The Costs of Coping: Long-Term Mortality Risk in Aging Men

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ABSTRACT

Objectives: Prospective associations between coping and all-cause mortality risk are understudied, particularly among non-medical samples. We assessed independent and joint associations of multiple components of the transactional stress and coping model with all-cause mortality in a cohort of community-dwelling men. We were particularly interested in how coping effort related to mortality.

Methods: Participants included 743 men from the Veterans Affairs Normative Aging Study who completed 1+ stress and coping assessment in 1993–2002 (baseline age: *M*=68.4, *SD*=7.1) and had mortality follow-up through 2020. The Brief California Coping Inventory assessed coping with a past-month stressor. Cox regression evaluated associations of problem stressfulness, coping strategies, total coping effort, and coping efficiency with all-cause mortality risk.

Results: Over a mean follow-up of 16.7 years (*SD*=7.1), 473 (64%) men died. Problem stressfulness was not associated with mortality risk (HR:1.07, 95%CI: 0.98–1.17), adjusted for demographics and health conditions. When examining coping via specific strategies, only social coping was associated with higher mortality risk (HR:1.15, 95%CI: 1.05–1.26) after Bonferroni correction. Total coping effort was associated with 14% greater risk of all-cause mortality (95%CI: 1.04–1.26), independent of problem stressfulness, demographics, and health conditions. Coping efficiency, a benefit-cost ratio of coping efficacy to total coping effort, was not associated with mortality risk in adjusted models.

Discussion: Total coping effort may be an important indicator for longevity among aging men, above and beyond problem stressfulness and specific coping strategies, which have been the foci in prior research.

Keywords: Stress, Coping behavior, Longevity, Health

The most widely adopted conceptualization of stress in psychological science defines stress as a person-environment transaction involving stressor exposure, primary appraisal concerning problem stressfulness, and secondary appraisal regarding adequacy of resources to cope with the problem (Lazarus & Folkman, 1984). Coping, defined as cognitive and behavioral efforts to manage the problem and its attendant negative affect, follows the appraisal of stressors as exceeding resources (Lazarus & Folkman, 1984). While a rich literature links stressor characteristics and greater perceived stress to mortality risk in large, population-representative samples (Johnson et al., 2020; Redmond et al., 2013), research on coping and health outcomes has been largely limited to clinical samples with short follow-up durations. Considering both stress *and* coping aspects of the transactional framework, the current study examines prospective associations of stressor appraisal and multiple coping constructs (specific strategy use, total effort, and efficiency) with risk of all-cause mortality over 17 years in a cohort of older men.

Research on coping and health has been predominantly focused on psychological outcomes and conducted in medical samples. Surveying the coping literature, Kato (2015) meta-analyzed studies that used one or more "frequently used coping scales," defined as a scale used in ten or more articles. Nearly half (48%) of the studies used patient samples and 60% examined a health-related stressor. Most coping outcomes were psychological (e.g., depression, anxiety) rather than physical (e.g., physical symptoms) (Kato, 2015). Among studies that considered physical health outcomes of specific coping strategies, the focus tended to be on disease-related stressors (e.g., medical diagnoses, pain) (Kato, 2015) and/or disease-specific mortality in small medical samples (e.g., Wolf & Mori, 2009). Thus, the findings may be partially driven by disease-specific processes and mental health factors and may not generalize to the broader population. Even fewer studies have considered mortality outcomes of specific coping strategies.

As reviewed below, findings have been somewhat mixed, in part because of differences in samples, inclusion and operationalization of strategies, and mortality outcomes (i.e., all-cause versus cause-specific).

One commonly used approach to categorizing coping strategies is by labeling them as adaptive or maladaptive based on their associations with favorable or poor health outcomes, respectively (Penley et al., 2002). Generally, adaptive strategies are thought to promote favorable outcomes by helping people manage their environments, social resources, and beliefs, whereas strategies are deemed maladaptive when they lead people to give up too soon, persist for too long, or fight unproductively. Examples of adaptive strategies include problem-focused strategies (actively addressing the stressor), support-seeking (soliciting emotional or instrumental support from others), and positive reappraisal (redirecting attention to positive aspects of the stressor). Examples of maladaptive strategies include escape-avoidance (withdrawing emotionally or physically from the stressor) and confrontive coping (hostile or aggressive efforts to alter the situation) (Penley et al., 2002).

With respect to mortality, studies have linked maladaptive coping strategies with greater risk, but findings for adaptive strategies are less clear. For maladaptive strategies, denial and behavioral disengagement were associated with 6% shorter lifespan in a national sample of middle-aged and older U.S. adults followed for 13 years (Trudel-Fitzgerald et al., 2022). In a population-based study of Japanese adults aged 50-79, avoidance-oriented coping was linked to higher risk of cardiovascular disease mortality (Svensson, Inoue, Sawada, Yamagishi, et al., 2016). For adaptive coping strategies, some studies reported protective effects of advice seeking (Delaney et al., 2018), religious/spiritual coping (e.g., prayer) (Chida et al., 2009), planning, consulting others, and positive reappraisal (Svensson, Inoue, Sawada, Charvat, et al., 2016;

Svensson, Inoue, Sawada, Yamagishi, et al., 2016). Other studies, however, reported null associations with mortality (e.g., Trudel-Fitzgerald et al., 2022). These mixed findings have called into question the utility of the adaptive/maladaptive categorization (Stephenson & DeLongis, 2020). Furthermore, the dichotomy assumes that all (mal)adaptive strategies are equally (mal)adaptive and relate to outcomes in the same manner across stressor contexts and personal characteristics (e.g., resources) (Tamres et al., 2002).

Beyond specific strategy use, little is known about how additional dimensions of coping relate to mortality risk. As most people use more than one coping strategy in response to a stressor, it is logical to study the impact of using various strategies simultaneously (Vishwanatha et al., 2015). One approach is to assess coping repertoire breadth, defined as the number of strategies used above sample-specific thresholds (Cheng et al., 2014). However, this approach does not consider the extent of coping efforts and lacks comparability across studies. An alternative approach considers total coping effort, which measures variance in use across all strategies within a coping questionnaire (Aldwin, 2007).

Limited work has considered how appraisals about one's coping influence health. Coping efficacy refers to appraisals of past coping efforts or future expectations about one's abilities to cope with stressors (Zautra & Wrabetz, 1991). Coping efficacy may explain or influence coping-health associations (Aldwin & Revenson, 1987; Zautra & Wrabetz, 1991) but has not been considered in relation to longevity. Comparing coping efficacy relative to coping effort is analogous to a benefit-cost ratio which addresses the question, *how well has my coping effort paid off*? The effort-reward imbalance model posits that effort-reward imbalance in stressful circumstances has negative health effects (Siegrist, 1996). Extending Siegrist's work to aging research, we operationalized coping efficiency as a benefit-cost ratio of coping efficacy to coping

effort. We hypothesized that inefficient coping (i.e., low efficacy despite high effort) would be associated with shorter lifespan.

Although older age is marked by unique resilience and vulnerabilities vis-à-vis stress and coping processes (Charles, 2010), the role of age in coping-health associations has received little research attention. Aldwin and colleagues (2023) proposed that lifespan development is characterized by more efficient coping, which allows older adults to conserve diminishing supplies of resources, such as time, cognitive attention, and physical energy. Supporting these notions, studies reported that, older versus younger adults appraised fewer situations as stressors, reported lower stress ratings, and used fewer coping strategies while reporting similar coping efficacy (Aldwin et al., 2023). A converging line of research reinforces the notion that older adults' tendency to use less coping effort is developmentally adaptive. The Strength and Vulnerability Integration (SAVI) theory (Charles, 2010) posited that older adults use avoidant coping strategies that limit exposure to and reduce emotional engagement with stressors more often than younger adults. However, when older adults are unable to disengage from or de-escalate negative experiences, they are less able to modulate their physiological response, which can have deleterious health consequences (Piazza et al., 2019). Thus, older adults may be particularly motivated to adopt coping behaviors that limit stressor engagement and minimize resource use.

Current Study

The current study considered prospective associations of stress and coping components of the transactional model (Lazarus & Folkman, 1984) with all-cause mortality risk. We evaluated primary appraisal of a specific stressor (i.e., problem stressfulness), specific strategy use, total coping effort, and coping efficiency as exposures. We tested four hypotheses: (1) Problem

stressfulness ratings would be positively associated with all-cause mortality risk. (2) Beyond problem stressfulness, greater use of coping strategies typically considered adaptive for health would be associated with lower mortality risk, while coping strategies typically considered maladaptive would be linked to higher mortality risk. (3) Higher total coping effort would be associated with greater mortality risk, as more effortful coping requires greater energy expenditures under stress (Hobfoll, 2011). (4) Greater coping efficiency (i.e., higher efficacy for each unit of effort) would be associated with lower mortality risk. Our analyses adjusted for demographic and health variables known to be associated with both coping and mortality (Svensson, Inoue, Sawada, Charvat, et al., 2016; Trudel-Fitzgerald et al., 2022). We also considered health behaviors, which could confound or mediate these associations (Rodgers et al., 2021).

Methods

Study Design and Sample

The Veterans Affairs (VA) Normative Aging Study (NAS) is a longitudinal study of aging men founded at the VA Boston Outpatient Clinic (Bossé, 1984). Between 1961 and 1970, over 6,000 community-dwelling men were screened for absence of major physical and mental illness and for geographic stability; 2280 men aged 21 to 81 years were enrolled; over 90% were veterans. NAS men have undergone in-person examinations since enrollment. In 1993, a stress and coping assessment was added to a psychosocial survey administered by mail one month prior to each triennial examination.

Men were included in the present study if they had at least one stress and coping assessment in which they (1) reported a past-month stressor that caused at least some stress, and

(2) responded to at least 80% of items within the coping inventory. Their earliest assessment meeting these criteria served as their baseline (range: 1993-2002, median: 1996). Our analytic sample included 743 men. Excluded men were older, had lower educational attainment and income, and were more often unmarried (Supplemental Table 1S). The VA Boston Healthcare System institutional review board approved the NAS protocol. Participants provided written informed consent.

Measures

Past-Month Stressor

Participants described "the most stressful thing that occurred to [them] in the past month". Subsequent questions regarding problem stressfulness, coping strategies, and coping efficacy were anchored to this stressor. Stressors were related to health (33%), miscellaneous hassles (24%), children (9%), and work (9%) (see Supplemental Table 2S).

Problem Stressfulness

Participants rated how much the problem bothered them on a scale from 1 ("not at all troubled") to 7 ("the most troubled I've ever been") (*M* (*SD*)= 3.4 (1.5); Supplemental Table 4S). We recoded item responses to 0 to 6 and z-standardized the scores (i.e., *M*=0, *SD*=1). Following Lazarus and Folkman's (1984) definition of a stressor as an event appraised as stressful, we omitted 34 men who rated stressfulness as 0 and 73 men with missing data.

Coping Effort

Coping effort via coping strategies. The Brief California Coping Inventory (BCCI; Aldwin, Sutton, & Lachman, 1996) asked respondents to rate the extent to which they used 45 coping items to address their past-month stressor. Men rated how much they used each from 0 ("not at all") to 3 ("did a lot"). We excluded one item ("take time outs") because it was

erroneously dropped from a subset of surveys. We conducted an exploratory factor analysis and identified a 5-factor solution comprising 35 items that largely replicated prior psychometric work on the scale in a large, middle-aged adult sample (Aldwin, Sutton, & Lachman, 1996). We removed six items due to weak factor loadings (<.35), and three items on using substances or food to cope (Supplemental Methods). As alcohol use and dietary habits may function both as coping strategies and as habitual behaviors (Park & Iacocca, 2014), we evaluated health behaviors as covariates. The five retained BCCI factors (i.e., coping strategies) were positive action (α = .87, 13 items, e.g., "Focus on managing the problem"), social coping (α = .74, 4 items, e.g., "Strengthen your ties to others"), spiritual coping (α = .89, 3 items, e.g., "Pray for guidance"), negative action (α = .78, 9 items, e.g., "Yell or curse"), and escape avoidance (α = .68, 7 items, e.g., "Distract yourself") (Supplemental Table 3S). We computed strategy-specific z-scores, using mean substitution for missing items, for subscales with 80% or more non-missing items.

In post-hoc analyses, we considered coping strategy scores as a share of total coping effort. Following Vitaliano et al. (1987), we computed *relative strategy scores* by dividing each absolute coping strategy score by a man's total coping effort score (described below).

Total coping effort. We computed total coping effort by summing strategy-specific z-scores for participants with data on 4+ coping strategy z-scores. To evaluate possible non-linear associations, we coded total coping effort terciles.

Coping Efficiency

We operationalized coping efficiency as a benefit-cost ratio of coping efficacy to total coping effort. Efficacy was assessed with the item "Given the circumstances, how did you feel you handled this problem overall?" (1 = "not well at all" to 5 = "very well"). We standardized

coping efficacy and total effort using percent of maximum possible scores (100*(raw – min)/(max – min)), before dividing coping efficacy by total coping effort. Given equal coping effort, coping efficiency is higher when someone thinks they have handled the problem better.

Covariates

Covariates were assessed concurrently with coping. We selected covariates that could confound or lie on the causal pathway from coping to mortality. Demographic covariates included age, education in years (1 to 20), marital status (married versus other), income (assessed as 1=<$15k to 14=$75k+, coded into quartiles), and race (white versus non-white). Health conditions were a count of four major chronic conditions (diabetes, cancer, chronic obstructive pulmonary disease, and cardiovascular disease) assessed by a study physician at the in-person exam. Health behaviors included self-reported smoking status (never, former, and current) and alcohol consumption (none to moderate, former, and heavy/problematic drinking).

Neuroticism is a personality factor associated with both mortality (Graham et al., 2017) and stress and coping processes (Lahey, 2009). More neurotic individuals tend to generate and/or perceive more stressors, appraise stressors as more aversive, and experience exaggerated acute stress response. Neuroticism was assessed at baseline with nine dichotomous items from the short Eysenck Personality Inventory (Floderus, 1974), which has good internal consistency (Cronbach's alpha=.74) in our sample. Item scores were summed to yield a total score from 0 (lowest) to 9 (highest). Missingness in up to two items was handled using mean substation.

The Elders Life Stress Inventory (ELSI; Aldwin, 1990) assessed occurrence (1=yes, 0=no) of 30 past-year major life events common among middle- and older-adults (e.g., retirement, spousal death). We summed the number of past-year events endorsed and, due to

skewness, top-coded responses into categories representing 0, 1, 2, 3, and 4+ events. ELSI scores were positively associated with problem stressfulness and neuroticism (Aldwin et al., 1989).

All-Cause Mortality Assessment

Participant deaths were identified via searches of Veterans Affairs records and the Social Security Administration Death Master File, and by notification from next of kin or postal authorities. Death certificates were obtained from state health departments, coded by an experienced research nurse, and reviewed by a NAS physician. We considered deaths that occurred between each participant's baseline and March 2020.

Statistical Analysis

We generated descriptive statistics by coping effort terciles and examined bivariate correlations among analytic variables. We tested hypotheses using Cox proportional hazards regression predicting time-to-event (1=death; 0=right-censored) since coping assessment. The first equation evaluated problem stressfulness as a predictor of all-cause mortality risk. Subsequent equations adjusted for problem stressfulness while evaluating key predictors. Equations two through six tested associations of specific coping strategies (one strategy per equation) with mortality. To test the hypothesis that more effortful coping would be associated with higher mortality risk, independent of problem stressfulness, equation seven replaced individual strategies with total coping effort. Finally, to evaluate the association between coping efficiency and mortality risk, equation eight predicted all-cause mortality from the coping efficacy-to-effort ratio.

We considered three levels of covariate adjustment in the eight aforementioned equations. Model 1 adjusted for demographics (age, education, marital status, race, income). Model 2 (core model) added chronic health conditions as a potential confounder. Model 3

considered health behaviors as potential confounders and/or pathway variables of coping-mortality associations and was deemed exploratory because smoking and drinking alcohol can be coping strategies themselves.

We further probed associations in three sets of supplemental analyses. First, to consider nonlinear effects, we tested associations of coping effort terciles with mortality risk. Second, because neuroticism and stressful life events have each been linked to mortality risk (Cohen et al., 2019) and may confound coping-mortality associations, we conducted sensitivity analyses that added past-year stressful life events (Model A), neuroticism (Model B), and both variables (Model C) to Cox equations predicting mortality risk from total coping effort. Third, to clarify unexpected findings related to specific coping strategies, we conducted post-hoc analyses that substituted strategy-specific absolute effort scores with strategy-specific *relative* scores in Cox equations adjusted for problem stressfulness.

Tests of the proportional hazard assumption indicated no violations by demographic confounds. Missing covariate data were handled using maximum likelihood estimation. We report results regarding the five individual coping strategies with respect to traditional significance thresholds ($p < .05$, 95% CI not including one) while noting whether they withstand Bonferroni adjustment for multiple testing ($p<.01$).

Results

Men averaged 68.4 years old at baseline (*SD*=7.1, range=50–97). Most had at least some college education (*M*=14.3 years, *SD*=2.5) and were married (87%). Follow-up duration averaged 16.7 years (*SD*=7.1); 64% died during follow-up. Participants with low coping effort were older than those with medium and high effort, $F(1, 741)=19.60$, $p < .0001$, and had fewer

chronic conditions than those with high effort, $F(1, 741)=4.26$, $p=.04$. Most coping strategies were weakly to moderately *positively* correlated (Supplemental Table 4S). Coping strategies thought to be adaptive were used more frequently than those considered maladaptive (Supplemental Table 5S). Higher problem stressfulness was associated with greater coping effort ($r=.25$, $p<.01$).

Association of Stress and Coping Components with Mortality

Table 2 summarizes main analyses evaluating associations of problem stressfulness, specific coping strategies, total coping effort, and coping efficiency with all-cause mortality risk. The association of problem stressfulness with mortality was not statistically significant (HR: 1.08, 95% confidence interval [CI]: 0.99–1.18), albeit in the expected direction. The association remained non-significant after adjusting for health conditions (Model 2: HR: 1.07, 95%CI: 0.98–1.17) and health behaviors (Model 3: HR: 1.0, 95%CI: 0.98–1.17).

Each additional *SD* of positive action, social coping, and spiritual coping was associated with 9% (95%CI: 1.00–1.20), 15% (95%CI: 1.0–1.26), and 10% (95%CI: 1.00–1.21) higher mortality risk, respectively, adjusting for problem stressfulness, demographics, and health conditions (Table 2, Model 2). Negative action and escape avoidance were not associated with mortality risk. After Bonferroni correction for multiple testing across specific strategies, only social coping remained significantly associated with mortality risk. Results remained consistent when further accounting for smoking and drinking (Model 3).

Each *SD* greater total coping effort was associated with 14% higher mortality risk, adjusted for problem stressfulness, demographics, and health conditions (Model 2: HR: 1.14, 95%CI: 1.04–1.26). The association was robust to additional adjustment for health behaviors

(Model 3: HR: 1.13, 95%CI: 1.03–1.24). Coping efficiency was unrelated to mortality (e.g., Model 2 HR: 1.00, 95%CI: 0.98–1.02).

Association of Coping Effort Terciles with Mortality Risk

Results regarding total coping effort were replicated when effort was measured in terciles. Compared to men with low coping effort, mortality risk was incrementally higher among men with medium (Model 2: HR=1.13, 95%CI: 0.90–1.41) and high (HR:1.31, 95%CI: 1.03–1.65) coping effort.

Role of Contextual Factors

The association of total coping effort with all-cause mortality was unchanged when accounting for neuroticism and past-year stressful life events as background influences (Supplemental Table 6S, Model C versus Table 2, Model 2).

Associations of Relative Coping Strategies with Mortality Risk

We conducted post-hoc analyses to clarify unexpected associations between greater use of adaptive coping strategies and higher mortality risk. We replaced each strategy-specific score reported above (henceforth, "absolute" score) with the corresponding *relative* strategy-specific z-score to ascertain whether greater use of a strategy relative to others was important for mortality risk, irrespective of individual differences in total effort (Supplemental Table 7S). Greater relative use of spiritual coping was associated with 1% *lower* mortality risk (Model 2: HR: 0.99, 95%CI: 0.98–1.00), compared with 10% *higher* mortality risk from greater absolute use (Table 2, Model 2: HR: 1.10, 95%CI: 1.00–1.21). Greater relative use of positive action was also marginally linked to 2% higher mortality risk (Model 2: HR: 1.02, 95%CI: 1.00–1.03), compared with 9% higher mortality risk from greater absolute use (Table 2, Model 2: HR: 1.09, 95%CI:

1.00–1.20). Neither association withstood correction for multiple testing via Bonferroni adjustment.

Discussion

We evaluated associations of multiple components of the transactional stress and coping model (Lazarus & Folkman, 1984) with all-cause mortality risk over 17 years in a well-characterized cohort of aging men. The most salient predictor of all-cause mortality was total coping effort, which was associated with a 14% greater all-cause mortality risk. These associations were robust to adjustment for problem stressfulness, demographic confounds, health conditions, and health behaviors. Across specific coping strategies, greater use of social coping was associated with 15% higher mortality risk. Coping efficiency, a benefit-cost ratio indexing coping payoff, and appraisal of problem stressfulness were unrelated to all-cause mortality risk. Contextualizing our findings against those obtained from younger samples suggests that, in older age, the overall cost incurred by one's coping effort may be more important for longevity than the type of strategy used.

Greater coping effort was associated with higher mortality risk, adjusted for problem stressfulness, demographics, health conditions, neurotic personality, and recent life stressors. This finding supports three prominent theories of aging, two of which posit that older adults avoid or minimize stressors to promote adaptation, and one of which notes the importance of resource conservation in later life. SAVI (Charles, 2010) argues that older adults use more proactive and avoidant coping to avoid stressors and maintain emotional and physiological equilibrium. The Coping, Appraisal, Resilience, and Aging (CARA) model (Aldwin & Igarashi, 2016) proposes that older adults are less likely to appraise situations as stressful and thereby

conserve resources. The Conservation of Resources Theory (Hobfoll, 2011) posits that, for individuals with low resource reserves or ongoing resource loss, like older adults, the cost of resource expenditure (i.e., coping) can begin to outweigh potential benefits. Resource conservation may explain why older adults use fewer coping strategies than younger adults to manage their problems (Aldwin, Sutton, Chiara, et al., 1996; Meeks et al., 1989). Our study suggests that greater resource investment (i.e., less conservation), reflected by greater total coping effort, has a cost for adaptation in later life. Coping efforts may generate resource loss spirals, a scenario involving a net loss of resources which renders individuals less equipped to cope with future stressors, thus begetting further loss (Hobfoll, 2011). Loss spirals are particularly destructive for individuals who have or are susceptible to having few resources. Older adults experiencing age-related physical and cognitive declines may deploy resources to manage multiple stressors often encountered in later life, such as caring for an ailing partner and grieving the loss of a friend. The physical, cognitive, emotional, and financial resources used to cope with these problems may deplete their already-low resource reserve, leading to further losses. Loss spirals may initiate or accelerate deteriorative biological cascades that culminate in diseases and premature death. Resource-intensive coping likely involves greater emotional engagement with stressors, which places older adults at greater risk for physiological dysregulation (Charles, 2010) and thus increases mortality risk. In older ages, avoiding or minimizing problems may be more adaptive than expending resources to cope with them.

The pattern of findings for specific coping strategies was contrary to our expectations and suggests that the commonly adopted classification of strategies as adaptive versus maladaptive may be an oversimplification that does not readily extend to longevity in later adulthood. Social coping was the only strategy typically deemed adaptive that had a meaningful association with

mortality risk after correction for multiple testing, and we observed *elevated* mortality risk with greater use of social coping. The nature of social support in this study may help explain this finding. Our social coping items involve other-directed action that may deplete emotional and physical resources instead of bolstering them (e.g., do something to help others; provide emotional support; try to placate others; Supplemental Table 3S). Resource mobilization may be a shared phenomenon driving both the associations of total coping effort and social coping with higher mortality risk. Among aging men, resource-intensive social coping, when mainly used to serve others rather than to support oneself when facing stressors, was associated with greater risk of dying.

The association of problem stressfulness with mortality risk was not statistically significant. While the parameter estimates were in the expected direction, they were imprecise, as evidenced by the wide confidence interval. We assessed stressfulness with a single item referring to a stressor at a snapshot of participants' lives, which may not fully represent their typical stressful experiences and corresponding appraisals. The parameter estimates for problem stressfulness were drastically and consistently reduced when considered in conjunction with coping constructs (Model 2: HR=1.07 as a sole predictor vs. 1.02 after including total coping effort). Thus, the toll of stressful problems on lifespan may be partially attributable to the effort individuals spend managing them. Likewise, coping efficiency, a novel benefit-to-risk index of coping payoff, was not associated with mortality. This may be due to its limited range, as most men in our sample considered their coping to be quite efficacious. It would be useful to examine this novel metric in more diverse samples. Taken together, these findings underline the value of disentangling the contributions of various stress and coping constructs to health.

Associations between coping and mortality risk were only slightly attenuated by health behaviors (smoking and drinking). Future research should consider additional candidate pathways, including behavioral (e.g., diet, exercise), social (e.g., social integration), and biological (e.g., blood pressure) factors.

Several limitations should be considered. First, our sample was limited to older White, male participants from a long-running study who were in their late 60s at baseline and relatively healthy. They are generally representative, albeit of slightly higher SES, of the male population in New England at NAS enrollment. Typical of their birth cohort, most participants served in the military when young and have varying degrees of military exposures that may confer long-term positive and negative effects on their stress appraisals, socioemotional resources, and coping skills, which our research group has considered in other works (Spiro et al., 2015). Our results may not generalize to other populations, including women, minoritized individuals, or younger cohorts, in light of group differences in stress and coping constructs (Almeida et al., 2020; Robinson & Thomas Tobin, 2021; Tamres et al., 2002). Second, while we adjusted for demographic factors, health conditions, and health behaviors, residual confounding from unmeasured variables (e.g., early-life exposures) is possible. Moreover, our analyses adjusted for several leading causes of death in older adults, but we did not include cognitive impairment, which has been linked to perceived stress (Kulshreshtha et al., 2023) and coping strategies used (Helvik, 2021).

The current findings contribute to the extant literature on stress, coping, and mortality by parsing the transactional model into key components and testing their independent associations with mortality using a prospective design with 17 years of follow-up. Per Lazarus and Folkman's (1984) recommendation, we assessed coping effort vis-à-vis a specific problem (as opposed to a

hypothetical problem or problems in general), thereby enhancing the validity of our coping assessment. Including total coping effort as a predictor allowed us to compare the common underlying energy "cost" or "wear and tear" of coping, even when specific coping behaviors differed. Given that stress and coping unfold in real-life contexts, ecological designs that track processes on more granular timescales may inform mechanistic targets for intervention to extend years spent in good health.

Altogether, our findings indicate *how much* individuals do in response to stressors matters more for longevity in old age than *what* they do. It may be useful for clinicians to monitor the effort older adults are using to manage their problems, as highly effortful coping may signal a need for support and/or resources. Interventions designed to empower aging adults by bolstering their resources and capacity to cope with stressors may be relevant for extending our life span.

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Conflict of Interest

None.

Data Availability

This study was not preregistered. Requests to access the study materials and VA-owned data can be submitted to A. Spiro (avron.spiro@va.gov) and will be considered on a case-by-case basis. Analysis scripts and output files will be made available upon request to the corresponding author.

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Table 1. *Descriptive Statistics of Covariates and Mortality by Total Coping Effort Terciles*

	Low		Medium		High			
[Variable]	*M / %*	*SD*	*M / %*	*SD*	*M / %*	*SD*	F/χ^2	*df* [a]
Demographics								
Age	70.0	7.0	67.9	7.5	67.2	6.5	19.60**	(1, 741)
Education in years	14.0	2.5	14.6	2.5	14.4	2.5	3.20§	(1, 741)
Marital Status (% Married)	87.5		84.8		88.5		1.63	2
Race (% White)	97.6		97.5		98.4		0.60	2
Income in USD (%)							9.96	6
<15k to <30k	23.1		20.6		20.2			
30k to <45k	28.3		27.2		22.9			
45k to <60k	30.4		24.3		30.0			
60k to 79,999k	18.2		28.0		26.9			
Major chronic conditions [b]								
Number of conditions	0.8	0.8	0.8	0.8	0.7	0.8	4.26*	(1, 741)
Health Behaviors								
Smoking status (%)							5.92	4
Never Smoker	25.1		23.1		26.9			
Former Smoker	69.6		66.3		64.0			
Current Smoker	5.3		10.7		9.1			
Alcohol Consumption (%)							7.9§	4
None to moderate	82.6		78.6		82.2			
Former	15.4		16.9		17.0			
Heavy or problematic	2.0		4.5		0.8			

Note. n = 743; *M* = mean, *SD* = standard deviation, *HR* = hazard ratio, *CI* = confidence interval, *df* = degrees of freedom, k = thousand; Covariates were assessed at each participant's study baseline.

[a] df shown in brackets are ($df_{Between}$, df_{Within})

[b] Major chronic conditions include cancer, cardiovascular disease, chronic obstructive pulmonary disease, and diabetes.

** $p < .01$; * $.01 \leq p < .05$; § $.05 \leq p < .10$.

Table 2. *Associations of Problem Stressfulness, Coping Effort, and Coping Efficiency with All-Cause Mortality*

	Model 1[a]	**Model 2 (Core)**	**Model 3 (Exploratory)**
[Variable]	**HR (95% CI)**	**HR (95% CI)**	**HR (95% CI)**
Equation 1: *Problem Stressfulness Only*			
Stressfulness	1.08 (0.99–1.18)[§]	1.07 (0.98–1.17)	1.07 (0.98–1.17)
Equations 2–6: *Individual Coping Strategies (z-scores)*[b]			
Positive Action	1.07 (0.98–1.17)	1.09 (1.00–1.20)[§]	1.10 (1.01–1.20)[*]
Social Coping	1.13 (1.03–1.24)[*]	1.15 (1.05–1.26)[**]	1.14 (1.04–1.25)[**]
Spiritual Coping	1.13 (1.02–1.24)[*]	1.10 (1.00–1.21)[*]	1.10 (1.00–1.21)[§]
Negative Action	1.04 (0.95–1.14)	1.05 (0.96–1.16)	1.04 (0.94–1.14)
Escape Avoidance	1.09 (0.99–1.19)[§]	1.06 (0.97–1.16)	1.05 (0.95–1.15)
Equation 7: *Total Coping Effort (z-score)*[b]			
Total Coping Effort	1.13 (1.03–1.24)[*]	1.14 (1.04–1.26)[**]	1.13 (1.03–1.24)[**]
Equation 8: *Coping Efficiency*[b,c]			
Coping Efficiency	1.00 (0.98–1.02)	1.00 (0.98–1.02)	1.00 (0.98–1.01)

Note. n = 743. HR = hazard ratio.

[a] Model 1 adjusted for demographics. Model 2 adjusted for demographics and health conditions. Model 3 adjusted for demographics, health conditions, and health behaviors. Higher coping efficiency represents greater perceived efficacy (i.e., how well one has handled the problem) divided by total coping effort.

[b] Equations for individual coping strategies, total coping effort, and coping efficiency were adjusted for problem stressfulness, which was no longer significant in any of the equations. Individual coping strategy equations were Bonferroni-corrected to adjust for multiple analyses.

[c] Equations for coping efficiency were conducted in men with non-missing coping efficiency (n=726).

[**] $p < .01$, Bonferroni adjusted threshold; [*] $.01 \leq p < .05$; [§] $.05 \leq p < .10$.