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Authors

Hill, Patrick L
Beck, Emorie D
Jackson, Joshua J

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Original Research Report

Maintaining Sense of Purpose Following Health Adversity in Older Adulthood: A Propensity Score Matching Examination

Patrick L. Hill, PhD,* Emorie D. Beck, PhD, and Joshua J. Jackson, PhD

Department of Psychological and Brain Sciences, Washington University in St. Louis, Missouri, US.

*Address correspondence to: Patrick L. Hill, PhD, Washington University in St. Louis, 1 Brookings Drive, Campus Box 1125, St. Louis, MO 63130, US. E-mail: patrick.hill@wustl.edu.

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Abstract

Objectives: Research has demonstrated sense of purpose predicts better health in older adulthood. However, work is limited with respect to understanding how experiencing a health event or illness diagnosis impacts older adults' sense of purpose.
Method: The current study employed a propensity score matching approach to compare older adults who did or did not experience an adverse health event on changes in sense of purpose across 3 waves of the Health and Retirement Study. Sense of purpose was assessed at each wave, and changes were compared between people who did versus did not experience one of 7 diagnoses and health events.
Results: When propensity score matching was employed, no differences in trajectories of change for sense of purpose were found with respect to all 7 events. Individual differences in trajectories, however, were evidenced across groups.
Discussion: The current findings suggest that even when health events impact older adults' physical functioning or place limitations on their activity, they may hold little ramifications for their sense of purpose. Future research should consider this potential for resilience, focusing on how adults compensate for losses.

Keywords: Health events, Older adulthood, Propensity score matching, Sense of purpose

Purposeful individuals strive toward their personal life directions, which catalyzes and guides engagement in life (Ryff, 1989; Scheier et al., 2006). Studies have linked sense of purpose to self-reported physical functioning (Scheier et al., 2006), greater activity assessed via pedometer counts (Hooker & Masters, 2016), and remaining physically active longitudinally in older adulthood (Kim et al., 2020). However, work has yet to fully consider the alternative direction, namely whether limitations to activity engagement, such as experiencing poor health, may lead individuals to feel less purposeful. The current study employs data from the Health and Retirement Study (HRS) to rigorously test whether adverse health events, varying in their impact on physical limitations, influence trajectories of change in sense of purpose during older adulthood.

Sense of purpose predicts reduced risk for future infirmity, injury, and disability (Boyle, Buchman, & Bennett, 2010; Mota et al., 2016), cardiovascular incidents (Cohen et al., 2016; Kim et al., 2013), Alzheimer's disease (Boyle, Buchman, Barnes, & Bennett, 2010), and even mortality (Boyle et al., 2009; Cohen et al., 2016). Underlying these associations may be the tendency for purposeful adults to take better care of themselves (Hill et al., 2019; Kim et al., 2014, 2020), presumably to scaffold their life goal pursuit. Accordingly, researchers have declared sense of purpose as "a psychological resource for aging well" (Windsor et al., 2015).

As such, it is unfortunate that older adults may be more susceptible to declines for sense of purpose (Hill & Weston, 2019; Pinquart, 2002). One potential explanation appears to be health issues. Past work with the HRS has shown that self-rated health predicted retired adults' trajectories for sense of purpose (Hill & Weston, 2019). Research with other samples also has linked health indicators longitudinally to constructs similar to sense of purpose (Steptoe & Fancourt, 2020). Only a few studies, however, have focused on how experiencing adverse health circumstances is associated with sense of purpose. Research on early-life adversity suggests that health disadvantage during childhood holds modest, negative associations with sense of purpose in adulthood (Hill et al., 2018). Moreover, older adults who recently experienced a stroke may be likely to decline in sense of purpose (Lewis et al., 2018), but relative stability was found among individuals who had experienced the event in the past. However, research on health adversity is complicated because (a) sense of purpose predicts initial risk for health concerns, (b) multiple factors, such as working status and age, impact both health and sense of purpose, and (c) the impracticalities of experimentally manipulating health events.

Current Study

Work is thus needed that examines whether adverse health events shape older adults' sense of purpose, while accounting for differences prior to the health event mimicking the conditions of an experimental design. The current study employed propensity score matching (PSM) to create matched groups of participants who do and do not experience the health event in the future years, using data from the HRS for seven different health events that differ in severity and impact on physical limitations. A *declining engagement account* would predict that older adults who experience a health event decline thereafter on sense of purpose, because of actual or perceived physical limitations that hinder goal pursuit. However, a *resilience account* would suggest that health events may hold little impact, in line with work suggesting modest-to-null associations between other forms of adversity and later purpose (Maier & Lachman, 2000; Pfund et al., 2020).

Method

Participants

This project uses data from the HRS, an ongoing longitudinal study of households in the United States. These data are available at https://hrs.isr.umich.edu. The HRS (Health and Retirement Study) is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan. To be included in the current sample, participants had to have (a) at least one wave of measurement matching variables, (b) at least two waves of purpose data, and (c) health event data for every wave of purpose data. Further, people included in each event sample did not have the specific health event in question at the initial wave or any known prior wave (i.e., we examined how the first experience of each health event predicted trajectories of sense of purpose). Depending on the cohort, sense of purpose was collected starting in either 2006 or 2008, collected again in 2010/2012 and again in 2014/2016. After these exclusions were made, there was a total *N* of 14,179. Table 1 presents the sample demographic information, which differs based on the health event given the exclusion criteria.

Measures

Health events

At each wave, participants were asked, "Has a doctor ever told you that you have [specific illness]?" Illnesses were (a) high blood pressure or hypertension; (b) diabetes or high blood sugar; (c) cancer or a malignant tumor, excluding minor skin cancer; (d) a chronic lung disease, such as chronic bronchitis or emphysema; (e) a heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems; (f) a stroke; and (g) arthritis or rheumatism. Responses were coded as either yes or no, and participants could be included in the analyses below for multiple events, if more than one was experienced.

Sense of purpose

Participants completed a seven-item measure of sense of purpose from the Psychological Well-being scales (Ryff, 1989; Ryff & Keyes, 1995). Participants reported their agreement to statements such as "I am an active person in

Table 1. Descriptive Statistics for Matched and Unmatched Samples

	Unmatched			Matched		
Life event	*N* event (no event)	M_{age} (*SD*)	% Women	*N* event (no event)	M_{age} (*SD*)	% Women
Arthritis	1,357 (13,510)	63.31 (9.72)	55.20	1,085 (4,288)	63.31 (9.48)	56.59
Cancer	990 (13,877)	66.81 (8.99)	51.52	793 (3,168)	66.71 (8.64)	51.95
Diabetes	1,123 (13,744)	64.65 (9.08)	56.19	906 (3,584)	64.75 (8.82)	56.18
Heart problems	1,481 (13,386)	68.16 (9.37)	59.08	1,186 (4,694)	68.05 (9.03)	59.53
High blood pressure	1,464 (13,403)	64.72 (9.84)	57.86	1,167 (4,546)	65.00 (9.51)	58.10
Lung disease	688 (14,179)	67.15 (9.41)	58.43	538 (21,47)	67.03 (9.16)	60.78
Stroke	762 (14,105)	70.45 (9.70)	58.92	573 (2,277)	70.33 (9.25)	59.16

carrying out the plans I set for myself" on a scale from 1 (Strongly Disagree) to 6 (Strongly Agree). This scale showed good reliability at each time point (α's ranged from .73 to .78 across assessments).

Analyses

The full analysis code and results are available on the Open Science Framework (https://osf.io/2saqh/). The current investigation was not preregistered. Analyses proceeded in three steps. First, we used multiple imputation to impute missing data for the 118 potential matching variables, which included demographic characteristics, work status, and initial sense of purpose (see Supplementary Table 1 for a full list of matching variables). The same imputation procedure was conducted 10 times, resulting in 10 different data sets to later be pooled together during the third step. Before the imputation was run, we created composites of our matching variables collected during and prior to the initial wave, due to differences in survey construction across years, as well as potential for changes in some of the variables. Multiple imputation was conducted using the mi package in R.

Second, we calculated propensity scores for each of the multiply imputed data sets based on the 118 matching variables, separately for each event and for each of the 10 imputed data sets, resulting in 70 different propensity calculations (10 data sets × 7 health events). These propensities were then used to match those who experienced the life event with those that had not, mimicking the conditions one would get using an experimental design. Because the sample sizes for the groups who experience specific health events are much smaller than the individuals who did not experience them, we used a 4 (no event) to 1 (event) matching scheme, with a caliper width of .25 (Guo & Fraser, 2015). Propensity score matching was done using the matchit package in R.

Third, we used the brms package in R to estimate seven multilevel growth curve models (one for each health event), with the 10 separate data sets for each health event pooled together using brm_multiple() function. Each repeated measure was predicted by year, our time measure. A participant's first assessment wave was scaled to be time 0, and thus the intercept of the model can be interpreted as a participant's starting value at the initial wave. Year can be interpreted as change in purpose for each year in study. Health event is a dichotomous predictor and was multiplied by the time variable. The resulting time-by-event coefficient represents whether change in purpose differed across event groups. Age and gender were included as a covariate in all models, in addition to being included in the PSM. To understand the effects of PSM, we also ran the models without the matching approach. Inferences will be based on 95% Bayesian credible intervals.

Results

As shown in Table 1, many participants experienced a health event for the first time after the initial purpose assessment. For the matched models, participants that would go on to experience a health event did not differ from those that were health event-free on initial sense of purpose (Table 2). In contrast, the unweighted models indicated that those who would eventually be diagnosed with a lung condition were higher on initial levels (estimate = .06, 95% CI [0.01, 0.11]), and those that would eventually be diagnosed with high blood pressure were lower in purpose (estimate = −.05, 95% CI [−0.08, −0.01]). These results indicate that matching was effective in equating the two groups to be equivalent at the initial wave on sense of purpose. Further, the balance plots (Supplementary Figures S1–S7) indicate that background characteristics were matched between the two groups.

As reported elsewhere (Hill & Weston, 2019), models suggested modest mean-level declines in sense of purpose across time (estimate = −.01, 95% CI [−0.00, −0.02]) as well as individual differences in intraindividual change (estimate = .09, 95% CI [0.08, 0.11]). These individual differences in trajectories allow investigations into whether health events explained differences in longitudinal change. Figure 1 presents the distributions for change scores across groups, demonstrating the capacity for individual differences in trajectories among all event groups where some people increase, and some people decrease in purpose across the 8-year period.

Table 3 presents the differences in purpose trajectories between those that had a health event after the initial wave compared to the purpose trajectories of those that did not experience a health event. For the matched analyses, all health events did not impact change in purpose relative to the control group. As seen in Figure 1, the estimates for both groups were just below 0, but nearly identical to one another. In contrast, the unmatched analyses found some evidence that health events were associated with changes in purpose, in a manner counter to the declining engagement account and more in line with the resilience account. Those that were diagnosed with a high blood pressure (estimate = .04, 95% CI [0.01, 0.07]) or experienced a stroke (estimate = .04, 95% CI [0.00,

Table 2. Initial Differences on Sense of Purpose Before and After Propensity Score Matching

	Matched		Unmatched	
Event	*b*	CI	*b*	CI
Arthritis	0.01	−0.03, 0.05	−0.01	−0.05, 0.02
Cancer	0.00	−0.04, 0.05	−0.01	−0.05, 0.03
Diabetes	−0.01	−0.06, 0.04	−0.01	−0.05, 0.03
Heart problems	0.01	−0.03, 0.05	0.01	−0.03, 0.04
High blood pressure	−0.02	−0.06, 0.02	**−0.05**	**−0.08, −0.01**
Lung disease	0.01	−0.06, 0.08	**0.06**	**0.01, 0.11**
Stroke	−0.01	−0.07, 0.05	0.04	−0.01, 0.08

Note: Health event was coded 1, while the control group was coded 0. Bold indicates $p < .05$.

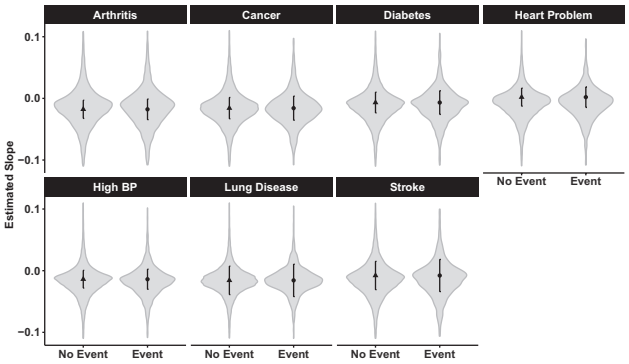

Figure 1. Distributions of individual-level purpose trajectories for health event and no event groups across different health events. Circles and triangles indicate the fixed effect of purpose trajectories for health event and no health event groups, respectively.

Table 3. Differences in Changes in Trajectories for Sense of Purpose Between Groups With and Without the Given Health Event, Both With and Without Propensity Score Matching

	Matched		Unmatched	
Event	*b*	CI	*b*	CI
Arthritis	−0.00	−0.04, 0.03	−0.01	−0.04, 0.02
Cancer	0.03	−0.02, 0.07	0.02	−0.01, 0.06
Diabetes	−0.02	−0.06, 0.02	−0.02	−0.05, 0.01
Heart problems	−0.00	−0.04, 0.03	0.00	−0.03, 0.03
High blood pressure	0.03	−0.00, 0.07	**0.04**	**0.01, 0.07**
Lung disease	0.02	−0.04, 0.07	0.01	−0.03, 0.06
Stroke	0.04	−0.02, 0.09	**0.04**	**0.00, 0.09**

Note: Negative estimates reflect greater declines among the group with the event. Bold indicates $p < .05$.

0.09]) increased on purpose relative to the control group. The remaining health events did not impact purpose trajectories even without PSM.

Discussion

The current study examined whether adverse health events influence trajectories for sense of purpose in older adulthood. After accounting for initial standing on a broad range of psychosocial and demographic variables, including sense of purpose, results demonstrated that older adults who experienced the major health events evaluated here differed little from adults who did not in their trajectories of change for sense of purpose. These findings provide evidence suggestive of older adults' resilience in the face of major health conditions; insofar, these events fail to derail their sense of purpose in the long term.

Given the design of the HRS, the current study was unable to consider what happens to individuals immediately following the onset of a health condition. Assessments spread 4 years apart may mask individuals' short-term fluctuations in sense of purpose, and work is needed to consider whether older adults show more reactive changes immediately following a health event. Past research has shown changes in sense of meaning, a construct related to purpose (Costin & Vignoles, 2020), in the days prior to and following a major life event (Wilt et al., 2016). However, even if shorter-term changes are evidenced, the current findings support a *resilience account* insofar that older adults may rebound after coping with health limitations. Indeed, the unmatched analyses even found *positive* change trajectories following two events.

Older adults may be finding new mechanisms or methods for goal-directed activity following the events, which aligns with theories of adult development that underscore the potential for individuals to compensate for losses (Baltes, 1997; Freund, 2008). Another possibility is that following health adversity, individuals may set new, lowered expectations for feeling purposeful. If true, objective purposeful activity may in fact decline, but self-reports would suggest maintenance because the individual is reaching now-lowered standards for being purposeful. Future research should consider whether individuals interpret purpose items differently based on health status, as seen in research on work status (Hill & Weston, 2019).

Additional limitations of the current work merit discussion. First, there is great heterogeneity in the experience and resulting consequences for any health event, capturing which often requires more proximal assessments to the event. Research should consider the role of event characteristics, such as severity and length, for understanding the differential trajectories for change shown in Figure 1. Moreover, it would be valuable to obtain health records to confirm the self-reports of the event and its characteristics. Second, the current study provided no information on the content of the participants' life goals. Health events may hold greater consequence when the participant's purpose in life requires greater activity. Third, additional assessments are needed to consider nonlinear change trajectories, and the potential compounding effects of multiple health conditions. Although the propensity score matching accounted for initial number of health conditions, it would be valuable to understand whether multiple, closely timed event occurrences would hold more negative consequences for sense of purpose; however, such work is complicated by the difficulties with matching groups that experienced more than one event, and information would again be needed regarding the timing of multiple events.

These caveats aside, the current findings paint a positive picture for maintaining purpose in older adulthood. Across multiple health events, older adults who experienced the event differed little on average in their trajectories for sense of purpose. These findings also should motivate inquiry into identifying older adults who are more likely to maintain purposefulness following health events, which may require understanding of available support mechanisms (Lewis et al., 2018; Weston et al., 2020).

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflict of Interest

None declared.

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