Cognition and Experienced Well-Being in the Aging Population: Findings from the Health and Retirement Study

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This thesis used data collected in the 2012 National Health and Retirement Study.

Abstract

The investigation of activity-linked, experienced well-being encompasses the affects experienced during engagement in activities. Using the 2012 National Health and Retirement Study data on experienced well-being, cognitive measures such as memory recall, and demographic information, I propose that those individuals who experience a typically dominant negative affect during engagement in activities in the aging population over 50 years old will, on average, show lower memory recall scores. Additionally, the relationships with individuals' desire to seek cognitively challenging tasks, as well as gender, will show significant effects on the direction of memory recall scores, indicating that negative well-being during engagement in activities may be more linked to lower cognitive performance compared to those who experienced positive well-being while engaged in activities.

Keywords: Aging, Cognition, Experienced Well-being, Engagement in Activities

Throughout the aging process, people's emotions, activities, abilities and lifestyles can change dramatically. The emotions experienced, both positive and negative, about daily activities with which people are engaged, comprise affective well-being (Smith, Ryan, Queen, Becker & Gonzalez, 2014). Experienced well-being, on the other hand, is a measure which encompasses both participants level of enjoyment of the daily activities with which they are engaged, but also the emotions experienced and recalled upon after the activity was finished (Smith et al., 2014). Many studies have been launched to investigate the links between experienced well-being in the aging population and a number of other factors effecting successful aging from engagement and longevity to depression, pessimism, optimism and cognitive benefits.

One of these factors, cognitive functioning, involves multiple components at different levels, including the ability to perform daily activities competently and other mental abilities that reflect more basic processes (e.g. memory, language processing). Further, Parisi, Stine-Morrow, Noh, and Morrow (2009) also suggest that cognitive motivation may be readily linked to experienced well-being: not only is cognitive stimulation linked to engaging in both mentally and physically challenging activities, but it is also the way that the activity is experienced emotionally. Cognitive functioning is individualistic, as even basic daily activities may be performed with differing levels of thoughtfulness and attention (Parisi et al., 2009). According to Stine-Morrow (2007) practicing and incorporating cognitive strategies in the application of cognition in basic daily activities may help to preserve cognition through aging by becoming skilled strategists. However, challenging activities may not be the only way to seek the benefits of mental stimulation throughout adulthood. Rather, it seems that enrichment and engagement in activities is equally as important as the emotions and level of enjoyment experienced during and after engaging in these activities. Parisi et al., (2009) also found that people who exhibit higher

levels of predispositional engagement – that is, mindfulness, openness to new experiences and who exhibit a higher need for cognition – may be unsurprisingly more drawn to engaging in activities which demand higher cognition.

Moreover, studies have shown that those who exhibit personality traits related to predispositional mental engagement exude high positive correlations with cognition measures such as inductive reasoning, spatial orientation, verbal intelligence and memory recall (Parisi et al., 2009). An important point is made here about the impact of individualistic temperaments and their ability to impact one's propensity to seek mentally stimulating activities. Additional studies examined both the level of engagement as well as the novelty of the activities engaged in by participants in so far as their ability to impact cognition. It was found that the overall level of activity was a good predictor of cognition scores. Social activities, developmental activities, technological use, and experiential activities were found to be positive predictors of fluid cognitive ability. However, activities such as watching television, playing games and crafting did not positively predict fluid abilities (Jopp & Hertzog, 2007). Although this information is not surprising, it raises interesting questions about the level of mental engagement necessary to positively influence fluid cognitive ability. Activities which involve physical and social engagement, such as going to the library, taking courses or gardening are positively associated with higher fluid ability, but why? What about these experiences positively impacts cognition through aging? It certainly seems as though the propensity of an individual to be predispositionally engaged has an effect, but what about an individual's affect?

Experienced well-being as studied in the US national Health and Retirement Study [HRS] examines participants' pleasure in the activities they are engaged in, as well as their affect towards the activities both during and after the activity. Hertzog, Kramer, Wilson, and

Lindenberger (2008) showed that activities that stimulate cognition have the ability to curtail cognitive decline. This study also found that as individuals age, they have the ability to influence their cognitive functioning by either participating in or avoiding engaging in mental, physical and social activities. Further, Hertzog et al., (2008) also purported that the potential for cognitive plasticity and the ability to positively impact cognition through the aging process is maintained in the level of adult cognition. This study also provided evidence suggesting that older adults are able to effectively use certain knowledge and expertise, and maintain the ability to learn new knowledge. Similarly, certain structured skills requiring executive coordination show transfer to different task environments, revealing that stimulation of different mental activities in older adults can in fact be enhanced through different types of training interventions (Hertzog et al., 2008). Maintaining a lifestyle whose environment provides higher levels of mental and intellectual stimulation better predicts the maintenance of cognitive skills through aging, while also decreasing the risk of developing Alzheimer's Disease in late adulthood (Fratiglioni, Paillard-Borg & Winblad, 2004).

The relationship between experienced well-being and engagement seems to be bi-directional. That is, evidence suggests that both meaningful social activities and engagement predict sustained cognitive functioning in late adulthood (Hertzog et al., 2008). Not only is being physically engaged in activities ranging from exercise to taking classes important, but mental investment in engagement also seems to have a significant impact on cognition as well. The bi-directionality of this relationship may be examined on the basis of not only physical engagement, but also the pleasure or dissatisfaction of the activities with which the aging population is engaged. As a first step in understanding the relationship between engagement and cognitive functioning, I move to examine the role that activity related experienced well-being plays in

cognitive functioning. The impact of the number and plethora of activities engaged in may contribute to cognitive maintenance while the amount of pleasure during engagement contributes to enhanced cognitive functioning.

Physical engagement and mental engagement in activities have been evidentially shown to make a positive impact on cognitive skills, both in preservation and maintenance, but also in slowing cognitive decline (Hertzog et al., 2008). Taken together as experienced well-being, it seems a natural inclination that positively construed emotional experiences along with meaningful and intellectually or physically stimulating activities, should yield higher cognitive functioning through adulthood. Moreover, it is suggested that people with higher cognitive ability expose themselves to more challenging activities and experience a need for cognition. Hence, people with higher cognitive functioning may have more negative emotional experiences due to either frustration with obligatory daily activities (e.g. housework) or to self-awareness of cognitive decline.

The implications provided from evidence in previous studies are numerous in their potential effect on cognition through aging. In order to measure the effects on activity-linked engagement on cognition, data from the 2012 National Health and Retirement Study on immediate and delayed memory recall and the need for cognition will be included. The types and number of activities engaged in as well as the emotions experienced will serve as the measure of activity-linked experienced well-being. These factors will be analyzed in an attempt to link them to measures of cognition. Generally, I suggest that engagement, and experienced well-being together will positively predict the ability of an individual to perform higher on measures of cognition, the need for cognition, and memory scores. We posit that participants with higher cognitive ability will report a higher total number of activities experienced during activity

engagement. Similarly, participants with higher cognitive ability will be associated with both higher positive and negative activity related experiences and report a higher number of activities.

Method

Health and Retirement Study Background

The University of Michigan Health and Retirement Study is a cross-sectional panel study that utilizes the United States population over 50 years of age. The HRS began in 1992 and operates biennially. The HRS collects longitudinal data on individual participants and their families who participate from wave to wave. Furthermore, the Health and Retirement Study does not seek to interpret the data as a means of assessing the sample population as they age, but rather what the subjects experience at differing ages. Access to the HRS data, codebooks, questionnaires, and assessments are available free of charge on the HRS website at: www.hrsonline.isr.umich.edu.

The participants in these analyses were selected based on their participation in both a face-to-face (or phone) interview and a self-administered psychosocial and lifestyle questionnaire in the 2012 HRS wave (N = 6,777) (HRS, 2012). The HRS data utilized in this investigation compares participants by age in terms of their experienced well-being, consisting of the participants emotions about their engagement in activities during and after their participation. The participants also reported the total number of activities they participated in. During either the face-to-face interview or the phone interview, all participants completed a memory exercise, measuring both immediate and delayed memory recall. The measures taken from the questionnaire include the number of activities the subjects participated in as well a series of six questions to gauge their need for cognition (HRS, 2012).

Participant Demographics

All of the participants ranged in age from 51 to 101 years old. Out of a total of 6,777 subjects, the youngest participant was 51 and the oldest was 101 years old (M = 67.92 years, SD = 10.409). There were a total of 1,871 (27.61%) participants age 50-59 years old; 1,802 (26.59%) participants between the ages of 60-69; 2,073 (30.59%) participants between the age of 70-79; 895 (13.21%) participants between the ages of 80-89, 134 (1.97%) participants age 90-99; one participant age 100 (0.0001%); and one (0.0001%) participant was 101 years old.

Furthermore, 2,768 (40.8%) of the participants were men and 3,963 (58.9%) were women (N = 6,731). The average number of years of schooling among the participants was 12.89 years (N = 6,777, SD = 3.004) with 37 (0.55%) of the participants indicating that they had not received any formal education; 1,188 (17.53%) of the subjects indicated that they had received between 1-11 years of schooling; 2,181 (32.18%) of the participants indicated that they had completed high school; 823 (12.28%) indicated that they had graduated from a four-year college; 807 (11.91%) had received post-college education; and 106 (1.56%) participants did not enter information for their level of education. The marital status of the participants (N = 6,774) was recorded as follows: where 1 = married, 2 = divorced, 3 = widowed, 4 = never married. 4,045 (59.7%) of participants indicated that they were married, 129 (1.9%) indicated that they were separated, 984 (14.5%) indicated that they were divorced, 1,257 (18.5%) indicated that they were widowed, 348 (5.1%) indicated that they were never married, 10 (.1%) classified their marital status as “other” and 3 (.0004%) did not report their marital status.

Procedure

Memory Recall. The memory recall tasks were always administered with the immediate recall task first, followed by the delayed word recall task. The recall tasks were composed of four different lists of nouns and were randomly assigned, enabling the lists to be alternated

throughout different waves of testing and to administer different lists to each member of a household who participated in the study. Furthermore, the words appeared one at a time on a laptop screen and the interviewer read the word aloud as soon as it appeared on the screen. The words were read at a rate of 10 seconds, allowing for a standardized speed of word presentation.

During the immediate memory recall task, the participants were instructed that they would be read a set of 10 words and would be asked to recall as many as possible. They were also told that the task consisted of a long list of words and that it would be challenging for any person to recall all of the words. The participants were notified that the experimenter could not repeat any of the words. For the delayed recall task, the participants were instructed that a short while ago they were read a list of words and repeated the ones they could remember aloud. The interviewer then asked that the participants to repeat the words that they had remembered aloud (HRS, 2012).

Cognition and Activities. The Psychosocial and Lifestyle Questionnaire was sent to participants via mail. Upon completion of the questionnaire, participants sent their completed forms back to the University of Michigan in a pre-addressed and pre-paid envelope. The questionnaire included many psychometric measures, including questions related to the subject's social and physical engagement, loneliness, emotions, and health. The data were then recorded, coded and saved in a database at the Institute for Social Research at the University of Michigan in Ann Arbor.

Experienced Well-being. Using the Day Reconstruction Method (Smith, Ryan, Becker & Gonzalez, 2011) participants were asked to recall the previous day's activities. The subjects reconstruct the previous day by time and rate their feelings experienced during each of these

activities. They were also asked whether each activity was part of their daily routine, whether it was followed with additional activities, and if there were other people present.

Measures

Experienced Well-being. Experienced well-being was measured based on the participants emotions during and after engaging in an activity or multiple activities (Smith et al., 2012). These activities included: running errands, socializing, traveling, participating in other health-related activities, watching television, volunteering, and exercising. For all 6,777 participants 5,793 (85.5%) reported watching television, 1,661 (24.5%) participants reported engaging in volunteer work, 3,037 (44.8%) reported exercising, 2,088 (308%) reported engaging in other health-related activities, 3,437 (50.7%) reported traveling, 3,689 (54.4%) reported socializing, and 2,606 (38.5%) reported running errands. The emotions that were recorded across the aforementioned activities were as follows: happy, interested, frustrated, sad, content, and bored. These emotions were scored on a 5-point likert scale. Each of the aforementioned emotions were calculated without and controlled for the activity of being alone.

Need for Cognition. The participant's need for cognition was assessed based on the mean score of six questions on the psychosocial questionnaire, question 34A (a-f). Each question was scored on a 6-point scale (1 = Strongly disagree, 2 = Somewhat disagree, 3 = Slightly disagree, 4 = Slightly agree, 5 = Somewhat agree, 6 = Strongly agree). The average need for cognition score was 2.85 (N = 6,313, SD = 0.638). The need for cognition score was calculated by averaging the scores across the six questions: 34Aa: I like to have the responsibility of handling a situation that requires a lot of thinking, 34Ab: I really enjoy a task that involves coming up with new solutions to problems, 34Ac: The notion of thinking abstractly is appealing to me, 34Ad: I would rather do something that requires little thought than something that is sure

to challenge my thinking abilities, 34Ae: I try to anticipate and avoid situations where there is likely a chance I will have to think in depth about something, and 34Af: I only think as hard as I have to (HRS, 2012).

Memory Recall. In order to assess memory recall, two assessments were completed during the face-to-face or phone interview. There was both an immediate and delayed memory recall task. Each assessment consisted of ten total words. During both tasks, ten high-frequency nouns were flashed on a laptop screen, while the interviewer also read the word aloud to the participant. The recall score for delayed and immediate recall were each out of a possible 10 words and scores were out of a possible 10 points, with each word correctly recalled counted as one out of 10. An example of one of the word lists is as follows: HOTEL, RIVER, TREE, SKIN, GOLD, MARKET, PAPER, CHILD, KING, BOOK (HRS, 2012). In order to compare memory recall to other measures, an overall recall score was created, averaging the score for each participant's immediate and delayed recall score and was out of a maximum of 10.

Results

Means

Across the participants, the average memory recall score was 4.81 words (SD = 4.82, N = 6,626). The average for the delayed recall task was 4.26 words (SD = 1.95) and the average number of items recalled for the immediate recall task was 5.37 (SD = 1.63). Furthermore, the average number of activities reported was 3.29 (SD = 1.48) with a minimum of one activity and a maximum of seven activities reported (N = 6,777). 6,642 (98%) participants reported more than activity. 865 (12.8%) participants reported one activity, 1,355 (20%) participants reported two activities, 1,586 (23.4%) subjects reported three activities, 1,482 (21.9%) reported four activities, 965 (14.2%) reported five activities, 443 (6.5%) reported six activities, and 81 (1.2%)

participants reported seven activities. For all 6,777 participants, the average "happy" emotion across activities was 3.53 (SD = 1.59), the "interested" average was 3.65 (SD = 1.53), the average "frustrated" response was 0.7096 (SD = 1.08), the average for "sad" was 0.53 (SD = 1.03), the average "content" was 3.40 (SD = 1.68), the average "bored" was 0.67 (SD = 1.08). Overall, the average positive affect across activities was 3.53 (N = 6,777, SD = 1.45) and the average negative affect across activities was 0.63 (N = 6,777, SD = 0.91).

Need for Cognition. In order to investigate the relationship between participants need for cognition with affect and other cognitive measures, a composite score was produced using the average score of six questions for each participant. Each question was answered on a 5-point likert scale using the following seriation: 1 = Not at all like me; 2 = Somewhat unlike me; 3 = Uncertain; 4 = Somewhat like me; 5 = Very much like me. The HRS 2012 need for cognition questions were as follows:

a) I like to have the responsibility of handling a situation that requires a lot of thinking.
b) I really enjoy a task that involves coming up with new solutions to problems.
c) The notion of thinking abstractly is appealing to me.
d) I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.
e) I try to anticipate and avoid situations where there is likely a chance I will have to think in depth about something.
f) I only think as hard as I have to.

Parts d), e), and f) were reversed coded for the analyses. The average response for part a) was 3.40 (N = 6,574, SD = 1.20), the average for part b) was 3.53 (N = 6,558, SD = 1.19), the

average for part c) was 3.10 (N = 6,465, SD = 1.20), the average for part d) was 3.54 (N = 6,568, SD = 1.17), the average for part e) was 3.61 (N = 6,542, SD = 1.18), and finally the average for part f) was 3.81 (N = 6,571, SD = 1.18). The average need for cognition composite score comprised of all six questions was 3.50 (N = 6,313, SD = 0.73). Taken together, the need for cognition questions have a Cronbach's Alpha of .674 (N = 6,313) indicating that the six questions comprising the composite construct are reliable and a good measure of the subjects need for cognition.

Inter-item correlations. Unsurprisingly, many of the need for cognition questions were highly correlated with one another. Questions a) and b) had a strong positive correlation of .662; a) and c) had a strong positive correlation of .516; a) and d) had a correlation of .058; a) and e) had a correlation of .100; a) and f) had a correlation of .108. Questions b) and c) had a strong positive correlation of .599; b) and d) had a correlation of .072; b) and e) had a correlation of .124; b) and f) had a correlation of .121. Questions c) and d) had a correlation of .052; c) and e) had a correlation of .096; c) and f) had a correlation of .091. Questions d) and e) had a strong positive correlation of .471; d) and f) had a correlation of .347. Finally, questions e) and f) had a strong positive correlation of .422.

Modeling

In order to examine the relationship between experienced well-being and cognition, three hierarchical regression models were used to investigate the multi-directional relationships among: positive experienced well-being across activities, negative experienced well-being across activities, and memory recall. Factors previously associated with memory recall such as age, gender, race, ethnicity, years of schooling, marital status, and self-rated health were entered into all models as controls.

Memory Recall. The results from the control variables accounted for 23% of the variance in memory recall scores (R^2 = .230). The addition of the activities participated in, including: watching television, socializing, running errands, exercising, working as a volunteer, traveling and other health-related activities accounted for 23.6% of the variance in memory recall scores (R^2 = .236) and showed a positive linear correlation (R = .486). The change in R^2 = .006 (F (13, 6052) = 143.393, p < .001). Next, with the addition of the participants average positive affect across activities, the correlation remained the same as in the previous step (R = .486) however, the variance in memory recall scores with the addition of positive affect increased to 23.9% (R^2 = .239). The change in R^2 = .003 (F (14, 6052) = 133.323, p < .001). Separately, adding negative affect across activities increased the positive correlation between the factors and memory recall (R = .489) and the variance explained by memory recall scores increased to 23.9% (R^2 = .239). The change in R^2 = 0 (F (15, 6052) = 126.416, p < .001). Finally, the addition of the participant's average need for cognition accounted for 24.4% of the variance, a significant variance in memory recall scores (R^2 = .244) as well as increased the positive correlation with memory scores (R = .494) where the change in R^2 from the first control model to the final model = .014 (F (16, 6052) = 121.837, p < .001). The final regression model accounted for 24.4% of the variance in memory recall.

In the control model, all predictor variables were significant. Participants current age displayed the greatest significant relationship to memory recall (β = -.290, p < .001). The number of years of schooling also demonstrated a positive correlation to memory recall scores (β = .252, p < .001). Gender, specifically identifying as female (β = .169, p < .001) was associated with a higher memory recall score. The addition of negative affect across activities in the next step in the regression model was significant in all stages of the model where it was present (β = -.057, p

< .001). Similarly, working as a volunteer showed a significant positive correlation to memory recall in all stages of the model (β = .039, $p < .001$) as did traveling (β = .030, $p < .02$) and engaging in other health-related activities (β = .026, $p < .03$). The addition of the participants need for cognition into the model was positively correlated with memory recall (β = .075, $p < .001$). Positive affect across activities, participating in exercise, socializing, running errands, or watching television did not display a significant correlation with memory recall in any stage of the model ($p > .05$). The results from the final regression model are shown in Table 1.

Negative Affect. The results from the control variables: marital status, self-rated health, current age, years of schooling, race and ethnicity, and gender accounted for 5.1% of the variance in negative affect across activities ($R^2 = .051$). The change in $R^2 = .051$ ($F (6, 6052) = 41.785$, $p < .001$). Martial status (β = .061, $p < .001$) and self-rated health (β = .196, $p < .001$) were the only control variables that displayed significant positive correlations with negative affect. While current age showed a significant negative correlation with negative affect (β = -.088, $p < .001$), years of schooling showed a slightly negative correlation, as did gender, however they were not significant ($p > .05$). Similarly, race and ethnicity did not display a significant correlation with negative affect across activities (β = .001, $p > .05$).

In the next step of the model, adding the activities and number of activities engaged in accounted for 7.2% of the variance explained by negative affect across activities ($R^2 = .072$) and showed a positive correlation with negative affect (R = .268). The change in R^2 from the first model to the second model including activities and number of activities = .021 ($F (9, 6052) = 38.742$, $p < .001$). The number of activities reported was significant and negatively correlated to negative affect in each subsequent stage of the model including the final model (β = -.081, $p < .001$). Similarly, socializing showed a significant negative correlation to negative affect across

activities during activities in all stages of the model (β = -.042, $p < .005$). In contrast, neither watching television nor participating in other health-related activities showed a significant correlative relationship ($p > .05$).

To investigate the correlative relationship between negative experienced well-being and positive experienced well-being, positive affect during activities was then added to the model and along with the aforementioned variables, accounted for 10.1% ($R^2 = .101$) of the variability as explained by negative affect across activities, while increasing the correlation with negative affect (R = .318). The change in $R^2 = .029$ (F (11, 6052) = 61.785, $p < .001$). Adding positive affect across activities showed a negative correlation to negative affect across activities in all subsequent stages of the model, including the final model (β = -.182, $p < .001$).

The next stage of the model included the addition of the participant's average need for cognition score. Participant's need for cognition score didn't account for any differences in the relationship to negative affect across activities, and the variability explained by negative affect remained at 10.1% (R = .318, $R^2 = .101$). The change in $R^2 = 0$ (F (12, 6052) = 56.664, $p < .001$). Similarly, the need for cognition did not show any significant correlations to negative affect across activities throughout any stage of the model where it was included ($p > 0.300$). The final step in the model included the addition of the participant's memory recall scores. Memory recall accounted for 10.5% of the variability that could be explained by negative positive affect across activities ($R^2 = .105$) and showed a significant negative correlation to negative affect across activities (β = -.068, $p < .001$). The change in $R^2 = .004$ (F (13, 6052) = 54.319, $p < .001$). These results can be found in Table 2.

Positive Affect. The results from the control variables: marital status, self-rated health, current age, years of schooling, race and ethnicity, and gender accounted for 6.0% of the

variance in negative affect across activities (R^2 = .060). In the initial control model, self-rated health was negatively correlated to positive affect across activities (β = -.219, p < .001). Marital status was also negatively correlated with positive affect across activities (β = -.034, p = .007). Gender (β = .050, p < .001) and years of schooling (β = .040, p = .002) were both positively significantly correlated with positive affect across activities. Current age, race and ethnicity were not significantly correlated throughout any step in the model (p > .05).

In the next step of the model, watching television, exercising, participating in other health-related activities, traveling, socializing, running errands, and working for pay were all added and accounted for 11.7% of the variance explained by average positive affect across activities (R^2 = .117). The change in R^2 = .003 (F (14, 6488) = 61.481, p < .001). It also showed a correlative relationship with average positive affect across activities (R = .343). Watching television was negatively correlated with positive affect across activities (β = -.026, p = .028) while working as a volunteer was positively correlated (β = .034, p < .010). Exercising was positively correlated with positive affect across activities (β = .067, p < .001) as was socializing (β = .198, p < .001). Participating in other health-related activities was negatively correlated to positive affect across activities (β = -.077, p < .001) while traveling was positively correlated (β = .029, p = .025). Running errands and working for pay were not significantly correlated to positive affect across activities during any stage in the model.

In the next stage of the model, average negative affect across activities was added, and accounted for 14.2% of the variance as explained by positive affect across activities (R^2 = .377), the change in R^2 = 0.034 (F (15, 6488) = 71.651, p < .001). There exists a negative correlative relationship between negative affect and positive affect across activities (β = -.164, p < .001). In

this step of the model, the only difference in significant correlations that were effected by the addition of negative affect across activities into the model was traveling ($p > .05$).

In the final stage of the model, memory recall was added, accounting for 14.3% of the variance as explained by positive affect across activities ($R^2 = .143$), the change in $R^2 = .001$ ($F, 16, 6488) = 67.254$, $p < .001$). The only differences in significant correlations between independent variables was that the addition of memory recall into the model showed that traveling was no longer significantly correlated to positive affect ($p > .08$). The average negative affect across activities in the final model showed a significant negative correlation to positive affect across activities ($\beta = -.163$, $p < .001$). Memory recall itself was not significantly correlated to positive affect across activities ($\beta = .015$, $p > .05$). There was also no significant correlative relationship found between average positive affect across activities with participant's average need for cognition. These results can also be seen in Table 3.

Discussion

Generally, successful aging seems to be attributed to a multitude of factors ranging from affect to cognition to activity engagement. The negative factors associated with aging seem to be widely accepted as a combination of genetic as well as environmental and lifestyle influences. These range from declining illness and physical bodily limitations to cognitive declines in memory or language processing, all of which contribute to the idea of poor aging. However, there are many positive factors associated with the aging process. Recent research suggests that the aging population has the ability to participate in potentially preventative practices to help reduce the risk of experiencing many of the factors many people associate with an unsuccessful aging process. For instance, Hertzog et al., (2008) asserts that maintaining physical and mental engagement promotes cognition as aging continues into late-life through longitudinal studies of

older adults. Fratiglioni et al., (2004) echo similar findings, where the inclusion of mental, physical and social engagement show encouraging effects for protection against dementia and Alzheimer's Disease for adults in late-life. The same study also found that dynamic engagement in physical, mental and social lifestyles also showed overall benefits toward cognition in old age. It is very possible that together these factors differentially impact one another as well as overall health and cognitive prowess at varying levels in the aging population. This investigation examined the relationship between both positive and negative experienced well-being during engagement in various activities as well as cognition through memory recall and the participants need for cognitively stimulating activities. The goals of this analysis were to further assess the relationships between positive and negative affect through activity engagement and cognition in hopes of illuminating more about what kinds of experienced well-being are linked to higher memory recall performance.

Affect

Based on the findings from the 2012 dataset, the highest average across participants was 3.65 (N = 6,777, SD = 1.53) for the emotion "interested" followed closely by "happy" with an average of 3.53 (N = 6,777, SD = 1.59). These averages indicate that the participants on average showed they were both interested as well as pleased with their activity engagement. The average positive affect across activities was much higher at 3.53 (N = 6,777, SD = 1.45) than the average negative affect across activities, which was 0.63 (N = 6,777, SD = 0.91). Overall, the negative emotions measured showed much lower averages than the positive emotions. Interestingly, this finding plays into the concept that the measures of these emotions were through ten-minute day reconstruction tasks, which are reflections on the previous day's emotions during activity. One of the major findings from Smith et al., (2014) was that the vast majority of participants from the

2010 wave had reported multiple emotions, most of which were mixed, that is, reporting a combination of positive and negative emotions such as frustration and interest. The 2012 wave of participants also likely reported a mixture of emotions, which may explain why the average negative affect is significant in relation to it's association with cognitive memory measures more so than the positive affect, yet displays a much smaller average across the participants. I assert that because the participants on average reported multiple activities (M = 3.29, SD = 1.48) that the majority of emotions reported were likely mixed between positive and negative because different activities likely encouraged participants to report multiple emotions.

Need for Cognition

Each of the need for cognition questions individually averaged between 3.10 and 3.81 among participants. For the composite score, the average need for cognition was 3.50. Based on the likert scale, participants on average were between an uncertain designation and below the somewhat like me designation in their need for cognition. This sample is representative of the population, however the results are not generalizable throughout the aging process. Although the HRS sample utilized participants ranging from 51 to 101 years old, the data is not longitudinal. The results from the cross-sectional data suggest that currently, across the fifty-year lifespan from age 51 to 101, the average need for cognition is slightly above uncertain. Future studies should investigate possible differential needs for cognition or cognitive stimulation based on age groups to examine the differences between subsets of the aging population.

Vitality and well-being achieved through cognitively challenging stimulation may change based on people's ability or inability to participate in such activities. Further, Hertzog et al., (2008) assert that individuals who live mentally stimulating lifestyles maintain better overall cognitive functioning and the risk of developing Alzheimer's disease later in life is significantly

lower. Future research on the effects of the need for cognition should also examine the longevity of individuals whose need for cognition remains constant throughout aging as well as what experienced well-being is like for those individuals at the end of their lives.

Experienced Well-Being

Activity-linked experienced well-being encompasses the emotions during and after engaging in activities. The relationship between experienced well-being and engagement is both important and bidirectional. The influence of the emotional aspects of engagement, whether it is social, physical or emotional all play a role in determining the level of engagement. Analogously, the activity being engaged in also effects the emotions experienced, and as a result, activity-linked experienced well-being may become increasingly more important when the aging population considers with whom, how, and what they will engage. As previous research shows, the link between affect and engagement is significant in terms of life satisfaction in old age. The quality of social networks, self-rated health, sense of control, and depressive symptoms in old age were significantly associated to life satisfaction, hitting on many of the same concepts as investigated in this case through well-being (Berg, Hassing, McClearn & Johansson, 2006).

Memory Recall

Memory recall was used as this investigation's central measurement of cognition. The score used in the regression analyses averaged the participant's immediate and delayed memory recall task scores. The immediate and delayed recall scores taken separately, were not found to be significantly related to overall positive or negative affect during activity engagement. Rather, the average score combining both measures of memory, and therefore the central measure of cognition, showed multiple significant relationships with the measures of affect during activity engagement. Based on the findings, many of the control variables were unsurprisingly

significantly correlated to memory recall. Age showed the largest correlation to lower memory recall scores, ($\beta = -.290$, $p < .001$), while the number of years of schooling showed the highest correlation to higher memory recall scores ($\beta = .252$, $p < .001$). Age has been shown to have an effect on memory recall, as normal memory decline occurs with age. The amount of schooling may also play into enhancing memory recall as well as other cognitive factors due to a plethora of reasons. Education provides not only valuable skills such as reading and writing, but it also provides many with social interactions, some of which result in lifelong friendships.

Socializing was one of the most significantly correlated activities in all aspects of this investigation, although it was not found to be a significant correlate when memory recall was investigated as the dependent variable. However, other activities which involve socializing, including traveling ($\beta = .030$, $p < .02$) and working as a volunteer ($\beta = .039$, $p < .001$) both showed significant positive correlations to memory recall. Need for cognition was positively correlated to memory recall as well, exhibiting that participants with a higher need for cognition are more likely to have higher memory recall ($\beta = .075$, $p < .001$). The addition of negative affect across activities was significant ($\beta = -.057$, $p < .001$) and also served to decrease the correlation between positive affect across activities and memory recall ($\beta = -.325$, $p < .001$) which was not significant, but interesting nonetheless.

The role of socialization, or interaction with others seems to play a vital role in the bidirectionality of cognition as well as positive and negative affect. However, positive affect across activities, socializing, participating in exercise, running errands, and watching television did not display significant correlations with memory recall ($p > .05$). These findings were surprising, in that socializing did not show significance to memory recall, even though there has been widespread support from prior research.

Positive Affect Across Activities

Positive affect across activities was one of the most interesting factors in this investigation as reflected by the findings. Self-rated health ($\beta = -.219$, $p < .001$ and marital status ($\beta = -.034$, $p = .007$) were both negatively associated with positive affect across activities, meaning that as participants reported themselves to be of lesser health, their positive affect decreased. Similarly, as participants moved from married to divorced, widowed or never married, they reported lower positive affect across activities. However, the data revealed that women significantly exhibit higher positive affect across activities, as well as the participants who had more years of schooling ($\beta = .040$, $p <= .002$). One of the most surprising findings was that positive affect was not significantly correlated with age ($p > .05$), revealing that positive affect, and in turn, positive experienced well-being may not be impacted by age, but rather by personality, gender or any of the above included factors, and may be worth further investigation.

Watching more television ($\beta = -.026$, $p = .028$) and participating in other health-related activities ($\beta = -.077$, $p < .001$) were significantly associated with lower positive affect across activities. Watching television may be related to less challenging cognitive stimulation as well as a lack of socialization during engagement, potentially resulting in lower positive affect overall. Engaging in other health-related activities may also be linked to a cognizant awareness of a negative health condition, potentially explaining a lower positive well-being during those activities. Increased exercise ($\beta = .067$, $p < .001$), socializing ($\beta = .182$, $p < .001$), and working as a volunteer ($\beta = .032$, $p < .010$) were significantly positively correlated to higher positive affect. These findings again align with earlier assertions about the benefits of socialization. Finally, memory recall was not significantly correlated to positive affect or the participant's need

for cognition. This also means that positive activity-linked experienced well-being is not linked to poor cognition, and hence not harmful toward cognition.

Negative Affect Across Activities

As expected, age showed a significant negative correlation with negative affect ($\beta = -.116$, $p < .001$). The older participants in the study experienced lower negative affect across their activities during the day reconstruction. This may be due to a number of reasons, although the view that cynicism or negativity falls by the wayside with older age may serve as a possible explanation for less negative affect reported across activities in the older participants. Similarly, the more emotions that were reported during activities were associated with lower negative affect in each stage of the model ($\beta = -.057$, $p < .001$). Increased socialization was also significantly correlated with less negative affect during activities ($\beta = -.042$, $p < .005$). These findings suggest that when multiple emotions are reported, they are likely a mix of both positive and negative emotions, with the experience of positive affect outweighing the alternatives. Increased socialization, as supported by multiple prior studies, was indeed significant in association with lower levels of negative experienced well-being.

Memory recall showed a significant correlation with negative affect ($\beta = -.068$, $p < .001$). Although slight, higher memory recall was significantly associated with lower negative affect across activities. Likewise, positive affect showed a negative correlation with negative affect across activities ($\beta = -.182$, $p < .001$) affirming that positive experienced well-being interacts with negative emotions which effects activity-linked experienced well-being in this instance. Conversely, need for cognition did not display a significant correlation with negative affect leading to the conclusion once again that negative affect may not necessarily be detrimental to cognition, or in this case, the need for cognition.

Implications

Based on the findings from this study, it is suggested that positive and negative activity-linked experienced well-being contribute differentially to the ability of an individual to perform higher on measures of cognition, the need for cognition, and memory scores. Similarly, participants with higher cognitive abilities were associated with both higher positive and negative activity-related experiences of well-being. According to Hertzog et al., (2008) meaningful social engagement predicts better maintenance of cognitive functioning in old age. Activities show potential in their ability to benefit normal cognitive decline with aging and potentially the ability to help alter cognitive decline. At the same time, halting activity engagement may also be in part caused by late-life cognitive decline, hence the bi-directionality of the relationship. Based on the findings above, it is not possible to indicate the direction of the relationship between cognition and activity-linked experienced well-being in the aging population.

However, a reasonable conclusion based on the findings would be to say that together, social, emotional and physical lifestyle factors help to contribute to the differential in experienced well-being. The lack of correlation between positive affect and memory recall is unconcerning, although not what was initially predicted. The lack of significant correlation identifies it as being neither harmful or necessarily helpful. However, examining the other relationships with positive affect across activities, a number of other factors are significantly correlated to both positive affect and higher memory recall, even though positive affect on its own is not. Factors such as socializing, traveling, volunteering, and exercising are all intricately linked to both positive affect across activities as well as memory recall. The possibilities are

endless in that positive affect, and therefore average positive experienced well-being, plays a moderating role in helping to determine cognitive measures through aging.

Next, negative affect across activities, and therefore negative activity-linked experienced well-being, was significant in correlated to many factors tested in this analysis including: age, gender, self-rated health, memory recall, positive affect across activities, socializing, and the number of reported activities. The factors not significantly associated with negative experienced well-being were: watching television, the need for cognition, and engaging in other health-related activities. Negative experienced well-being is not significantly effected by one's need for cognition, watching television, or engaging in other health-related behaviors which leads to the conclusion that multiple forms of engagement are essential to maintaining a positive experienced well-being.

It may be the case that negative activity-linked experienced well-being is only societally associated with other harmful or detrimental factors which threaten the successful aging process. Instead, based on the findings, negative activity-linked experienced well-being is associated with slightly lower, yet significant memory recall. The findings suggest though, that positive affect from activity engagement interacts with and may potentially overrule negative activity-linked experienced well-being, but not necessarily cognition. This is an interesting assertion, and one that should be given more consideration in future studies looking at the intersection of positive and negative affect and how it correlates to cognitive measures.

Suggestions

Finally, many of the findings from this investigation could and should be examined on the basis of individual differences. Investigating differences between individuals in terms of reporting extremely positive or negative affects during activities, a mixture of both and which

emotions were reported, looking at the participants in each age group who scored the highest on the memory recall measures and examining the activities and affects reported are just a few examples. Performing analyses on the individual differences in this instance would provide specific examples for understanding the relationship between engagement, affect, and cognition first-hand. Although the directionality of the factors could still not be assumed, it would provide more insight into the lifestyle and affect patterns of the individuals who showed higher memory recall.

Moreover, Berg et al., (2006) found that depressive symptoms in women were significant in determining life satisfaction, bringing to light gender differences which may also be worth further exploration in future research. Social support and socioeconomic status have shown significant effects on health impairment, which was a key predictor for determining happiness (Bishop, Martin & Poon, 2007). Again, bringing to light the idea that overall well-being should be measured in terms of multiple factors: genetics, environmental influences, physical, mental, and emotional engagement, as well as cognitive measures. The HRS provides an ideal dataset due to its uniqueness in size, scope and information collected, allowing a variety of analytical investigations on life after fifty years of age.

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Tables

Table 1

Final Stage of Memory Recall Stepwise Regression Data (N = 6052)

Factor	B	SE B	β	p-value
Age	-.045	.002	-.277	.000
Years in School	.127	.007	.223	.000
Gender	.596	.040	.176	.000
Self-Rated Health	-.129	.020	-.081	.000
Race/Ethnicity	-.092	.015	.176	.000
Marital Status	-.055	.010	-.062	.000
Volunteering	.148	.045	.039	.001
Need for Cognition	.197	.031	.075	.000
Health-Related Activities	.092	.042	.026	.027
Positive Affect	.007	.014	.006	.619
Negative Affect	-.106	.022	-.057	.000
Traveling	.098	.041	.030	.016

Note. $R^2 = .244$

Table 2

Final Stage of Negative Affect Stepwise Regression Data (N = 6052)

Factor	B	SE B	β	p-value
Age	-.010	.001	-.116	.000
Gender	.009	.024	.005	.698
Self-Rated Health	.116	.012	.135	.000
Marital Status	.025	.006	.052	.000
Volunteering	.148	.045	.039	.001
Need for Cognition	.197	.031	.075	.000
Socializing	-.076	.027	-.042	.004
Positive Affect	-.114	.008	-.182	.000
Negative Affect	-.106	.022	-.057	.000
Memory Recall	-.037	.008	-.068	.000
Number of Activities	-.049	.010	-.081	.000

Note. $R^2 = .105$

Table 3

Final Stage of Positive Affect Stepwise Regression Data (N = 6052)

Factor	B	SE B	β	p-value
Age	-.001	.002	-.007	.000
Gender	.116	.036	.039	.001
Self-Rated Health	-.202	.018	-.147	.000
Marital Status	-.022	.009	-.028	.022
Years of Schooling	.016	.006	.032	.011
Volunteering	.108	.043	.032	.012
Watching Television	-.095	.048	-.023	.047
Socializing	.530	.035	.182	.000
Exercising	.178	.034	.061	.000
Health-Related Activities	-.243	.037	-.078	.000
Negative Affect	-.263	.019	-.163	.000
Memory Recall	.013	.011	.015	.264

Note. $R^2 = .143$