



## Original Contribution

# Sense of Mission and Subsequent Health and Well-Being Among Young Adults: An Outcome-Wide Analysis

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Purpose in life is potentially a modifiable “health asset” that enhances health and well-being. However, the association between purpose and health in younger populations remains understudied. In this study, we prospectively examined an aspect of purpose in life—specifically having a sense of mission—and a wide range of outcomes related to psychosocial well-being, mental health, health behaviors, and physical health in young adults. Longitudinal data from the Growing Up Today Study (2007–2010 or 2007–2013, depending on outcome; mean baseline age = 22.97 years) were analyzed using generalized estimating equations. Sample sizes ranged from 6,323 to 7,463, depending on outcome. Bonferroni correction was used to correct for multiple testing. All models controlled for sociodemographic characteristics, religious service attendance, maternal attachment, and prior values of the outcome variables. Greater sense of mission was associated with greater psychological well-being (including life satisfaction, positive affect, self-esteem, emotional processing, and emotional expression), greater use of preventive health care, more volunteer activities, and possibly fewer depressive symptoms. However, there was little association with physical health or other behavioral outcomes. The formation of a sense of mission may provide a novel target for promoting multiple facets of psychological well-being, prosocial character, and possibly mental health among young adults.

health; outcome-wide analysis; purpose in life; religion; sense of mission; well-being; young adults

Abbreviations: GUTS, Growing Up Today Study; NHSII, Nurses’ Health Study II; SES, socioeconomic status.

Young adulthood is a crucial life-transition period that shapes people’s trajectories of health and well-being (1). Yet according to a recent report by the Institute of Medicine and the National Research Council, there is a “paucity of attention to young adulthood as a distinct period of life in policy and research” (1, p. 1). Public health efforts to improve the health of young adults should focus not just on reducing harmful risk factors but also on identifying protective factors that promote health and well-being (2). Purpose in life, a central component of human flourishing that addresses the extent to which individuals perceive their lives as having goals and meaning, is potentially one such protective factor (3). In older adults, greater purpose has been linked with lower mortality and reduced risk of chronic health conditions (4). Purpose can be derived from numerous sources, such as close social relationships, achievements, and religion (5); further, some randomized trials suggest that it can be intentionally modified (6). Developing purpose is a lifetime process that can start in early life (7). Purpose, therefore, may be a promising target

for intervention strategies aimed at improving health and well-being among young adults.

Purpose has been hypothesized as a self-sustaining source of motivation and meaning that creates and sustains health and well-being (8). Specifically, having purpose stimulates behavioral consistency and helps direct resources in light of personal goals. Living in accordance with purpose provides satisfying experiences, increases resilience in stressful situations, motivates behavioral regulation, and often requires exercising character strengths, leading to better functioning across multiple domains of health and well-being (8).

While purpose has more often been studied in older adults, a small but growing number of empirical studies in younger populations suggest that higher purpose is associated with greater subjective well-being, less psychological distress, fewer risky behaviors, and greater virtue (7, 9–11). While such pioneering studies in younger populations have contributed substantially to the literature, they may have been subject to certain limitations.

First, the majority of studies have been cross-sectional, and thus the direction of causality could not be determined. Second, there has often been limited control for confounders. The association between purpose and health is also likely bidirectional, since poor health may impede one's purposes (12), but prior work has seldom addressed the possibility of reverse causation. Third, only a limited range of health and well-being outcomes have been examined. Finally, there are different aspects of purpose in life or different levels of the hierarchy of purpose. At the lowest level, there are goals—things people aim to accomplish; at an intermediate level, there are purposes which generate, organize, and prioritize goals (8). At the highest level, there may be a sense of calling, vocation, or mission, which itself will often generate, organize, and prioritize various purposes. While there have been some (though relatively few) rigorous empirical studies of purpose, there has been almost no study of a sense of mission, the highest level of the hierarchy, either as an exposure or as an outcome.

In this study, we performed an outcome-wide analysis (13, 14) to prospectively examine the associations of a sense of mission with a wide array of health and well-being outcomes among young adults. We also explored potential antecedents of sense of mission as a secondary analysis, guided by a previously proposed model on potential pathways to human flourishing (15). We hypothesized that greater sense of mission is associated with better psychological well-being, greater mental and physical health, healthier behaviors, and greater character strengths.

## METHODS

This study used longitudinal data from Nurses' Health Study II (NHSII) and the Growing Up Today Study (GUTS). The NHSII cohort study was initiated in 1989 when 116,430 registered nurses between 25 and 42 years of age were enrolled from across the United States (16). In 1996, NHSII participants with children aged 9–14 years were invited to have their children enroll in GUTS (17), a newly formed cohort study of adolescents, who later became young adults. A total of 16,882 GUTS participants completed questionnaires about their health. Because a number of participating families had multiple children enrolled, some GUTS participants were siblings. NHSII and GUTS participants have been followed up annually or biennially (16, 17).

In 2007, a measure of sense of mission was included in the GUTS questionnaire; therefore, 2007 was considered the baseline for the current study ( $n = 9,860$ ; mean age = 22.97 years). Participants were excluded from the analyses if they had missing data on sense of mission ( $n = 657$ ) or the outcomes (numbers excluded ranged from 1,740 to 2,880, depending on the outcome). Missing data on covariates ( $n$ 's = 0–1,322) were imputed using data from previous questionnaire waves; if such data were not available, the mean values (for continuous variables) or values of the largest category (for categorical variables) of the nonmissing data were used for imputation. This yielded a final analytical sample of 6,323–7,463 individuals, depending on outcome; up to 2,937 participants were siblings. The study was approved by the institutional review board of Brigham and Women's Hospital (Boston, Massachusetts).

Web Table 1 (available at <https://academic.oup.com/aje>) shows when each study variable was assessed. The exposure

variable—sense of mission—was assessed in the GUTS 2007 questionnaire. Outcomes were assessed in the GUTS 2010 questionnaire (Web Table 2 compared baseline characteristics of participants retained in the cohort and those lost to follow-up at the time of administration of the 2010 questionnaire); however, if the outcome was not assessed in 2010, we used outcome data from the 2013 questionnaire (these outcomes might not be directly comparable to outcomes assessed in the 2010 questionnaire because of the additional 3 years of follow-up). Covariate data were obtained from the GUTS 2005 and 2007 questionnaires and the NHSII 2001 questionnaire.

## Assessment of sense of mission

Sense of mission (GUTS 2007) was measured with a question from the 2-item Meaning Subscale of the Brief Multidimensional Measure of Religiousness/Spirituality (18): "I have a sense of mission or calling in my own life." Response options ranged from 1 (strongly agree) to 4 (strongly disagree). Responses were reverse-coded so that a higher score reflected greater sense of mission. We collapsed the 2 lowest response categories (strongly disagree and disagree) in order to reduce data sparsity, which resulted in a 3-level variable. The original 2-item Meaning Subscale has been validated in young populations and has shown good psychometric properties (19). In this sample, the 1-item measure of mission was positively associated with baseline religious service attendance and inversely related to depressive symptoms, providing some evidence for construct validity.

## Outcome assessment

A wide range of outcomes (GUTS 2010 or GUTS 2013) were assessed, including psychological well-being (i.e., life satisfaction, positive affect, self-esteem, emotional processing, emotional expression), physical health (i.e., number of physical health problems, overweight/obesity (defined as body mass index (weight (kg)/height (m)<sup>2</sup>)  $\geq 25$ )), mental health problems (i.e., depression, anxiety), health behaviors (i.e., binge eating (at least weekly episodes of binge eating and feeling out of control while binge eating), an eating disorder, cigarette smoking, frequent binge drinking ( $\geq 12$  episodes of binge drinking (consuming  $\geq 5$  (men) or  $\geq 4$  (women) alcoholic beverages over a few hours) during the past year), marijuana use, other illicit drug use, prescription drug misuse, history of sexually transmitted infections, use of preventive health care, short sleep duration ( $< 7$  hours over a typical 24-hour period)), and volunteering and civic engagement (i.e., time contributed to the community, to charity, to a place of worship; voting in the 2008 presidential election). See Web Table 3 and Web Appendix 1 for details on outcome measurement.

## Assessment of covariates

*Sociodemographic characteristics.* Covariates included participant age (in years), sex (male, female), race (white, non-white), and area of residence (West, Midwest, South, Northeast) (GUTS 2007). We also considered several socioeconomic status (SES) variables (NHSII 2001): 1) maternal subjective SES in the United States and in the community, assessed with validated scales (20) (both on a 10-point scale); 2) pretax annual house-

hold income (<\$50,000, \$50,000–\$74,999, \$75,000–\$99,999, or ≥\$100,000); 3) census-tract percentage of residents with a college education (used as a continuous variable); and 4) census-tract median annual income (<\$50,000, \$50,000–\$74,999, \$75,000–\$99,999, or ≥\$100,000).

**Religious service attendance.** Participants were queried about frequency of attendance at religious services (GUTS 2005). Response options included never, less than once per week, and at least once per week.

**Maternal attachment.** Maternal attachment (GUTS 2005) was assessed with a validated 9-item scale (e.g., “I am satisfied with the love and affection my mother shows me”) (21). Response options ranged from 1 (strongly disagree) to 5 (strongly agree). An overall score was created by averaging the responses across items ( $\alpha = 0.94$ ) (21).

**Prior values of the outcome variables.** We controlled for prior values of the outcome variables wherever available, to reduce the possibility of reverse causation (22). Adjustments were made for prior status of binge eating, overweight/obesity, depressive symptoms, smoking, frequent binge drinking, marijuana or other illicit drug use, prescription drug misuse, sexually transmitted infections, preventive health-care use, volunteering, and voting registration status (GUTS 2005 or GUTS 2007).

### Statistical analyses

Statistical analyses were performed using SAS, version 9.4 (SAS Institute, Inc., Cary, North Carolina); tests of statistical significance were 2-sided. Analysis of variance and  $\chi^2$  tests were used to examine participant characteristics across levels of sense of mission.

Generalized estimated equations models with an independent correlation structure were used to analyze the association between sense of mission and each outcome separately, adjusting for clustering by sibling status. Continuous outcomes were standardized (mean = 0; standard deviation, 1) so that effect sizes were reported in terms of standard deviations of the outcome variables. Bonferroni correction was used to account for multiple testing. All models adjusted for sociodemographic characteristics, religious service attendance, maternal attachment, and prior values of all outcome variables simultaneously wherever data were available.

We also explored potential antecedents of sense of mission as a secondary analysis. A generalized estimated equations model with Poisson distribution was used to regress the top level (versus the middle and bottom levels combined) of the mission score on religious service attendance, sociodemographic characteristics, maternal attachment, and prior health and well-being indicators simultaneously, adjusting for clustering by sibling status.

Several sensitivity analyses were performed. First, because the measure of mission was taken from a scale originally developed for assessing purpose in a religious context, we reanalyzed the primary sets of models without adjusting for religious service attendance for comparison, and we also stratified the primary analyses by religious service attendance and tested for product-term interactions. Second, to evaluate the robustness of the observed associations between mission and various outcomes to unmeasured confounding (23–25), we assessed the extent to which an unmeasured confounder would need to be

associated with both the exposure and each outcome variable to explain away the observed association. For this purpose, we calculated E-values (24), which is the minimum strength of association on the risk ratio scale that an unmeasured confounder would need to have with both the exposure and the outcome, above and beyond the measured covariates, to fully explain away observed exposure-outcome associations.

## RESULTS

### Descriptive analyses

At study baseline, the mean age of participants was 22.97 (standard deviation, 1.71) years. Participants were mostly female, were primarily white, and mostly had a high family SES, and 27.35% reported being at the top level of sense of mission (mean = 3.06 out of 4; standard deviation, 0.73) (Web Table 4). Participant characteristics across levels of sense of mission are shown in Table 1. Compared with participants lost to follow-up, those who remained in the cohort were healthier, had a higher SES, and attended religious services more frequently but did not differ in terms of level of mission (Web Table 2).

### Sense of mission and health and well-being

Sense of mission was positively associated with all psychological well-being outcomes, use of preventive health care, and several volunteering outcomes in a monotonic pattern. Moreover, the top (versus the bottom) level of mission was possibly associated with fewer depressive symptoms, although the association did not reach the  $P < 0.05$  level after accounting for multiple testing. There was little association, however, between mission and other behavioral or physical health outcomes (Table 2). We also examined sense of mission in relation to cessation of binge eating, smoking, binge drinking, and drug use, and all of the associations were close to null (Web Table 5). When the primary sets of models were reanalyzed without adjustment for religious service attendance, results were similar but the magnitude of associations was somewhat larger (Web Appendix 2, Web Table 6). Further, the stratified analyses suggested that the strength of the associations between mission and almost all psychological well-being outcomes, depressive symptoms, and some behavioral and volunteering outcomes increased with frequency of religious service attendance (Web Appendix 2, Web Table 7).

### Antecedents of sense of mission

Weekly attendance at religious services (versus never) was a strong predictor of having a high sense of mission. Maternal attachment was also positively related to mission. A number of prior health and well-being characteristics were predictive of mission as well (Table 3).

### Sensitivity analyses for unmeasured confounding

We calculated E-values (24) to assess the robustness of the observed associations to unmeasured confounding (Table 4). There was moderate evidence that the associations of mission with psychological well-being, preventive health care, and volunteering outcomes were probably robust to unmeasured

**Table 1.** Characteristics of Participants According to Level of Sense of Mission at Study Baseline (2007 Questionnaire Wave;  $n = 9,203$ ), Growing Up Today Study, 2007

Participant Characteristic <sup>a</sup>	Level of Sense of Mission <sup>b</sup>						P Value
	Bottom Level ( $n = 1,717$ )		Middle Level ( $n = 4,969$ )		Top Level ( $n = 2,517$ )		
	%	Mean (SD)	%	Mean (SD)	%	Mean (SD)	
Sociodemographic factors							
Age, years <sup>c</sup>		23.05 (1.74)		22.98 (1.71)		22.90 (1.69)	0.018
Male sex	42.17		35.64		35.36		<0.001
White race	92.33		94.01		92.56		0.013
Geographical region							
West	17.62		15.39		18.84		<0.001
Midwest	30.40		35.17		34.10		
South	15.34		15.77		17.85		
Northeast	36.64		33.66		29.21		
Mother's subjective SES in the United States <sup>c</sup>		7.11 (1.34)		7.16 (1.26)		7.25 (1.29)	0.003
Mother's subjective SES in the community <sup>c</sup>		6.93 (1.58)		7.05 (1.52)		7.12 (1.56)	<0.001
Pretax annual household income							
<\$50,000	11.79		12.39		11.90		0.530
\$50,000–\$74,999	23.52		22.65		24.15		
\$75,000–\$99,999	22.47		23.05		20.89		
≥\$100,000	42.22		41.91		43.05		
Census-tract % of persons with a college education <sup>c</sup>		33.35 (16.59)		32.84 (16.46)		31.70 (15.85)	0.002
Census-tract median annual income							
<\$50,000	22.71		22.58		23.73		0.420
\$50,000–\$74,999	47.70		48.00		49.36		
\$75,000–\$99,999	21.55		21.37		19.67		
≥\$100,000	8.04		8.05		7.23		
Maternal attachment <sup>c</sup>		36.43 (7.42)		37.68 (7.03)		38.61 (7.15)	<0.001
Frequency of attendance at religious services							
Never	56.78		39.30		28.94		<0.001
Less than once per week	32.04		39.01		32.13		
At least once per week	11.19		21.69		38.93		
Prior health status/health behaviors							
Depressive symptoms <sup>c</sup>		6.93 (3.82)		5.61 (3.23)		4.94 (3.20)	<0.001
Binge eating	2.48		2.26		1.60		0.117
Overweight or obesity	32.24		29.27		26.92		0.002
Cigarette smoking	42.17		36.55		29.51		<0.001
Frequent binge drinking	32.52		27.48		21.86		<0.001
Marijuana use	40.46		31.61		24.27		<0.001
Use of drugs other than marijuana	14.98		11.35		9.03		<0.001
Prescription drug misuse	21.04		17.78		14.68		<0.001
History of STIs	6.84		6.67		5.71		0.270
Past-year use of preventive health care	56.75		60.43		63.77		<0.001
Frequency of volunteering <sup>c</sup>		1.51 (0.74)		1.77 (0.81)		2.14 (0.95)	<0.001
Voting registration status	85.76		89.55		91.92		<0.001

Abbreviations: SD, standard deviation; SES, socioeconomic status; STI, sexually transmitted infection.

<sup>a</sup> For information on variable categories, see Web Appendix 1.

<sup>b</sup> Analysis of variance or  $\chi^2$  tests were used to examine the mean (SD) level of a characteristic or the proportion of individuals within each level of sense of mission with that characteristic. Sense of mission was originally measured on a scale from 1 to 4. We collapsed the 2 lowest categories to create a 3-level variable. Percentages in subgroups may not sum to 100 because of rounding.

<sup>c</sup> Range of values for participant characteristics in this sample: age, 20–28 years; mother's subjective SES in the United States, 1–10; mother's subjective SES in the community, 1–10; census-tract percentage with a college education, 0%–85%; maternal attachment, 9–45; depressive symptoms, 0–21; prior frequency of volunteering, 1–4.

**Table 2.** Association Between Sense of Mission and Subsequent Health and Well-Being in Young Adults (2010 or 2013 Questionnaire Wave;  $n = 6,323-7,463^a$ ), Growing Up Today Study, 2007–2010 or 2007–2013

Health and Well-Being Outcome <sup>b</sup>	Sense of Mission <sup>c</sup>							
	Middle Level vs. Bottom Level				Top Level vs. Bottom Level			
	RR <sup>d</sup>	$\beta^e$	95% CI	P Value Threshold	RR <sup>d</sup>	$\beta^e$	95% CI	P Value Threshold
Psychological well-being								
Life satisfaction		0.17	0.11, 0.24	<0.002 <sup>f</sup>		0.33	0.25, 0.40	<0.002 <sup>f</sup>
Positive affect		0.21	0.15, 0.27	<0.002 <sup>f</sup>		0.42	0.35, 0.49	<0.002 <sup>f</sup>
Self-esteem		0.15	0.09, 0.22	<0.002 <sup>f</sup>		0.33	0.26, 0.40	<0.002 <sup>f</sup>
Emotional processing		0.21	0.14, 0.27	<0.002 <sup>f</sup>		0.43	0.36, 0.51	<0.002 <sup>f</sup>
Emotional expression		0.13	0.06, 0.19	<0.002 <sup>f</sup>		0.28	0.21, 0.35	<0.002 <sup>f</sup>
Physical health								
No. of physical health problems		0.02	-0.04, 0.08			0.04	-0.03, 0.11	
Overweight/obesity	1.02		0.95, 1.09		1.04		0.96, 1.13	
Mental health								
Depressive symptoms		-0.05	-0.11, 0.01			-0.11	-0.18, -0.04	<0.010
Depression diagnosis	0.91		0.80, 1.03		0.95		0.81, 1.12	
Anxiety symptoms		0.03	-0.04, 0.09			-0.01	-0.08, 0.06	
Anxiety diagnosis	0.94		0.81, 1.09		1.00		0.83, 1.20	
Health behaviors								
Binge eating	1.04		0.58, 1.87		0.61		0.28, 1.32	
Eating disorder	0.80		0.51, 1.26		0.74		0.43, 1.25	
Cigarette smoking	0.96		0.88, 1.05		1.01		0.91, 1.12	
Frequent binge drinking	1.02		0.94, 1.10		0.93		0.84, 1.03	
Marijuana use	0.93		0.85, 1.01		0.95		0.85, 1.06	
Any other illicit drug use	1.08		0.91, 1.29		1.04		0.84, 1.29	
Prescription drug misuse	1.01		0.87, 1.16		1.03		0.86, 1.24	
History of STIs	0.98		0.83, 1.15		0.85		0.69, 1.04	
Use of preventive health care	1.11		1.05, 1.18	<0.002 <sup>f</sup>	1.15		1.08, 1.23	<0.002 <sup>f</sup>
Short sleep duration	1.09		0.97, 1.24		1.20		1.04, 1.38	<0.050
Volunteering and civic engagement								
Contributed time to community		0.09	0.03, 0.15	<0.010		0.17	0.10, 0.25	<0.002 <sup>f</sup>
Contributed time to charity		0.09	0.03, 0.15	<0.010		0.20	0.12, 0.27	<0.002 <sup>f</sup>
Contributed time to place of worship		0.15	0.10, 0.19	<0.002 <sup>f</sup>		0.31	0.25, 0.37	<0.002 <sup>f</sup>
Voted in 2008 presidential election	1.03		1.00, 1.06		1.03		0.99, 1.06	

Abbreviations: CI, confidence interval; OR, odds ratio; RR, risk ratio; SES, socioeconomic status; STI, sexually transmitted infection.

<sup>a</sup> The full analytical sample was restricted to participants who had valid data on sense of mission. The actual sample size for each analysis varied depending on the number of missing values for each outcome under investigation. Missing data on the covariates were imputed from previous questionnaire years; if no such data were available, missing data were imputed using the mean values (continuous variables) or values of the largest category (categorical variables) of the nonmissing data. All models controlled for participants' age, race, sex, area of residence, mother's report of SES (subjective SES, household income, census-tract percentage with a college education, and census-tract median income), participants' prior religious service attendance, prior maternal attachment, and prior values of the outcome variables (prior depressive symptoms, prior binge eating, prior overweight/obesity, prior smoking, prior binge drinking, prior marijuana use, prior use of other illicit drugs, prior prescription drug misuse, prior history of STIs, prior use of preventive health care, prior frequency of volunteering, and prior voting registration status).

<sup>b</sup> For information on variable categories, see Web Appendix 1.

<sup>c</sup> Sense of mission was originally measured on a scale from 1 to 4. We collapsed the lowest 2 categories to create a 3-level variable.

<sup>d</sup> Effect estimates for the outcomes "binge eating" and "eating disorder" were ORs (examined with a binomial distribution, logit link; these outcomes were rare (prevalence <10%), so the OR would approximate the RR). Effect estimates for other dichotomized outcomes were RRs (examined with a Poisson distribution, log link).

<sup>e</sup> All continuous outcomes were standardized (mean = 0, standard deviation, 1), and  $\beta$  was the standardized effect size.

<sup>f</sup>  $P < 0.05$  after Bonferroni correction ( $P$  value cutoff for Bonferroni correction =  $0.05/25$  outcomes =  $0.002$ ).

confounding. For instance, to fully account for the association between the top (versus bottom) level of mission and positive affect, an unmeasured confounder associated with both greater mission and higher positive affect by 2.29-fold each on the risk ratio scale, above and beyond the measured covariates, could suffice, but weaker confounding could not; and by 2.12-fold each to shift the lower limit of the confidence interval to include the null value. Similarly strong E-values were found with other psychological well-being outcomes, and to a lesser extent with volunteering outcomes and preventive health care, suggesting that these associations were also somewhat robust to unmeasured confounding. In contrast, there was little evidence that the associations (especially the confidence intervals) with physical health and other behavioral outcomes were robust to unmeasured confounding.

## DISCUSSION

In this large prospective cohort study of young adults, we found positive associations between a sense of mission and multiple dimensions of psychological well-being, use of preventive health care, and several volunteering outcomes. These findings are consistent with past research on purpose (9, 11, 26), but they extend prior work by using data from a large prospective cohort study with up to 6 years of follow-up, rigorous control for confounding and reverse causation, and explicit assessment of robustness to unmeasured confounding, focusing specifically on a sense of mission, and by examining a wide range of outcomes simultaneously. This study is also one of the first (to our knowledge) to have explored factors that may shape a sense of mission, and it suggests both religious participation and a positive parent-child relationship as strong predictors of higher mission. The results also support the previously proposed model on potential pathways to human flourishing (15), which hypothesized family and religion as 2 major sources of a sense of meaning and purpose. To the best of our knowledge, this is the first study to provide evidence that the associations between mission and several health and well-being characteristics are probably bidirectional (i.e., prior health and well-being predicts subsequent sense of mission, while mission is also associated with several subsequent health and well-being outcomes after adjustment for prior values of these outcomes).

Contrary to prior studies evaluating the connection between purpose and health in older adults (4), there was little association between mission and physical health outcomes in this young adult sample. However, many diseases take time to develop (e.g., cancer, cardiovascular diseases) and may not be discernable until later adulthood. Our sample participants were on average 23 years of age at baseline and only in their late twenties during follow-up, and thus relatively healthy. Further, compared with prior cross-sectional research in young populations (9, 27), this study found weaker associations between this aspect of purpose and several behavioral outcomes (e.g., substance abuse, sexually transmitted infections). These contrasting results may be attributable to differences in study design (longitudinal vs. cross-sectional), lower rates of some behaviors in our sample as compared with the general population of young adults (28), and differential adjustment for confounding variables. For example, we did not find much evidence for an

association between mission and subsequent marijuana use or civic engagement after adjusting for prior marijuana use and prior civic engagement (Table 2). However, we did find associations of earlier marijuana use with lower subsequent sense of mission and earlier civic engagement with higher subsequent sense of mission (Table 3). The direction of causality here may thus be the reverse of what is sometimes thought.

While developing purpose is an ongoing process, early life is likely to be a formative period for cultivating a sense of purpose (11). For young adults, a sense of purpose or a life mission can contribute to the development of a stable self-identity and can help one cope with daily stressors in light of personal goals. Purpose could also be interwoven into one's identity and help direct resources towards meaningful goals, which in turn leads to health and well-being (7). Such theories have received little empirical attention, partly because of the assumption that younger populations might not be able to conceptualize existential constructs like purpose (29). In contrast to this assumption, a small but growing number of studies suggest that young adults and even older adolescents may be able to hold similarly complex concepts of purpose as older age groups (26, 30). However, the sources and cognitive processes involved in deriving purpose may vary across life stages. For instance, young adults develop purpose or mission mostly through preparing for future life, whereas older adults may be inclined to derive meaning by reflecting on past achievements (31). Therefore, it is important to study purpose among younger populations separately, rather than assuming that processes of developing purpose and its health associations are similar across the life course. Such evidence will be particularly helpful in informing interventions to heighten purpose for young adults.

This study was subject to certain limitations. First, sense of mission was assessed with a 1-item question that asked about the extent to which participants had a sense of mission or calling. This was also a strength of the study, however, since this highest level of the purpose hierarchy has not been previously examined. The question assesses the extent to which a person has a sense of direction in which to strive, which comprises important themes mentioned by younger populations when asked to define what it means to have purpose (30, 31) as well as key themes featured in prominent definitions and measurements of purpose such as Ryff's measure (3) and the Purpose in Life Test (11, 32, 33). However, future research could assess purpose in a more developmentally relevant framework. For instance, while this study was not able to assess change in mission over time because of a lack of data, prior studies have suggested that younger populations often report a higher level of searching for meaning rather than the presence of meaning compared with older adults (34). Therefore, in future research, investigators could develop measures of mission and purpose specifically for younger populations, considering their developmental stage. Second, both sense of mission and health and well-being were self-reported, so responses may have been subject to social desirability and common methods bias. Third, this study was not able to directly control for baseline psychological well-being because of a lack of data. However, we adjusted for depressive symptoms, parental attachment, and a wide range of health behaviors and other potential confounders and we explicitly performed sensitivity analysis for unmeasured confounding, which might substantially reduce concern about residual confounding.

**Table 3.** Potential Antecedents of Sense of Mission<sup>a</sup> for the Top Level of Sense of Mission Versus the Middle and Bottom Levels Combined (2005 Questionnaire Wave; *n* = 9,203), Growing Up Today Study, 2005–2007<sup>b</sup>

Potential Antecedent <sup>c</sup>	RR	95% CI	P Value
Frequency of attendance at religious services (vs. never) <sup>d</sup>			
Less than once per week	1.05	0.96, 1.14	0.287
At least once per week	1.54	1.42, 1.67	<0.001
Age (standardized), years	1.00	0.96, 1.03	0.817
Male sex (vs. female)	0.99	0.93, 1.06	0.824
White race (vs. nonwhite)	0.89	0.79, 1.00	0.047
Area of residence (vs. West)			
Midwest	0.83	0.76, 0.91	<0.001
South	0.95	0.86, 1.06	0.367
Northeast	0.79	0.72, 0.87	<0.001
Mother's subjective SES in the United States (standardized)	1.03	0.99, 1.08	0.144
Mother's subjective SES in the community (standardized)	0.99	0.95, 1.03	0.471
Pretax annual household income (vs. <\$50,000), %			
\$50,000–\$74,999	1.06	0.93, 1.20	0.367
\$75,000–\$99,999	1.00	0.89, 1.12	0.977
≥\$100,000	1.06	0.94, 1.20	0.355
Census-tract % with a college education (standardized)	0.93	0.88, 0.98	0.008
Census-tract median annual income (vs. <\$50,000), %			
\$50,000–\$74,999	1.07	0.98, 1.17	0.149
\$75,000–\$99,999	1.06	0.91, 1.22	0.458
≥\$100,000	1.11	0.90, 1.36	0.315
Maternal attachment (standardized)	1.07	1.03, 1.11	<0.001
Depressive symptoms (standardized)	0.83	0.80, 0.86	<0.001
Binge eating (yes vs. no)	0.96	0.73, 1.26	0.759
Overweight or obesity (yes vs. no)	0.96	0.89, 1.04	0.308
Cigarette smoking (yes vs. no)	1.00	0.92, 1.09	0.970
Frequent binge drinking (yes vs. no)	0.94	0.86, 1.03	0.200
Marijuana use (yes vs. no)	0.88	0.80, 0.97	0.011
Illicit drug use other than marijuana (yes vs. no)	1.05	0.91, 1.21	0.533
Prescription drug misuse (yes vs. no)	1.05	0.94, 1.17	0.387
History of STIs (yes vs. no)	1.02	0.87, 1.19	0.844
Past-year use of preventive health care (yes vs. no)	1.17	1.09, 1.26	<0.001
Frequency of volunteering (standardized)	1.30	1.27, 1.34	<0.001
Voting registration status (yes vs. no)	1.21	1.07, 1.37	0.003

Abbreviations: CI, confidence interval; RR, risk ratio; SES, socioeconomic status; STI, sexually transmitted infection.

<sup>a</sup> Sense of mission was originally measured on a scale from 1 to 4. We collapsed the bottom 2 categories to create a 3-level variable.

<sup>b</sup> A generalized estimating equations model (Poisson distribution, log link) was used to regress the top level of sense of mission (versus the middle and bottom levels combined; approximately 27.35% of the participants reported being at the top level of mission in this sample) on the following covariates simultaneously: participant's age, race, sex, area of residence, mother's report of SES (subjective SES, household income, census-tract percentage with a college education, and census-tract median income), participant's religious service attendance, maternal attachment, and prior values of the outcome variables (prior depressive symptoms, prior binge eating, prior overweight/obesity, prior smoking, prior binge drinking, prior marijuana use, prior use of other illicit drugs, prior prescription drug misuse, prior history of STIs, prior routine physical examination, prior frequency of volunteering, and prior voting registration status), adjusting for clustering by sibling status.

<sup>c</sup> For information on variable categories, see Web Appendix 1.

<sup>d</sup> The unadjusted proportions of persons who were in the top level of sense of mission across the different levels of prior religious service attendance were as follows: never attended services, 22.48%; attended services less than once per week, 24.42%; attended services at least once per week, 43.42%.

**Table 4.** Robustness to Unmeasured Confounding (E-Values<sup>a</sup>) of Associations Between Sense of Mission<sup>b</sup> (Top Level vs. Bottom Level) and Subsequent Health and Well-Being Among Young Adults (2010 or 2013 Questionnaire Wave; *n* = 6,323–7,463), Growing Up Today Study, 2007–2010 or 2007–2013

Health and Well-Being Outcome <sup>c</sup>	E-Value	
	For Effect Estimate <sup>d</sup>	For CI Limit <sup>e</sup>
Life satisfaction	2.04	1.88
Positive affect	2.29	2.12
Self-esteem	2.04	1.88
Emotional processing	2.32	2.10
Emotional expression	1.90	1.75
No. of physical health problems	1.23	1.00
Overweight/obesity	1.24	1.00
Depressive symptoms	1.45	1.27
Depression diagnosis	1.29	1.00
Anxiety symptoms	1.11	1.00
Anxiety diagnosis	1.00	1.00
Binge eating	2.66	1.00
Eating disorder	2.04	1.00
Cigarette smoking	1.11	1.00
Binge drinking	1.36	1.00
Marijuana use	1.29	1.00
Any other illicit drug use	1.24	1.00
Prescription drug misuse	1.21	1.00
History of STIs	1.63	1.00
Use of preventive health care	1.57	1.76
Short sleep duration	1.69	1.24
Contributed time to community	1.61	1.39
Contributed time to charity	1.69	1.48
Contributed time to place of worship	1.98	1.83
Voted in 2008 presidential election	1.21	1.00

Abbreviations: CI, confidence interval; STI, sexually transmitted infection.

<sup>a</sup> For information on calculation of E-values, see VanderWeele and Ding (24) for the formula and Mathur et al. (25) for the website and R software (R Foundation for Statistical Computing, Vienna, Austria).

<sup>b</sup> Sense of mission was originally measured on a scale from 1 to 4. We collapsed the lowest 2 categories to create a 3-level variable.

<sup>c</sup> For information on variable categories, see Web Appendix 1.

<sup>d</sup> E-values for effect estimates are the minimum strength of association on the risk ratio scale that an unmeasured confounder would need to have with both the exposure and the outcome, above and beyond the measured covariates, to fully explain away the observed association of sense of mission (top level vs. bottom level) with various outcomes as shown in Table 2.

<sup>e</sup> E-values for the 95% CI limit closest to the null denote the minimum strength of association on the risk ratio scale that an unmeasured confounder would need to have with both the exposure and the outcome, above and beyond the measured covariates, to shift the 95% CI to include the null value.

Finally, participants in this study were all children of nurses, with little variation in SES and race. This sample was also healthier than the general young adult population and possibly had a

higher level of purpose. Therefore, the results may not be generalizable to other young adults. In future research, these associations could be evaluated in more diverse populations.

Among older adults, purpose in life may be somewhat modifiable through teaching, discussion, and experiential exercises (6). Although evidence is limited for younger populations, emerging research suggests that purpose can be fostered starting in early life (35). For instance, purpose-centered educational programs in kindergarten–grade 12 and college curricula have been linked to greater purpose and well-being in students (36, 37). However, very few schools have programs explicitly teaching purpose (35). Randomized controlled trials of parenting programs that aim to foster positive parenting have resulted in better health and well-being in participants' children (38). Such programs could also consider teaching parents skills to help their children cultivate a sense of mission or purpose. Whether health-care providers such as pediatricians and psychiatrists could help reinforce the importance of developing purpose during patients' routine visits depends on many factors, including whether such interventions are feasible and effective. For example, even a simple question along the lines of "What do you hope to do in your future?", when routinely asked of children and adolescents during pediatrician visits, may help shape a sense of purpose. Additionally, collaboration with religious institutions could also be a useful avenue for empowering younger populations, connecting them to adult role models and to other resources in the broader religious community (9).

The practical implications of this study are that young adults with a sense of higher purpose or mission have greater future psychological well-being, use of preventive health care, and display of prosocial characteristics, and possibly better mental health. Considering that young adulthood is a critical life-transition period, interventions designed to heighten a sense of mission or purpose among young adults, and potentially even earlier in life among adolescents, may be warranted. The future well-being of a nation largely depends on how the younger populations, especially young adults, fare as a whole (1). Enhancing purpose and helping people achieve a sense of mission could potentially provide innovative avenues to support emerging adults as they prepare to become society's future workers, parents, citizens, and civic leaders.

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