Health Psychology

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Objective: Higher life satisfaction is associated with reduced risk of age-related morbidities and premature mortality. However, the degree to which life satisfaction moderates the physical and mental health-related outcomes of daily stressors remains understudied. In this study, we evaluated whether higher life satisfaction moderated the association between the experience of daily stressors and reports of positive affect, negative affect, and physical symptoms. *Method:* We used data from a substudy of the Midlife in the United States Study ($n = 2,022$; conducted 2004–2009). Participants reported their life satisfaction and daily diary entries on stress, positive/negative affect, and physical symptoms. We used multilevel modeling to assess whether life satisfaction moderated stress-related variations in affect and physical symptoms when participants reported a particularly high number of stressors. *Results:* Higher life satisfaction was associated with lower negative affect and fewer physical symptoms among participants who reported more frequent stressors (i.e., between-subjects). We did not observe associations with positive affect. Life satisfaction also moderated the impact of stressors within individuals, such that people reported higher negative affect and physical symptoms on days with more stressors but this association was reduced among those higher in life satisfaction. *Conclusion:* The findings from this study advance our understanding of how life satisfaction might confer benefits for mental and physical health, primarily through moderating the effect of stress on poorer outcomes. We discuss the findings in the context of the mechanisms linking psychological well-being to physical health in the context of stress across the lifespan.

Public Significance Statement
Higher life satisfaction is associated with a reduced risk of morbidity and mortality across the lifespan, but its role in moderating stress-related processes is understudied. This study finds that life satisfaction moderated the association between daily stressors and emotions and physical symptoms, suggesting that the negative effects of stress might be lower among those high in psychological well-being.

Life satisfaction is one promising health asset seen to be influential for individuals (Bolier et al., 2013; Wiese et al., 2018) and even at the national scale (Bolier et al., 2013; Helliwell et al., 2018; The Global Council for Happiness and Wellbeing, 2019). Mounting research suggests that higher life satisfaction is associated with better health outcomes and behavior. These outcomes include reduced risk of chronic disease (Boehm et al., 2016; Kim et al., 2021), preventable hospitalizations (De Prophetis et al., 2020), high health care use (Goel et al., 2018), and mortality (Kim et al., 2021).

Moreover, life satisfaction is also thought to provide people with social and psychological resources associated with better mental and physical health (Kim et al., 2021). This protective effect of life satisfaction may also have implications for how people perceive and respond to stress over the course of their daily lives—one of the most pernicious causes of poorer health across the lifespan (Cerino et al., 2024; Leger et al., 2021; Sin et al., 2015). However, limited research has addressed whether life satisfaction may moderate the association between stress and mental and physical health outcomes, and understanding the differential effects of stress on these outcomes could point to novel means of improving health. This study addresses this particular question—whether life satisfaction might moderate the association between daily stress and mental and physical health in response to daily stress.

Life Satisfaction and How It Is Related to Stress

Life satisfaction refers to a cognitive, evaluative judgment of one's overall life quality, reflecting the extent to which individuals perceive their life as aligning with their expectations and values (Diener et al., 1985). It is a key component of subjective well-being—an umbrella term encompassing life satisfaction, the presence of positive affect, and the absence of negative affect (Diener et al., 1999). While life satisfaction captures a more reflective and global evaluation, positive and negative affect represent emotional experiences in the moment or over shorter durations. Life satisfaction overlaps conceptually with purpose—both involve evaluating one's life as valuable and fulfilling—but purpose emphasizes direction and goal pursuit (Ryff, 1989), whereas life satisfaction focuses on contentment, which is why they are modestly related but separate constructs (Li et al., 2021; Martinez-Calderon et al., 2023).

In the United States, life satisfaction levels are generally moderate to high, though they vary across demographic groups and over time. The Gallup Polls report that most Americans rate their satisfaction between 6 and 8 on a 10-point scale, with differences influenced by age, income, and social factors (Helliwell et al., 2023; Jebb et al., 2020). Life satisfaction can also serve as a personal resource or health asset: individuals with higher life satisfaction tend to experience better mental and physical health outcomes, including lower risks of mortality and chronic illness (Steptoe et al., 2015). While life satisfaction exhibits relative stability over time, consistent with personality traits like conscientiousness it remains dynamic and responsive to life circumstances such as unemployment, marriage, or health declines (Lucas & Donnellan, 2007). Thus, life satisfaction reflects both a stable predisposition and a state-sensitive measure of well-being.

A few laboratory studies suggest life satisfaction might enhance health by moderating the association between stress and harmful outcomes. In other words, although stress is associated with deleterious mental and physical health, it is possible that life satisfaction might serve as a protective factor in ameliorating the negative effects that stress has on mental and physical health. Specifically, given the more adaptive appraisal and coping strategies of those people high in life satisfaction, experiencing daily stressors may not seem as daunting or harmful for people relatively satisfied with their lives (Haehner et al., 2024; Hamarat et al., 2001; Luhmann et al., 2021). For example, people will often display disrupted cardiovascular functioning in response to laboratory stress tests (Schwerdtfeger et al., 2017), but in these contexts, people with higher life satisfaction tend to display a healthier cardiovascular profile (i.e., greater cardiac output and lower peripheral resistance). Cardiovascular recovery also tends to be faster among those higher in psychological well-being (Papousek et al., 2010). These studies suggest that, although stress disrupts physiological functioning, people higher in life satisfaction do not experience as severe consequences and might recover faster. Altogether, there is evidence that life satisfaction may moderate associations between stress and adverse physical outcomes. However, although these laboratory studies are invaluable at providing an internally valid test of these ideas, stress rarely occurs under such controlled circumstances. Rather, stress waxes and wanes over time and throughout daily life. This observation requires that the field examine associations between stress in daily life and mental and physical health markers in a more externally valid context. Does life satisfaction moderate the associations between stress—as life is lived, outside the laboratory—and mental and physical health markers? As it stands, it is unclear if similar patterns will be observed for stressors encountered in daily life.

The Current Study

We tested whether life satisfaction moderated the association between daily stressors and (a) daily positive and negative affect and (b) physical symptoms. To do so, we needed information on daily stressors (over multiple days), an assessment of life satisfaction, and a broad array of outcomes that would enable us to examine associations between stress and positive affect, negative affect, and physical symptoms. We used data from the National Study of Daily Experiences (NSDE), a Midlife in the United States Study (MIDUS) substudy—the largest data set with these variables and the ideal design to test our ideas.

We hypothesized that higher levels of life satisfaction would be associated with less negative affect and more positive affect, on average and within people over time (i.e., on particularly stressful days). We also hypothesized that people with higher life satisfaction would report fewer daily physical symptoms, on average and within people over time (i.e., on particularly stressful days). We also expected life satisfaction to moderate the associations between average levels of stress and affect and physical symptoms at the between-subjects level. Specifically, we hypothesized that the previously seen associations between stress and the outcomes would be lower among those high in life satisfaction. Historically, approaching the question in this way conflates the influence of between- and within-person characteristics—a problem seen in many analytic approaches (Hamaker, 2023; Hamaker et al., 2015). An interaction at this between-subjects level would conceptually reproduce what has been found in previous research but more precisely account for many preexisting differences between people who experience more or less stress (Hamaker et al., 2015). These hypotheses, at the between-person level, are somewhat less novel given previous

work demonstrating these associations between life satisfaction and mental and physical health, on average (Diener & Chan, 2011).

However, isolating between-subject effects from within-subjects effects can more carefully delineate how fluctuations in stress around these averages are linked to mental and physical health in daily life (while isolating alternative explanations seen in how people differ from one another). With regard to within-person effects, we hypothesized that people with higher life satisfaction would be less impacted by daily stressors, as reflected by smaller differences in negative affect, positive affect, and physical symptoms when comparing more and less stressful days.

Method

Transparency and Openness

Due to data access restrictions, we cannot share the data publicly. However, all data and materials are available to researchers at the MIDUS and ICPSR websites (Ryff et al., 2019). The syntax for the models is publicly available as the additional online materials on the Open Science Framework page for the project (https://osf .io/yt574/). Data were analyzed using SPSS. The study was not preregistered.

Participants and Design

We analyzed data from 2,022 participants of the NSDE II (Brim et al., 2004), a part of the MIDUS study (Almeida et al., 2009). The participants' age ranged from 33 to 84 at baseline ($M_{age} = 56.24$, $SD = 12.20$). The NSDE employed a daily diary method to study processes related to daily stress and well-being among midlife adults. Specifically, participants were contacted for daily phone interviews for eight consecutive days, and all available data from the NSDE II were used (see Almeida et al., 2009 for more details). Data were collected from 2004 to 2009. Participants provided informed consent to participate in the study, and data were collected in compliance with an umbrella Institutional Review Board granted to the MIDUS study. Participants, on average, took the daily portion of the study about 21.36 months ($SD = 13.86$) after the main survey (when life satisfaction was assessed). The time lag (i.e., the distance between the life satisfaction assessment and the daily experiences substudy) was not a significant predictor of positive affect ($p = .204$), negative affect ($p = .657$), or physical symptoms ($p = .330$), nor did its inclusion in the below models affect the results in any way. We used all available data, and the average number of diary entries provided was 7.37 (out of 8; $SD = 1.30$) across participants. Excluding those with fewer than four daily entries (i.e., half) did not substantively affect the results.

The sample was comprised of 57.2% women, and mostly working adults (63.4%), married people (72.6%), and White people (93.8%). The median level of education was one or 2 years of college but no degree; 5.3% had less than a high school education or general educational development, 56.4% had at least a high school education/ general educational development but no 4-year college degree, 25.2% had a 4-year college degree but not a professional degree, and 13.2% had a professional degree of some sort. Table 1 has a full description of the sample and distributional properties of each variable.[1]

Table 1

Descriptive Statistics and Participant Characteristics

Variable	M/%	SD	Min	Max
Age	56.24	12.20	33	84
Gender	57.2% women			
Race	6.2% people of color			
Education	7.23	2.44	1.00	12.00
Marital status	72.6% married			
Employment status	63.4% employed			
Self-rated health	3.67	0.92	1.00	5.00
Weekday	73.1% weekday			
Average stressors	0.53	0.48	0.00	6.00
Positive affect	3.74	0.79	1.00	5.00
Negative affect	1.19	0.32	1.00	4.50
Physical symptoms	1.87	2.21	0	20

Note. Education was a categorical variable with the following response options: no school/some grade school (1), eighth grade/junior high school (2), some high school (3), GED (4), graduated from high school (5), 1–2 years of college (6), 3 or more years of college (7), graduated from a 2-year college or vocational school/associate's degree (8), graduated from a 4- or 5-year college/bachelor's degree (9), some graduate school (10), master's degree (11), and PhD/EDD/MD/DDS/LLB/LLD/JD/other professional degree (12). Min = minimum; Max = maximum; GED = general educational development.

Measures

Life Satisfaction

Life satisfaction was assessed with six items for which participants were asked to evaluate their satisfaction with their work, health, relationship with spouse/partner/children, financial situation, and life overall on a scale ranging from 0 (*the worst possible*) to 10 (*the best possible*) (Prenda & Lachman, 2001). All six items were averaged for a composite score ($\alpha = .72$).

Daily Stressors[2]

The daily inventory of stressful events index was used to assess daily stressors (Almeida et al., 2002). Each day, participants were asked whether they experienced any of the following seven stressors in the past 24 hr: arguments, potential arguments, work/school stressors, home stressors, discrimination-related stressors, family/ friend-related stressors, and other stressors. Participants responded to each with a 1 (*yes*) or 0 (*no*), and responses were summed to yield a count of daily stressors. The mean stressor number across all participants and assessments was relatively low (i.e., $M = 0.53$, $SD = 0.48$). Across all the possible data points, most people report

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[1] A subset of the sample is comprised of sibling data (some of whom are twins), which introduces an additional source of nonindependence in the data, albeit most participants were singletons and not paired with a sibling. To quantify the influence of some participants coming from the same household, we re-ran the models below and (a) randomly chose one person from a household in one model and (b) excluded households that had two or more members. The results were nearly identical to what is presented in the article below.

[2] An alternative way of conceptualizing daily stressors is whether (1; 38.9% of days) or not (−1; 61.1% of days) at least one stressor is present (Hill et al., 2018). We used the number of stressors because it enabled us to separate between- and within-person effects. However, models conducted running this dichotomous variable yielded similar results (see Tables S1–S3 in the online supplemental materials).

not experiencing any stressor (61.1% of assessments), followed by one stressor (28.9%), two stressors (8.1%), three stressors (1.6%), and four or more stressors (0.4%). The most common stressor was purposely avoiding a possible argument (14.6%) and the least common stressor was discrimination-related (0.6%). A more thorough discussion of stressor diversity and more finite discussions for how people experience different types of stressors can be found elsewhere (Koffer et al., 2016).[3]

Daily Positive and Negative Affect

Positive and negative affect each day were assessed with items specifically developed for the MIDUS study based on a compilation of several affect measures (Bradburn, 1969; Charles et al., 2016; Kessler et al., 1994; Macmillan, 1957; Taylor, 1953; Watson et al., 1988). Participants responded according to how often they experienced each emotion on a recoded scale from 1 (none of the time) to 5 (all of the time). The positive affect scale comprises 13 items: in good spirits, cheerful, extremely happy, calm and peaceful, satisfied, full of life, close to others, like you belong, enthusiastic, attentive, proud, active, and confident. The negative affect scale comprises 14 items: restless or fidgety, nervous, worthless, so sad nothing could cheer me up, that everything was an effort, hopeless, lonely, afraid, jittery, irritable, ashamed, upset, angry, and frustrated. Responses to each item were averaged such that higher values on each scale indicated higher positive affect ($\alpha = .96$) or negative affect ($\alpha = .89$), respectively.

Daily Physical Symptoms

The number of physical symptoms each day was a sum measure of 28 different physical symptoms that included: headache, backache, muscle soreness, fatigue, joint pain, muscle weakness, cough, sore throat, fever, chill, other cold and flu symptoms, nausea, allergies, diarrhea, constipation, poor appetite, other stomach problems, chest pain, dizziness, shortness of breath, menstrual-related symptoms, hot flashes or flushes, any other physical symptoms, skin-related symptoms, eye-related symptoms, ear-related symptoms, teeth-related symptoms, and leg/foot-related symptoms (Larsen & Kasimatis, 1991). Participants responded to each with a 1 (yes) or 0 (no), and responses were summed to yield a count of physical symptoms.

Covariates

Based on our evaluation of previous research (Han et al., 2020), we included several characteristics that might theoretically explain variation in life satisfaction, stressors, positive/negative affect, and physical symptoms. Specifically, we included age, gender (−1: women, 1: men), race (−1: non-Hispanic White, 1: Person of Color), education, marital status (−1: unmarried, 1: married), employment status (−1: not working, 1: working), and self-rated health which ranged from 1 (poor) to 5 (excellent), as well as whether the survey was answered on the weekday (1) or weekend (−1). These demographic characteristics were important to add as covariates as they help partial out other influences that might accompany variation in daily emotions and physical symptoms (e.g., that older adults might have more physical symptoms). Self-rated health was added as a covariate to ensure that we could isolate the association between daily stressors and physical symptoms net of a person's overall perception of their health. Nevertheless, the models reported below without self-rated health yielded similar results.

Analytic Approach

Following the procedure outlined by Laurenceau and Bolger (2005), we examined daily variation in positive affect, negative affect, and physical symptoms using multilevel models in which days (Level 1) were nested within persons (Level 2). Stressors were decomposed at the between-person (i.e., a person-specific mean across all days) and within-person level (i.e., deviations from the person-specific mean each day). By separating between-person and within-person stressors, we examined how deviations in stressors (relative to a person's typical number of stressors) impact mental and physical health. Further, we included random intercepts and a fixed effect for linear time to capture how mental and physical health changed across the duration of the study. Following best practices, the within-subjects effect of stressors was treated as a random effect to enable multiplicative interactions with life satisfaction.

In Model 1, for each outcome (positive affect, negative affect, and physical symptoms), we estimated associations with the between-person (i.e., average number of stressors over the course of the study) and within-person number of stressors (the day-specific number of stressors), adjusting for life satisfaction and other covariates (i.e., age, gender, race, education, marital status, working status, subjective health, and whether the survey took place on a weekday).[4] The effect of between-person stressors can be interpreted as the effect of experiencing a larger number of stressors, on average, compared to others, on mental and physical health. In contrast, the effect of within-person stressors can be interpreted as the effect of experiencing a particularly higher number of stressors—relative to a person's own average, on mental and physical health.

In Model 2, we added the cross-level interaction between life satisfaction and between- and within-person stressors. For the between-persons interaction, a significant interaction would indicate that the association between people's average number of stressors and each mental and physical health outcome varies by level of life satisfaction. For the within-persons interaction effect, a significant interaction would indicate that the association between a relatively high or low number of stressors and each outcome varies by level of life satisfaction. For any significant interactions, they were decomposed at ±1 SD around the mean for life satisfaction (Aiken & West, 1991). Simple slopes are superimposed in the figures.

Results

Positive Affect

The results for positive affect can be found in Table 2. More stressors, both on average and relative to that average, were associated with

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[3] A helpful reviewer encouraged us to examine whether life satisfaction was associated with the experience of different types of stressors. Luckily, MIDUS indexes the particular types of stressors, making this possible. We found that life satisfaction was associated with a lower likelihood of experiencing all types of stressors, including having an argument (15.4% lower likelihood, $p < .001$), being stressed but avoiding an argument (13.6% lower, $p < .001$), work/school-related stressors (10.8% lower, $p < .001$), what anyone would consider a stressor (13.5% lower, $p < .001$), discriminatory stressor (34.1% lower, $p < .001$), social stressor (6.3% lower, $p = .040$), and another other stressor not already mentioned (9.5% lower, $p < .001$).

[4] The results were comparable with and without these covariates, so we elected to report the models that included these covariates. Unadjusted models are available upon request from the first author.

Table 2

Multilevel Models Predicting Variation in Positive Affect

Predictor	Model 1			95% confidence interval		Model 2			95% confidence interval	
	Estimate	SE	p	LB	UB	Estimate	SE	p	LB	UB
Intercept	3.566	0.115	<.001	3.340	3.791	3.565	0.115	<.001	3.339	3.790
Time	−0.0003	0.002	.867	−0.004	0.003	−0.0003	0.002	.872	−0.004	0.003
BP stressors	−0.284	0.034	<.001	−0.350	−0.217	−0.285	0.034	<.001	−0.352	−0.218
WP stressors	−0.096	0.006	<.001	−0.109	−0.084	−0.096	0.006	<.001	−0.109	−0.084
Life satisfaction	0.229	0.014	<.001	0.203	0.256	0.230	0.014	<.001	0.203	0.257
Age	0.004	0.001	.005	0.001	0.006	0.004	0.001	.005	0.001	0.006
Gender	0.014	0.015	.362	−0.016	0.043	0.014	0.015	.357	−0.015	0.043
Race	0.032	0.031	.306	−0.030	0.093	0.032	0.031	.305	−0.029	0.093
Education	−0.029	0.006	<.001	−0.041	−0.016	−0.028	0.006	<.001	−0.041	−0.016
Marital status	0.013	0.017	.425	−0.020	0.046	0.013	0.017	.431	−0.020	0.046
Working status	0.030	0.016	.061	−0.001	0.061	0.030	0.016	.060	−0.001	0.061
Self-rated health	0.044	0.017	.010	0.010	0.078	0.044	0.017	.011	0.010	0.078
Weekday	−0.019	0.004	<.001	−0.027	−0.011	−0.019	0.004	<.001	−0.027	−0.011
BP Stressors × Life Satisfaction						−0.007	0.024	.771	−0.053	0.039
WP Stressors × Life Satisfaction						−0.002	0.005	.711	−0.012	0.008

Note. Model 1 includes main effects and adjustments (i.e., covariates). Model 2 includes the two interactions between life satisfaction and stressors. LB = lower bound; UB = upper bound; BP = between-persons; WP = within-persons.

lower positive affect. Life satisfaction was associated with more positive affect. However, stressors and life satisfaction did not interact with each other at either the between ($p = .771$) or the within level ($p = .711$).

Negative Affect

The results for negative affect can be found in Table 3. More stressors, both on average and relative to that average, were associated with higher negative affect. Life satisfaction was associated with less negative affect. We found statistically significant interactions between life satisfaction and stressors at both the between and within levels (both $ps < .001$).

Decomposing this interaction at the between-person level (Figure 1a) reveals that, among individuals higher in life satisfaction, more stressors on average were associated with more negative affect. However, among those lower in life satisfaction, the association between average stressors and negative affect was stronger.

The interaction at the within-person level (Figure 1b) was very similar. Specifically, relative to a person's average number of stressors, more stressors were associated with more negative affect. However, the extent of this increase in negative affect was less pronounced among those with higher life satisfaction.

Physical Symptoms

The results for physical symptoms can be found in Table 4. More stressors were associated with more physical symptoms, both on average and relative to that average. Life satisfaction was associated with fewer physical symptoms. We found statistically significant interactions between life satisfaction and stressors at the within-person level ($p < .001$) but not the between-person level ($p = .090$).

The interaction at the within-person level (Figure 1c) was similar to what was found for negative affect, with one slight

difference. Specifically, relative to a person's average number of stressors, more stressors were associated with more physical symptoms only among those lower in life satisfaction ($b = 0.232, p < .001$). Among those higher in life satisfaction, the number of relative stressors was not significantly associated with physical stressors.[5]

Discussion

In this study, we evaluated whether higher life satisfaction moderated the association between stressors and daily reports of positive and negative affect and physical symptoms. We observed that, among people who experienced more stressors on average (i.e., between-subjects), life satisfaction was associated with less negative affect and physical symptoms. Counter to our hypotheses, these effects were not observed for positive affect. Life satisfaction also moderated the effects of stress on negative affect and physical symptoms. Previous research had historically examined these processes at the between-person level, and we mostly conceptually reproduced these results. Reproducing the effects at the between-subjects level was crucial in that it (a) illustrates that pre-existing differences in life satisfaction, stress, and mental/physical health were related in predictable ways and (b) separated these often-found effects from the within-person level effects (a more precise estimate for how

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[5] To contextualize these interaction results, we computed a standardized effect size (Cohen's d) for the interaction effects. The magnitude of these interaction effects was relatively small, with individuals both high and low in life satisfaction showing similar associations between stress and the outcomes. For negative affect, the significant between-subjects ($d = -0.20$) and within-subjects ($d = -0.33$) interactions were relatively small. For physical symptoms, the within-person interaction ($d = -0.31$) was also small, and the between-person interaction was not significant at all ($d = -0.08$). Worth noting, smaller effect sizes are typical in research in psychology, particularly for multiplicative interactions between self-report variables (Vize et al., 2023). Our results are consistent with this observation.

Table 3
Multilevel Models Predicting Variation in Negative Affect

Predictor	Model 1					Model 2				
				95% confidence interval					95% confidence interval	
	Estimate	SE	p	LB	UB	Estimate	SE	p	LB	UB
Intercept	1.220	0.036	<.001	1.149	1.291	1.217	0.036	<.001	1.146	1.287
Time	−0.009	0.001	<.001	−0.010	−0.007	−0.009	0.001	<.001	−0.010	−0.007
BP stressors	0.230	0.011	<.001	0.209	0.251	0.224	0.011	<.001	0.203	0.245
WP stressors	0.113	0.004	<.001	0.105	0.121	0.113	0.004	<.001	0.105	0.121
Life satisfaction	−0.050	0.004	<.001	−0.058	−0.041	−0.054	0.004	<.001	−0.062	−0.045
Age	0.000002	0.0004	.995	−0.001	0.001	−0.00002	0.0004	.955	−0.001	0.001
Gender	0.002	0.005	.595	−0.007	0.012	0.003	0.005	.486	−0.006	0.012
Race	−0.003	0.010	.752	−0.022	0.016	−0.003	0.010	.748	−0.022	0.016
Education	−0.001	0.002	.649	−0.005	0.003	−0.0005	0.002	.808	−0.004	0.003
Marital status	−0.004	0.005	.484	−0.014	0.007	−0.004	0.005	.442	−0.014	0.006
Working status	−0.009	0.005	.063	−0.019	0.0005	−0.009	0.005	.086	−0.018	0.001
Self-rated health	−0.006	0.005	.246	−0.017	0.004	−0.007	0.005	.218	−0.017	0.004
Weekday	0.012	0.002	<.001	0.008	0.017	0.013	0.002	<.001	0.008	0.017
BP Stressors × Life Satisfaction						−0.030	0.007	<.001	−0.045	−0.016
WP Stressors × Life Satisfaction						−0.020	0.003	<.001	−0.026	−0.013

Note. Model 1 includes main effects and adjustments (i.e., covariates). Model 2 includes the two interactions between life satisfaction and stressors. LB = lower bound; UB = upper bound; BP = between-persons; WP = within-persons.

stress affects mental/physical health [given its disaggregation of variance into between and within components] and whether this association was moderated by life satisfaction). An interaction present at the between-subjects level, but not a within-subjects level, would suggest that the moderating effect of life satisfaction is likely attributable to other factors between individuals and not a within-person process.

Indeed, we also found that life satisfaction moderated these associations with negative affect at the within-person level. Specifically, after accounting for the number of stressors people experience on average, the association between experiencing a relatively high number of stressors (relative to a person's typical number) and negative affect was lower among those high in life satisfaction. At the within-person level, the fact that the interaction was present for stress and negative affect (but not stress and positive affect and physical symptoms) suggests that life satisfaction's moderating potential is limited to the associations with negative affect. Thus, life satisfaction likely does not reduce the physical symptoms resulting from daily stress experiences.

Why these effects were specific to more ostensibly negative outcomes (i.e., negative affect, physical symptoms) and not positive outcomes (i.e., positive affect) was a bit perplexing. Possible reasons include people's greater fixation on negative cues and stimuli about themselves (Baumeister et al., 2001), which might have led to hyper-vigilance about how stress negatively affects them. Indeed, there is an asymmetry in people's attention (and emotional responses) to good and bad things that happen to them (Bono et al., 2013; Finch et al., 2012). Because of this valence-consistency and asymmetry, the introduction of negative stressful events is more likely to induce negative affect than reduce positive affect (and the absence of negative stressful events is more likely to reduce negative affect than increase positive affect).

Our results align with prior lab studies, which have shown that people with higher life satisfaction moderate some of the harmful effects of stress on cardiovascular outcomes (Papousek et al.,

2010; Schwerdtfeger et al., 2017). We examined this hypothesis in a more externally valid context—one that assessed people's stressors, emotions, and physical health symptoms over the course of daily life. Importantly, assessing people's phenomenological experience with stress, in the context of daily life, is crucial in understanding how people psychologically perceive and respond to daily stressors. That is, people's subjective assessment and attention to stressors—and the subsequent emotional and physical consequences that accompany these experiences—helps provide a holistic evaluation of the intersection with stress and mental and physical health; and these evaluations may not immediately be captured through other methods. We found that life satisfaction similarly moderates associations between daily stress and negative mental and physical health outcomes. But why would life satisfaction moderate the negative effects of stress on mental and physical health? We suggest at least two reasons. Specifically, a growing body of research suggests that people with higher life satisfaction both perceive stressors as less difficult and are less reactive to stressors when they are perceived. Formal studies examining stress appraisals among people high in life satisfaction show that happy people tend to approach stressors with more confidence that they can overcome the stressor, a greater sense of control over how they respond to a stressor, react with less intensity and negative affect, and engage in creative problem solving (Haehner et al., 2024; Hamarat et al., 2001; Luhmann et al., 2021). These two factors—perceiving stressors as less difficult and not reacting as dramatically—might, in turn, reduce the activation of stress response systems. In terms of both the appraisal of stressors and how they navigate successfully resolving a stressor, people higher in life satisfaction likely have some additional protections for when stress occurs.

And stress is considered a significant problem that leads to considerable health problems. For example, chronic activation of this stress response system has been implicated in the development of higher inflammation and hypertension (Rohleder, 2014). Our results and prior work (Papousek et al., 2010; Schwerdtfeger

Figure 1

The Moderating Effect of Life Satisfaction on the Association Between Stressors and Negative Affect at the Between (a) and Within (b) Levels, and the Association Between Stressors and Physical Symptoms at the Within Levels (c)
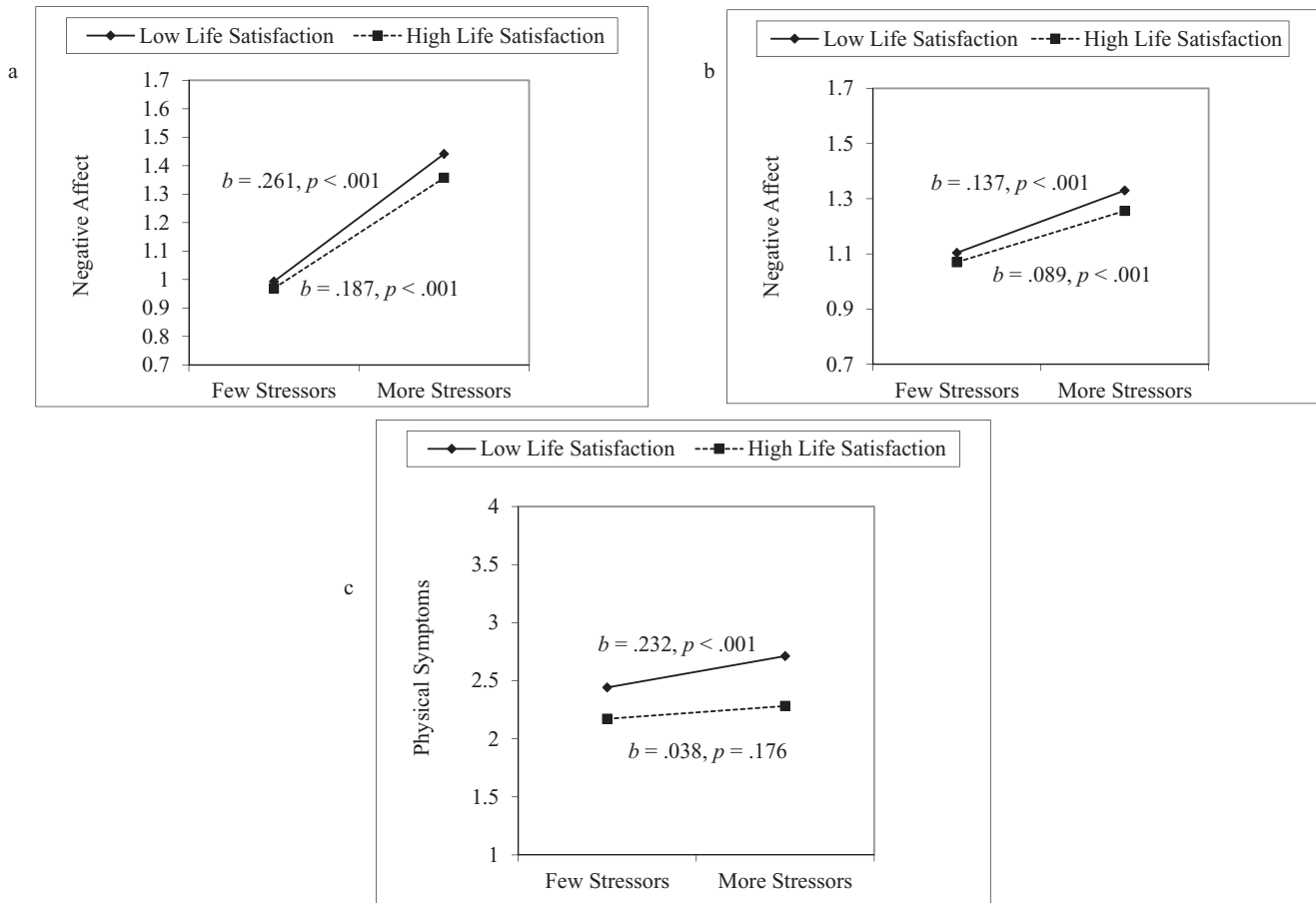
et al., 2017) suggest that higher life satisfaction might moderate associations between the frequency and intensity of these stress responses. Previous theorizing and research, most commonly studied at the between-person level, has linked life satisfaction with lower stress-related reactivity, whether that be cortisol variations or inflammatory responses (Blanchflower & Oswald, 2008; Diener & Chan, 2011; Hamer & Chida, 2011; Uchino et al., 2018). Our study, albeit not one on physiological reactivity, supplements this research by showing that the replicable associations between stress and worse mental and physical health are lower among people high in life satisfaction. People with lower levels of negative affect on days that stressors are experienced have a lower risk of inflammation, chronic health conditions, and mortality (Mroczek et al., 2015; Sin et al., 2015). We found that life satisfaction might be an important factor that affects the likelihood of experiencing lower negative affect on particularly stressful days.

Our study has several limitations. First, stressors, affect, and physical health symptoms were asked in the same interview, although life satisfaction was assessed separately. The contemporaneous measurement of some of these characteristics might have affected the results. Future research can more formally model lagged processes as a way of partially testing the robustness of these associations

and the processes we discussed above. Within the context of the daily surveys, memory biases or other psychological factors (Leger et al., 2016), could potentially influence the accuracy of recall and reporting. However, some of the factors might also be considered antecedents and consequences of life satisfaction. Measuring these characteristics contemporaneously, preferably over large stretches of the lifespan, would be beneficial as it would enable researchers to more deliberately test how associations between life satisfaction and daily stress processes evolve together over time, as some research and theory would suggest (Charles et al., 2023; Stawski et al., 2019). Further, given that life satisfaction is associated with a lower likelihood of perceiving particular types of stressors, future research can more deliberately examine how stressor diversity is associated with physical and mental health (Koffer et al., 2016) and the degree to which life satisfaction moderates associations between these stressors and physical and mental health across the lifespan.

Second, most participants were White and had higher socioeconomic status compared to the general U.S. population, and this (in addition to our methodological approach of studying daily stressors) likely imposes constraints on the generalizability of our results. Future research should evaluate these questions in more diverse samples and methods. Doing so would enhance the generalizability of

Table 4

Multilevel Models Predicting Variation in Physical Symptoms

	Model 1					Model 2				
				95% confidence interval					95% confidence interval	
Predictor	Estimate	*SE*	*p*	LB	UB	Estimate	*SE*	*p*	LB	UB
Intercept	2.590	0.311	<.001	1.979	3.200	2.577	0.311	<.001	1.966	3.187
Time	−0.126	0.006	<.001	−0.137	−0.114	−0.125	0.006	<.001	−0.137	−0.114
BP stressors	0.896	0.092	<.001	0.715	1.077	0.877	0.093	<.001	0.695	1.060
WP stressors	0.137	0.020	<.001	0.097	0.177	0.135	0.020	<.001	0.096	0.175
Life satisfaction	−0.345	0.037	<.001	−0.417	−0.273	−0.350	0.037	<.001	−0.422	−0.277
Age	0.014	0.004	<.001	0.007	0.021	0.014	0.004	<.001	0.007	0.021
Gender	0.170	0.040	<.001	0.091	0.249	0.173	0.040	<.001	0.094	0.252
Race	0.046	0.085	.590	−0.120	0.212	0.046	0.085	.589	−0.120	0.212
Education	−0.037	0.017	.031	−0.070	−0.003	−0.035	0.017	.039	−0.069	−0.002
Marital status	0.009	0.045	.836	−0.080	0.098	0.007	0.045	.862	−0.081	0.097
Working status	−0.116	0.043	.007	−0.200	−0.032	−0.113	0.043	.008	−0.198	−0.029
Self-rated health	−0.341	0.047	<.001	−0.433	−0.250	−0.343	0.047	<.001	−0.434	−0.251
Weekday	0.049	0.013	<.001	0.023	0.074	0.049	0.013	<.001	0.024	0.075
BP Stressors × Life Satisfaction						−0.109	0.064	.090	−0.234	0.017
WP Stressors × Life Satisfaction						−0.080	0.016	<.001	−0.111	−0.048

Note. Model 1 includes main effects and adjustments (i.e., covariates). Model 2 includes the two interactions between life satisfaction and stressors. LB = lower bound; UB = upper bound; BP = between-persons; WP = within-persons.

results, which, as of right now, may be limited to samples that resemble the data available from the NSDE II.

Third, we relied primarily on self-reported constructs, particularly people's reports of their stressors, emotions, and physical symptoms. Self-reports may be subject to method and recall biases. Ideally, insights from this study could be augmented with physiological or performance data to ascertain whether daily stress has a negative effect on these physical outcomes. Indeed, some of these measures are available in the MIDUS sample, albeit they were part of other data collection efforts (in the case of the biomarker project) or on only a subset of the days in the daily diary study (for cortisol). Although these analyses were deemed to be beyond the scope of this project and were misaligned with the timescales of the daily diary data (such that they were not measured on the same daily level), future research can examine the impact of stress on these outcomes and whether life satisfaction similarly moderates those associations. Future research can also expand its coverage of psychological characteristics beyond life satisfaction to examine their influence on stress-related outcomes (and potential confounding effects). Our life satisfaction measure had relatively low reliability, and examining more holistic well-being measures—in addition to other psychological characteristics and physiological measures—can provide a more precise account of how daily stressors affect physiological variability and intersect with psychological factors.

Conclusion

In conclusion, we found that life satisfaction moderated the associations between daily stress and negative affect at both the between- and within-person levels. It also moderated the association between daily stress and physical symptoms at the within-person level. Specifically, people reported more negative affect and physical symptoms on particularly stressful days. However, these associations were smaller among those higher in life satisfaction. Future

research can more deliberately examine the coping and appraisal abilities of people high in life satisfaction, which can motivate discussions about how life satisfaction might be a protective health asset moving forward.

Resumen

Objetivo: Una mayor satisfacción vital se asocia con un menor riesgo de morbilidad relacionada con la edad y mortalidad prematura. Sin embargo, el grado en que la satisfacción vital modera los resultados de salud física y mental relacionados con los factores estresantes diarios sigue siendo poco estudiado. En este estudio, evaluamos si una mayor satisfacción vital moderaba la asociación entre la experiencia de factores estresantes diarios y los informes de afecto positivo, afecto negativo y síntomas físicos. *Métodos:* Se utilizaron datos de un sub-estudio del estudio "Midlife in the United States" (MIDUS, por sus siglas en inglés; $n = 2{,}022$; realizado entre 2004 y 2009). Los participantes informaron sobre su satisfacción vital y anotaciones diarias en su diario sobre estrés, afecto positivo/negativo y síntomas físicos. Se utilizó un modelo multinivel para evaluar si la satisfacción vital moderaba las variaciones relacionadas con el estrés en el afecto y los síntomas físicos cuando los participantes informaron un número particularmente elevado de factores estresantes. *Resultados:* Una mayor satisfacción vital se asoció con un menor afecto negativo y menos síntomas físicos entre los participantes que reportaron factores estresantes más frecuentes (es decir, intersujetos). No se observaron asociaciones con el afecto positivo. La satisfacción vital también moderó el impacto de los factores estresantes en los individuos, de modo que las personas reportaron mayor afecto negativo y síntomas físicos en los días con más factores estresantes, pero esta asociación se redujo entre quienes presentaron mayor satisfacción vital. *Conclusión:* Los hallazgos de este estudio amplían nuestra comprensión de cómo la satisfacción vital podría beneficiar la salud mental y física, principalmente al moderar el

efecto del estrés en los peores resultados. Analizamos los hallazgos en el contexto de los mecanismos que vinculan el bienestar psicológico con la salud física en el contexto del estrés a lo largo de la vida.

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