HHS Public Access

Author manuscript

Gerontology. Author manuscript; available in PMC 2018 April 26.

Published in final edited form as:

Gerontology. 2017 ; 63(5): 460–468. doi:10.1159/000466691.

Subjective Memory in a National Sample: Predicting Psychological Well-Being

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Abstract

Background—Individual perception of memory performance (i.e., subjective memory) is assessed using a variety of approaches. This article focuses on two such approaches: self-comparison assessments that attempt to capture changes in memory ability over a period of time, and age-anchored comparisons that assess how an individual perceives their memory in relation to others their age. These different types of assessment may relate to psychological well-being differently due to the underlying mechanisms of assessment.

Objective—The purpose of these analyses is to examine two measures of subjective memory (i.e., a self-comparison measure and an age-anchored comparison measure) as predictors of psychological well-being among adults in mid- and late life.

Methods—Participants (n=3,434) in the Midlife in the United States Study completed measures of subjective memory, depressive affect, and life satisfaction. Structural equation modeling was used to examine whether self-comparison and age-anchored comparison measures had differential predictive utility of on psychological well-being.

Results—Higher age-anchored comparison ratings were related to higher life satisfaction scores. There was a significant interaction between the two items such that individuals with lower ratings on both subjective memory measures had the poorest outcomes. Additionally, age-anchored comparisons interacted with age: older adults had the poorest outcomes when they reported poorer age-anchored comparisons.

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Conflict of interest: None.

Ethical standards: The MIDUS survey complied with institutional review board standards of the University of Wisconsin and the study protocol was approved by the human study committee. This is consistent with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Conclusion—These findings highlight the importance of precise measurement in the consideration of subjective memory. How an individual was asked to rate his or her perception of memory influenced the relationships between subjective memory and psychological well-being. This study contributes valuable insight into the importance of the assessment models of subjective memory.

Keywords

subjective memory; subjective cognition; well-being; depressive symptoms; life satisfaction

Introduction

Subjective memory is a term used to indicate how individuals interpret, feel, or think about their own memory; in other words, one's perceptions regarding memory performance (Pearman & Storandt, 2004). Studies examining the relationship between subjective memory and concurrent objective memory performance have been decidedly mixed, with some reporting weak positive associations and others no association (e.g., Pearman & Storandt, 2004; Snitz, Morrow, Rodriguez, Huber, & Saxton, 2008). Subjective memory is influenced by a multitude of factors beyond actual memory performance. Regardless of objective memory performance, poorer subjective memory is frequently linked to increased psychological distress (Buckley et al., 2013; Chin, Oh, Seo, & Na, 2014; Minett, Da Silva, Ortiz, & Bertolucci, 2008); however, this literature has focused on the relationship of subjective memory and depressive symptoms without considering other aspects of psychological well-being (e.g., life satisfaction, Hill et al., 2016). Additionally, no studies have examined whether different approaches to the assessment of subjective memory differentially predict psychological well-being. There is great variability in current subjective memory measures. In their recent review, Rabin and colleagues (2015) urge caution in comparing findings relevant to subjective memory across studies due to the substantial heterogeneity of measures. There is an identified need to interpret findings that associate subjective memory and outcomes with specificity: item construction matters. In response, this study compares two different measures of subjective memory to simultaneously predict psychological well-being, including age as a potential moderator of these relationships, in a national sample of adults.

Subjective Memory Assessment

Subjective memory, or an individual's perceived memory performance, is influenced by a combination of *ability judgments* and *memory concerns* (Cavanaugh, Feldman, & Hertzog, 1998). *Ability judgments* are based on exposure to memory problems that affect our perceptions of our memory. For example, forgetting to pick up milk from the store may cause us to reflect on the frequency of such an event and negatively evaluate our memory performance. *Memory concerns* are based on fears or worries about memory problems (and decline) including perceiving one's memory functioning as poorer than peers. In general, ability judgments are thought to stem from concrete events while memory concerns are thought to be influenced by beliefs about memory including, but not limited to, aging-related stereotypes (Cavanaugh et al., 1998).

Ability judgments and memory concerns are represented in two common approaches to subjective memory assessment: self-comparisons and age-anchored comparisons (Tandetnik et al., 2015). Self-comparisons measure subjective memory by asking individuals to compare their present memory to their memory in the past (i.e., Is your memory as good as it was five years ago?). To answer these questions, respondents must evaluate and compare their past and current memory ability, rather than concerns about memory. In contrast, age-anchored comparisons assess subjective memory by asking individuals to compare their present memory to their peers (i.e., Do you feel you have more memory problems than others your age?). Age-anchored comparisons are viewed as a social threat activating an individual's concerns about their memory (Suls & Wheeler, 2012). When making age-anchored comparisons, respondents frequently react by evaluating themselves in a more complimentary way (Fastame, Penna, Rossetti, & Agus, 2013), a phenomenon referred to as the better-than-average effect (Alicke, 2000).

Subjective Memory and Psychological Well-Being

Psychological well-being is a multidimensional construct represented by both negative facets such as depressive symptoms as well as positive facets such as life satisfaction (Huppert, 2009). Perceptions of memory play a key role in the psychological well-being of adults. Indeed, multiple studies have demonstrated associations between poorer subjective memory ratings and greater depressive symptoms as well as higher levels of stress, which may in turn exacerbate memory-related problems (Hill et al., 2016; Metternich, Schmidtke, & Hüll, 2009; Zuniga, Mackenzie, Kramer, & McAuley, 2016). This relationship may be more pronounced for older adults. Perceiving one's memory as poor or declining is a threat to aging well: perceptions of memory problems precipitate emotional distress and worry about dementia or loss of independence (Kessler, Bowen, Baer, Froelich, & Wahl, 2012; Mol, Ruiter, Verhey, Dijkstra, & Jolles, 2008). Coping may also be particularly difficult for this age group, as cognitive decline (aging- or dementia-related) may be considered inevitable.

With respect to positive facets of psychological well-being, Toffalini, Borella, Cornoldi, and De Beni (2016) found a significant positive relationship between subjective memory and overall well-being in older adults. However, this relationship is far less evidenced in the literature. It is important to consider how an individual's memory perceptions impact their psychological well-being both in terms of increases in negative symptoms, such as depressive symptoms, as well as decreases in positive aspects such as life satisfaction (Kotter-Grühn & Hess, 2012).

As described above, self-comparisons and age-anchored comparisons rely on two different intrapersonal strategies for memory evaluation which may reflect their corresponding relationships to psychological well-being. Age-anchored comparisons activate social threat mechanisms but may not be related to actual performance decrements. In contrast, self-comparisons reflect perceived decline in memory performance indicating poorer functioning more broadly (Cavanaugh et al., 1998). However, it remains unclear whether these different mechanisms will result in differential relationships with positive and negative aspects of psychological well-being. The current study will explore these relationships in more depth.

Current Study

In the current study, we used a large national sample of adults to examine whether two measures of subjective memory (one self-comparison and one age-anchored comparison) are differentially related to aspects of psychological well-being: depressive symptoms and life satisfaction. Although much of the current literature has focused on older adults, we include middle-aged adults based on recent work suggesting a peak in self-rated memory problems around ages 45–54 (Begum et al., 2014). There were two aims in the current analyses:

1. Examine age differences in self-comparison and age-anchored comparison ratings of subjective memory.
2. Examine whether self-comparisons and age-anchored comparisons were associated with depressive symptoms and life satisfaction.

Methods

Participants

Data were collected as part of the second wave of Midlife in the United States (MIDUS) survey (subjective memory was not assessed as part of the first wave of the MIDUS). Participants were originally recruited into the first wave of MIDUS (1995–1996) through random digit dialing over the 48 contiguous United States; while MIDUS includes a sample recruited from across the nation, it is not nationally representative with the requisite survey weighting for analysis. Full details of the recruitment procedure are described in Brim, Ryff, and Kessler (2004). The total sample size at the first wave was 7,108. At the second wave, 4,963 individuals returned to complete the survey in 2002–2006, representing a 69.8% retention rate (Radler & Ryff, 2010). At the second wave, participants completed a 45-minute phone interview and two self-administered questionnaire packets. The MIDUS survey complied with institutional review board standards of the University of Wisconsin and the study protocol was approved by the human study committee.

Missing data occurred when participants failed to return packets or returned incomplete packets reducing the available sample to n = 3,924; a response rate of 79.4%. Participants were also excluded if they did not participate in the cognitive protocol so that the final sample for the current analyses was n = 3,434. Individuals providing complete data were more likely to be older ($t(4,960) = -5.79$, $p < .01$), Caucasian (χ^2 (1) = 69.77, $p < .01$), female (χ^2 (1) = 14.36, $p < .01$), and higher in education (χ^2 (4) = 9.73, $p < .01$) compared to those with incomplete data. Demographic characteristics for the final analytic sample appear in the bottom of Table 1. The sample in the current analysis was 55.1% female, 53.1% had some college or less education, 92.5% Caucasian, and the average age was 56.1 years (SD = 12.19).

Measures

Subjective Memory—Two items assessed subjective memory. The self-comparison subjective memory item asked individuals to compare their current memory to their memory five years ago using a rating scale from 1 (Improved a lot) to 5 (Gotten a lot worse). Participants were also asked to compare their memory to other individuals of the same age

using a rating scale from 1 (Excellent) to 5 (Poor). To ease interpretation in the current analysis, these items were rescaled so that higher values represented better-perceived memory functioning (i.e., higher subjective memory ratings).

Psychological Well-Being: Depressive Affect and Life Satisfaction— Psychological well-being was operationalized using depressive affect and life satisfaction measures. For depressive affect, participants completed a checklist of eight depression-related symptoms derived from the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1987) that included: felt sad/depressed, lost interest in most things, felt tired/low energy, lost/increased appetite, trouble sleeping, trouble concentrating, felt down/worthless, and thought a lot about death. Items were rated as yes or no and a total score of was created by summing the number of symptoms endorsed. Previous work using this measure reported good construct validity with higher scores related to greater engagement with mental health services (Wang, Berglund, & Kessler, 2000).

Participants rated their life satisfaction in four specific domains (work, health, relationship with spouse, relationship with children) as well as overall (Prenda & Lachman, 2001). Each was rated on a scale of 0 (worst possible) to 10 (best possible) and the average of the scores was computed as a measure of life satisfaction. Cronbach's alpha in the current study was . 68.

Covariates—Based on previous work on subjective memory and psychological well-being, we also included a number of relevant covariates: age, gender, education, ethnicity, neuroticism, and objective memory performance (see Table 1 for distributions). Previous work indicates that these variables are significantly related to both the outcomes of interest and perceptions of memory performance, hence we accounted for their potential confounding effects (Begum et al., 2014; Ficker, Lysack, Hanna, & Lichtenberg, 2014; Lehrner et al., 2014; Snitz et al., 2012). Neuroticism was assessed using a personality scale developed for the MIDUS study (Lachman & Weaver, 1997). Participants indicated the extent to which four adjectives described them (moody, worrying, nervous, and calm) on a scale from 1 (not at all) to 4 (a lot). These items were then averaged to create a total neuroticism score (Cronbach's alpha = .74). Participants completed two measures of episodic memory via telephone. These measures included an immediate recall test of 15 words and a delayed recall of the same list of words. Participants were read the list of words at a rate of one word per second and given one minute for recall. Following a filled delay of approximately 12 minutes, participants were again given another minute for recall. Previous work indicates these scores load on one factor for objective memory performance (Tun & Lachman, 2006). Scores were standardized before inclusion in the regressions.

Analytic Strategy

Analyses were conducted in MPLUS (Muthén & Muthén, 2010) in a series of steps. First, we computed correlations among all variables, including covariates, prior to conducting the primary analyses. Next, descriptive analyses explored the distributions of the two subjective memory variables across age.

We addressed the aims of our analyses simultaneously using structural equation modeling (SEM). SEM allowed us to evaluate the systems of equations for our aims as well as model depressive symptoms and life satisfaction as latent outcomes. Latent variables improve precision of measurement by capitalizing on the common variance among related items. The depressive symptoms were binary variables and full-information maximum likelihood with numerical integration was used to estimate these models. For models using this estimation method, only comparative fits indices are provided (e.g., Akaike Information Criterion) and model fit was established by examination of width of the confidence intervals and stability of factor loadings. Standardized coefficients are reported for all paths.

Constraints were added to the model to test the equivalence of the of the coefficients of self- and age-anchored comparisons predicting depressive symptoms and life satisfaction. The significance of these constraints was evaluated using the Wald Test (Harrell, 2001).

Prior to conducting the SEM, we examined the multivariate distributions for outliers. Less than 3% of observations met criteria for multivariate non-normality using Mahalanobis D. All analyses were conducted with and without these individuals to ensure consistency of results. Linearity of relationships was established using diagnostic plots of residuals.

Age was treated continuously and a linear and quadratic effect for age were tested in these models. We also included the age by self- and age-anchored comparison interactions to account for age moderation of the effects of subjective memory on life satisfaction and depressive symptoms. Continuous covariates were grand mean centered and categorical covariates were effect coded to ease interpretation of final models. All covariates were treated as control variables and did not include interactions with any of the primary variables.

Results

Descriptive statistics and correlations for the primary analytic variables appear in Table 1. The two subjective memory item ratings were moderately correlated (r = .42). Age was not significantly correlated with either measure of subjective memory. There was little variation in the magnitude of correlations among subjective memory measures and the outcomes of interest. Outcome measures were significantly intercorrelated, indicating the importance of using the multivariate analysis to examine outcomes simultaneously.

For descriptive purposes, Figures 1 and 2 display the two subjective memory items in the current sample by age decade. Most of the adults in our sample perceived no change in their memory over the target time period (the self-comparison item). As expected, there was a tendency for older adults (ages 70+) to endorse that their memory had declined over the past five years. When comparing themselves to others their age (age-anchored comparison), most participants felt their memory was good, with only small proportions considering themselves to be poorer than others their age (0.72% to 2.34%).

The SEM allowed us to simultaneously examine the aims of the current paper. Full results of this model appear in Table 2. Although many of the covariates were not significant (e.g.,

ethnicity), removing these did not change substantive findings and results are reported for the full model.

For our first aim (Table 2, Aim 1), age was significantly related to subjective memory self-comparisons such that older ages were related to lower self-comparisons indicating a perceived decline over the last 5 years (b = −.051, SE = .021, p = .017). Age was not significantly related to age-anchored comparisons (b = .005, SE = .020, p = .798).

For our second aim (Table 2, Aim 2), age-anchored comparisons and not self-comparisons were significantly related to depressive symptoms (age-anchored: b = −.150, SE = .029, p < .001; self-comparison: b = −.012, SE = .029, p = .691) and life satisfaction (age-anchored: b = .256, SE = .019, p < .001; self-comparison: b = −.019, SE = .019, p = .336). Higher age-anchored comparisons were related to greater life satisfaction and lower depressive symptoms. Neither effect was moderated by age (all p's > .234).

Poor power or measurement instability could have contributed to a lack of overall significance for self-comparisons and the Wald significance test was computed to determine whether the coefficients for self- and age-anchored comparisons were statistically equivalent. This test was significant for both outcomes (life satisfaction: Wald (df = 1) = 52.32, p < .001; depressive symptoms: Wald (df = 1) = 5.86, p = .016) indicating that the relationship between age-anchored comparisons and the outcomes were significantly stronger than self-comparisons.

In a supplemental analysis, we examined the interaction between self- and age-anchored comparisons. This interaction was only significant for life satisfaction (b = −.124, SE = .035, p < .001). Individuals rating themselves poorly on both self- and age-anchored comparisons had the lowest levels of life satisfaction. The final model with this interaction included appears in Figure 3.

Discussion

Our findings indicate that, in this sample of adults in mid- to late life, lower self-comparison ratings only (rating current memory as worse than memory five years ago) were associated with older ages. Higher age-anchored comparisons (rating memory as the same or better than one's peers) were associated with better psychological well-being (lower depressive symptoms and higher life satisfaction) regardless of age. The combination of poor self- and age-anchored comparisons (individuals who perceived a decline in memory over the past five years *and* perceived their current memory functioning as worse than their peers) was associated with the lowest life satisfaction scores when they occurred together. Furthermore, these effects were significant while controlling for demographic factors, neuroticism, and actual memory performance. These findings speak to the importance of multi-item subjective memory assessments to accurately capture the nuances of the memory experience and ultimately improve predictive utility (Amariglio, Townsend, Grodstein, Sperling, & Rentz, 2011; Laske et al., 2015).

The potential immediate as well as long-term clinical implications of subjective memory in mid- and late life have led researchers to increasingly focus attention on *perceptions* of

memory in addition to memory *performance*, particularly throughout the aging process. However, examining the role of subjective memory, or subjective cognition more broadly, is considerably limited by a lack of commonly accepted terminology, clearly defined concepts, and consistent approaches to measurement (Jessen et al., 2014; Rabin et al., 2015). Furthermore, within relatively consistent conceptual definitions, such as subjective memory as a measure of individual memory perceptions, a variety of measurement items are employed which rely on different levels and contexts of comparison. This study contributes a clarification of the relationships between two such frames of reference in ratings of subjective memory (self-comparison and age-anchored comparison) with concurrent psychological well-being.

We proposed that self-comparisons would reflect ability judgments and be more strongly related to both positive and negative aspects of psychological well-being. Instead, self-comparisons were only associated with life satisfaction, and furthermore only in the context of poorer age-anchored comparisons. This suggests that other factors may influence self-comparisons more than actual memory functioning; however, what those factors may be is unclear from the current data. One telling result is the association between neuroticism and subjective memory. It is possible that self-comparisons are more impacted by personality factors particularly when an individual is asked to retrospect over long periods of time (e.g., five years). An alternative is that self-comparisons capture age stereotypes rather than assessments of memory performance. Canvanugh and colleagues (1998) suggest that long time intervals cause the individual to access schemas related to aging rather than recall of actual performance which is supported by the association between self-comparisons and age found in the current study. An older adult assumes that because memory is supposed to decline with age that their memory must be poorer than it was five years ago.

In contrast, we suggested that age-anchored comparisons would specifically relate to life satisfaction given the activations of memory concerns (rather than decrements in performance). Rating memory as the same or better than one’s peers was associated with lower depressive symptoms and higher life satisfaction. This is consistent with a broader perspective that age-anchored comparisons activate social threat mechanisms and indicates the impact of these mechanisms to be more widespread. In addition to activating social threat, age-anchored comparisons may reflect aspects of actual performance from recent memory. Both younger and older adults may use comparisons with other individuals at or about their age as a metric of their current memory functioning. If they feel they are better than average (Alicke, 2000), psychological well-being is preserved, while perceiving impairments relative to age-matched peers results in poorer psychological well-being regardless of how it is measured.

A limitation in the current study is the cross-sectional approach, which prohibits our ability to examine the temporal ordering of these relationships. Increases in depression may lead an individual to perceive more memory decline rather than the alternative. Additionally, we were only able to examine the differential effects of two subjective memory items, although many different approaches are used within the scientific literature. However, self-comparisons versus age-anchored comparisons do represent two different methods of contextualizing subjective memory, and our study supports the differential relationships

between these types of measures and outcomes relevant to well-being. A multi-item assessment approach is valuable for understanding an individual's perceptions of their memory and the interaction between these items reinforces the need to treat subjective memory as a multidimensional construct. An additional limitation is the use of depressive symptoms rather than a more graded evaluation of depressive affect. In sensitivity analyses, we found that excluding individuals with more than three depressive symptoms resulted in the age-anchored comparisons no longer significantly relating symptoms. However, this is likely due in part to reduced variability in depressive symptoms as this led to the exclusion of over 100 individuals.

Future research on subjective memory should attempt to address the measurement and temporality issues discussed above. Developing brief but comprehensive assessments for inclusion in large national samples would enhance our ability to describe this construct in representative populations across the lifespan. Further, longitudinal analysis would provide the opportunity to differentiate those individuals who experience problems with memory prior to emotional and functional decrements from those who experience the opposing trajectory. Identifying these differing trajectories would elucidate the underlying processes driving perceived memory decline across important subgroups within the population. Research focusing on the specific reasons for perceived memory declines should include individuals from across the adult lifespan to understand the underlying mechanisms.

Based on our findings, the consideration of specific items used in subjective memory assessment is important beyond its implications for identifying a preclinical stage of cognitive impairment. The context of comparison, specifically in reference to one's self over time or in reference to others, demonstrates differential associations with aspects of psychological well-being. This holds important implications, particularly given the well-established links between subjective memory and affective symptoms (Hill et al., 2016). Disentangling these complex relationships is key to identifying intervention targets: poor subjective memory ratings may indicate the need for more extensive mental health screenings, or alternatively, the introduction of cognitive strategies and supports to maintain everyday functional ability. In order to identify individually-relevant targets for intervention, we must improve our ability to assess subjective memory with more specificity. Although examining links between subjective memory and cognitive decline are important areas of research, the immediate impact of maintaining high levels of functioning in daily activities as well as positive mental health are important for long-term cognitive (and more broadly, health and quality of life) outcomes.

Acknowledgments

None.

Financial support: This research was supported by a grant from the National Institute on Aging (P01-AG020166) to conduct a longitudinal follow-up of the MIDUS (Midlife in the United States) investigation; original study supported by the John D. and Catherine T. MacArthur Foundation Research Network on Successful Midlife Development.

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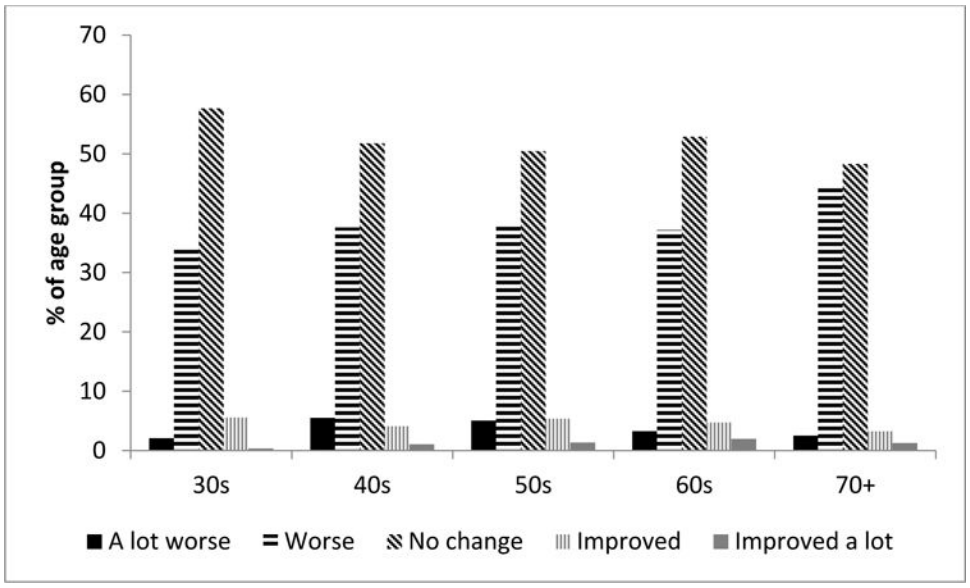

Figure 1.

Cross-sectional trends in subjective memory self-comparisons. Ns by age group: 30s n = 288; 40s n = 854; 50s n = 971; 60s n = 764; 70+ n = 557.

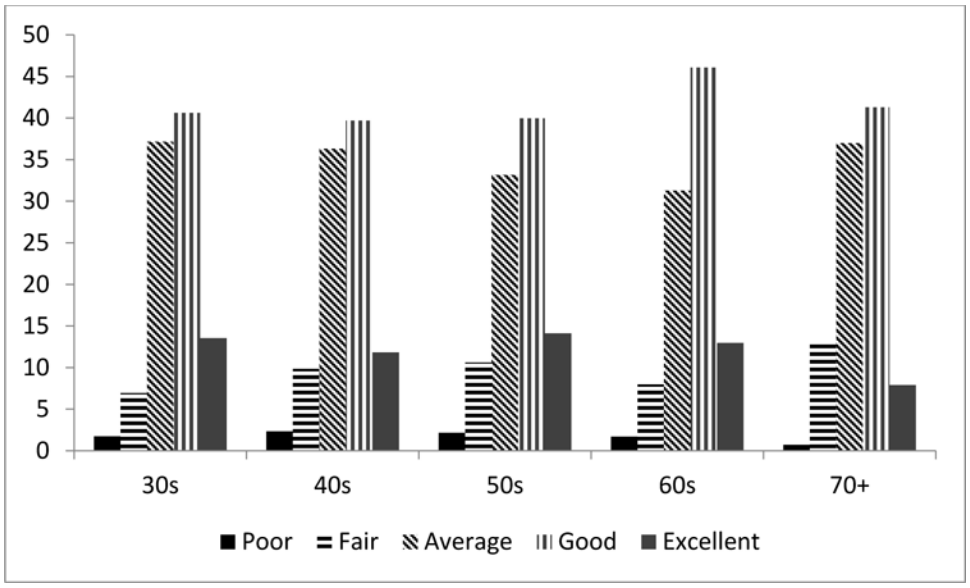

Figure 2.

Cross-sectional trends in subjective memory age-anchored comparisons. Ns by age group: 30s n = 288; 40s n = 854; 50s n = 971; 60s n = 764; 70+ n = 557.

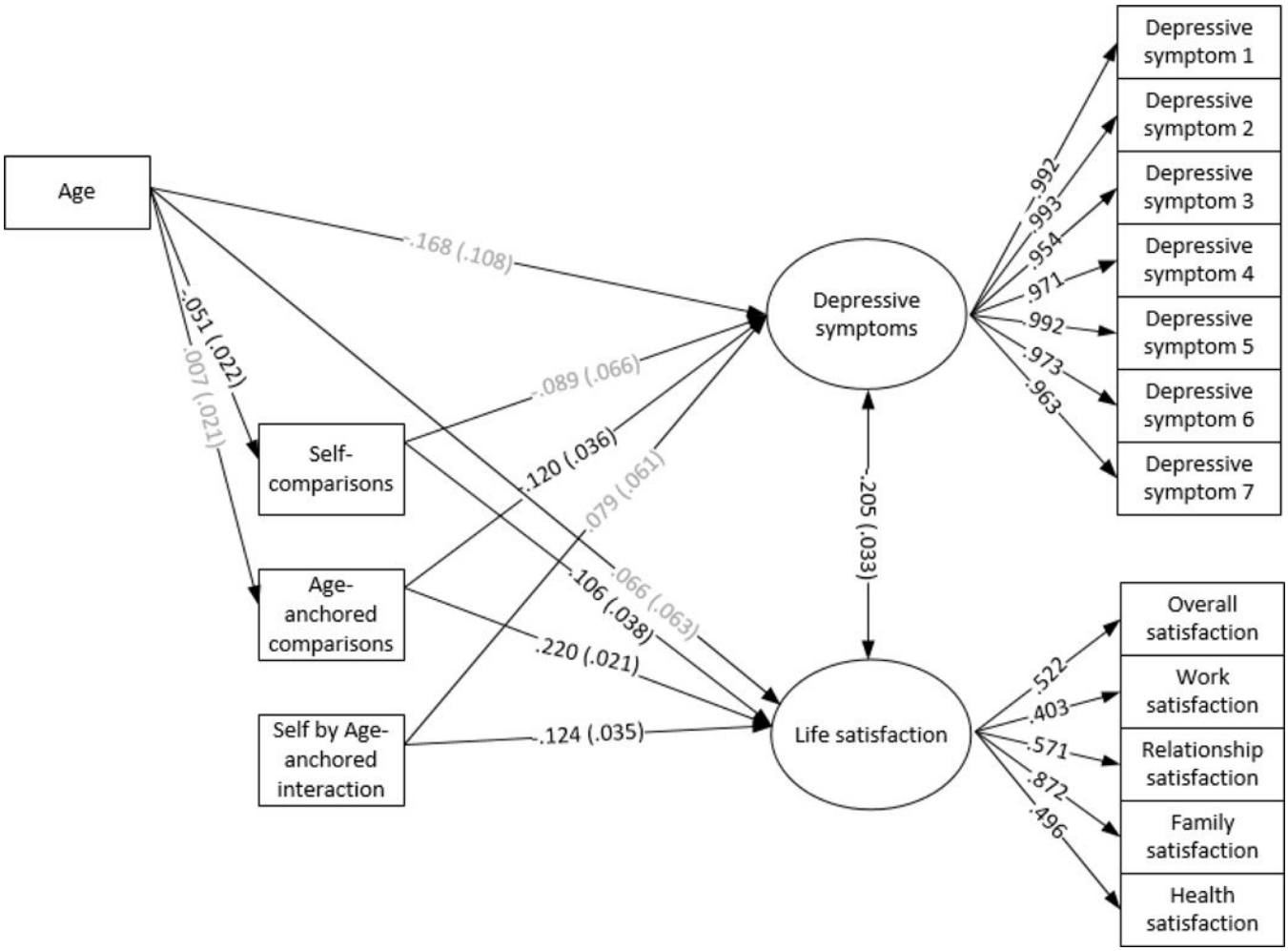

Figure 3.
Final structural equation model predicting depressive symptoms and life satisfaction.

Table 1

Descriptive statistics and correlations

	SM self-comparison	1	2	3	4	5	6	7	8	9
1. SM age-anchored comparison	0.42*									
2. Age	−0.02	−0.01								
3. Gender (ref = female)	0.04*	0.04*	0.02							
4. Education (ref = HS degree)	0.01	0.16*	−0.11*	0.10*						
5. Ethnicity (ref = Caucasian)	−0.02	0.01	0.03*	0.01	0.02					
6. Neuroticism	−0.16*	−0.17*	−0.13*	−0.10*	−0.07*	−0.01				
7. Objective Memory	0.01	0.08*	−0.25*	−0.20*	0.16*	0.06*	0.01			
8. Depressive symptoms	−0.12*	−0.15*	−0.09*	−0.13*	−0.05*	−0.01	0.21*	0.03*		
9. Life satisfaction	0.11*	0.24*	0.13*	−0.02	0.06*	0.02	−0.25*	0.01	−0.19*	
Mean	−0.39	2.52	56.11	55.13%	25.22%	92.49%	2.05	0.04	0.62	7.78
SD	0.70	0.90	12.19				0.62	1.00	1.74	1.22
Skew	0.23	−0.36	0.20				0.48	0.57	2.63	−1.00
Kurtosis	0.90	−0.04	−0.82				0.06	0.37	5.38	1.62
Minimum	−2.00	0.00	32.00				1.00	−2.19	0.00	2.00
Maximum	2.00	4.00	84.00				4.00	3.87	7.00	10.00

Note.

*p < .05. SM= subjective memory, HS = high school; Summary scores used to represent depressive symptoms and life satisfaction.

Table 2

Structural equation modeling results for Aims 1 and 2

Aim 1			Aim 2		
Variables	**Self-comparisons**	**Age-anchored comparisons**	**Variables**	**Life satisfaction**	**Depressive symptoms**
Age (linear)	−0.051 (0.022) *	0.007 (0.021)	Age (linear)	0.069 (0.063)	−0.166 (0.108)
Age (quadratic)	0.001 (0.02)	−0.009 (0.018)	Age (quadratic)	0.017 (0.019)	−0.059 (0.033)
Gender (ref = female)	−0.005 (0.02)	−0.021 (0.019)	Gender (ref = female)	0.055 (0.018) *	0.176 (0.029) *
Ethnicity (ref = Caucasian)	−0.03 (0.017)	0.004 (0.018)	Ethnicity (ref = Caucasian)	−0.009 (0.017)	0.001 (0.028)
Education (ref = HS degree)	−0.012 (0.02)	0.156 (0.019) *	Education (ref = HS degree)	0.018 (0.019)	−0.006 (0.031)
Neuroticism	−0.21 (0.019) *	−0.215 (0.018) *	Neuroticism	−0.315 (0.017) *	0.307 (0.028) *
Objective memory	−0.007 (0.021)	0.087 (0.02) *	Objective memory	0.015 (0.019)	0.005 (0.033)
			Self-comparisons	−0.019 (0.019)	−0.012 (0.029)
			Age-anchored comparisons	0.256 (0.019) *	−0.15 (0.029) *
			Self- by age interaction	−0.007 (0.023)	0.024 (0.041)
			Age-anchored by age interaction	0.071 (0.059)	0.078 (0.099)

Note.

* p < .05. Models conducted simultaneously for Aims 1 and 2. Standardized coefficients reported. HS = high school