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Structural differences in life satisfaction in a U.S. adult sample across age

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Abstract

Objective: Many studies investigating age-related mean differences in life satisfaction disregard potential differences in the structure of the life satisfaction construct. Because developmental tasks at different life stages vary and thus the salience of specific life domains (e.g., health, finances, relationships, etc.) might differ, life satisfaction might differ between age groups in its underlying structure and meaning.

Method: To address this issue, we investigated the covariance structure of life satisfaction as measured by the Satisfaction with Life Scale (SWLS) and the domains of health satisfaction and financial satisfaction with local structural equation modeling. We analyzed data from 8341 U.S. citizens between the ages of 30 and 97 who participated in the Panel Study of Income Dynamics. Furthermore, we explored the association of respondents' health and financial status with life satisfaction.

Results: Both the SWLS and domain items were found to be invariant across age. The health and financial status accounted for small proportions of variance in overall life satisfaction and the respective domain satisfactions significantly at all ages.

Conclusion: The current analysis indicates that across the adult age range, general life satisfaction is qualitatively the same, and health and financial satisfaction are equally integrated into overall life satisfaction.

KEYWORDS

age, domain-specific satisfaction, life satisfaction, local structural equation modeling, measurement invariance

1 | INTRODUCTION

Life satisfaction, or happiness, is a widely shared goal for which most individuals strive. Furthermore, peoples' life satisfaction is associated with a range of relevant life outcomes. Understanding life satisfaction is an important area of research and empirical results are utilized to inform policy-makers, stakeholders, and individuals.

Importantly, structural differences in the measurement of life satisfaction need to be taken into consideration when studying mean differences. It is an empirical question of whether the same indicators can be used to assess life satisfaction across a broad age range. With this in mind, the present study explores differences in the measurement and associations of overall life satisfaction, health, and financial satisfaction, as well as the objective measures of wealth and chronic medical conditions across the adult age with participants

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from the Panel Study of Income Dynamics (PSID; $N = 8341$; Panel Study of Income Dynamics, 2019).

1.1 | Life satisfaction

Life satisfaction is defined as the global evaluation of an individual's life as a whole and the conscious cognitive judgmental component of subjective well-being (Veenhoven, 1996). Life satisfaction is often measured with only a few broad items such as "I am satisfied with my life." (Diener et al., 1985). Although these measures are found to have very good internal consistencies and are frequently used as outcome measures (Pavot & Diener, 2008), it is important to ensure that this collection of items assesses the same underlying disposition in all participants. Instruments designed to measure life satisfaction are assumed to deliver information concerning the relative standing of individual participants irrespective of age or their idiosyncratic life situations (Diener et al., 1999). Additionally, with overarching instruments, it is implicitly assumed that the structure of the life satisfaction measure and its characteristics will remain unaffected by differences in life domains, whereas the level of general satisfaction might be related to domain satisfaction. However, when asked to make the rather complex cognitive ratings of "life as a whole," participants are likely to use heuristics or mental shortcuts, such as considering more salient or important domains of life instead of "life as a whole" (Campbell et al., 1976), that might affect the validity of the measures and limit the gain of knowledge by studies using global, self-reported measures (Kahneman, 1999; Schwarz & Strack, 1999).

Although broad but unspecific measures of general life satisfaction have been deemed beneficial (Diener et al., 1985; van Praag & Ferrer-i-Carbonell, 2004), arguably evaluating the domains that participants consider to be valuable contains more information about their life satisfaction. Campbell and colleagues (1976) argue that respondents should be asked about their satisfaction in specific domains and only one item on overall life satisfaction should be included. This approach has been adopted by several researchers (e.g., Cummins, 1996; Heller et al., 2004). The usefulness of domain-specific judgments is demonstrated by reliable uniqueness in ratings on the different domains and dissociations in patterns of correlations with other constructs (Huebner, 1994) as well as changes in life circumstances (Kaiser et al., 2020).

Along with the introduction of domain satisfaction, the question arises of whether respondents should also weight the domains by their subjective importance. However, studies have failed to find evidence for increases in the validity of weighted compared to unweighted measures (Campbell

et al., 1976; Philip et al., 2009; Rohrer & Schmukle, 2018). The most important argument for not needing to weight scores is probably that domains, which are included in questionnaires, have been carefully selected to ensure overall relevance for all respondents and therefore the importance of weighting is somewhat redundant (Trauer & Mackinnon, 2001). In line with this argument, many participants report all life domains as extremely or very important to them (e.g., in the PSID survey; Freedman, 2017). Additionally, when participants rate a domain as important they are also likely to use their satisfaction with it as a source for their general life satisfaction judgment resulting in higher correlations between the domain and general satisfaction rating (Schimmack et al., 2002). Arguably, the subjective importance of a domain is, therefore, already included in the satisfaction rating. Thus, life satisfaction is determined by changes in both the specific domains of satisfaction as well as the weighting of domains as sources of life satisfaction (Schimmack & Oishi, 2005).

1.2 | Age and life satisfaction

Before reviewing the literature on life satisfaction across age, it is important to raise the question of measurement equivalence. Comparing mean level differences in life satisfaction is only reasonable if one compares participants' relative standing on the same construct. A recent review on the measurement invariance of the Satisfaction With Life Scale (SWLS; Diener et al., 1985) concluded that perceptions of life satisfaction and thus the interpretation of SWLS items may change as people get older (Emerson et al., 2017). Hence, considering measurement invariance is important whenever age heterogeneous participants are assessed or an age invariant interpretation of life satisfaction is assumed. The majority of studies included in the review report configural or metric invariance levels. However, all previous investigations split participants into age groups. The risk of missing a nonlinear relation between life satisfaction and age is substantial when age is arbitrarily categorized (MacCallum et al., 2002). To our knowledge, no previous study has examined age-related differences in the structure of life satisfaction using methods that allow for continuous moderation of model parameters.

Life satisfaction is presumably responsive to changing life circumstances, which is why changes in ratings across the life span would be expected (Anusic et al., 2012; Anusic & Schimmack, 2016). Earlier studies often found stable life satisfaction ratings (Diener & Suh, 1997), while newer studies including large panel studies conclude that mean levels of life satisfaction ratings change across the age range (Fujita & Diener, 2005). The typical pattern found in longitudinal and cross-sectional mean trajectories in life satisfaction across the adult age range is a decrease until around the age of 40 to 50, followed by an increase until about 70 years of

age, and a plateau or decrease afterward (Baird et al., 2010; Blanchflower & Oswald, 2019).

According to the dynamic equilibrium theory (Headey & Wearing, 1992), life satisfaction judgments mostly bounce back to the same level based on the personality of a person. But there are events in life domains that lead to long-term changes in life satisfaction (Headey, 2006). One explanation for the “well-being” paradox—that life satisfaction does not decrease with age while life circumstances like health or income get worse—could be that individuals change the sources of their life satisfaction judgment (Lelkes, 2008; Schimmack et al., 2002). These fluctuations in individual criteria for judgment and creating their overall judgment of life satisfaction might be highly related to more stable factors like personality (Lucas et al., 2003).

Regarding personality traits, extraversion and neuroticism are most strongly related to life satisfaction ratings (Steel et al., 2008). High levels of extraversion are associated with rather stable and high levels of life satisfaction (Mroczek & Spiro, 2005), while higher levels of neuroticism are associated with lower levels of life satisfaction (Gale et al., 2013). Research on personality development has shown that neuroticism declines across most of the adult life until it increases again in very old age (Graham et al., 2020; Roberts et al., 2006) whereas results concerning extraversion are less consistent (Olaru et al., 2018; Roberts et al., 2006). Based on the trajectories of neuroticism, one could expect a reverse U-shaped mean trajectory for life satisfaction ratings, with individuals being most satisfied when their neuroticism levels are the lowest. However, recent investigations suggest that mean level trajectories of life satisfaction (Baird et al., 2010; Blanchflower et al., 2019) and neuroticism (Graham et al., 2020) both follow a U-shaped curve with life satisfaction showing a more pronounced increase in old age. These counterintuitive mean trajectories indicate mechanisms resulting in age-associated life satisfaction differences beyond personality development. Different domains that are associated with general life satisfaction and their changes across age will be discussed in the next section.

1.3 | The relationship between life and domain satisfaction across age

Because physical and mental health, socioeconomic circumstances, social relationships, and other domains of life change over time, life satisfaction judgments should also change (Baird et al., 2010). Naturally, different life domains might be seen as more or less salient in different stages of life. There is no doubt that satisfaction ratings of specific life domains and the judgment of general life satisfaction are related (Campbell et al., 1976; Schimmack, 2008). These considerations lead to two important research questions: (a)

Does the association between domain satisfaction and general life satisfaction differ across age? (b) Does the relation between life and domain satisfaction with objective measures of life domains differ across age?

Health is one of the life domains that is considered a strong correlate and essential ingredient of life satisfaction (e.g., Campbell et al., 1976; Scott et al., 2009). Generally, a positive relationship between subjective ratings of health as well as satisfaction with one's health and life satisfaction has been found (Campbell et al., 1976; Røysamb et al., 2003). In terms of physical health, higher life satisfaction ratings are associated with stronger immune systems and better cardiovascular health (Diener & Biswas-Diener, 2008), whereas lower levels of life satisfaction are associated with disabilities, physical distress, and pain (Strine et al., 2008). In addition, a decrease in life satisfaction is associated with several psychological impairments (Strine et al., 2008). Moreover, more satisfied individuals tend to engage more in healthy behaviors and report fewer addictions to alcohol or drugs (Diener & Biswas-Diener, 2008; Strine et al., 2008). Longitudinal studies have shown that changes in life satisfaction can precede changes in health (Danner et al., 2001). While the effective direction of the relationship between health and life satisfaction has not been sufficiently evaluated yet, it is presumably bidirectional (Step toe et al., 2015).

Although the subjective satisfaction with one's health is expected to be based on one's actual health status, the strength of this relationship might not be the same across the age range. If a young person has a severe disease, it appears to be worse by comparison and might influence the evaluation of their life more than if they were older. In line with the social comparison theory, associations between actual health-related issues on one side and self-rated health and life satisfaction on the other side decline with age (Schnittker, 2005; Wurm et al., 2008).

Another arguably very important life domain for overall life satisfaction is one's financial situation, because of its effects on other life circumstances. For example, more financial resources are associated with better health care and more interesting leisure time experiences (Diener et al., 2018). As expected, income level is positively related to both one's financial satisfaction and to a substantially lower extent overall life satisfaction (e.g., Campbell et al., 1976; Diener & Diener, 2009). In a study by Loewe and colleagues (2014), satisfaction with one's financial situation was the strongest predictor for one's satisfaction with life as a whole.

The positive effect of income on life satisfaction and financial satisfaction seems to be strongest for individuals in their midlife (Cheung & Lucas, 2015; Hsieh, 2003). Financial hardship is negatively related to life satisfaction with religious contexts buffering this effect especially for older adults (Jung, 2018). The age paradox that has been found on the overall level of life satisfaction is also manifested at the level

of financial satisfaction. While an individual's income is highest in midlife, their financial satisfaction is also lowest at this stage of life. This effect can partly be explained by greater assets and lower debts and liabilities in older age. However, people having little income and wealth are still more satisfied when they are older, which still leaves room for the explanation that older adults interpret their financial situation differently (Hansen et al., 2008; Plagnol, 2011).

Two theories that might help explain the shift in life domain relevance are the socio-emotional selectivity theory (Löckenhoff & Carstensen, 2004) and the selective optimization theory (SOC; e.g., Baltes & Dickson, 2001). According to socio-emotional selectivity theory, when participants view their time as limited, which is more likely for older individuals, they will focus more on a present rather than a future goal. One of the goals could then be the maintenance of positive affect and life satisfaction despite approaching death, which would, in turn, explain why they report high levels of life satisfaction despite declining satisfaction in some of the specific domains (McAdams et al., 2012). SOC predicts that people become more selective about what they spend their time and energy on when they are limited. They optimize their time by spending it on activities that appear relevant to them and compensate for life domains that might deteriorate. When averaging the domain items with differing trajectories to one overall score and comparing these averaged domain satisfactions to the trajectory of overall life satisfaction, they were remarkably similar in a study by McAdams and colleagues (2012) supporting SOC. Importantly for this study, satisfaction with the different domains was weighted equally. Thus, one conclusion was that overall life satisfaction ratings differ because of differences in domain satisfaction ratings and the “well-being paradox” can be explained by different trajectories in domain satisfactions ratings, but not because of age-related differences in the use or relevance of the domains for the general life satisfaction judgments. Nevertheless, evidence for possible changes in the contribution of satisfaction in different domains to general life satisfaction can be drawn from importance ratings in samples of varying ages. Whereas health is rated as more important in older compared to younger samples, the opposite trend can be found for finances (Hillerås et al., 2001; Scott et al., 2010).

In summary, health and financial satisfaction are substantially related to general life satisfaction ratings (Campbell et al., 1976). However, it is unclear if the relationship differs across age due to a shift in sources of general life satisfaction judgments (Schimmack & Oishi, 2005; Scott et al., 2009). Similarly, objective measures of health status and financial situation are expected to account for variance in domain and life satisfaction ratings (Lucas & Schimmack, 2009; Mroczek & Spiro, 2005), but the relationship between satisfaction and objective ratings might differ at different ages (Cheung & Lucas, 2015; Wurm et al., 2008).

1.4 | The current study

The objective of this study is to provide insight into the assessment and influencing factors of life satisfaction across the adult life course. Specifically, the investigation compares estimates of model parameters across age as a continuous moderator to examine the factorial structure of life satisfaction and the relative weight of different domains on life satisfaction. A series of models along the age range, as well as neuroticism and extraversion levels, will be estimated using local structural equation modeling (LSEM; Hildebrandt et al., 2009). The main research question of the current investigation is whether age moderates the strength of associations between indicators of general life satisfaction as well as domain satisfactions. Relying on a large U.S.-representative sample of participants, we tested a common factor model to highlight the nomothetic breadth of life satisfaction while imposing restrictions on model parameters. The advantage of using confirmatory factor analysis is that we are able to disentangle shared and unique variance (including measurement error) of the indicators. The assumption being that age-related differences in the shared variance between the indicators of general life satisfaction and the indicators for domain satisfaction or their loadings help us better understand what is measured with these items across the age range. If the measurement model turns out to be invariant across age, life satisfaction could be deemed as the same latent variable across the age range. However, if parameters, like the factor loadings or intercepts, change across the age range, that is evidence in favor of a modulated life satisfaction construct—meaning that depending on the participant's age the latent factor represents something slightly different and subsequently the life satisfaction of participants of different ages cannot be simply compared.

The PSID Wellbeing survey (PSID-WB; Freedman, 2017) uses the SWLS (Diener et al., 1985). Regarding measurement invariance of the SWLS, one could expect to find metric invariance based on the literature on the invariance of the SWLS (Emerson et al., 2017). In contrast, many studies theoretically expected the ingredients of life satisfaction to change with age (e.g., Siedlecki et al., 2008, 2014), but have largely used multiple-group methods to investigate invariance, which is inferior to LSEM.

Based on the existing literature, we expected objective indices for the health and financial status to explain significant, but small, amounts of variance in general life satisfaction and the respective domain satisfaction. We expected that the association between life satisfaction and domain satisfactions differs across age, indicating that the shared variance with the broad indicators of life satisfaction would differ and therefore show a change in the overlap between the overall judgment and the domain judgment. We hypothesized that the loading of health satisfaction on the general factor would increase

with increasing age—indicating that it gets more essential in the evaluation of life in general—while the prediction of objective health gets weaker as people perceive health problems as more natural. In other words, health becomes more relevant to people, but their actual health status says less about how they evaluate it and their life in general. As life events in people's thirties and forties are associated more with spending money (buying a house, having kids, etc.) than they are later in life, the financial satisfaction may be more at the forefront of people's minds in this age range, when they are asked about how satisfied they are. Thus, a decrease in the association between financial and life satisfaction was anticipated. The variance in life and financial satisfaction that can be accounted for by the objective measure of the financial situation was hypothesized to decrease across age. The moderation of the life satisfaction measure by neuroticism and extraversion was an exploratory analysis. Because a substantial proportion of the variance in life satisfaction can be explained by neuroticism, the nature of life satisfaction may differ depending on neuroticism levels. We did expect the measurement of life satisfaction to be invariant across extraversion.

2 | METHODS

2.1 | Sample

The PSID is representative of the full U.S. population. The data used in the current analysis stems from the 2016 Wellbeing and Daily Life Supplement. Eight thousand three hundred and forty-one participants completed this survey, which was produced and distributed by the Survey Research Center at the University of Michigan. The questionnaire on well-being (PSID-WB; Freedman, 2017) was a brief self-administered instrument completed via the internet or on paper. Twenty-one participants did not complete the global life satisfaction measure and had to be excluded from the current analysis. The inclusion criteria of the PSID were that participants must be at least 30 years old and that individuals have been household heads or their spouse or partner was in the main PSID in 2015 (Freedman, 2017). Participants were between 30 and 97 years old. Women comprised 56.35% of the sample. The data used for the current analysis have been made accessible by the Institute for Social Research of the University of Michigan at <https://simba.isr.umich.edu/data/data.aspx>.

2.2 | Measures

2.2.1 | Assessment of global life satisfaction

Global life satisfaction was measured with the SWLS (Diener et al., 1985). Participants indicated their agreement with the

five statements on a 5-point scale ranging from strongly disagree (1) to strongly agree (5). The model-based reliability (Brunner et al., 2012) for the scale indicated by McDonald's (2013) ω_{total} is 0.88.

2.2.2 | Assessment of domain satisfaction

Satisfaction with 10 different life domains (based on Campbell et al., 1976) was measured on a 5-point scale, ranging from not at all satisfied (0), to completely satisfied (4). A sixth response option was available, "Does not apply to me," based on the assumption that not all items apply to all participants. In the current analysis, "Does not apply to me," answers were coded as missing values. The 10 different domains were: housing, living area, job, finances, hobbies, marriage, romantic relationship, friends, health, and faith. In the current investigation, we focused on the items asking about the respondents' satisfaction with their financial situation and their health. For an easier interpretation, all life satisfaction items were recoded so that higher values indicated higher satisfaction ratings and all scores ranged between 1 and 5.

2.2.3 | Assessment of personality

Neuroticism and extraversion were measured with three items each, with items originally developed for the German Socio-Economic Panel Study (Gerlitz & Schupp, 2005). Neuroticism was measured relatively broadly, while the extraversion items mostly tap into the sociable part of this factor. Participants were asked to indicate how much the statements describe them on a 5-point scale ranging from a lot (1) to not at all (5). Two items per trait were reversed coded. We recoded the items so that higher values indicate higher trait levels. For the current analysis, mean scores across the three items were calculated.

2.2.4 | Assessment of health and financial status

The health index contains the number of severe diseases from which a participant has ever suffered. Respondents were asked whether a doctor or another health professional ever told them that they had the following diseases (ordered by prevalence in the current sample): hypertension, arthritis, any other severe chronic condition, diabetes, asthma, psychiatric problems, cancer, heart disease, heart attack, lung disease, stroke, learning disorder, or memory loss. The "Yes"-responses were counted, resulting in a maximum achievable value of 13. The health-related data collected in the PSID were found to be of high quality (Andreski et al., 2009). To

simplify the interpretation with regards to the content, the algebraic sign was switched so that more negative values indicated poorer health.

The financial index contains two variables: wealth and wages/salary. The wealth variable is estimated as the sum of seven asset types, the net debt value, and the value of home equity. We decided to combine wealth and salary because together they most accurately reflect one's current financial situation. For example, in older age, salary most likely plays a smaller role (Brown et al., 2014). However, in general, debts can be reduced faster with a higher salary and salary could also be used for expenses that do not count as accumulated wealth, like vacations, but are still of value for people. The financial index was calculated by first z -standardizing the unweighted sum of the two variables. To reduce skewness, the respective p -value in the cumulative normal distribution was assigned to every z -value. The final score was multiplied by 100, which resulted in a financial index that could range from 0 to 100 (see Table 1 for descriptive statistics).

2.3 | Analytic approach

All analyses were conducted using R 3.6.2 (R Core Team, 2020). The R package used for the LSEM analysis was *sirt* 3.7–40 (Robitzsch, 2019). The R script is available on an OSF repository (<https://osf.io/dyqs6>; Hartung et al., 2020). If not otherwise specified, $\alpha = 0.05$ was used as the significance level.

2.3.1 | Measurement model

Since life satisfaction is theorized to be a single latent construct and exploratory factor analysis studies have empirically found the SWLS to be unidimensional (e.g., Clench-Aas et al., 2011; Diener et al., 1985; Pavot & Diener, 1993), we modeled the SWLS item data in a confirmatory factor analysis model as a single factor (see Figure 1). Due to their life-balancing character, the residuals of the SWLS items “So far, I have gotten the important things I want in life.” and “If I could live my life over, I would change almost nothing.” were allowed to correlate. To identify the model, the variance of the latent factor was fixed to 1. Unanswered items, “Don't know” responses, and “Does not apply to me” responses were defined as missing.¹ Full Information Maximum Likelihood was applied to handle missing data.² A robust maximum likelihood estimator was used for estimation. Model fit was evaluated based on comparative fit indices (CFI), root mean squared error of approximation (RMSEA), and standardized root mean square residual (SRMR) (Bentler, 1990; Browne & Cudeck, 1992).

In a second extended model, we added the two items concerning satisfaction with finances and health as manifest indicators for overall life satisfaction. Their residuals were allowed to correlate with each other, as they share variance due to their specific domain character, which is not shared with the SWLS items. This model was used to test whether there were differences in the association of satisfaction with specific domains and general life satisfaction across the adult age range as well as the levels of neuroticism and extraversion.

After testing for measurement invariance, the covariates financial status and health status were added to the extended model as predictors of life satisfaction and the respective domain satisfaction. Please note that in the third model, 597 cases were removed due to missing values in the health and/or financial index variables.

2.3.2 | Local structural equation models

Having defined the measurement models with an acceptable fit, the LSEM analyses with age as a continuous moderator variable were conducted for all three models to investigate age-related structural differences. LSEM allows one to explore nonlinear trends of all model parameters and has the advantage of avoiding the negative consequences of artificially categorizing continuous moderator variables (Hildebrandt et al., 2009; Olaru et al., 2019).

LSEM estimates the measurement model at each specified value of the moderator variable, called focal points. At each focal point, observations get weighted as a function of the proximity of their moderator value to the moderator value of the respective focal point, using a Gaussian kernel and a bandwidth parameter of $h = 1.1$. Two criteria should be considered when defining focal points: effective sample size (N_{eff}) and the weighted mean of the moderator (effective moderator value) at each focal point (Hartung et al., 2018; Olaru et al., 2019). All participants get included in the analysis at each focal point with different weights resulting in N_{eff} . Depending on the moderator distribution, the weighting can lead to a discrepancy between focal point values and effective moderator value, especially at the boundaries of the moderator distribution (Hartung et al., 2018; Hildebrandt et al., 2016). Focal points were selected so that effective age deviated less than 1 year from the focal age and $N_{\text{eff}} > 250$. This resulted in focal points ranging from 32 to 78 years with increments of 1 year. Neuroticism and extraversion were z -standardized. Focal points for extraversion ranged from -2 to 2 with 0.1 increments. Focal points for neuroticism ranged from -1.7 to 2 with 0.1 increments. Using these focal points, effective moderator values deviated less than 0.1 from the focal point value.

Due to the weighting procedure, samples are partly overlapping and measurement invariance cannot be tested

TABLE 1 Descriptive statistics and a correlation matrix of the manifest variables

	<i>N</i>	Mean	SD	Range	Age	SWLS 1	SWLS 2	SWLS 3	SWLS 4	SWLS 5	SWLS	Finance satisf.	Health satisf.	Extraversion	Neuroticism	Finance status	
Age	8341	50.55	14.37	30–97													
SWLS 1	8294	3.78	1.03	1–5	0.02												
SWLS 2	8279	3.74	1.06	1–5	–0.03	0.75											
SWLS 3	8261	3.97	1.00	1–5	0.01	0.74	0.76										
SWLS 4	8277	3.99	1.03	1–5	0.05	0.62	0.61	0.65									
SWLS 5	8298	3.33	1.27	1–5	0.03	0.54	0.54	0.55	0.53								
SWLS	8320	3.76	0.90	1–5	0.02	0.87	0.87	0.87	0.81	0.78							
Finance satisf.	8223	3.07	1.18	1–5	0.17	0.50	0.51	0.49	0.47	0.43	0.59						
Health satisfaction	8298	3.50	1.10	1–5	–0.01	0.43	0.48	0.44	0.36	0.34	0.49	0.41					
Extraversion	8326	3.23	0.84	1–5	–0.02	0.15	0.16	0.16	0.14	0.14	0.18	0.11	0.13				
Neuroticism	8322	2.54	0.93	1–5	–0.10	–0.31	–0.31	–0.34	–0.24	–0.25	–0.34	–0.26	–0.30	–0.14			
Financial status	7790	46.7	14.46	2.9–100	0.27	0.19	0.22	0.19	0.23	0.16	0.23	0.36	0.13	0.05	–0.06		
Health status	7980	–1.45	1.58	–9–0	–0.40	0.15	0.20	0.15	0.11	0.11	0.17	0.09	0.26	0.05	–0.12	0.03	

Note: Pearson correlations with pairwise deletion. Numbers in light grey indicate non-significant correlations, all correlations > |0.02| were significant with $p < 0.01$. Abbreviations: SD, standard deviation; satisf., satisfaction; SWLS, Satisfaction with life scale.

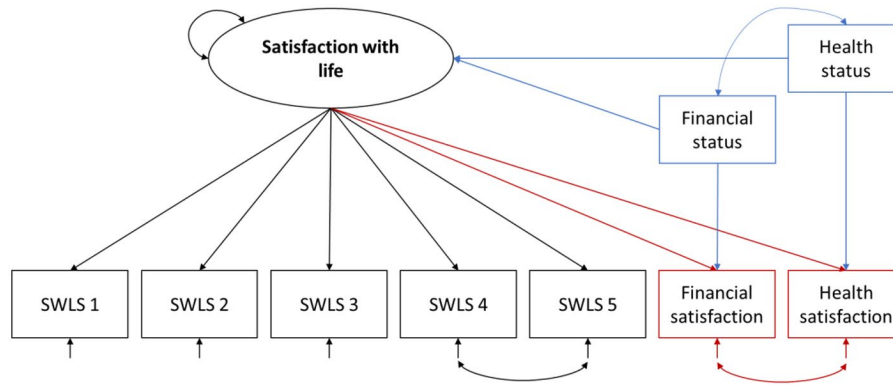


FIGURE 1 Schematic representation of the tested models. The indicators of the basic measurement model are marked in black, those added to the extended measurement model in red. Predictors are marked in blue [Color figure can be viewed at wileyonlinelibrary.com]

traditionally via a χ^2 difference test (Olaru et al., 2019). A recent approach to test for invariance in the LSEM framework is the joint estimation method developed by Robitzsch (2019), which was used in the current analysis. With joint estimation, it is possible to constrain selected parameters to equality across the range of the moderator. LSEMs with increasing levels of measurement invariance across age were tested (Meredith, 1993). Bootstrapping with 100 iterations per invariance level was applied for statistical inference. We considered differences between models with increasing invariance constraints as meaningful if $\Delta CFI \geq -0.01$ and $\Delta RMSEA \geq 0.015$ (Chen, 2007; Cheung & Rensvold, 2002). For $\Delta SRMR$ at the metric level, the recommended cut-off is ≥ 0.030 , and at the scalar and strict level recommended cut-off is ≥ 0.010 (Chen, 2007).

Because the change in model fit when constraining intercepts to equality is of interest, the models have to be estimated without prior residualization of the manifest indicators. However, when estimating the models including the regressions of satisfaction on the objective indices, it is reasonable to first residualize all manifest variables for the influence of age. If the manifest indicators are not residualized around the mean, or, in other words, if the effects of age (and age squared) do not get controlled for, the local mean structure will bias the covariance estimation (Hildebrandt et al., 2016; Hofer et al., 2006). By the residualized values, we made sure that the estimates at every focal point reflect age-independent variance.

3 | RESULTS

3.1 | Descriptive analysis

The number of respondents, mean values, and the standard deviations for all items are depicted in Table 1. The median was 3.00 for all satisfaction items, except for the respondents' satisfaction with their financial situation (median = 2.00).

Hence, participants were rather satisfied on average. The mean of the health index indicates that participants were diagnosed with 1.45 severe diseases on average; thus, indicating that the majority of the sample enjoys rather good health. Correlations of the SWLS items, as well as health satisfaction with age, were close to 0 (see Table 1). Finance satisfaction and financial status were positively correlated with age whereas health status was negatively correlated with age. All satisfaction items were negatively correlated with neuroticism and positively related to extraversion. Correlations between personality and financial and health status were close to 0 except for a positive correlation between health status and neuroticism.

3.2 | Measurement models in the overall sample

Before investigating the models across age, their fit in the overall sample was examined. The basic model fitted the data very well: $\chi^2_{(4)} = 68.47$, $p < 0.01$, $CFI = 0.997$, $RMSEA = 0.044$, and $SRMR = 0.007$. The extended model also exhibited a very good overall fit: $\chi^2_{(12)} = 295.70$, $p < 0.01$, $CFI = 0.991$, $RMSEA = 0.053$, and $SRMR = 0.016$. The third model that additionally included the objective measures as independent variables resulted in very good fit to the data: $\chi^2_{(22)} = 332.93$, $p < 0.01$, $CFI = 0.989$, $RMSEA = 0.044$, and $SRMR = 0.016$. Therefore, the three models can be used as well-founded baseline models for LSEM.

3.3 | LSEM with age as continuous moderator

The average age of the weighted samples (effective age) ranged from 32.77 to 77.42 years. The minimum effective sample size was $N_{\text{eff}} = 251.01$ at focal age 78 and the

maximum $N_{\text{eff}} = 1606.51$ at focal age 35 (see Figure A1). Thus, the weighted sample sizes were sufficiently large to support model estimation.

3.3.1 | Satisfaction with life scale

Model fit

CFI values ($M_{\text{CFI}} = 0.997$, $SD_{\text{CFI}} = 0.002$), SRMR values ($M_{\text{SRMR}} = 0.007$, $SD_{\text{SRMR}} = 0.002$), and RMSEA values ($M_{\text{RMSEA}} = 0.047$, $SD_{\text{RMSEA}} = 0.014$) indicated acceptable fit across the age range. For all fit indices, the model fit best at focal age 41 and similarly well at focal age 70.

Loadings

In general, standardized factor loadings were quite stable (see Figure 2; for their respective 95-percent confidence intervals see Figure A3). The first to third item of the SWLS had standardized mean loadings between $M_{\lambda} = 0.860$ and 0.878 ($SD = 0.010$ – 0.014). Changes in the loadings of these three items were marginal. The two life-balancing items of the SWLS loaded lower but quite substantial on the latent factor (SWLS 4: $M_{\lambda} = 0.730$, $SD = 0.015$; SWLS 5: $M_{\lambda} = 0.625$, $SD = 0.014$). Their mean residual correlation was $r = 0.143$ ($SD = 0.052$) with the highest correlations toward the end of the age range. All factor loadings of the SWLS were significant at the $\alpha = 0.05$ significance level, while residual correlations of the life-balancing items were only significant until focal age 44 and between ages 67 and 71.³

Intercepts

Intercepts reflect manifest values on the answer scale and thus can range from 1 to 5. The intercepts represent the predicted value by the model when the mean of the latent variable is

0. To calculate a standardized model-based response to an item, the latent trait value needs to be multiplied by the standardized loading of this item. While intercepts indicated the U-shape commonly found in the literature, the confidence intervals always covered a similar range across weighted overlapping age groups (see Figure 3).

Invariance testing

To test for invariance, the joint estimation approach was conducted. The introduction of equality constraints on model parameter groups indicating weak, strong, and strict invariance of all five SWLS items across focal points did not lead to a considerable deterioration in model fit (see Table 2).

3.3.2 | Domain satisfactions

Model fit

Following the results of the basic model, the SWLS items were constrained to adhere to strict invariance across age, and the domain items health satisfaction and financial satisfaction were estimated freely. The joint estimation approach was used to implement this partial invariance. The model fitted the data well (see Table 2).

Loadings

The gradient of the health satisfaction item had a mean loading of $M_{\lambda} = 0.523$ ($SD = 0.035$) and increased at an almost steady, but slow, rate until the end of the distribution, with the highest loading $\lambda = 0.62$ at focal age 77 (see Figure 4). The financial satisfaction gradient, with a mean loading of $M_{\lambda} = 0.621$ ($SD = 0.035$), exhibited a reverse pattern: The maximum point with a value of $\lambda = 0.68$ was reached at focal age

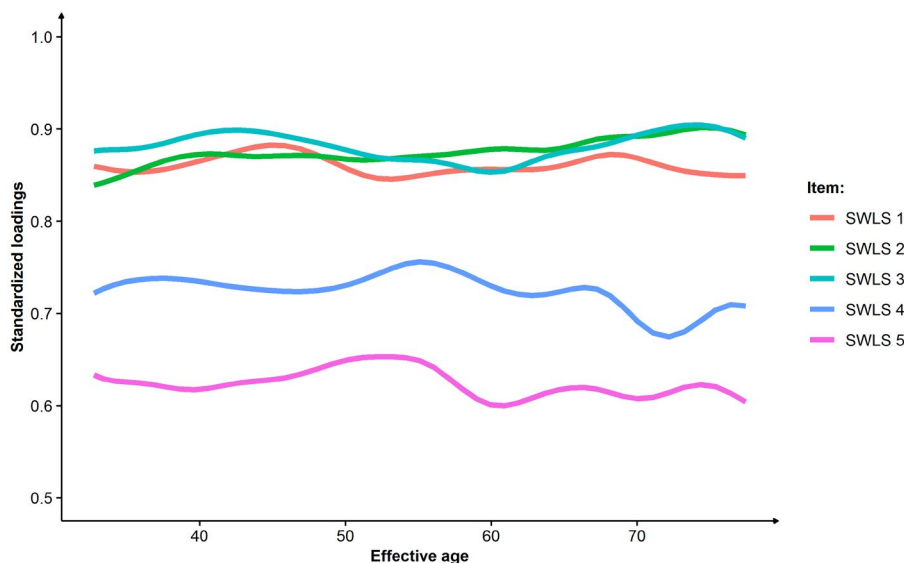


FIGURE 2 Standardized factor loadings of the SWLS items across effective age. SWLS, satisfaction with life scale [Color figure can be viewed at wileyonlinelibrary.com]

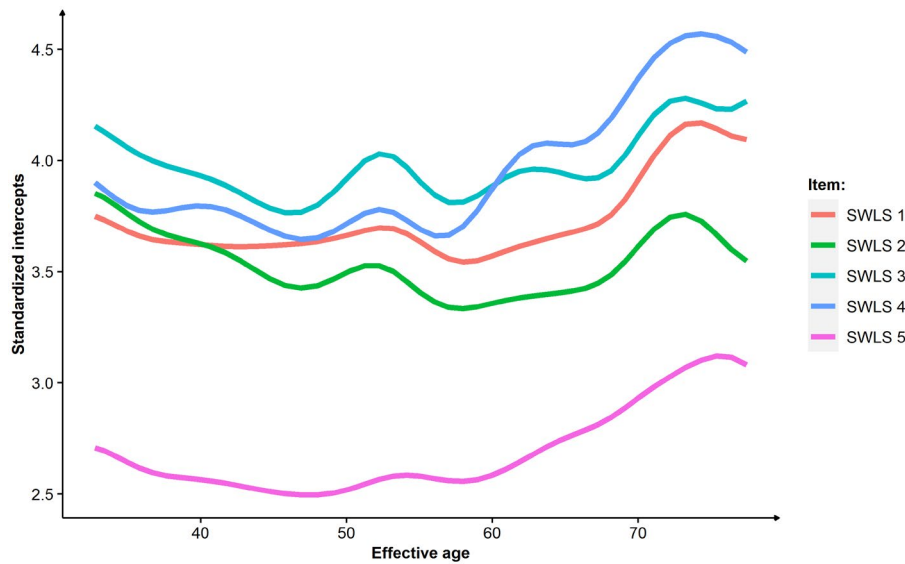


FIGURE 3 Intercepts of the SWLS items across effective age. SWLS, satisfaction with life scale [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 2 Model fit comparisons across the levels of invariance for the basic model and the extended model concerning age

	Configural	Metric	Scalar	Strict
Basic model				
<i>CFI</i> (<i>SE</i>)	0.999 (0.001)	1.00 (0.001)	0.997 (0.002)	0.997 (0.002)
<i>RMSEA</i> (<i>SE</i>)	0.030 (0.009)	0.021 (0.005)	0.030 (0.004)	0.026 (0.004)
<i>SRMR</i> (<i>SE</i>)	0.006 (0.001)	0.022 (0.005)	0.034 (0.005)	0.036 (0.005)
Extended model				
<i>CFI</i> (<i>SE</i>)	0.993 (0.002)	0.992 (0.002)	0.984 (0.003)	0.984 (0.003)
<i>RMSEA</i> (<i>SE</i>)	0.034 (0.003)	0.035 (0.003)	0.046 (0.003)	0.044 (0.003)
<i>SRMR</i> (<i>SE</i>)	0.031 (0.004)	0.037 (0.004)	0.045 (0.004)	0.045 (0.004)

Note: Standard errors computed via bootstrapping in 100 samples.

Abbreviations: *CFI*, comparative fit index; *RMSEA*, root mean square error of approximation; *SE*, standard error; *SRMR*, standardized root mean square residual.

32 with an almost steady drop until the end of the age range ($\lambda = 0.58$ at focal age 78). The residuals of the two items had a small mean correlation of $r = 0.096$ ($SD = 0.038$).

Invariance testing

Since we determined strict invariance for the five SWLS items in the first model, they were restricted on all levels of invariance testing in the extended model, while the items assessing one's satisfaction with health and financial situation were restricted consecutively. All indices indicated strict invariance of domain satisfactions in addition to the SWLS across focal points. (see Table 2).

3.4 | Covariate analysis

Following the results of the previous tested models, all satisfaction items were constrained to be strictly invariant across

age, while regression coefficients were estimated freely (see Table 3). Fit indices still indicated an acceptable fit with $RMSEA = 0.033$ ($RMSEA_{bootstrap} = 0.023$), $CFI = 0.989$ ($CFI_{bootstrap} = 0.996$), and $SRMR = 0.033$ ($SRMR_{bootstrap} = 0.027$).

3.4.1 | Health status

Health status was a significant positive predictor for both overall life satisfaction and health satisfaction across all focal points (see Figure 5 and Table 3). It predicted life satisfaction best between the ages of 32 and 50. At higher ages, the regression coefficient decreased almost steadily until the end of the age range covered in the present data. An interpretation of these results is that every additional medical condition leads to an average drop in life satisfaction by 0.145 points on the life satisfaction scale. On average,

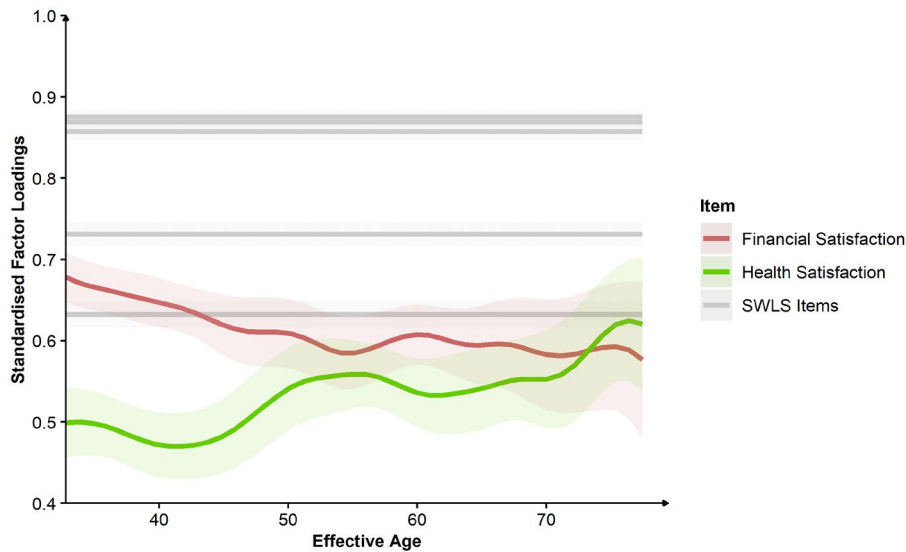


FIGURE 4 Standardized factor loadings of the items health satisfaction and financial satisfaction across effective age. The bands around the lines represent respective 95-percent confidence intervals (bootstrapped). SWLS items were constrained to equality across age. SWLS, satisfaction with life scale [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 3 Unstandardized and standardized regression coefficients of the health status and financial status predicting life satisfaction and health satisfaction or financial satisfaction, respectively

	Unstandardized <i>B</i>				Standardized β			
	<i>M</i>	<i>SD</i>	Min	Max	<i>M</i>	<i>SD</i>	Min	Max
Health status								
Life satisfaction	0.145	0.040	0.050	0.199	0.191	0.031	0.087	0.230
Health satisfaction	0.130	0.012	0.110	0.158	0.172	0.029	0.137	0.258
Financial status								
Life satisfaction	0.018	0.004	0.010	0.026	0.221	0.029	0.155	0.273
Financial satisfaction	0.018	0.004	0.013	0.024	0.208	0.034	0.163	0.272

Abbreviations: *M*, mean; Max, maximum; Min, minimum; *SD*, standard deviation.

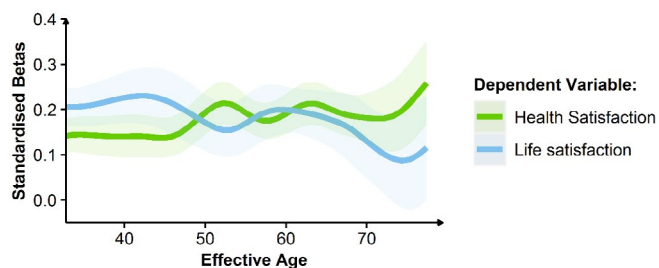


FIGURE 5 Standardized regression coefficients of the health status predicting life satisfaction and health satisfaction across the effective age range. Bootstrapped 95-percent confidence intervals are included [Color figure can be viewed at wileyonlinelibrary.com]

standardized values indicate a drop in life satisfaction by 0.191 standard deviations for a one standard deviation increase in health status.

On average, health satisfaction dropped by 0.130 points on the scale with every additional disease from which one has ever suffered. Standardized values indicated that one standard deviation unit less on health status led to an increase in life satisfaction by 0.172 standard deviations. The gradient had two small bumps around focal ages 52 and 62 but remained relatively stable across the age range. Despite descriptive changes in the regression coefficients of health status across the adult-age range, fixing the coefficients did not lead to a meaningful decrease in model fit ($RMSEA = 0.032$, $SRMR = 0.037$, $CFI = 0.988$).

3.4.2 | Financial status

Both gradients of the standardized regression coefficients for the financial status explaining variance in life satisfaction and financial satisfaction were significant across the age range and

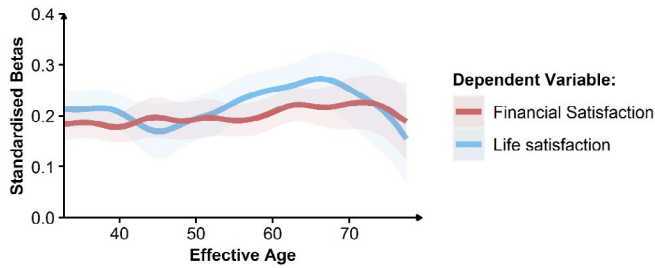


FIGURE 6 Standardized regression coefficients of the financial status predicting life satisfaction and financial satisfaction across the effective age range. 95-percent confidence intervals are included [Color figure can be viewed at wileyonlinelibrary.com]

were rather stable (see Figure 6 and Table 3). Imposition of constraints revealed that both gradients are strictly invariant over the age range ($RMSEA = 0.033$ and $SRMR = 0.037$, $CFI = 0.988$). On average, one point more on the financial status led to an increase in life satisfaction by 0.018 points. An increase of one standard deviation in the financial status led to, on average, an increase in life satisfaction by 0.221 standard deviations. An increase in the financial status by one point led to an average increase in financial satisfaction by 0.018 points on the satisfaction scale. Standardized values indicated that an increase in financial status by one standard deviation led to an average increase in financial satisfaction by 0.208 standard deviations.

3.4.3 | Correlation between health and financial status

The covariance between the two covariates was estimated freely across the age range. The correlation ranged from 0.088 to 0.224 (see Figure A2). Restricting the correlation to equality led to a slight deterioration in fit ($RMSEA = 0.045$, $CFI = 0.976$, $SRMR = 0.051$).

3.5 | LSEM with neuroticism and extraversion as continuous moderator

For the analysis across levels of personality, the extended model was used because the main focus of this analysis was on the invariance of life satisfaction across either neuroticism or extraversion. To test for invariance, the joint estimation approach was conducted following the usual steps of invariance testing. Please note that for model identification, the factor variance was fixed to 1 and the factor mean was fixed to 0. Thus, changes in the latent level are not possible and will be pushed to the measurement level of the model.

3.5.1 | Extraversion as a moderator

Model fit of the LSEM analysis suggested that the model fitted the data acceptably across the whole extraversion range

with the worst fit at the highest focal point 2 ($M_{CFI} = 0.987$, $SD_{CFI} = 0.004$, $M_{SRMR} = 0.018$, $SD_{SRMR} = 0.003$, $M_{RMSEA} = 0.063$, $SD_{RMSEA} = 0.010$). In general, loadings and intercepts were very stable across extraversion. This impression is confirmed by the invariance analysis, which suggests that strict invariance can be assumed (see Table 4).

3.5.2 | Neuroticism as a moderator

Model fit can be interpreted as acceptable across the whole neuroticism range ($M_{CFI} = 0.986$, $SD_{CFI} = 0.004$, $M_{SRMR} = 0.019$, $SD_{SRMR} = 0.003$, $M_{RMSEA} = 0.061$, $SD_{RMSEA} = 0.009$). The invariance analysis suggests that while configural and metric invariance hold, scalar invariance does not hold (see Table 4). This result implies that the general factor structure and loadings are the same across neuroticism levels, but intercepts are not the same. More specifically, intercepts decrease with increasing levels of neuroticism.

4 | DISCUSSION

The aim of this work was to investigate age-associated changes in the factorial structure of adults' life satisfaction including financial and health satisfaction. The LSEM analysis showed that the measurement of life satisfaction with the SWLS was invariant across age. By a common factor model including health and financial satisfaction, we stressed the nomothetic breadth of life satisfaction. Loadings of the two domain items were lower than the loadings of the SWLS, but still sufficiently high to indicate that general life satisfaction is expressed in both health and financial satisfaction. In the current analysis, restricting the loadings on domain satisfactions did not lead to a significant deterioration of fit. Therefore, results of LSEM indicate that the association between the domain and overall life satisfaction was stable over the age range. Objective indices for finance and health as predictors of life satisfaction and the respective domain satisfactions indicated that these indices accounted only for small proportions of variance in satisfaction. In particular, they did not account for more variance in the domain-specific variance than the life satisfaction factor. Imposing equality restrictions on the regression weights did not lead to a significant deterioration of fit. This result implies that the objective health and financial situation do not differ substantially in their predictive power across the adult age range. Regarding life satisfaction across neuroticism and extraversion, the current investigation suggests that the measurement of life satisfaction with the SWLS with the addition of health and financial satisfaction works the same way across extraversion levels, while intercepts decrease with increasing neuroticism levels indicating that observed life satisfaction ratings might differ depending on neuroticism levels despite equal latent life satisfaction.

	Configural	Metric	Scalar	Strict
Extraversion				
<i>CFI (SE)</i>	0.993 (0.002)	0.994 (0.002)	0.989 (0.002)	0.989 (0.003)
<i>RMSEA (SE)</i>	0.046 (0.004)	0.037 (0.003)	0.041 (0.003)	0.037 (0.003)
<i>SRMR (SE)</i>	0.016 (0.001)	0.033 (0.004)	0.061 (0.006)	0.063 (0.006)
Neuroticism				
<i>CFI (SE)</i>	0.993 (0.002)	0.988 (0.002)	0.955 (0.004)	0.942 (0.005)
<i>RMSEA (SE)</i>	0.046 (0.004)	0.047 (0.003)	0.075 (0.003)	0.076 (0.003)
<i>SRMR (SE)</i>	0.017 (0.001)	0.084 (0.007)	0.147 (0.009)	0.159 (0.008)

Note: Standard errors computed via bootstrapping in 100 samples.

Abbreviations: *CFI*, comparative fit index; *RMSEA*, root mean square error of approximation; *SE*, standard error; *SRMR*, standardized root mean square residual.

TABLE 4 Model fit comparisons across the levels of invariance for the extended model across extraversion and neuroticism

4.1 | SWLS invariant across adulthood

We partly replicated and extended findings of measurement invariance of the SWLS with multiple group structural equation modeling (e.g., Clench-Aas et al., 2011; Siedlecki et al., 2014) using LSEM. In particular, we were able to introduce constraints up to the level of strict invariance without relevant loss of fit. This finding is at odds with the position that life satisfaction judgments are of a different structure depending on the age of the respondents. Instead, the results are consistent with the view that life satisfaction judgments are based on broad, similar statements about someone's satisfaction with life in general, which are comparable across the age range. However, the small residual correlation between the two life-balancing items indicates only a minor deviation from optimal indicators within this strongly restricted sample of items. The increased strength of this effect in older age might be due to age determining the nature, length, and scope of hindsight over one's life. For proponents of the SWLS, the strict invariance over the age range from 32 to 78 years is reassuring, particularly because these results do not invalidate established mean level trends in overall life satisfaction.

4.2 | Domain satisfaction

In the current analysis, the association between health and financial satisfaction and a general life satisfaction factor was stable across the age range. These results seem contrary to the focus on different domains at different stages of adulthood (Scott et al., 2009) but are in line with McAdams et al. (2012), who could recreate the mean trend of general life satisfaction with the combination of different mean trends of equally weighted domain satisfactions. One explanation for this result might be that although different domains appear more or less important to participants across their life span, they implicitly built their overall life satisfaction rating in a quite similar fashion. In other words, when asked broad questions

about how satisfied they are with their life, the same domains inform their rating to a similar degree across age. Despite changing developmental tasks across the adult age range, the domains essentially stay the same (Hutteman et al., 2014).

As is already pointed out by Campbell et al. (1976), satisfaction can be understood as the gap between participants' perception of their current situation and the situation to which they aspire. As mentioned in the introduction, differences in aspiration levels might contribute to the well-being paradox. Objectively, health might deteriorate with age, the subjective perception of their health status might also be sensitive to a deterioration in health, and health could even become more central in participants' perception. However, their aspiration levels decrease at the same time adapting to the age-associated slow changes in life circumstances. As a result, satisfaction ratings might be stable on the mean level.

4.3 | Health and financial indices as predictors of satisfaction

In the current data, the stable amount of variance accounted for in domain and life satisfaction indicates that despite age-associated differences in the number of diseases and financial situation, the relative importance of both domains for all facets of life satisfaction remains fairly stable. Although the health and financial indices were significant predictors for life satisfaction and the respective domain satisfaction, they did not account for much variance. Previous research has shown similar effect sizes (Deaton, 2008). Furthermore, the nature of the health index might influence its relation to satisfaction ratings. A study based on old participants found that physical health was hardly related to life satisfaction, while mental health was strongly related to life satisfaction (Puvill et al., 2016). In the same sample, self-rated health was only weakly related to expert-rated health, but self-rated health-related stronger to life satisfaction (Puvill, Lindenberg, Gussekloo, et al., 2016). It might not be surprising that higher

subjective health ratings go hand in hand with higher subjective ratings of satisfaction. Furthermore, there are many more facets of life circumstances that can influence how satisfied people are with their life.

Interestingly, the objective measures did not account for more variance in the domain-specific satisfaction variance than the overall life satisfaction variance. When comparing these regression weights, the broader measurement of the general life satisfaction factor compared to the majority of the literature needs to be considered. This difference between the current and previous studies might explain why the common finding that an objective indicator is more strongly related to satisfaction in the respective domain than general satisfaction (Argyle, 2013) was not replicated in this study. This finding indicates that life circumstances are related to general and domain-specific satisfaction to a similar extent. Changes in life circumstances should, therefore, not only influence domain satisfaction but also general satisfaction ratings.

Specific life domains are likely not independent from each other. For instance, higher incomes can lead to better health (Ecob & Smith, 1999; Marmot, 2002), better housing, higher standards of living (Argyle, 2003), and provide opportunities to satisfy life goals (Cheung & Lucas, 2015). However, the correlation between the health and financial index in the overall sample of the current analysis is negligible. Nevertheless, the correlation increased across the age range and dropped again in very old age, which could be indicative that the relationship between financial and health status changes across the adult age range. There is evidence that income influences health at the lower end of the health distribution, but not at the higher end (Jones & Schurer, 2011). The negative correlation of health status with age confirms the expectation that health decreases with age. Importantly, this effect might be dependent on the health insurance system implemented in the respective country. Due to this dependency on the health insurance system and the unclear causality, which can only be investigated in longitudinal data, we do not want to overinterpret the correlation between health and financial status. Importantly, the results we report might not only hinge on normative life events and their variation across countries (i.e., retirement age has different implications for participants across the range), but country-level effects might also exert effects on the participant level (i.e., welfare might decrease relative and absolute poverty as well as existential uncertainty).

4.4 | Life satisfaction across neuroticism and extraversion

A consistent finding regarding the relationship between personality and life satisfaction has been a strong correlation with extraversion and neuroticism, relative to other personality factors (e.g., Steel et al., 2008). Furthermore, personality

changes predict changes in life satisfaction and vice-versa (Specht et al., 2013).

The nature of life satisfaction may differ depending on a person's personality. For example, the level of life satisfaction of a highly neurotic person could represent more whether this person is depressed, with low levels of life satisfaction indicating a depression, while for emotionally stable participants life satisfaction represents how satisfied they are with their life circumstances.

To the best of our knowledge, no investigation of invariance of life satisfaction measures across personality exists. In the current investigation, we examined the research question of whether life satisfaction as measured by the SWLS, extended by two domain satisfaction ratings, represents the same construct across the range of neuroticism and extraversion levels. LSEM analyses with joint estimation indicated that the SWLS is invariant across extraversion, but intercepts differ significantly across neuroticism levels. This result indicates that individuals with the same latent life satisfaction level, but different neuroticism levels, have different manifest scores on the SWLS. Nevertheless, it is important to have model identification in mind when interpreting the results. Factor means were constrained to 0 and factor variances to 1 across all focal points. Thus, potential differences on the latent level are pushed to the measurement level. If the identification method is changed by fixing the loading and intercept of the first indicator (i.e., the first SWLS item) to 1, strict invariance can be assumed and the factor mean decreases with increasing neuroticism levels, as would be expected (see Figure A3 in the Appendix). Hence, the changes in intercepts only reveal the association of life satisfaction and neuroticism. In conclusion, life satisfaction is the same irrespective of a person's extraversion and neuroticism level. Importantly, this finding does *not* imply that life satisfaction is unrelated to personality.

4.5 | Limitations and future research

The composite variable—counting the number of diseases—we computed from the information provided in the data might not be exhaustive for capturing health status. For example, mental health has only a small frequency among the constituents of the count variable. Furthermore, severe diseases are rather uncommon and therefore represent non-normative life circumstances. Including physical fitness and the level of everyday function that are measured objectively would most likely improve the distribution of the health index and its explanatory power (Pierce & Hanks, 2006; Tonack et al., 2008).

The financial index comprised a variable constructed by the PSID team that consists of several asset types, the net of debt value, and the value of home equity with the addition

of the salary/wages of respondents. Income equivalence and per-capita income have been found to be better predictors of financial satisfaction than salary (Hsieh, 2004). Besides the salary variable, other compositions of the net value are also easily conceivable. The variable provided by the PSID includes stocks and other volatile assets which seem less likely than, say, real estate, to conclude overarching life or financial satisfaction. To our knowledge, it is also unclear whether or not the influence of the financial situation on satisfaction ratings is linear or logarithmic or follows some other function.

Cross-sectional data always come with the disadvantage that results might include cohort effects. The epochal change in life satisfaction is itself of scientific interest. For instance, a study based on middle-aged to old-age U.S. adults found that younger cohorts are less satisfied financially (Hsieh, 2000). However, the data only covers trends from the 1970s to the late 90s. Thus, cohort trends in financial life satisfaction now could be quite different. Furthermore, longitudinal data are needed to draw conclusions on intra-individual changes across age. Nevertheless, the large cross-sectional data set used for the current analysis allows us to examine the question of age-associated differences in the domains of life satisfaction with a statistical method that has not been used to investigate this important research question before, and treats age as a continuous variable.

Another limitation of the current data set is that the youngest participants were 30 years old. Hence, a critical developmental period, adolescence and young adulthood, is not included in the data. Results about trajectories in life satisfaction in adolescents and young adulthood are mixed (e.g., Ranta et al., 2013; Willroth et al., 2021). Studies including a wide age range also show mixed results regarding invariance with a tendency to lower invariance levels across age groups (see Emerson et al., 2017 for a review). To obtain a whole life-course perspective, it would be necessary to replicate the investigation with a sample including a wider age range.

The parsimony of the model might play a role with regard to invariance testing. Because constraining of a model parameter group leads to a simplification of the model, the discrepancy of the composite likelihoods could be evaluated as not sufficient compared to the gain in degrees of freedom. However, the model parameter could still have a meaningful trend across the moderator. The joint estimation approach also allows us to test for a specific trend of a model parameter across the context variable similar to moderated factor analysis (Cheung et al., 2015; Tucker-Drob, 2009). Based on our hypothesis and previous literature, it could be tested whether the intercepts of the SWLS deviate significantly from a U-shape and whether modeling the loadings of the domain items as linearly decreasing or increasing across age leads to a significant deterioration in fit.

Having discussed the results based on the current data and the limitations of the data itself, we want to complete the

discussion by pointing out which kinds of data would be ideal to investigate the research questions asked at the beginning of this publication. Preferably, each domain would be represented by more than one indicator making it feasible to specify an overarching higher-order model with domain-specific first-order factors and the general life satisfaction items as a reference method. Furthermore, a multi-trait multi-method matrix with life satisfaction measured with different methods, measures of related constructs, such as well-being and quality of life, would be desirable to investigate jingle-jangle fallacies in this area of research (Olderbak & Wilhelm, 2020). Understanding better how specific measures represent a construct and how different constructs overlap is important to exceed the current research status, but also to integrate accumulated empirical findings. We strongly advocate a broader view on life satisfaction that includes evaluations of specific aspects of life and embraces complementary methods to capture it.

4.6 | Conclusion

The general life satisfaction factor was qualitatively the same across the adult age range. Health and financial satisfaction are steadily associated with general life satisfaction. Consequently, life satisfaction ratings are probably constructed in a similar manner independent of respondents' age. Therefore, comparisons between people of different ages on their life satisfaction ratings are quantitatively interpretable. Furthermore, a change in health or financial satisfaction is associated with a change of the same magnitude in life satisfaction across the adult age range. From a theoretical perspective, the interplay between changing reference groups, different assumptions and experiences of health and financial situations, and different evaluation processes might lead to the rather small differences in model parameters that we observed. Another possibility is that the operationalization in the study does not allow one to find age-related differences.

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AUTHOR CONTRIBUTIONS

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CONFLICT OF INTEREST

We have no known conflict of interest to disclose.

ETHICS STATEMENT

The study conforms to recognized ethical standards.

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ENDNOTES

- ¹ Note that only 53 participants (< 1%) used the “Does not apply to me” category. In total, only 2% of participants had missing values.
- ² As a robustness check, models were additionally estimated with the exclusion of people who replied with “does not apply to me.” The results did not differ substantially.
- ³ When estimating the model without the residual correlation, results are the same except for fit indices around focal point 70 indicating that the model does not fit the data well. This result indicates that the residual correlation is necessary in order to have a measurement model that fits the whole age range. Nevertheless, the residual correlation is quite small and does not always exceed the threshold for significance.

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APPENDIX

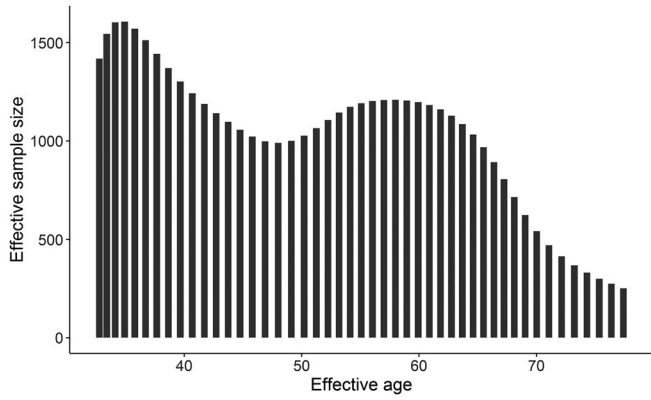


FIGURE A1 Effective sample size at every focal point estimated with LSEM

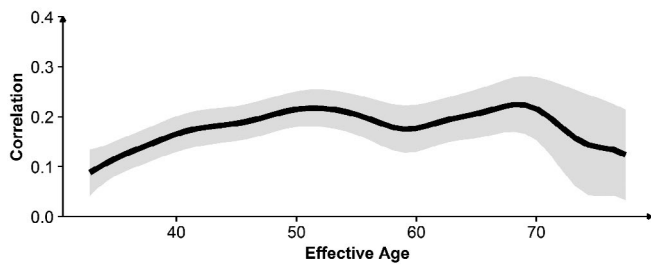


FIGURE A2 Correlation between health and financial status across the effective age range. 95-percent confidence intervals are included

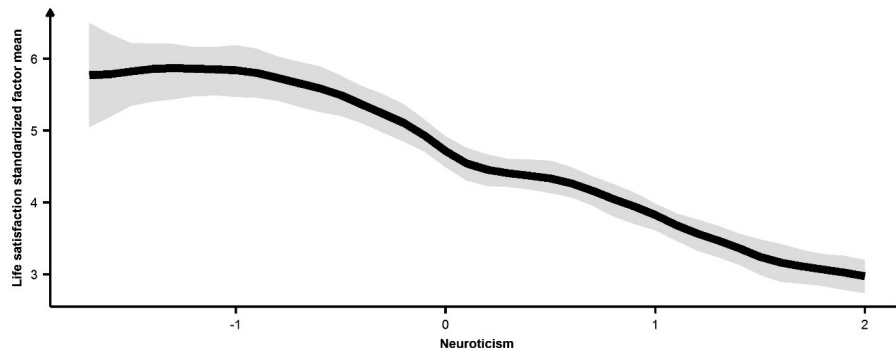


FIGURE A3 Gradient of the standardized factor mean of life satisfaction across neuroticism