HHS Public Access

Author manuscript

*Int J Geriatr Psychiatry*. Author manuscript; available in PMC 2018 November 01.

Published in final edited form as:

*Int J Geriatr Psychiatry*. 2018 May ; 33(5): 743–747. doi:10.1002/gps.4849.

# Psychological Well-being and Risk of Dementia

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## Abstract

**OBJECTIVE—**Well-being is a psychological resource that buffers against age-related disease. We test whether this protective effect extends to dementia and whether it is independent of distress.

**METHODS—**Participants (*N*=10,099) were from the Health and Retirement Study. Five aspects of positive psychological functioning (life satisfaction, optimism, mastery, purpose in life, positive affect) were tested as predictors of incident dementia over 6–8 years.

**RESULTS—**Purpose in life was associated with a 30% decreased risk of dementia, independent of psychological distress, other clinical and behavioral risk factors, income/wealth, and genetic risk. After controlling for distress and other risk factors, the other aspects of well-being were not associated with dementia risk.

**DISCUSSION—**After considering psychological distress, we found that measures of well-being were generally not protective against risk of dementia. The one exception is purpose in life, which suggests that a meaningful and goal-driven life reduces risk of dementia.

### Keywords

Well-being; dementia; Alzheimer's disease; purpose in life; psychological reserve; depressive symptoms

Aspects of psychological functioning have been associated consistently with risk of dementia. Negative affect, for example, measured either as acute symptoms (e.g., depressive symptoms [1]) or as a trait disposition (e.g., Neuroticism [2]) increases risk of cognitive decline and dementia. In contrast to poor psychological health, less work has addressed the relation between psychological well-being and dementia. Well-being has been implicated in health across adulthood, from specific behaviors to longevity [3]. It is often argued that well-being is not the opposite of distress but that its association with better outcomes is independent of negative affect [4]. The present research addresses this question in the context of dementia risk. Specifically, we examine whether well-being protects against incident dementia and whether any protective effect of well-being is independent of the risk associated with negative affect. Because well-being is a multi-faceted construct [5], we take a comprehensive

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Conflict of Interest: None.

approach and include aspects related to both the experience of positive emotion (e.g., frequency of feeling positive affect such as happy or enthusiastic) and the cognitive evaluation of one's life (e.g., life satisfaction). We expect that higher well-being will be associated with a lower risk of dementia. We further examine whether the associations are independent of psychological distress, clinical (e.g., diabetes), behavioral (e.g., physical activity), and genetic (i.e., presence of the *APOE* ε4 risk allele) factors known to be associated with increased risk of dementia[6], and whether the associations vary by demographic characteristics.

## Method

### Participants and procedure

Participants were from the Health and Retirement Study (HRS; http://hrsonline.isr.umich.edu). Comprehensive measures of well-being were first included in HRS in the 2006 Leave-Behind Questionnaire administered to half of the HRS sample; the other half first reported on their well-being in 2008; these two subsamples were combined as baseline. Thus, the baseline assessment of well-being occurred in 2006 for half the sample and in 2008 for the other half of the sample. Cognitive status was assessed every two years. The baseline cognitive assessment was in the same year as the baseline well-being measures (2006 and 2008, respectively). Performance on the cognitive test was available at each two-year assessment up until 2014 (the year with the most recent data available). Thus, the follow-up period for cognitive functioning was up to eight years (range two to eight). Participants were selected for analysis if they completed the well-being measures, scored within the normal range of cognitive functioning without any cognitive impairment (i.e., no dementia or cognitive impairment not dementia; TICSm≥12; see below) at the baseline well-being assessment, and had follow-up cognitive data. A total of 10,099 participants had the relevant data at baseline and follow-up to be included in the analysis.

There were 660 participants who had complete data at baseline but who did not have a follow-up cognitive assessment. Of those 660 participants, 457 died during the follow-up period. Compared to participants with data at follow-up, participants with only baseline data and who did not die during the follow-up ($n$=203) were more likely to have a diagnosis of a mental or emotional disorder ($\chi^2$=7.88, $p$<.05) and scored lower on purpose in life ($d$=−.18, $p$<.05). There were no differences in age ($d$=.02, *ns*), sex ($\chi^2$=.27, *ns*), race ($\chi^2$=1.25, *ns*), Hispanic ethnicity ($\chi^2$=.36, *ns*), years of education ($d$=−.03, *ns*), depressive symptoms ($d$=.00, *ns*), life satisfaction ($d$=.00, *ns*), optimism ($d$=−.05, *ns*), mastery ($d$=−.02, *ns*), or positive affect ($d$=−.10, *ns* [2006] and $d$=−.11, *ns* [2008]).

### Measures

**Life Satisfaction—**Participants completed the 5-item satisfaction with life scale [7] as a measure of cognitive well-being. Items (e.g., "In most ways my life is close to ideal.") were rated on a scale from 1 (*strongly disagree*) to 6 (*strongly agree*) in the 2006 assessment and from 1 (*strongly disagree*) to 7 (*strongly agree*) in the 2008 assessment. To account for this difference by putting the response scales on the same metric, scores were standardized

(*M*=0, *SD*=1) within wave before the waves were combined. The alpha reliability for this scale was .88.

**Optimism—**Participants completed the revised version of the Life Orientation Test (LOTr), a measure of optimism and pessimism [8]. The present research used the Optimism subscale of the LOTr (e.g., "In uncertain times, I usually expect the best."). Three items were rated on a scale from 1 (*strongly disagree*) to 6 (*strongly agree*). The alpha reliability was .79.

**Mastery—**Perceived Mastery was assessed with five items (e.g., "I can do just about anything I really set my mind to.") that measure participants' beliefs in their ability to accomplish their goals [9]. Items were measured on a scale from 1 (*strongly disagree*) to 6 (*strongly agree*). The alpha reliability was .89.

**Purpose in life—**The 7-iem purpose in life subscale was drawn from the Ryff Measures of Psychological Well-being [10]. Items (e.g., "I have a sense of direction and purpose in my life.") were rated on a scale from 1 (*strongly disagree*) to 6 (*strongly agree*). The alpha reliability for this scale was .75.

**Affect—**Positive affect was measured with 6 items (e.g., Cheerful) in the 2006 assessment and with 13 items (e.g., Proud) in the 2008 assessment. Items were measured on a scale from 1 (*all of the time [2006]/very much [2008]*) to 5 (*none of the time [2006]/not at all [2008]*). Ratings were made based on how participants felt within the last 30 days and reversed scored such that higher scores reflected having experienced more positive affect. Since the content and number of items differed between the two assessments, we analyzed the two years separately. The alpha reliability was .92 for both versions of the scale.

**Distress—**Participants completed an 8-item version of the Center for Epidemiological Studies Depression Scale, a measure of depressive symptoms. Participants also reported (yes/no) whether a physician had ever diagnosed them with an emotional or mental disorder.

**Dementia—**Participants completed the modified Telephone Interview for Cognitive Status (TICSm) [11] every two years. Cognitive data were available through the 2014 HRS assessment. The TICSm had a total possible score of 27 points based on performance on three cognitive tasks: immediate and delayed recall of 10 words (0–20 points), serial 7 subtraction (0–5 points), and backward counting (0–2 points). From the total score, participants were classified into either dementia (TICSm≤6) or non-impaired (TICSm>6). This cutoff has been validated against a comprehensive neuropsychological assessment and clinical diagnosis of dementia [11,12] and was used to track national trends in cognitive impairment and dementia [13].

**Covariates—**Covariates included demographic factors associated with dementia risk, including age (in years), sex (male=0, female=1), race (African American=1 and Other non-white=1 compared to white=0), ethnicity (non-Hispanic=0, Hispanic=1), and education (in years) because each of these demographic variables has previously been associated with dementia risk[6]. Additional covariates that have also previously been implicated in dementia risk [6] included obesity (BMI≥30; yes/no), reported physician diagnosis of diabetes (yes/no),

reported physician diagnosis of hypertension (yes/no), frequency of moderate physical activity (ranging from hardly ever or never to more than once a week), smoking status (yes/no), household income, household wealth, and *APOE* risk status (any ε4 risk variant contrasted against all other variants).

### Statistical Approach

All participants with complete data at baseline and follow-up ($N$=10,099) were included in the analysis; participants without follow-up data ($n$=660) were deleted listwise and not included in the analysis. We used Cox regression to test whether well-being measured in 2006–2008 was associated with incident dementia over the up to eight year follow-up (2008–2014 for the 2006 baseline assessment and 2010–2014 for the 2008 baseline assessment). Baseline well-being measures were entered separately as predictors of incident dementia over the follow-up period, controlling for demographic factors known to be associated with risk of dementia (age, sex, race, ethnicity, and education). Time was measured in years from the year of baseline assessment (2006 or 2008) to the year of incident dementia or the year of censoring. For participants who did not develop dementia, cases were censored at the last available cognitive assessment at which the participant did not score in the dementia range (e.g., for a participant with a 2006 baseline who scored in the normal range of cognitive function at the 2014 assessment time was coded as eight years and having not experienced the event). Model 1 included the demographic covariates, Model 2 included depressive symptoms as an additional covariate, and Model 3 also included history of a mental disorder as a covariate.

In supplemental analyses, we controlled for additional covariates to test the stability of the main findings. Specifically, we controlled for clinical and behavioral covariates associated with dementia risk (obesity, diabetes, hypertension, physical activity, smoking), household income and wealth, and *APOE* genetic risk (any ε4 risk variant against all other variants) to test whether any found association is also independent of other factors known to increase risk of dementia. Finally, because the risk of dementia varies by demographic and genetic factors (Alzheimer's Association, 2017), we test age, sex, race, ethnicity, education, and *APOE* genotype as moderators of the relation between well-being and dementia risk.

## Results

Across the 6–8 year follow-up period ($M_{follow\text{-}up}$=6.31 years, $SD$=1.77; 63,700 person years), 406 participants (4%) developed incident dementia. Descriptive statistics for the study variables are shown in Table 1. Controlling for basic socio-demographic covariates, three of the five aspects of well-being were protective against incident dementia (Table 2): Participants who reported greater satisfaction with their lives, more positive affect (2008), and greater purpose in life had an approximately 16–60% lower risk of dementia. Optimism and mastery were unrelated to dementia risk.

Controlling for state depressive symptoms or a history of diagnosed emotional problems somewhat changed the pattern of associations. Specifically, the protective effect of life satisfaction on dementia risk was reduced to non-significance. As to be expected, there is a negative correlation between life satisfaction and depressive symptoms (Supplementary

Table 1) that may contribute to problems with multicollinearity in the analysis. Purpose in life remained a significant predictor of dementia risk. This protective effect of purpose in life also persisted after controlling for behavioral and clinical risk factors (HR=.78, 95% CI=.70–.87), household income and wealth (HR=.79, 95% CI=.71–.88), and genetic risk (HR=.75, 95% CI=.66–.85). The association between purpose in life and dementia risk was not moderated by age, sex, race, ethnicity, education, or *APOE* genotype.

The association between positive affect and dementia risk varied with the scales used. The 6-item positive affect measured in 2006 was unrelated to dementia risk, whereas the 13-item positive affect measured in 2008 was protective and independent of depressive symptoms and history of a diagnosed emotional problem. In contrast to purpose in life, however, the protective effect of positive affect was reduced to non-significance when behavioral and clinical risk factors were included in the model (HR=.81, 95% CI=.65–1.01) but was independent of household income and wealth (HR=.78, 95% CI=.63–.97) and genetic risk (HR=.72, 95% CI=.57–.92). This association was not moderated by age, sex, race, ethnicity, education, or *APOE* genotype.

## Discussion

Several noteworthy results emerged from this research. First, the protective effect of purpose in life was independent of acute distress, history of emotional disorders, behavioral and clinical risk factors, and genetic risk. Individuals who score high on this dimension have a purposefulness and draw meaning from their lived experiences [14]. The goal-directedness that characterizes these individuals is similar to that of individuals high in Conscientiousness, which is found consistently to be protective against dementia [2]. The need to strive to achieve one's goals that are meaningful for the person and the organization and discipline it takes to do it may be the driving factor in these associations with dementia risk. Interestingly, mastery was unrelated to dementia risk, which suggests that it may be the purpose in goal striving rather than the perceived efficacy to achieve one's goals that is most important for protection against dementia.

This finding fits with previous research on purpose in life and cognition. Starting at least as early as middle adulthood, individuals with a higher purpose in life score better on measures of episodic memory and executive functioning, when purpose and cognition are measured concurrently [15]. In older adulthood, purpose in life is associated with less of a decline in tests of memory, perceptual speed, and visualspatial ability over a seven-year follow-up [16]. This protective effect on individual cognitive functions accumulates to lower risk of both mild cognitive impairment and Alzheimer's disease in older adulthood [16].

Similar to the idea of cognitive reserve [17], greater purpose in life may build psychological resources that can help prevent or delay cognitive impairment. The active striving to identify and achieve meaningful goals may reinforce a scaffolding of engaging activities and relationships, which in turn are likely to increase resilience against the neurological damage that leads to dementia. The outcomes of such striving – stronger interpersonal relationships, community involvement, active learning, etc. – may help bolster resistance against decline.

And, more generally, in developing interventions to reduce risk of dementia, our findings suggest a focus on building meaning in the individual's life and on reducing negative affect.

Second, the association between life satisfaction and dementia risk was not independent of negative affect and history of a mental disorder. In fact, inclusion of just depressive symptoms in the model reduced the association between life satisfaction and dementia to non-significance, which suggests that a history of a mental disorder was not consequential beyond the experience of depressive symptoms. Although cognitive evaluations of life satisfaction are distinct from negative affect [5], individuals who experience depression and other emotional problems also suffer from anhedonia and lower well-being. As such, our findings indicate that the association between life satisfaction and dementia risk is not independent of negative emotionality associated with lower well-being and thus is not an independent psychological resource that is protective against dementia.

There was, however, a relatively strong correlation between life satisfaction and depressive symptoms ($r$=−.42), whereas the correlation was slightly weaker for purpose in life ($r$=−.37). As such, the association for life satisfaction may have been attenuated due to multicollinearity. It still does suggest, however, that once the shared variance with depressive symptoms, which is known to be relatively substantial, is controlled for, the remaining well-being is not protective. In addition, it is also consistent with the personality literature that finds Extraversion, the strongest trait predictor of well-being, is unrelated to dementia risk [2].

Third, there was a complex association between positive affect and risk of dementia. The different scales across the 2006 and 2008 assessments had different results: Positive affect assessed with the 2006 measure was unrelated to dementia risk whereas positive affect assessed with the 2008 measure was protective against dementia. This difference may be due to the difference in content across the two measures. The 2006 measure, for example, had items focused primarily on happiness and feelings of energy, whereas the 2008 measure had items that sampled a broad range of positive emotions (e.g., determined, interested, proud). Although positive affect in 2008 remained a significant predictor of dementia when controlling for depressive symptoms and history of a diagnosis, it was not independent of clinical and behavioral risk factors for dementia.

Surprisingly, optimism was unrelated to dementia risk. A previous analysis of HRS participants from the 2006 wave found that optimism was protective against cognitive impairment over an up to four year follow-up period [18]. This analysis, however, did not disentangle optimism from pessimism. That is, the pessimism items were reverse scored and combined with the optimism items as the low end of optimism. There is debate about whether optimism and pessimism should be construed as one or two constructs [19]. In the context of cognition, the present analysis indicates that it is the negative emotionality associated with pessimism that may contribute to the association with dementia risk when optimism/pessimism is scored as a single construct (results for pessimism not shown) rather than the benefits of an optimistic disposition.

This research has several strengths including a large sample, a comprehensive assessment of well-being, and several confounds that could potentially have an effect on the association

between well-being and dementia. Limitations to address in future research include the use of cognitive performance to classify dementia instead of a clinical diagnosis and the relatively short follow-up time. Despite these limitations, the present research indicates that purpose in life may be protective against dementia whereas other aspects of well-being are not independent of the distress associated with lower well-being.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

Financial Support: Research reported in this publication was supported by the National Institute On Aging of the National Institutes of Health under Award Number R01AG053297 and R03AG051960. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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**Key points**

- Well-being is associated with more positive aging outcomes in older adulthood; we test whether this association extends to risk of dementia
- Life satisfaction, positive affect, and purpose in life were associated with reduced risk of dementia
- Purpose in life was the only dimension of well-being associated with reduced risk of dementia independent of psychological distress and clinical and behavioral risk factors

## Table 1

Baseline Demographic Characteristics and APOE ε4 Risk Status of the Full Sample and by Cognitive status at Follow-up

| Study variable | Normal *N*=9,693 | Dementia *N*=406 | Total *N*=10,099 |
|---|---|---|---|
| Age (years) | 66.76 (9.08) | 73.33 (9.22) | 67.03 (9.18) |
| Education (years) | 13.27 (2.61) | 11.93 (2.72) | 13.22 (2.63) |
| Gender (female) | 60% | 63% | 60% |
| Race (African American) | 9% | 17% | 10% |
| Race (other or unknown) | 2% | 3% | 2% |
| Race (white) | 89% | 80% | 88% |
| Ethnicity (Hispanic) | 6% | 10% | 6% |
| Current depressive symptoms | 1.59 (2.01) | 2.14 (2.31) | 1.61 (2.03) |
| History of mental disorder | 15% | 21% | 16% |
| *APOE* ε4 risk status[a] | 25% | 32% | 25%[a] |
| Well-being | | | |
| Life satisfaction[b] | .07 (.97) | −.07 (1.02) | .06 (.98) |
| Optimism | 4.56 (1.13) | 4.51 (1.16) | 4.56 (1.13) |
| Mastery | 4.83 (1.06) | 4.72 (1.09) | 4.83 (1.07) |
| Purpose in life | 4.70 (.90) | 4.38 (.93) | 4.69 (.90) |
| Positive affect 2006[c] | 3.66 (.65) | 3.65 (.77) | 3.66 (.66) |
| Positive affect 2008[c] | 3.67 (.76) | 3.35 (.80) | 3.66 (.76) |

*Note*. Total *N*=10,099.

[a] *n*=8,116 due to missing data on *APOE* status.

[b] For the SWLS only, the response scale in the HRS changed from 1–6 in the 2006 assessment to 1–7 in the 2008 assessment. To account for this difference, scale scores were standardized (*M*=0, *SD*=1) within wave before the waves were combined.

[c] The measure of positive and negative affect had different emotion words in 2006 and 2008. The waves were thus analyzed separately. 2006 *n*=5,390 and 2008 *n*=4,709.

**Table 2**

Well-being and Risk of Incident Dementia

| Well-being measure | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Life Satisfaction | .84 (.76–.92) ** | .90 (.81–1.00) | .91 (.82–1.02) |
| Optimism | .93 (.85–1.01) | .96 (.88–1.05) | .96 (.88–1.05) |
| Mastery | .98 (.89–1.07) | 1.03 (.94–1.13) | 1.03 (.94–1.14) |
| Purpose in Life | .76 (.69–.85) ** | .81 (.72–.90) ** | .82 (.73–.92) ** |
| Positive Affect 2006 | .93 (.76–1.14) | 1.04 (.82–1.31) | 1.06 (.84–1.35) |
| Positive Affect 2008 | .66 (.55–.80) ** | .75 (.61–.93) ** | .77 (.62–.95) ** |

*Note*. Total $N$=10,099; $n$=5,390 for 2006 Positive Affect and $n$=4,709 for 2008 Positive Affect. Coefficients are hazard ratios (95% confidence interval) from Cox regression. Model 1 includes age, sex, education, race, and ethnicity as covariates. Model 2 includes Model 1 covariates plus depressive symptoms. Model 3 includes Model 2 covariates plus history of a mental disorder. Each well-being measure was tested in a separate model.

** $p$<.01.