Psychological stress declines rapidly from age 50 in the United States: Yet another well-being paradox

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A B S T R A C T

Objectives: Although there is evidence that evaluative subjective well-being (e.g., life satisfaction) shows a U-shaped pattern with highest satisfaction in the youngest and oldest years and lowest in the middle years of adulthood, much less is known about experiential well-being. We explore a negative indicator of experiential well-being (perceived stress), examine its association with age, and explore possible determinants of the age pattern.
Methods: Using Gallup-Healthways survey data of over 1.5 million U.S. respondents, we analyzed a question asking about stress yesterday and demographic determinants of the pattern. To confirm this pattern, data on stress was analyzed from the American Time Use Survey and data on distress was analyzed from the Health and Retirement Survey.
Results: We show that ratings of daily, perceived stressfulness yield a paradox, with high levels from the 20's through about age 50, followed by a precipitous decline through the 70's. Data from the other two surveys confirmed the age pattern for stress. Regressions with the Gallup-Healthways data statistically controlled several third-variables, yet none substantially altered the pattern.
Conclusion: We argue that this new experiential well-being pattern informs us about aging in the US and the "paradox" calls out for explanation.

1. Introduction

Over the last two decades considerable effort has gone into understanding how aging relates to well-being. To date we know that in English-speaking, developed, Western countries evaluative well-being (e.g., life satisfaction) generally follows a U-shaped association with age, where the lowest levels of well-being are in the early to mid-50s [1,2]. In this paper, we examine the age association of another dimension of SWB, experiential well-being,[1] that refers to perceptions of everyday tensions, miseries, and joys [3]. Because experiential well-being can fluctuate in response to daily events, it is commonly assessed with brief recall periods, often for a single day.[2] Perceived stress is one of the negative aspects of experiential well-being. It is defined as a subjective experience based on a respondent's understanding of the word "stress" and is based on the pioneering work of Lazarus and others [5]. An extensive literature shows that perceived stress is linked to

health outcomes, including endocrine [6], immune [7,8], autonomic nervous system processes [9], and morbidity [10–12]. Thus, there are compelling reasons to evaluate the pattern of perceived stress over the life span and to explore what might cause it. Despite this, connections between psychological stress and aging have received surprising little attention in the research literature. A notable exception is a study examining 355,334 participants in the Gallup-Healthways Well-being Survey [1], a U.S. telephone interview survey that includes both evaluative and experiential measures of well-being. The observed age pattern for daily stress was remarkably strong: stress was relatively high from age 20 through 50, followed by a precipitous decline through age 70 and beyond. This is consistent with other daily studies that find a reduction in both frequency and severity of stressors as people advance past middle age [13,14].

This paper has three goals. First, we seek to confirm the prior findings on perceived stress and age with a much larger sample (over

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[1] Experiential well-being is similar to hedonic well-being, which is essentially affect or mood, but goes beyond it in including misery and subjective pain.
[2] Many concerns with the measurement of SWB have been documented and are an active area of investigation and this is not reviewed here. The interested reader is directed to a recent OECD report on measuring subjective well-being [4]

1.5 million) from the same Gallup-Healthways survey mentioned above, covering the years 2010 through 2015. Second, we seek to confirm the pattern in two additional large-scale surveys that employed somewhat different methodologies. Third, we attempt to identify potential explanatory mechanisms that produce the age—stress relationship. Several variables in the Gallup-Healthways dataset that are associated with age will be examined and tested for their ability to impact the observed age—stress pattern.

2. Methods

2.1. Gallup-Healthways well-being index survey

Since January 2008, the Gallup Organization and Healthways Inc. have conducted a telephone survey of approximately 1000 people per day using sampling that includes both landlines and cell phones. Because there were political questions placed prior to the well-being assessments in the first two years of the survey, that may have contaminated the well-being assessments through a context effect [15], the data analyzed here includes surveys that were collected from January 2010 through 2015 (through mid-year). The 2010 paper on age-gradients [1] included only data collected in 2008. A total of 1,503,337 interviews was included in the present study. Documentation on the interview is contained at http://wordview.gallup.com and the specific wording of the perceived stress question was "Did you experience the following feelings during A LOT OF THE DAY yesterday? How about ___?" Where "Stress" was one of several adjectives presented. The response options were "No" and "Yes".

To examine age differences in stress in the Gallup Healthways survey, linear weighted regression models were used in which stress was regressed on dummy coded 1-year age categories. Age was treated as a categorical predictor variable to allow the estimation of age trends without imposing any a priori assumptions about the functional form of the age-stress relationship. The regression models included sampling weights provided by Gallup-Healthways to adjust the sample to the population distribution of age in the US population.

2.2. American Time Use Survey (ATUS)

The ATUS is conducted by the Bureau of Labor Statistics (BLS) every two years and interviews a subsample of the Current Population Survey. It is a time use survey wherein respondents parse "yesterday" into segments based on activity content and duration, allowing for a detailed examination of how Americans spend their time. At the behest of the National Institute on Aging (NIA), the BLS added an experimental module in the ATUS to assess emotions (with "stress" being one of the emotions) associated with 3 randomly selected activities from those identified for each participant (usually about 15 activities),[3] similar to the procedures developed for the Day Reconstruction Method [16]. The response options for the stress item were: 0 ("means you were not stressed at all") to 6 ("means you were very stressed"). The analyses included 12,034 respondents who completed the emotion questions in the 2010 telephone interview.

Age effects in stress were estimated in regression analyses using 4-year age groups as categorical predictor variable. Clustered robust standard errors were employed to account for the nesting of 3 non-independent responses per person. Weights developed by BLS were used to handle deviations from a representative sample and for weighting to correct the sampling of episodes of different lengths.

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[3] Because limited interview time was available for the module, three activity episodes were randomly selected from each respondent and are analyzed here. There was a minor programming error in the selection of the episodes for the Well-being Module, which prevented the selection of the last event of the day for the sample.

2.3. Health and Retirement Study (HRS)

The HRS is a longstanding panel study of the impact of retirement in the United States; participants were recruited at about age 50 and followed every two years thereafter. We used the data from 5693 respondents from the 2012 administration who completed a "leave-behind" paper-and-pencil questionnaire and who answered the following question between ages 50 and 79. They were asked, "During the past 30 days, to what degree did you feel distressed" using a 5-point (very much – not at all) scale. We suggest that stress and distress are sufficiently similar so that the expectation is that they would be related to age in the same way.

Age effects in stress were examined with linear regression models regressing distress on 5-year age categories. HRS-supplied sampling weights were used to achieve representativeness of the U.S. population. Statistical analyses were performed using STATA version 14.

3. Results

3.1. Perceived stress in Gallup-Healthways survey, American Time Use Survey, and Health and Retirement Study

In the Gallup-Healthways survey, > 45% of young respondents reported "stress during A LOT OF THE DAY yesterday," whereas the incidence was only 25% in the older years. Fig. 1 presents means (and 95% confidence intervals in grey) for each year of age ($F(65, 1,365,788) = 857.2$, $p < 0.0001$, with age in years as a nominal predictor variable). Without any control variables, Fig. 1 shows that the decline in percentage of respondents reporting stress begins in the mid 40s, accelerates downward at about age 57, and continues at slower rates at around age 75. An effect size based on the most extreme differences over age was computed by examining the proportion reporting stress in a young group ($20 - 30$) versus an older group ($70-80$). This yields an effect size h (which is comparable to Cohen's d for proportions [17]) of 0.57 based on proportions of 0.474 and 0.207 respectively, and an absolute risk reduction of 0.28. Various demographic and other variables are included in more extensive regressions later, because without a theoretical basis "controlling" for standard demographics may muddle interpretation of results. For example, income may be considered a mechanism through which age is associated with stress; simply controlling income as a "standard" demographic variable would eliminate detection of downstream effects directly linked to income.

While the perceived stress-age gradient is pronounced, there may be concerns that it is based on a question with a particular wording ("a LOT of stress") and a reporting timeframe (1-day), which could limit the generalizability of the result to other wordings and time frames. It would therefore be reassuring to have corroborating evidence of the age-stress pattern from other studies using alternative methodologies. We present two additional sets of findings from (1) the American Time Use Survey (ATUS) that assessed perceived stress pertaining to specific episodes throughout the day, and from (2) the Health and Retirement Survey (HRS) that assessed a construct closely related to stress – distress. Each study had a substantial, representative sample.

From the ATUS, average stress levels for age groups of 4 years are shown in Fig. 2A. Although the association is noisier than the previous one, it is clear that stress has a slight, positive linear trend from the first to the second age grouping (age 18–21 to 22–25), a slight upward trend until age 54, followed by a large drop starting with the 54–57 age group until the late 70s ($F(15, 12,019) = 13.2$, $p < 0.0001$, with age group as a nominal predictor variable). Overall, the decline in stress (effect size Cohen's d) is 0.61 standard deviations from the age group with the highest stress (50–53) to the group with lowest stress (74–77), a substantial association confirming the pattern from the Gallup-Healthways study.

The third results we present are from the HRS, though with an attenuated age range of 50 years and older (see Methods). A clear drop in