships, what will happen to these people? To unpack this question, we decided to investigate the relationships between loneliness and emotions, physical health, and cognition across the adult lifespan. To summarize, we hypothesize that older adults will have more positive affect and less negative affect than young adults, with lonely older adults experiencing more negative affect than non-lonely older adults. Loneliness will be related to worse physical health in older adults but not young adults. Furthermore, we predict that older adults will perform worse than young adults on fluid cognitive tasks. Loneliness will not be related to information processing style for young adults but will be associated with reduced preference and use of both processing styles in older adults.

Methods

Participants

One hundred and one undergraduate students (32 males, 69 females, *M*_{age} = 19.33 years, age range: 17-24 years) from Cornell University participated in this study in exchange for course extra credit. Ninety-five older adults (37 males, 58 females *M*_{age} = 72.67 years, age range: 61-89 years) from Tompkins County of New York State participated in this study for \$15. The older adults were recruited from a database of potential research experiment volunteers.

Measures

Loneliness and Social Isolation

UCLA Loneliness Scale Version 3. The UCLA Loneliness Scale (Russell, 1996) is a 20-item measure that assesses subjective feelings of loneliness. Participants rate how often each statement is descriptive of them on a 4-point Likert-type scale from 1 (*never*) to 4 (*always*). Ten items are phrased negatively, such that higher ratings are indicative of how lonely a person feels (e.g., *How often do you feel alone?*). The other ten items are phrased positively, such that higher ratings are indicative of social satisfaction (e.g., *How often do you feel close to people?*). The positive items are reverse-coded and summed with the negative items to create a loneliness score for each participant.

Hawthorne Friendship Scale. The Hawthorne Friendship Scale (Hawthorne, 2006) is a 6-item measure in which an individual rates him/herself on six dimensions of social isolation and social connection. These dimensions include: relating to others, feeling isolated from others, sharing feelings with others, easily getting in touch with others, feeling separate from others, and feeling alone and friendless. Responses on social isolation items are given values, ranging from almost always, with a value of zero, to not at all, with a value of four. Items that assess social connectedness are reverse-coded such that a response of almost always has a value of four and

not at all has a value of zero. Scores on all six items are summed to evaluate social connectedness, with higher scores indicating greater social connectedness.

Social Network Index (SNI). The Social Network Index (Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997) is a 12-item measure of objective social isolation. The SNI consists of three components. The first, number of people in social network, is simply the total number of people with whom a respondent has regular contact (at least once every two weeks). Network diversity describes how many of 12 possible social roles are sufficiently filled in a social network. Social roles include spouse, children, parents, parents-in-law, close relatives, close friends, neighbors, religious group members, classmates, fellow volunteers, social group members, and co-workers. A role is sufficiently filled if the respondent has regular contact with an individual in that particular role. Finally, number of embedded networks reflects the activeness of a respondent in eight different network domains, including family, friends, religious groups, school, work, neighbors, volunteering, and other social groups.

Affect

Positive and Negative Affect Schedule- Trait (PANAS). The Positive and Negative Affect Schedule- Trait (Watson, Clark, & Tellegen, 1988) is a twenty-eight-item measure of stable positive and negative affect reactivity. Participants are asked to rate from 1 (*very slightly or not at all*) to 5 (*extremely*) the extent to which they experience 13 positive emotions and 15 negative emotions in general. The scores for positive affect and the negative affective are averaged to create mean positive and negative affect scores for each participant.

Self-Reported Health

Physical Symptoms Inventory. The Physical Symptoms Inventory (Wahler, 1973) is a 42-item measure of self-reported health. It consists of 42 specific health symptoms, ranging from

fatigue to heart troubles. By using a 6-point Likert-type scale from 0 (*almost never*) to 5 (*nearly every day*), respondents report their experiences and frequencies of these health symptoms.

Responses are summed to create a score of self-reported health.

Cognitive Measures

Rational Experiential Inventory (REI). The Rational Experiential Inventory (REI) (Pacini & Epstein, 1999) is a 40-item measure of participants' preference for rational versus experiential processing styles. Participants rate how descriptive each statement is of them on a 5-point Likert-type scale from 1 (*not at all*) to five (*extremely*). The REI consists of the rational and experiential scales. The rational scale assesses ability and engagement in logical and analytical thinking (e.g., "I have no problem thinking things through carefully"). Conversely, the experiential scale assesses one's ability and reliance on intuition and feelings in making decisions (e.g., "I believe in trusting my hunches"). Items that relate to a dislike or inability to use either scale are reverse-coded. Ratings for each scale are averaged to create rational and experiential scores for each respondent.

Verbal Fluency. Verbal fluency tasks (Benton & Hamsher, 1976) involve listing as many words as possible from three phonemic categories (words that begin with the letters f, a, or s) and one semantic category (animals) in 60 seconds. Verbal fluency scores were reported as the total number of words produced from the four categories.

Procedure

Older adults were recruited via telephone to participate in a study about health and healthcare decisions. If they agreed, the experimenter would then orally administer the verbal fluency task. The older participants also were told that they would receive a questionnaire of the remaining measures as well as a return envelope in which they would return the completed

questionnaire. Younger adults participated through mass testing sessions in a lecture hall at Cornell University. For the verbal fluency tasks, rather than giving oral responses, young adult participants were given 60 seconds to write down as many words as possible for each category in their survey packet. They then completed the same questionnaires as the older adults.

Results

Loneliness

To determine whether there were age differences in self-reported loneliness, we conducted an independent samples t-test comparing loneliness scores in both age groups. Although we did not expect to find age-related differences in loneliness, older adults reported slightly lower loneliness scores on the UCLA Loneliness Scale than young adults, $t(191) = 1.91$, $p = .057$ (see Table 1).

To determine whether there were age differences in perceived social isolation, we conducted an independent samples t-test comparing scores on the Hawthorne Friendship Scale in both age groups. Similarly to loneliness scores, older adults reported significantly higher feelings of social connectedness than young adults in the Hawthorne Friendship Scale, $t(193) = -3.83$, $p < .001$ (see Table 1). Across age-groups, scores on the UCLA Loneliness Scale and the Hawthorne Friendship Scale were highly correlated, $r(192) = -.721$, $p < .001$, suggesting that both measures assess similar experiences.

Objective Social Isolation

Following Cohen and colleagues (1997), we calculated scores for the three components of the SNI: network diversity, number of people in social network, and embedded networks. To determine whether there were age differences in participants' objective social isolation, we conducted independent samples t-tests between age groups on scores for network diversity,

number of people in social network, and embedded networks. There were no significant age differences for network diversity (i.e., the number of occupied social roles in a social network), $t(193) = -0.46, ns$, nor in the number of people in social network, $t(193) = -1.51, ns$. Young and older adults only differed on one measure of social isolation, the number of embedded networks, $t(193) = 4.93, p < .001$. Young adults were involved in a greater number of social network domains than older adults (see Table 1).

Despite finding that young adults reported feeling lonelier and more subjectively socially isolated than older adults, young adults were not more objectively socially isolated. In fact, for young adults, loneliness was not associated with two measures of social isolation, network diversity ($r(99) = -.102, ns$) and number of people in social network ($r(99) = -.011, ns$). Loneliness was negatively related to number of embedded networks in younger adulthood ($r(99) = -.262, p < .01$). These findings may suggest that loneliness and objective social isolation may be relatively distinct experiences for young adults. However, we found some relationships between loneliness and social isolation in later life. For older adults, loneliness was negatively correlated with network diversity ($r(93) = -.452, p < .001$) and number of embedded networks ($r(93) = -.421, p < .001$). The negative relationship between loneliness and number of people in one's social network for older adults was approaching significance ($r(93) = -.201, p = .053$). Therefore, the connection between objective social isolation and loneliness may be stronger in older age than in youth.

Affect

Both young and older adults experienced more positive affect than negative affect (see Table 1). A repeated-measures analysis of variance (ANOVA) indicated a main effect of affect, with higher positive affect and lower negative affect across age group, $F(1, 191) = 950.02$,

$p < .001$. However, our results also supported our hypothesis that older adults would display increased positivity. We found an interaction between age and affect, $F(1,191) = 48.92, p < .001$. To unpack this interaction, we compared PANAS-Trait scores between age groups using an independent samples t-test. Older adults reported experiencing significantly greater positive affect, $t(191) = 1.914, p < .05$, and less negative affect, $t(193) = 8.085, p < .001$, than young adults.

Importantly, these age differences were impacted by loneliness. Loneliness was negatively correlated with positive affect for both young adults ($r(99) = -.296, p < .01$) and older adults ($r(91) = -.412, p < .001$) while, loneliness was related to increased negative affect only for older adults ($r(93) = .339, p < .001$). Still, an analysis of covariance (ANCOVA) indicated that the interaction between affect and age remained significant even with loneliness as a covariate $F(1, 187) = 2.206, p = .139$. Thus, the effects of age on affect are more robust than the effects of loneliness.

To further explore the relationship between affect and loneliness, we divided each age group into three loneliness groups. The low loneliness group represented the bottom third scores of all participants on the UCLA Loneliness Scale, including individuals with scores of 35 and below. The middle loneliness group consisted of participants in the middle third with scores of 36 to 41. Lastly, the high loneliness group included those in the top third with scores of 42 and above. We conducted a one-way ANOVA on participants' positive and negative affect scores separately for older and younger adults. We found a main effect of loneliness on positive affect for young adults, such that young adult participants in the high loneliness group ($M = 3.23, SE = .11$) reported significantly less positive affect than those in the low loneliness group ($M = 3.34, SE = .17$), $F(2, 96) = 5.31, p < .01$. Similarly, in older adults, we found that participants in the

high loneliness group reported significantly less positive affect than those in the low loneliness group, $F(2,86) = 7.816, p < .01$ (see Figure 1). Whereas older adults in the high loneliness group reported significantly more negative affect than those in the low loneliness group, $F(2,90) = 4.14, p < .01$, there was no significant difference in negative affect between young adults in the high and low loneliness groups, $F(2,96) = 1.11, ns$ (see Figure 2). These findings demonstrate that although loneliness is associated with decreased positive affect across age groups, loneliness is related to increased negative affect specifically in older adults, suggesting that the interplay between loneliness and aging may have an extra adverse consequence on older adults' emotional wellbeing.

Self-Reported Health

Older adults' self-reports on physical health, based on the Physical Symptoms Inventory, did not differ from young adults', $t(197) = 1.409, ns$ (see Table 1). Older adults did not report more frequent physical health problems than young adults. Moreover, age was not significantly related to self-reported physical health for older adults ($r(95) = .070, ns$).

Even though young and older adults were relatively similar in terms of physical health, the role loneliness plays in physical health may change in later life. For older adults, higher scores on the Physical Symptoms Inventory were positively correlated with loneliness scores ($r(94) = .227, p < .05$). No relationship between physical health and loneliness was found for young adults ($r(99) = .063, ns$) (see Table 2).

Cognitive Processes

As predicted, older adults' verbal fluency was significantly lower than young adults', $t(197) = 5.70, p < .001$ (see Table 1). This finding bolsters previous evidence of fluid cognitive decline in old age. However, our hypothesis that older adults would display a higher preference

and reliance on the experiential processing style was not confirmed. Young and older adults scored similarly on the REI rational scale, $t(187) = .246$, *ns*, and experiential scale, $t(189) = .129$, *ns* (see Table 1).

Furthermore, despite our initial hypotheses, we also did not find significant relationships between loneliness and cognitive ability or information processing style. Loneliness was not associated with performance on verbal fluency tasks in either young ($r(99) = .030$, *ns*) or older adults ($r(94) = .082$, *ns*). Additionally, loneliness did not correlate with participants' reliance on and preference to use either experiential or rational processing (see Table 2). However, cognitive declines negatively correlated with a preference for rational processing in older adults. Higher rational scores on the REI were associated with higher scores on verbal fluency tasks for older adults ($r(90) = .480$, $p < .001$). Thus, although loneliness was not related to cognitive ability, our results suggest that the relationship between cognitive abilities and the rational processing system may become more important in later life.

Discussion

With consideration of socioemotional selectivity theory, our research explored the consequences that arise when age and loneliness converge, specifically concentrating on emotional wellbeing, physical health, and cognitive abilities. Our findings suggest that although the young adults in our sample were slightly lonelier, loneliness had more severe negative outcomes for older adults than young adults in the realms of emotional wellbeing and physical health. While lonely individuals in both age groups experienced less positive affect than their non-lonely counterparts, only lonely older adults reported significantly higher negative affect than non-lonely older adults. Similarly, the interaction of older age and loneliness was negatively

associated with self-reports of physical health. However, cognitive decline in older age was related to information processing style independent of loneliness.

We did not predict young adults to be lonelier than older adults. Previous evidence has suggested that loneliness is relatively stable throughout life (Demakakos, Nunn, & Nazroo, 2006). However, Russell (1996) found that college students reported higher levels of loneliness than other age groups, including the elderly. College is a particularly unique experience, encompassing crucial years of development as an adolescent reaches early adulthood. Many situations that a college student must face may force them to engage in self-exploration socially, potentially destabilizing social networks. In addition, newer college students, who are uprooted from their social networks at home, may not have had enough time to create close social bonds in college. Nevertheless, we still found that loneliness has more negative ramifications for older adults than for young adults.

Although there is evidence that objective social isolation and loneliness are independent concepts (Cornwell & Waite, 2009), we found that more aspects of objective social isolation were related to loneliness in older adults than young adults. All three measures of objective social isolation (network diversity, number of people in social network, and number of embedded networks) had either significant or nearly significant negative correlations with loneliness for older adults. However, only number of embedded networks was related to loneliness in young adults. These results suggest that older adults who are socially isolated are potentially more likely to become lonely and vice versa. We cannot determine the causality of this relationship; however, this correlation creates additional threats to the wellbeing of older adults as experiencing one type of social disconnectedness could potentially lead to the other. We also did not expect that the number of people in social network and loneliness to be nearly

significantly related in older age. Other research has suggested that older adults have smaller social networks because they were selectively pruning their networks in order to extract the most emotional contact from social interactions (Lang & Carstensen, 1994). Further analyses of these results will be necessary to understand this discrepancy. However, the connection between network diversity and loneliness may make more sense. It is possible that filling these social roles may become more important to older adults. Whereas young adults may only need high contact with their friends to feel socially fulfilled, older adults may require high contact from several different types of relationships, including children, parents, in-laws, and friends, in order to maximize their socioemotional satisfaction. In this way, network diversity may not be as applicable to young adults who cannot fill all of the social roles, as most are not married and do not have children, and do not value all relationships equally.

One of the most notable findings of this research was the existence of age differences in the impact of loneliness on negative trait affect. Only lonely older adults experienced more negative affect than their non-lonely peers. This result is even more surprising when considering that older adults often exhibit a positivity effect in their attention and evaluations (Carstensen & Mikels, 2005; Charles & Carstensen, 2009; Mather & Carstensen, 2003). However, feeling lonely could undermine the socioemotional benefits of aging. According to SST, older adults are motivated to seek emotionally gratifying social interaction. However, implicitly, lonely older adults are not achieving these aims. As compared to earlier life, older adults' failure to fill the gap between desired and achieved relationships may feel even worse within this temporal context. This effect may be so strong that it infiltrates various aspects of lonely older adults' lives, causing them to report their general affect as more negative even outside of social contexts, such as in our study. Social disconnectedness does impact young adults; lonely young adults

have decreased positive affect. Yet, the repercussions may not be as severe for them because the predominant motivational goals associated with youth put more value on information seeking and expanding horizons than on socioemotional pursuits. Consequently, loneliness appears to have an important influence on the emotional wellbeing of older adults.

The negative relationship between self-reported health and loneliness in older adults that we found in this study is consistent with previous research findings. These findings signify that the exacerbated emotional strain of loneliness in old age may take a toll on physical health (Cornwell & Waite, 2009; Fees et al., 1999). Loneliness is related to poorer health behaviors, such as decreased exercise and increased fat and alcohol consumption, which could lead to adverse health symptoms (for a review see Cacioppo & Patrick, 2008). Furthermore, a suggested model of loneliness by Fees and colleagues (1999) even implies that perceived social disconnectedness mediated the effects of age on self-reported health. However, it is also possible that negative affect may be a mediating factor in lonely older adults' perceptions of their physical health. In the future, we should consider whether lonely older adults' heightened negative affect could influence how older adults evaluate and remember their health symptoms.

Our study was limited in that we did not utilize a wide range of cognitive measures. We found that age, not loneliness, was related to decreased fluid cognitive abilities. However, we only used a measure of fluid cognition, verbal fluency, which is just a single aspect of cognition. Wilson and colleagues (2007) found that loneliness diminished global cognition, perceptual speed, and visuospatial ability as well as semantic memory. Thus, it is possible that we could have observed cognitive declines in relation to loneliness if we had used more diverse measures of cognitive ability. Another limitation in our study was our reliance on the REI to measure

processing style. Although this scale is widely used, it is a self-report measure and may not completely or accurately capture how people process information.

While we did not observe any differences in information processing style in relation to loneliness, our results suggested that the relationship between fluid cognition and rational processing strengthens with age. Because the rational system has been described as verbal (Epstein, 1994), it would seem that high scores on the rational scale would relate to higher verbal fluency scores for all. However, this correlation was only found in older adults. Further investigation of this link may provide profound insight into cognitive functioning in later life. Additionally, in the future we may consider investigating how loneliness impacts cognition involving emotional and social stimuli. Lonely individuals have displayed greater attention for negative social stimuli (for review see Cacioppo & Hawley, 2009), and older adults show a preference for positive social stimuli (Mather & Carstensen, 2003). Therefore, it would be interesting to examine how loneliness influences social cognition in later life.

Conclusion

The present investigation explored the relationship between aging and loneliness in emotional, physical health, and cognitive domains. We found that loneliness was differentially, and more negatively, associated with emotional and physical dysfunction in older adults as compared to young adults. We also observed decreased fluid cognitive ability, as well as a stronger relationship between this ability and rational processing in older age. However, no relationship between loneliness, age, and cognitive processing style preference was found. The negative consequences of loneliness in later life may be exacerbated because lonely older adults cannot fulfill the socioemotional goals of their limited time perspective. Loneliness is not a direct barrier to the information seeking and horizon expanding goals of young adults' open-

ended time perspective, so lonely young adults may not suffer as greatly. Thus, with special consideration of socioemotional selectivity theory, our results show that loneliness has more severe repercussions in older adulthood than in young adulthood.

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Table 1

Participant characteristics by age group.

Characteristic	Younger N = 101		Older N = 95	
	M	(SD)	M	(SD)
Age (in years)***	19.33	(1.20)	72.67	(7.70)
Sex	69 F, 32 M		58 F, 37 M	
Education (in years)*	14.09	(1.27)	15.39	(3.13)
Loneliness (UCLA)†	40.33	(7.71)	38.11	(8.42)
Social Connectedness (Hawthorne Friendship Scale)***	18.55	(3.34)	20.34	(3.17)
Network Diversity (SNI)	5.25	(1.33)	5.35	(1.79)
Number of people in social network (SNI)	30.82	(41.87)	43.22	(69.90)
Embedded Diversity(SNI)***	3.18	(.98)	2.48	(1.23)
Experiential Scale (REI)	3.33	(.48)	3.23	(.46)
Rational Scale (REI)	3.65	(.44)	3.74	(.58)
Positive Affect (PANAS)*	3.43	(.74)	3.64	(.50)
Negative Affect (PANAS)***	2.07	(.59)	1.47	(.42)
Self-reported Health (Wahler)	42.89	(22.88)	37.86	(27.35)
Verbal Fluency***	62.82	(12.45)	49.42	(18.63)

Note: Standard deviations are shown in parenthesis

† $p = .057$ * $p < .05$ ** $p < .01$ *** $p < .001$

Table 2

Correlates Between Age-Groups and Loneliness

<i>Correlates</i>	Younger	Older
	N = 101	N = 95
	Loneliness (UCLA)	Loneliness (UCLA)
Social Connectedness (Hawthorne Friendship Scale)	-.688***	-.747***
Network Diversity (SNI)	-.102	-.452***
Number of people in social network (SNI)	-.011	-.201†
Embedded Diversity(SNI)	-.262**	-.421***
Experiential Scale (REI)	-.176	-.109
Rational Scale (REI)	-.145	-.145
Positive Affect (PANAS)	-.296**	-.412***
Negative Affect (PANAS)	.166	.339**
Self-reported Health (Wahler)	.063	.227*
Verbal Fluency	.030	.082

Note:

† $p < .1$ * $p < .05$ ** $p < .01$ *** $p < .001$

Figure Captions

Figure 1. This figure shows the mean positive affect scores for the low, medium, and high loneliness groups within the young adult and older adult groups. Error bars represent +/- 1 SE.

Figure 2. This figure shows the mean negative affect scores for the low, medium, and high loneliness groups within the young adult and older adult groups. Error bars represent +/- 1 SE.

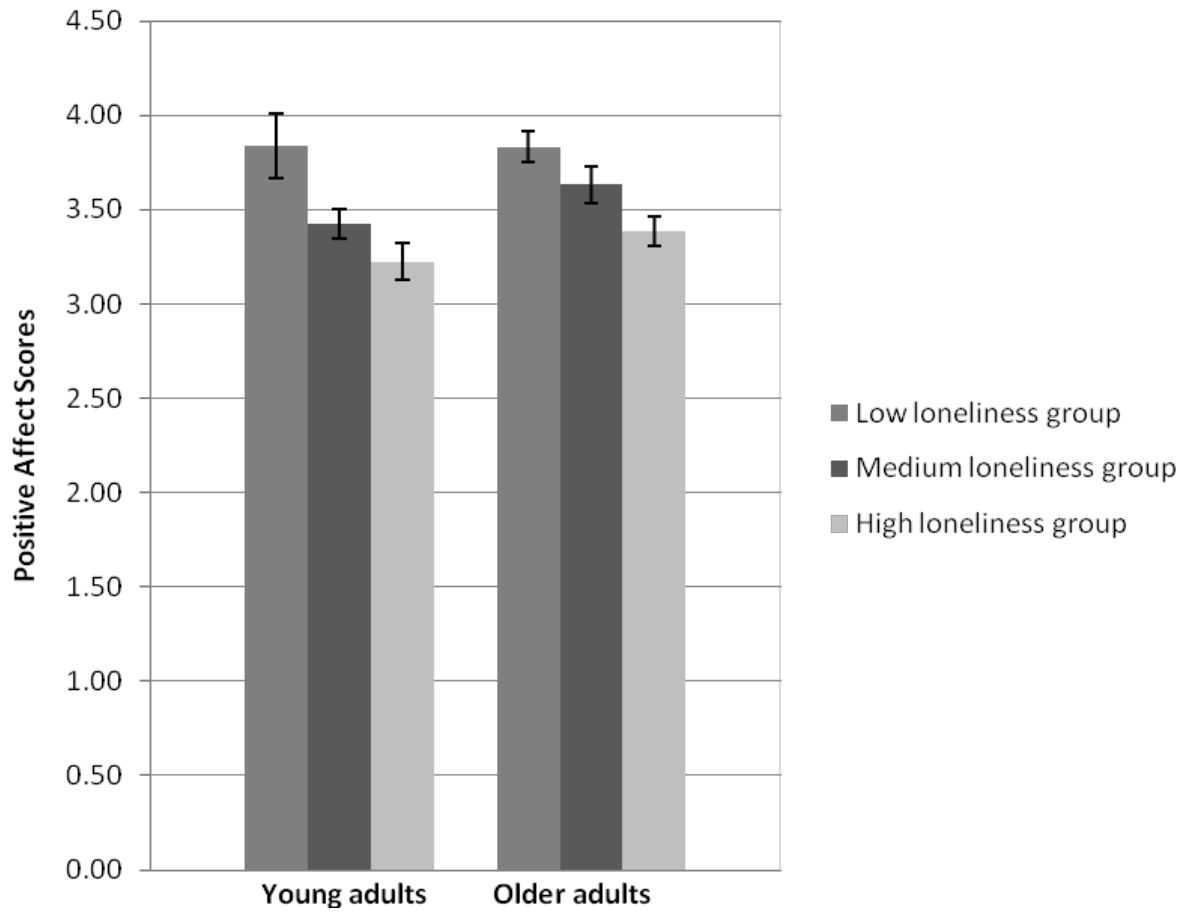


Figure 1.

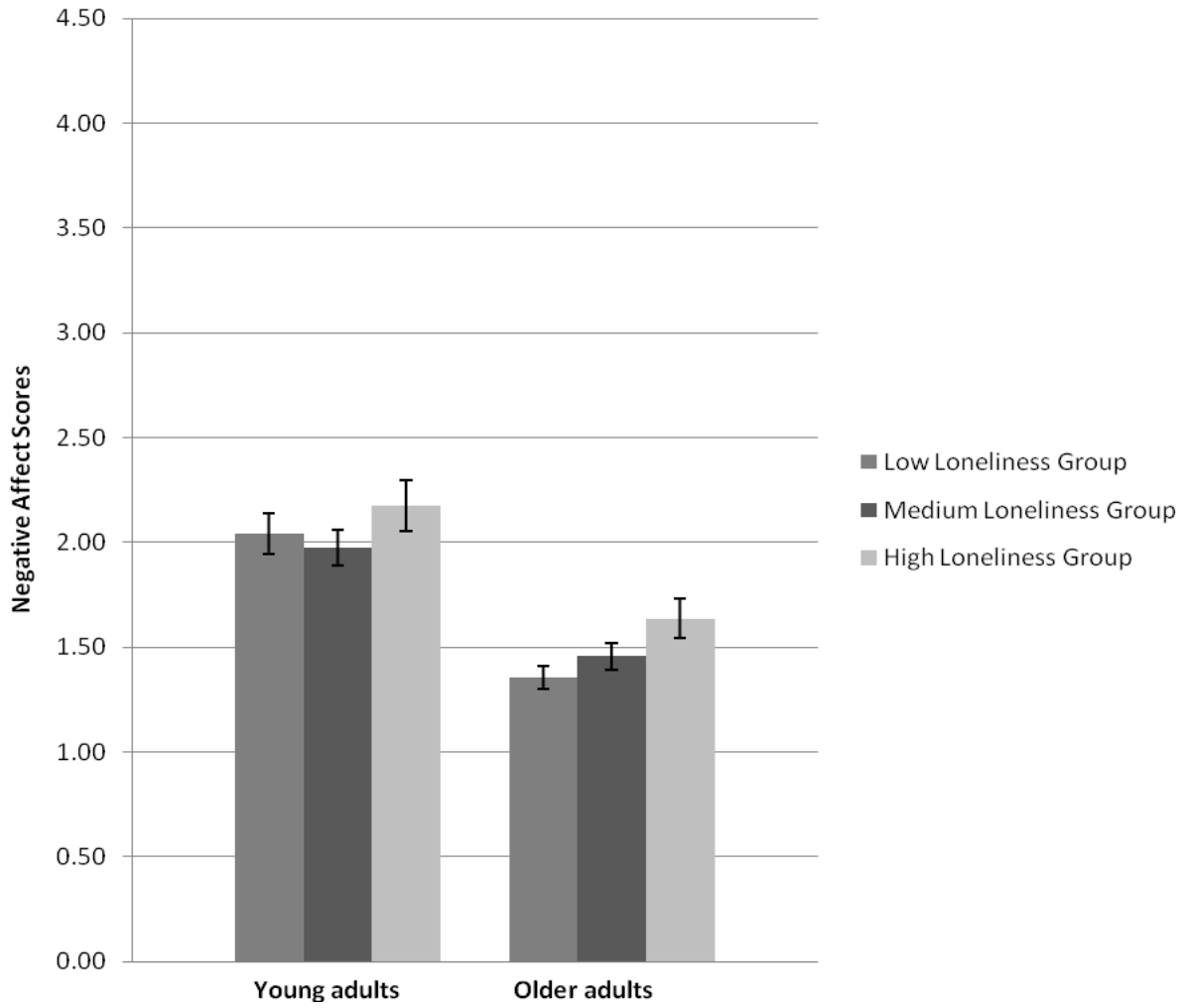


Figure 2.