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Antecedents of Purpose in Life: Evidence from A Lagged Exposure-Wide Analysis

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Abstract

Potential antecedents to having a sense of purpose in life remain understudied. As researchers begin contemplating purpose as a promising target of public health intervention, it is critical to identify its antecedents. Using prospective data from the Nurses' Health Study II (2009–2016; N ranged from 3,905 to 4,189), this study evaluated a wide range of potential antecedents of purpose, including: psychosocial well-being, psychological distress, employment characteristics, lifestyle, and physical health factors. In separate regression models we regressed purpose in life on each candidate antecedent. In each model, we adjusted for the prior value of purpose, prior values of all exposure variables, and various other covariates simultaneously. Bonferroni correction was used to correct for multiple testing. The results suggested that positive affect and the number of close relatives were each associated with higher purpose (e.g., β=0.14, 95% CI: 0.11, 0.17 for positive affect). Several psychological distress indicators were inversely associated with purpose, including

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depressive symptoms, anxiety symptoms, loneliness, and hopelessness (e.g., β=−0.16, 95% CI: −0.19, −0.13 for depressive symptoms). There was also some evidence suggesting that fewer close friends, living alone, and unemployment/retirement were associated with lower purpose. There was, however, little evidence that health behaviors or physical health were associated with subsequent purpose. This study extends the literature by providing longitudinal evidence with rigorous analytic methodologies, and by considering a wide range of potential antecedents of purpose including some that have seldom been examined previously.

Keywords

purpose in life; antecedents; lagged exposure-wide analysis; mid-life; psychological well-being; health and well-being

INTRODUCTION

Purpose in life, the extent to which an individual perceives his/her life as having a sense of directedness towards some meaningful end, is often considered a central component of human flourishing (Ryff, 2014; VanderWeele, 2017). A sense of purpose is considered a self-sustaining source of meaning and motivation, as it helps direct personal resources and behaviors towards achieving goals. Purposes help generate and prioritize goals, and living in accordance with one's purpose is hypothesized to both provide a sense of accomplishment and motivate behavioral regulation (McKnight & Kashdan, 2009). Purpose in life, therefore, is a potential psychological asset that helps foster better health and well-being.

Growing empirical evidence suggests that greater purpose in life is associated with a range of better health and well-being outcomes. For instance, several prospective analyses have documented associations of purpose with indicators of greater psychosocial well-being (Chen, Kim, Koh, Frazier, & VanderWeele, 2019), healthier behaviors (Kim, Hershner, & Strecher, 2015; Kim, Strecher, & Ryff, 2014), lower risk of chronic health conditions (Cohen, Bavishi, & Rozanski, 2016; Lewis, Turiano, Payne, & Hill, 2017), and lower risk of mortality (Alimujiang et al., 2019; Cohen et al., 2016). While there is increasing consensus that purpose in life is a health asset, potential antecedents that shape individuals' sense of purpose remain understudied.

Some review articles (Irving, Davis, & Collier, 2017; Pinquart, 2002) suggest that in the limited empirical evidence on predictors of purpose, the most robust associations were with social integration, psychological well-being, and depression. For instance, when considering a closely related construct – meaning – and various facets of social integration, widowed older adults generally reported a lower sense of meaning than their married counterparts (Koren & Lowenstein, 2008); collective social connectedness (i.e., a sense of belonging to a larger community) was also positively related to meaning in life, even after controlling for other aspects of social connectedness (Stavrova & Luhmann, 2016). Next, when considering psychological factors, multiple aspects of psychological well-being were positively associated with purpose, including optimism, positive affect and life satisfaction (Irving et al., 2017). With respect to psychological distress, there was often an inverse association between depression and purpose (Hedayati & Khazaei, 2014; Pinquart, 2002); in

comparison, other aspects of psychological distress have, however, seldom been examined in relation to purpose.

Age is another factor that often appears to shape the purpose trajectory. With only a few exceptions, purpose appeared to decline with age (Hill & Weston, 2019; Irving et al., 2017). The aging process, however, is often associated with changes (e.g., retirement, widowhood, declined health) that entail reduced resources for life engagement, loss of social roles and lowered sense of value. As such, it was hypothesized that it might be the age-associated loss rather than age in itself that causes the decline in purpose (Irving et al., 2017). For instance, retirement may be associated with declined purpose, especially among those who previously derived significant meaning from work (Shiba, Kondo, Kondo, & Kawachi, 2017).

Growing evidence also suggests that socioeconomic status (SES) is associated with purpose in life. Specifically, higher income and educational attainment are related to higher levels of purpose (Hill, Turiano, Mroczek, & Burrow, 2016; Hill & Weston, 2019; Ko, Hooker, Geldhof, & McAdams, 2016). Some have hypothesized that greater SES may itself reflect greater life achievements and thus serve as a source of purpose. Higher SES may also lead to greater knowledge and resources for goal pursuit and role fulfillment (Ward & King, 2019). However, interestingly, at the cross-national level, reports of meaning and purpose tend to be higher in less economically developed countries (Diener, Tay, & Myers, 2011).

Multiple aspects of religious participation have also been linked to greater sense of purpose (Chen, Kim, & VanderWeele, 2020; Irving et al., 2017). World religions often consider the quest for meaning in life as a central mission in their belief and value system; the communal aspect of religion, such as religious service attendance, also provides a platform for social integration and support (Koenig, 2015). In a prior cross-sectional analysis of young adults that examined several antecedents of a sense of mission (sometimes considered the highest level of purpose in life), frequent service attendance was associated with a substantially greater sense of mission (Chen et al., 2019).

There is also some suggestive evidence that the distribution of purpose may vary by physical health, although such evidence remains mixed. For example, while some studies suggest that self-reported health is positively associated with purpose (Hill & Weston, 2019; Saajanaho et al., 2016) and that purpose declines following occurrences of physical diseases (Lewis, Brazeau, & Hill, 2018), other studies have not observed such trends (Pinquart & Frohlich, 2009).

Taken together, prior work generally suggests that indicators of psychological well-being, social integration, higher SES and religious participation are associated with greater purpose, whereas depression and aging are negatively related to purpose. In comparison, evidence on whether physical health shapes subsequent purpose remains mixed. While these pioneering studies have contributed substantially to the field, several knowledge gaps remain. First, the majority of these studies are cross-sectional, and thus the direction of possible causation cannot be determined. Second, among the small number of prospective studies, there is not always adequate control for baseline levels of purpose, thus reverse causation remains a concern. Third, while a range of potential antecedents of purpose have

been evaluated, the relative strengths of the antecedents have seldom been compared directly. It is challenging to compare effect sizes across studies as differences might be attributable to differences in sample size, sample characteristics, covariate control, analytic strategies and a variety of other factors. Fourth, several potential antecedents of purpose have not been explored empirically. For example, while emerging evidence suggests that routines may help maintain a sense of purpose (Heintzelman & King, 2019), lifestyle factors (e.g., regular physical activity), as a major source of enacting routines in daily lives, have rarely been studied in relation to purpose (Ko et al., 2016). Finally, most prior studies have been conducted among older adults, but purpose often starts declining in middle adulthood. Thus, it is worthwhile to identify factors that shape purpose in earlier life stages, before purpose begins declining.

To address some of these issues, we performed a lagged exposure-wide analysis (VanderWeele, Mathur, & Chen, 2020) to prospectively assess a wide array of potential antecedents of purpose, including: psychosocial well-being, psychological distress, lifestyle, employment characteristics, and physical health factors. This approach helps provide a broad view of potential sources of purpose, as well as relative effect sizes across candidate antecedents of purpose. To reduce concerns regarding potential confounding and reverse causation, we “lagged” the analysis by controlling for the prior value of purpose in life and prior values of all exposure variables (wherever data were available) simultaneously in all models, in addition to a wide range of other covariates (VanderWeele et al., 2020). We hypothesized that:

- H1: Indicators of psychological well-being are positively associated with subsequent purpose, whereas indicators of psychological distress are negatively related to subsequent purpose;
- H2: Indicators of social integration are positively associated with subsequent purpose;
- H3: Unemployment, retirement and irregular working hours are negatively associated with subsequent purpose;
- H4: Healthier lifestyles and better physical health are related to greater subsequent purpose.

METHODS

Study Population

This study used longitudinal data from the Nurses’ Health Study II (NHSII, 2009–2016), an ongoing cohort with participants from across the United States (Colditz, Manson, & Hankinson, 1997). The NHSII cohort began in 1989 by enrolling 116,429 registered female nurses between the age of 25 and 42 years old. In 2008, a subset of NHSII participants (N=54,763) participated in a Trauma Exposure and Post-traumatic Stress Supplementary Survey in which a question on purpose in life was first included. In 2016, a random sample (N=4,438) of the 54,763 NHSII participants who had completed the 2008 Trauma Supplemental Survey participated in a substudy on spirituality and health in which purpose in life was assessed again. This 2016 substudy on spirituality is nested in a larger multi-

cohort Consortium study on Stress, Spirituality and Health in which NHSII participates. Since 1989, NHSII participants have been followed biennially via self-administered questionnaires, with response rates exceeding 90% in each follow-up cycle (Bao et al., 2016).

In the present study, we took data on the initial value of purpose in life, controlled for as a covariate, from the NHSII 2008 Trauma Exposure and Post-traumatic Stress Supplementary Survey. The outcome variable (purpose in life, 2016) was assessed approximately 8 years later in the 2016 supplementary survey on spirituality and health (N=4,438, a random sample of the participants of the 2008 supplementary survey). Data on the candidate antecedents of purpose (i.e., the exposure variables) were mainly taken from the NHSII 2009 main questionnaire; if such data were not available in 2009, we used data from the 2011 or 2013 main questionnaire instead.

If covariates are assessed at the same timepoint as the exposure, it remains unclear if the covariates are confounders or mediators. We therefore adjusted for covariates in the pre-baseline cycle, which helps reduce such concern. Thus, all covariate data were taken from cycles prior to the 2009 questionnaire. These included sociodemographic characteristics, the prior value of purpose in life, and prior values of all exposure variables (See Supplementary Figure1 for a visual representation of the timing of assessments). All analyses were restricted to participants who had data on the outcome (purpose in life, 2016) and the initial level of the outcome (prior value of purpose, 2008). The proportion of missing data for covariates ranged from 0% to 4% (except for household income which was only assessed in a subsample, thus had 11% missing data). Multiple imputation was performed to impute for missing values on the covariates. This yielded a final analytic sample that ranged from 3,905 to 4,189 participants, depending on the candidate antecedent (i.e., the exposure variable) under investigation. This study was approved by the Institutional Review Board at Brigham and Women's Hospital.

Measurements

Outcome assessment—Purpose in life was assessed in the 2016 supplementary survey with the following item: "I have a sense of direction and purpose in life" (Ryff, 1989). Response options ranged from 1 (strongly disagree) to 4 (strongly agree), and the response was used as a continuous score. We standardized the score (mean=0, standard deviation=1), so that the effect estimates could be reported in terms of the standard deviation of the score. As a sensitivity analysis, we also created a dichotomized measure of purpose to examine potential threshold effects (i.e., response options 1–3 were coded as "0" and response option 4 was coded as "1").

Exposure assessment—We tested a wide range of potential antecedents of purpose. They included psychosocial factors (positive affect, marital status, religious service attendance, community participation, number of close friends, number of relatives, emotional support, living arrangement), psychological distress (depressive symptoms, depression diagnosis, anxiety symptoms, loneliness, hopelessness), employment characteristics (employment status, night shift work schedule), health behaviors (heavy

alcohol consumption, smoking status, physical activity, short sleep duration, diet quality), and physical health (overweight/obesity, type 2 diabetes, asthma, myocardial infarction, stroke, cancer; and an overall score summing the total number of above conditions). Further details regarding the measurement of each exposure variable were provided in Supplementary Table S1.

Covariate assessment—Sociodemographic covariates included age (in years), race/ethnicity (non-Hispanic White), geographic region (Northeast, Midwest, South, West), subjective SES (assessed with a validated 10-point scale) (Giatti, Camelo Ldo, Rodrigues, & Barreto, 2012), household income (<$50 000, $50 000-$74 999, $75 000-$99 999, ≥$100 000), census tract college education rate (continuous), census tract median income (<$50 000, $50 000-$74 999, $75 000-$99 999, ≥$100 000), menopausal status (premenopausal or unknown, postmenopausal), and postmenopausal hormone use (yes, no).

To reduce possibility of reverse causation, we also adjusted for the initial level of purpose in life using an item in the 2008 supplementary survey that assessed the extent of having a sense of mission (Fetzer Institute/National Institute on Aging Working Group, 1999): "I have a sense of mission or calling in my own life." Response options ranged from 1 (strongly disagree) to 4 (strongly agree).

To evaluate effect of the *current* level of the exposure and to further reduce potential confounding, in each model we also adjusted for pre-baseline values of all exposure variables wherever data were available. These included prior values of positive affect, community engagement, number of friends, number of relatives, emotional support, living arrangement, night shift work schedule, depressive symptoms, depression diagnosis, anxiety symptoms, hopelessness, loneliness, dietary quality, preventive healthcare use, heavy alcohol intake, smoking, short sleep duration, physical activity, and the number of physical health problems.

Statistical Analysis

In separate linear regression models, we regressed the standardized score for "purpose in life" on each candidate antecedent separately. Every model adjusted for covariates including sociodemographic characteristics, the prior level of purpose in life, and prior values of all exposure variables (whenever data were available) simultaneously. All continuous exposure variables were standardized (mean=0, SD=1), so that the effect estimates were reported in terms of the standard deviation of the exposure variables. To account for multiple testing, we performed Bonferroni correction. As a sensitivity analysis, we repeated the primary analyses using Poisson regression models (Zou, 2004) with a dichotomized measure of purpose as the outcome variable.

We performed multiple imputation by chained equations to impute missing data on covariates with 5 imputed datasets (Groenwold, Donders, Roes, Harrell Jr, & Moons, 2011). As a sensitivity analysis, we re-analyzed the primary sets of models using complete-case analyses. All statistical analyses were performed using SAS, version 9.4 (SAS Institute, Inc., Cary, North Carolina) (all p values were calculated based on 2-sided tests).

RESULTS

Participants included in this analysis had a mean baseline age of 55.60 years (SD=4.41), were predominantly non-Hispanic white (96.73%), had relatively high SES (59.89% had an annual household income ≥ $75,000), and were generally healthy at baseline. The participants, on average, reported a high level of purpose in life both at baseline (i.e., the prior value of purpose, adjusted for as a covariate; mean=3.20, range: 1–4;) and at the follow-up wave 8 years later (i.e., the outcome variable; mean=3.44, range: 1–4). Several sociodemographic characteristics (e.g., marital status, religious service attendance, community engagement) remained fairly stable over time in this sample (Table 1). In primary analyses that sequentially regressed the standardized purpose score on a wide range of potential antecedents in separate models, results suggested strong associations between several indicators of psychological distress, psychological well-being, and social connection with the subsequent level of purpose (Table 2). Specifically, each standard deviation increase in depressive symptoms was associated with 0.15 points lower purpose on its standardized score (β =−0.15, 95% confidence interval [CI]=−0.18, −0.11). Similarly, per standard deviation increase in anxiety symptoms, loneliness, and hopelessness was each related to 0.08 points lower purpose on its standardized score (β =−0.08, 95% CI=−0.11, −0.05). On the other hand, each standard deviation increase in positive affect was associated with 0.12 points higher score on purpose in life (β =0.12, 95% CI=0.09, 0.15), and each standard deviation increase in the number of close relatives was associated with 0.06 points higher purpose (β =0.06, 95% CI=0.02, 0.09). There was also some evidence that having more close friends may be related to greater purpose, and that retirement (versus being currently employed) may be inversely associated with purpose, although these associations did not remain $p<.05$ after Bonferroni correction. We observed little evidence that health behaviors or physical health conditions were related to subsequent level of purpose (Table 2).

The sensitivity analysis that re-analyzing the primary sets of models using a dichotomized measure of purpose in life yielded similar results (Supplementary Table S2). The complete-case analysis also yielded results similar to those in the primary analysis (Supplementary Table S3).

DISCUSSION

This study used longitudinal data from a large and prospective cohort of middle-aged female nurses to examine a wide range of potential antecedents to having a sense of purpose in one’s life. The results suggest that several indicators of psychological distress, psychological well-being, and social connection were strong antecedents of purpose in this sample. There was also some evidence that retirement (versus currently working) may be related to a reduced sense of purpose. Equally important were the null associations with the health behavior and physical health factors. Several sensitivity analyses yielded similar results, suggesting that the results were robust to the modelling decisions that we made. The analyses extended the literature by providing longitudinal evidence on a wide range of potential antecedents of purpose (including some candidate antecedents that have seldom been examined before such as loneliness and health behaviors), with extensive control for potential confounders and attempts to address reverse causation in several ways.

Psychological Well-being, Psychological Distress and Subsequent Purpose

Congruent with prior literature (Irving et al., 2017; Pinquart, 2002), indicators of psychological distress (especially depression) and psychological well-being (especially positive affect) emerged as robust antecedents to having or not having a stronger sense of purpose in the present analyses. To help understand potential mechanisms underlying these associations, researchers hypothesized that feeling good in itself (e.g., positive affect) may serve as a direct source of meaning, and also promote a sense of meaning indirectly through motivating goal pursuits (Lapierre, Bouffard, Dubé, & Bastin, 2001). To the best of our knowledge, this study also provides first longitudinal evidence on several aspects of psychological distress as potential antecedent of purpose including anxiety, loneliness and hopelessness. For instance, while some evidence has suggested that higher levels of purpose is associated with lower levels of loneliness subsequently (Irving et al., 2017), to our knowledge whether loneliness also shapes the subsequent level of purpose has not been previously studied longitudinally.

Social Integration and Subsequent Purpose

Having close social relationships is hypothesized to intrinsically motivate helping others, thus contributing to a sense of being useful and respected (Siedlecki, Salthouse, Oishi, & Jeswani, 2014). In line with this hypothesis and consistent with prior work (Irving et al., 2017), we found that several dimensions of social integration were strongly associated with subsequent level of purpose. This study also agrees with some prior work (Pinquart, 2002), suggesting that interactions with close relatives may be a stronger predictor of higher purpose than interactions with close friends. This might be the case because family are often identified as the most important social network members, and interactions with family may provide more opportunities for support as compared to interactions with friends (Pinquart, 2002).

Our results, however, diverged from prior findings in some cases. For instance, marital disruptions (versus being married) has been associated with lower purpose in some prior work (Koren & Lowenstein, 2008; Pinquart, 2002); while we did not find substantial evidence for this in the present study, this may have been because the confidence intervals were wide (β =0.10, 95% confidence interval [CI]=−0.03, 0.23) due to relatively stable marital relations over time in this sample; the confidence interval is consistent with the possibility of a moderately sized effect as well as with no effect. It was hypothesized that marital dissolution may decrease psychological well-being because it often catalyzes financial hardships, psychological distress, and social isolation. However, over the past few decades, marital dissolution has become increasingly common; social norms surrounding marriage and divorce have also changed drastically (Amato, 2010; Tach & Eads, 2015). As such, another possible explanation is that the dynamics between marital status and dimensions of psychological well-being (e.g. purpose in life) may operate differently in the current climate compared to previous time periods. Additionally, compared to younger or older adults (who are the more often studied samples in prior work around antecedents of purpose), those in midlife typically have greater resources to cope with stress from marital disruptions (Marks & Lambert, 1998), and this might also explain our divergent findings. Some evidence also suggests that the negative effects of marital disruption on psychological

well-being may attenuate over time (Cao, Krause, Saunders, & Clark, 2015; van Scheppingen & Leopold, 2019), thus the effects, if any, may not be detected by the end of the 7-year long follow-up in this study. Our control for prior marital status as a covariate and the tiny proportion of participants (0.72%) in our sample that changed their marital status also limited our ability to detect the association, if any.

The strength of association between religious service attendance and purpose in life was weaker in this analysis relative to some prior work (Irving et al., 2017). This may reflect a lack of differentiation of the many inter-related influences captured in this widely used measure of religious service attendance (VanderWeele, Palmer, & Shields, 2017). Within many religious groups, leading a purposeful life is a central component of their values and beliefs (Koenig, 2015). Attendance at religious services also provides a meaningful platform for giving and receiving both spiritual and social support, which in turn may help promote a sense of meaning and purpose (Irving et al., 2017).This again may have been due in part to limited power due to relative stability of religious service attendance during this period of life for this sample; but it may also be the case that religious service attendance has more powerful effects on purpose earlier in life than in mid-life. Some prior evidence supports a strong role for religious service attendance in increasing purpose or mission in life for young adults (Chen et al., 2019).

Employment and Subsequent Purpose

Work may be a significant source of meaning and purpose for some individuals. For instance, work that demands varied skills and is challenging at a reasonable level may help individuals experience a “flow-like state” of consciousness, from which a sense of pleasure, satisfaction and meaning could be derived (Weston, Hill, & Cardador, 2020). While retirement was relatively uncommon in this middle-aged sample, we observed a moderate association between retirement and declining purpose. The literature to date on retirement and purpose, which has focused on older adults, generally suggests that purpose declines following retirement (Irving et al., 2017). Older adults may tend to disengage from social lives as it relates to their workplace during retirement and as they experience aging-related loss of roles and resources (Cumming & Henry, 1961). However, the effect may not be as substantial as previously expected and there is considerable individual variability (Hill & Weston, 2019). In attempting to explain such results, researchers have hypothesized that retirement opens opportunities for fulfilling other roles beyond work (e.g., increased role in the family, new opportunities to express generativity) and for developing new activities (e.g., volunteering) that helps maintain life engagement and active social interactions (Havighurst & Albrecht, 1953; Pinquart, 2002). Additionally, individuals in later life may increasingly derive purpose through reflecting on past achievements rather than planning for the future (Kashdan & McKnight, 2009). Both of these processes may help compensate for the loss of work as a source of purpose.

Health Behaviors, Physical Health and Subsequent Purpose

Contrary to our hypothesis, this study found little evidence that purpose in life substantially declines after an occurrence of physical disease. Although physical illness often sparks a loss of social roles, changes in lifestyles, and reduced agency for goal pursuit (Hill &

Weston, 2019), the potential negative impact of a physical illness on purpose might be buffered if the individual can maintain meaningful life engagement. For example, individuals may readjust life goals, so that expectations are aligned with reality; for some individuals, occurrence of physical illness may even be experienced as an opportunity to exercise increased spirituality and/or develop a deeper appreciation of life (Jim, Richardson, Golden-Kreutz, & Andersen, 2006). For instance, some cancer patients reported a greater sense of purpose after cancer diagnosis (Johnson Vickberg et al., 2001). It is also possible that the association between physical health and purpose may be modified by factors such as the severity of illness. Our sample is generally healthy with relatively little variation in physical health. Therefore, an association between physical health and purpose, if any, may not have been detected in this sample. In addition, this study assessed physical diseases based on data from medical records, whereas many prior studies on physical health and purpose assessed self-perceived physical health (Hill & Weston, 2019; Saajanaho et al., 2016), which may also help explain the somewhat contrary findings between this study and some prior work. Taken together, there may be considerable variability in purpose trajectories following physical health impairment, and this topic merits further investigation. This study also provides preliminary evidence that health behaviors may not be strong antecedents of purpose. The direction of association between purpose and health behaviors may, therefore, mainly function in the other direction – where purpose shapes subsequent behaviors (Kim, Shiba, Boehm, & Kubzansky, 2020; Roepke, Jayawickreme, & Riffle, 2014).

Strengths and Limitations

This study is subject to several limitations. First, purpose in life was measured with one questionnaire item, and the item for assessing the prior value of purpose queried only one aspect of purpose— having a sense of mission. Although limited, these items capture a core component in the predominant definitions and measures of purpose (Damon, Menon, & Cotton Bronk, 2003; Hanson & VanderWeele, 2020; Ryff, 2014). Second, the analytic approach that adjusted for prior values of all exposures and prior values of purpose is a conservative approach (VanderWeele et al., 2020). While it helps substantially reduce concerns about reverse causation and confounding, it may not be suitable for evaluating effects of factors that, in most cases, remain rather stable over time, or for evaluating the cumulative effects of an earlier life experience. Next, we were unable to examine other potentially important antecedents of purpose due to lack of data, such as character strengths (e.g., civic engagement, volunteering), personality traits, and indicators of psychological well-being beyond positive affect. Next, the majority of the study variables (except for data on physical health which were obtained from medical records) were based on self-reports, thus they may be subject to report bias. Finally, study participants were all middle-aged female nurses, the vast majority of whom were non-Hispanic whites, and thus the results of this study may not be generalizable to other populations. Further research is needed to explore the antecedents of purpose in life across diverse ethnic communities and cultures. These limitations are, however, balanced by important strengths of this study, including: use of longitudinal data from a large and prospective cohort, simultaneous examination of multiple antecedents of purpose in the same sample, and the rigorous control for potential confounding and reverse causation.

Conclusions

Purpose in life is potentially modifiable through behavioral interventions that support individuals participating in meaningful activities and goal-directed behaviors (Irving et al., 2017; Weiss, Westerhof, & Bohlmeijer, 2016). Effects of such behavioral interventions are, however, generally modest in size and difficult to maintain over time (Weiss et al., 2016). Thus, further research that illuminates factors that shape trajectories of purpose throughout the lifecourse is much needed. Results from this study suggest that psychological distress and social integration are potentially important factors that shape subsequent levels of purpose. Therefore, they might be key ingredients to target in interventions that aim to enhance purpose. As future research further elucidates antecedents of purpose in life, this line of evidence could help inform comprehensive interventions that help people develop, maintain, and restore a sense of purpose in life, with the attendant benefits for wellbeing and overall health.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Abbreviations:

NHSII	Nurses' Health Study II

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Public interest statement:

Accumulating evidence indicates that greater purpose in life is associated with better subsequent health. In comparison, potential antecedents to having a sense of purpose remain understudied. As researchers begin contemplating purpose as a promising target of public health intervention, it is critical to identify its antecedents. Using data from a large cohort of middle-aged U.S. female registered nurses, this study examined a wide range of potential antecedents of purpose in life. The results suggest that positive affect and several indicators of social connection were associated with subsequent higher levels of purpose, and multiple indicators of psychological distress were associated with subsequent lower levels of purpose. There was, however, little evidence that health behaviors or physical health were associated with subsequent purpose. Further studies identifying antecedents of purpose are needed. Evidence from such studies would inform comprehensive interventions that help people develop, maintain, and restore a sense of purpose in life.

Table 1.

Distribution of participant characteristics in the full analytic sample (The Nurses' Health Study II 2001 to 2016 questionnaire wave, N=4,189)

	Questionnaire wave	Mean (SD) or %
Outcome variable		
Purpose in life (range: 1–4)	2016	3.44 (0.64)
Exposure variables		
Positive affect (range: 1–4)	2013	3.23 (0.69)
Community engagement (range: 0–3)	2013	1.23 (0.91)
Number of close friends (range: 0–3)	2013	1.83 (0.65)
Number of close relatives (range: 0–3)	2013	1.76 (0.72)
Emotional support (range: 0–5)	2013	3.97 (1.27)
Loneliness (range: 1–4)	2013	1.43 (0.68)
Hopelessness (range: 1–4)	2013	1.85 (0.93)
Living alone, %	2009	12.15
Married or in domestic partnership, %	2009	82.03
Religious service attendance, %	2013	
Never		33.90
Less than once per week		18.02
At least once per week		48.08
Current employment status, %	2009	
Employed		80.03
Unemployed		11.46
Retired		8.51
Frequency of rotating night shift work (range: 0–21)	2009	0.88 (3.22)
Depressive symptoms (range: 0–30)	2013	5.16 (4.23)
Depression diagnosis, %	2013	16.66
Anxiety symptoms (range: 0–21)	2013	2.50 (3.07)
Preventive healthcare use, %	2009	87.95
Heavy alcohol consumption, %	2011	5.57
Current smoker, %	2009	3.56
Frequent physical activity, %	2009	74.65
Short sleep duration, %	2009	22.26
AHEI dietary score (range: 24.86–102.42)	2011	66.26 (12.91)
Number of physical health problems (range: 0–4)	2009	0.78 (0.76)
Overweight/obesity, %	2009	52.17
Type 2 diabetes, %	2009	4.56
Asthma, %	2009	11.03
Myocardial infarction, %	2009	1.05
Stroke, %	2009	1.03
Cancer, %	2009	8.26

	Questionnaire wave	Mean (SD) or %
Sociodemographic factors (covariates)		
Age in years (range: 44–64)	2009	55.60 (4.41)
Non-Hispanic White, %	2005	96.73
Area of residence, %	2007	
Northeast		26.88
Midwest		34.43
South		20.02
West		18.66
Subjective SES in the US (range: 1–10)	2001	7.28 (1.28)
Subjective SES in the community (range: 1–10)	2001	7.13 (1.54)
Pretax household income, %	2001	
<$50,000		13.32
$50,000-$74,999		26.80
$75,000-$99,999		21.44
≥$100,000		38.45
Census tract college education rate (range: 2.18% −84.71%)	2007	32.22% (16.10%)
Census tract median income, %	2007	
<$50,000		25.83
$50,000-$74,999		48.82
$75,000-$99,999		18.24
≥$100,000		7.11
Childhood abuse victimization (range: 0–5)	2001	1.75 (1.50)
Postmenopausal status, %	2007	67.08
Postmenopausal hormone use, %	2007	19.48
Prior value of the outcome and prior values of the exposure variables (covariates)		
Purpose in life (range: 1–4)	2008	3.20 (0.72)
Positive affect (range: 1–4)	2008	3.14 (0.75)
Community engagement (range: 0–3)	2008	1.23 (0.97)
Number of close friends (range: 0–3)	2008	1.76 (0.66)
Number of close relatives (range: 0–3)	2008	1.87 (0.72)
Emotional support (range: 0–5)	2008	3.83 (1.37)
Living alone, %	2005	9.55
Married or in domestic partnership, %	2005	82.75
Frequency of rotating night shift work (range: 0–20)	2005	1.03 (4.04)
Religious service attendance, %	2008	
Never		23.91
Less than once per week		30.27
At least once per week		45.82
Depressive symptoms (range: 0–30)	2008	5.51 (4.64)
Depression diagnosis, %	2007	13.71
Phobic anxiety symptoms (range: 0–16)	2005	2.18 (2.06)
Loneliness (range: 1–4)	2008	1.49 (0.74)

	Questionnaire wave	Mean (SD) or %
Hopelessness (range: 1–4)	2008	1.80 (0.91)
Preventive healthcare use, %	2007	87.42
Heavy alcohol consumption, %	2007	4.86
Current smoker, %	2007	4.11
Frequent physical activity, %	2005	73.35
Short sleep duration, %	2001	23.22
AHEI dietary score (range: 22.32–101.86)	2007	62.91 (12.81)
Number of physical health problems (range: 0–4)	2007	0.73 (0.73)

Table 2.

Antecedents of purpose in life (standardized score) (The Nurses' Health Study II 2009, 2011 or 2013 to 2016 questionnaire wave, N=3,905 to 4,189[a])

Candidate Antecedents of Purpose	Purpose in life[b] (standardized score) *β (95% CI)*
Psychosocial Well-being	
Positive affect (standardized)	0.12 (0.09, 0.15)***
Married or in domestic partnership (yes vs. no)	0.10 (−0.03, 0.23)
Religious service attendance	
Less than once per week (vs. never)	−0.05 (−0.15, 0.05)
At least once per week (vs. never)	0.08 (−0.03, 0.19)
Community engagement (standardized)	0.01 (−0.03, 0.04)
Number of close friends (standardized)	0.03 (0.00, 0.07)*
Number of close relatives (standardized)	0.06 (0.02, 0.09)***
Emotional support (standardized)	0.02 (−0.01, 0.05)
Living alone (yes vs. no)	−0.13 (−0.26, −0.01)*
Psychological Distress	
Depressive symptoms (standardized)	−0.15 (−0.18, −0.11)***
Depression diagnosis (yes vs. no)	−0.08 (−0.17, 0.01)
Anxiety symptoms (standardized)	−0.08 (−0.11, −0.05)***
Loneliness (standardized)	−0.08 (−0.11, −0.05)***
Hopelessness (standardized)	−0.08 (−0.11, −0.05)***
Employment Characteristics	
Current employment status	
Unemployed (vs. employed)	−0.09 (−0.18, 0.00)
Retired (vs. employed)	−0.12 (−0.22, −0.01)*
Frequency of rotating night shift work (standardized)	0.00 (−0.03, 0.03)
Health Behaviors	
Preventive healthcare use (yes vs. no)	−0.02 (−0.11, 0.07)
Heavy alcohol consumption (yes vs. no)	−0.04 (−0.20, 0.11)
Current smoker (yes vs. no)	−0.04 (−0.26, 0.19)
Frequent physical activity (yes vs. no)	−0.04 (−0.11, 0.04)
Short sleep duration (yes vs. no)	−0.04 (−0.11, 0.02)
AHEI dietary score (standardized)	0.01 (−0.03, 0.06)
Physical Health	
Number of physical health problems (standardized)	0.04 (−0.02, 0.09)
Overweight/obesity (yes vs. no)	0.03 (−0.05, 0.10)
Type 2 diabetes (yes vs. no)	0.04 (−0.11, 0.19)
Asthma (yes vs. no)	0.04 (−0.05, 0.14)
Myocardial infarction (yes vs. no)	0.24 (−0.04, 0.51)

Candidate Antecedents of Purpose	Purpose in life[b] (standardized score) *β (95% CI)*
Stroke (yes vs. no)	0.21 (−0.07, 0.49)
Cancer (yes vs. no)	−0.08 (−0.19, 0.03)

a. The full analytic sample was restricted to those who had valid data on the outcome variable (purpose in life) and the prior value of purpose in life. Multiple imputation was performed to impute missing data on covariates. The actual sample size for each analysis varied depending on the number of missing values in the exposure variable under investigation.

b. A set of regression models (with normal distribution) were used to regress the standardized score of purpose in life on each exposure variable in separate models. All models controlled for participants' age, race, geographic region, socioeconomic status (subjective socioeconomic status, household income, census tract college education rate, and census tract median income), postmenopausal status, postmenopausal hormone use, prior purpose in life, and prior values of all the exposure variables wherever data was available (prior positive affect, community engagement, number of friends, number of relatives, emotional support, living arrangement, frequency of night shift work, depressive symptoms, depression diagnosis, anxiety symptoms, hopelessness, loneliness, dietary quality score, preventive healthcare use, heavy alcohol consumption, smoking, short sleep duration, physical activity, and the number of physical health problems).

* $p < 0.05$ before Bonferroni correction,

** $p < 0.01$ before Bonferroni correction,

*** $p < 0.05$ after Bonferroni correction (the p value cutoff for Bonferroni correction = 0.05/28 outcomes=0.0018).