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Accentuating the Positive: Contribution of Positive Relations With Others and Daily Interpersonal Interactions to Longevity

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Abstract

Objective. Social connection has well-established benefits for individual health and longevity. Positive Relations with Others, a distinct form of social connection, benefits health and longevity independent from more established forms, including social integration. Our primary aim is to investigate these forms of social connection as predictors of longevity. We also explore daily positive interpersonal interactions and daily interpersonal stressors as predictors of longevity beyond the contributions of social connection.

Methods. Data for this study (N = 1757) are from the national longitudinal Midlife in the United States study (MIDUS), the National Study of Daily Experiences (NSDE), and the National Death Index. Participants for the NSDE study were randomly selected from the MIDUS sample and completed short telephone interviews about daily experiences for 8 consecutive days.

Results. Positive Relations with Others was significantly associated with a reduced mortality hazard (HR = 0.88, p = .02). When daily interpersonal interactions were added, daily positive interpersonal interactions (HR = 0.93, p = .001) predicted lower mortality hazard and reduced the association between Positive Relations with Others and mortality (HR=0.91, p = .067). Neither social integration nor daily interpersonal stressors were associated with mortality .

Conclusions. Findings reveal the health benefits of cultivating social ties that are mutual and meaningful, and also of engaging in daily positive interpersonal interactions. Cultivating positive relations operates in conjunction with routine positive interpersonal interactions to promote health and longevity.

Keywords: Positive Relations with Others, daily interpersonal interactions, social connection, longevity

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Abbreviations: Midlife in the United States study (MIDUS); National Study of Daily Experiences (NSDE); random digit dialing (RDD); Psychological Well-Being (PWB); Non-Hispanic (NH)

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Introduction

Social connection is a powerful psychosocial resource with well-established benefits for individual health and longevity[1-3]. In an expansive literature, compelling theoretical and conceptual approaches trace plausible pathways through which social relationships reach "under the skin" to protect (or threaten) physical health and well-being (e.g.,[1,4-6]). As a complement to social connection, capturing everyday social exchanges provides a glimpse into interpersonal processes that give rise to health benefits and risks, especially when they are repeated over time[7,8]. Our primary objective is to investigate social connection, represented by social integration (size and structure of network ties) and by cultivation of mutual and meaningful relationships (i.e., Positive Relations with Others), as independent predictors of longevity. We also anticipate that, beyond indicators of social connection, daily positive interpersonal interactions will contribute uniquely to reducing mortality risk and conversely, that daily interpersonal stressors will increase mortality risk.

Positive Relations with Others

Positive Relations with Others, an essential component of human thriving, is one of a set of domains of positive psychological functioning formulated by Ryff[9,10]. Bringing together theoretical and philosophical perspectives, this formulation of well-being has generated considerable research uncovering the richness of psychological well-being and establishing linkages to health and longevity[10]. Positive Relations with Others emphasizes purposeful investment in mutual and meaningful relationships as part of living a 'good life'[10]. Evidence that such intentionality motivates the nurturing of warm and trusting ties may be inferred from a modest association of Positive Relations with Others and "prioritizing positivity," or the organization and planning of everyday life to actuate experience of positive emotions[11]. In this

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way, Positive Relations with Others is distinct from other types of social connection, such as social integration and social support, primarily through the coupling of effortful cultivation of meaningful relationships with a sense of self and life-fulfillment[12].

Positive Relations with Others and Health

Positive Relations with Others as a component of positive psychological well-being, and its contributions as a health-protective psychosocial resource in particular, have received limited research attention relative to other components formulated by Ryff[9], such as purpose in life. In most examinations of Positive Relations with Others and health, findings reveal associations with better health and wellness (for notable exceptions, see[13,14]). Prior work shows that Positive Relations with Others is associated with health-enhancing physiological processes including lower inflammation[15,16] and better cardiac functioning[17].

In recent work[12], we investigated Positive Relations with Others as a predictor of health and longevity using data from Midlife in the United States (MIDUS) survey. As anticipated, Positive Relations with Others was associated with fewer functional limitations and with greater longevity among midlife and older adults. Importantly, Positive Relations with Others remained associated with functional limitations and with longevity when accounting for effects of both social integration and social support. Evidence of unique, health-enhancing effects suggests that Positive Relations with Others promotes health and functioning independent from other forms of social connection.

The association between Positive Relations with Others and greater longevity is likely to be carried through associations with healthy functioning (e.g., [12,15,17]) as reviewed earlier. Additionally, repeated exposure to positive interpersonal experiences in everyday life may complement health benefits of having mutual and meaningful ties with others. Importantly,

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positive daily experiences are situated in close temporal proximity to subsequent variations in physiological functioning, such as inflammation[18]. In this way, exposure to repeated daily interpersonal uplifts (or stressors) may accompany (or may counteract) key health-enhancing attributes derived from cultivating and maintaining meaningful relationships with others.

Daily Interpersonal Interactions and Health

Considering repeated experiences throughout daily life has been described as "capturing life as it is lived"[19]. Notably, repeated daily assessments provide valuable methodological advantages including enhancing ecological validity of experiences captured in "real time." In addition, reports provided closer in time to the events of interest attenuate memory difficulties and bias in recall[19,20].

Everyday living entails wide-ranging experiences and events including those that are energizing and others that are exasperating. Exposure to daily stressors, defined as "routine challenges of day-to-day living"[20], is the primary focus of much of the evidence linking daily experiences with health outcomes. Considerable evidence indicates that daily stressors can accumulate, or pile up, to exert a strong influence on health and well-being[8,20,21]. Further, negative affective reactivity in response to daily stress exposures has been linked to increased mortality risk[22].

Emerging evidence reveals health benefits associated with *positive* daily events, such as spending time with a friend or being in nature[18,23,24], even when accounting for daily stressors. This pattern of findings may suggest distinct health pathways associated with daily positive events relative to daily stressors. Additionally, daily positive events are reported to occur with greater frequency than daily stressors[25,26], which may signal purposeful efforts to prioritize positive encounters to the benefit of self and others.

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A subset of daily experiences, daily *interpersonal interactions* include exposures to stress and tensions in daily social exchanges (e.g., arguments[20,26]), and also opportunities for rewarding experiences with social partners[18,26,27]. Consistent with research on daily events, most interpersonal interactions experienced in everyday life are evaluated as positive. For instance, in one study using ecological momentary assessments[27], participants rated their social interactions and momentary feelings of loneliness 5 times daily over a two-week period. The majority (84%) of social interactions were rated as "pleasant," whereas few (less than 1%) were rated as "unpleasant." As with other daily experiences, interactions that are positive and, particularly those that are negative, have distinct implications for emotional health outcomes including loneliness and depression[26,27].

Relative to daily negative social exchanges, i.e., interpersonal stressors, that generally are shown to detract from health and well-being, daily positive exchanges are linked with maintaining emotional well-being and a sense of connection to others (i.e., lower feelings of loneliness[26,27]). Notably, *positive* social connection was conceptualized by Kok and colleagues[28] as connection with a network of "rewarding" relationships with whom one feels "in tune" and "close to" during substantive daily social interactions. Importantly, this conceptualization of positive social connections was shown to contribute to an upward spiral of positive emotional and social experiences that improved physical health. In line with these findings, we view routine *positive interpersonal interactions* in everyday life as mutual overtures of warmth and worth that nurture health-promoting connections between social partners.

Current Study

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This study extends earlier work demonstrating health and longevity benefits of Positive Relations with Others independent from other forms of social connection[12]. To sharpen the focus on discrete associations between Positive Relations with Others and longevity, we again consider social integration as a predictor of longevity. Drawing from emerging evidence linking daily events with health processes (e.g.,[18,24]), we examine associations of longevity with both forms of social connection, i.e., social integration and Positive Relations with Others in the context of daily interpersonal interactions. We anticipate that social integration, Positive Relations with Others, and daily positive interpersonal interactions, although aligned, will exert unique effects on longevity. To further investigate daily interpersonal interactions and longevity, we examine repeated daily interpersonal stressors as a potential risk to longevity.

Methods

Data are from the second wave of the national longitudinal Midlife in the United States study (MIDUS) and from the National Death Index. MIDUS originated in 1995-1996 (MIDUS 1) with a total sample of 7108 men and women between the ages of 24 and 75 comprising a national probability sample of non-institutionalized English-speaking adults (n = 3487) living in the co-terminus United States and recruited by random digit dialing (RDD), a sample of monozygotic and dizygotic twin pairs (n = 1914) recruited from a national twin registry, a sample of siblings of RDD participants (n = 950), and oversamples of select metropolitan areas (n = 757) [29]. A follow-up study (MIDUS 2) was completed in 2004-2006. Mortality-adjusted retention was 75% from MIDUS 1 to MIDUS 2. All respondents completed telephone interviews and self-administered questionnaires. A sub-sample of longitudinal MIDUS 2 respondents (n = 1842) was randomly selected to participate in the National Study of Daily Experiences (NSDE) and complete short telephone interviews about daily experiences for 8 consecutive days. Of

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these, 68 (1.1%) were excluded as they did not complete the MIDUS 2 self-administered questionnaires, and an additional 17 participants were missing data on one or more study variables, yielding an analytical sample for the current study of 1757. Data collection protocols and data use were approved by the institutional review boards at the University of Wisconsin-Madison and Purdue University.

Longevity

All-cause mortality data for the MIDUS sample were obtained from searches of the National Death Index, routine longitudinal sample maintenance, and mortality closeout interviews during waves of data collection. A total of 2360 respondents from the original MIDUS 1 sample have died since study inception through the end of 2023. A dichotomous variable (1=deceased) was used in all analyses.

Social Connection

Positive Relations with Others was assessed using the 7-item version of Ryff's Psychological Well-Being (PWB) scales[9,30] from MIDUS 2. Items included "Maintaining close relationships has been difficult and frustrating for me" (reverse-scored), "People would describe me as a giving person, willing to share my time with others," and "I have not experienced many warm and trusting relationships with others" (reverse-scored). Response options ranged from 1=strongly disagree to 7=strongly agree, and item scores were averaged into an overall scale score for analyses (range 1-7). Internal consistency for the 7-item scale was good (Cronbach's □=.78; McDonald's □=.83).

Social integration. The social integration measure was based on our and others' recent work using MIDUS data and showing links between social integration and both mortality [12] and inflammation [15]. Participants indicated whether they were in a marriage or marriage-like

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relationship (1=yes), frequency of contact with non-resident family members and with friends (1=at least weekly contact with both), frequency of attending religious or spiritual services (1=at least once a month), and frequency of attending meetings of unions or professional groups, sports or social groups, or other groups not related to participants' jobs (1=attendance at any group meetings at least once a month). Scores were totaled for an overall measure of social integration (range 0-4) that was included in all analyses.

Daily Interpersonal Interactions

The NSDE daily telephone interviews included questions about having "an interaction with someone that most people would consider particularly positive;" "an argument or disagreement with anyone;" and something that happened that they "could have argued about but decided to let pass in order to avoid a disagreement." As arguments and avoided arguments have been treated as social stressors in previous studies [31,32], these were combined into a single variable indicating daily interpersonal stressors. Each "Yes" response was scored a "1" and the total number of days with one or more positive or negative social interactions across the eight-day observation period was individually calculated (range = 0-8).

Covariates

We controlled for factors that represented potential confounds, including age (range: 24-74 years; continuous), sex (1=women), self-identified race and ethnicity (dummy-coded: hispanic, non-hispanic white (reference group), non-hispanic black), and educational attainment (dummy coded: high school degree or GED (reference group); some college; college or more). Chronic conditions were assessed using a set of 26 self-reported conditions (e.g., heart disease, cancer, hypertension), each one weighted by its propensity to be disabling based on scores from the multimorbidity weighted index [33] and then summed (index score range -0.07-55.9).

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Statistical analyses

A series of Cox proportional hazard regression models were estimated using Stata version 19 [34]. Time to death was in units of months. December 2023 was the censor date for survivors. We first estimated the association between Positive Relations with Others and mortality including social integration and adjusting for covariates (Model 1). Number of days with at least one positive social interaction from the NSDE and number of days with at least one interpersonal stressor were added in Model 2. Additionally, Model 2 was modified to include positive interpersonal interactions and interpersonal stressors separately in Models 2a and 2b, respectively. Robust standard errors were applied in all models to account for clustering in the data due to the presence of siblings and twins.

Results

Descriptive statistics for the analytical sample are shown in Table 1. Mean age was 57, 57% of the respondents were female, 41% had a college education or more, 90% were non-Hispanic White, and 72% were married or in a marriage-like partnership. Mean scores on Positive Relations with Others (scale range: 1-7) and Social Integration (scale range: 0-4) were 5.9 and 2.6, respectively. On average, respondents reported positive social interactions on 4.7 days out of the 8 days of data collection and interpersonal stressors on 1.7 days.

At the bivariate level, higher scores on Positive Relations with Others were significantly correlated with greater social integration ($r = .30$; $p < .001$), more days with positive interpersonal interactions ($r = .21$; $p < .001$), and fewer days with interpersonal stressors ($r = -.10$; $p < .001$). Social integration, in contrast, was significantly associated with more days with both positive interpersonal interactions ($r = .17$; $p < .001$) and interpersonal stressors ($r =$

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.07; $p < .01$). Positive interpersonal interactions and interpersonal stressors were also significantly positively correlated ($r = .16$; $p < .001$).

Five hundred and one (501) participants in the analytical sample died between MIDUS 2 data collection and December 2023. This mortality rate (28.5%) was lower than the mortality rate for the full MIDUS sample over the same time period (34.7%; χ^2=22.2, p<.000). As shown in Table 2; Model 1, after adjustment for social integration and potential confounds, higher scores on the Positive Relations with Others scale were significantly associated with a reduced mortality hazard (HR = 0.88, $p = .02$), indicating that a 1-point increment in Positive Relations with Others was associated with a 12% reduction in likelihood of dying at any point in the follow-up period. Table 2, Model 2 shows the results after including daily interpersonal interactions from the NSDE. Number of days with a positive social interaction (HR = 0.93, $p = .001$) predicted lower mortality hazard, and number of days with interpersonal stressors was not associated with longevity (HR = 1.04, ns). Finally, Table 3 shows results when daily positive interactions and daily interpersonal stressors are considered separately. With positive interpersonal interactions included in Model 2a, the association between Positive Relations with Others and longevity was reduced (HR = .90; $p = .051$). However, with interpersonal stressors included in Model 2b, Positive Relations with Others was significantly associated with lower mortality (HR = .89, $p = .023$).

Discussion

Connection with others, particularly ties that are mutually meaningful and warm, contribute to lower mortality[12]. As anticipated, Positive Relations with Others predicted longevity, even when accounting for quantity of social ties, i.e., social integration. Additionally, daily positive interpersonal interactions were predictors of longevity independent from Positive

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Relations with Others. In contrast to daily positive interactions, daily interpersonal stressors were not associated with longevity in this investigation.

Our findings are consistent with related work from the larger MIDUS dataset demonstrating reduced mortality risk associated with positive social encounters, including our prior work[12]. Our current and earlier findings suggest that purposeful engagement in mutually meaningful experiences with others facilitates better health and longevity, independent from the number of social ties and the amount of support they provide. Similarly, other work focused on daily experiences demonstrates reduced mortality risk for those with more frequent, and more enjoyable, positive experiences across multiple life domains[35], including social interactions.

As we have posited[12], Positive Relations with Others is conceptually and empirically distinct from being integrated in a network of social ties. Clearly, there is some overlap as endorsing positive relations connotes having ties to others, and social integration includes number of social ties. But as our current findings reveal, one key difference between them is their bivariate associations with routine social interactions. Greater Positive Relations with Others was correlated with more daily positive interactions and with fewer daily interpersonal stressors. Social integration also was correlated with more daily positive interactions, but was correlated with more interpersonal stressors. This pattern of associations suggests that Positive Relations with Others may foster and be fostered by the cultivation of social interactions that are on balance emotionally positive. In contrast, a greater number of social ties may simply increase the number of routine social interactions without regard to their emotional valence.

Daily Interpersonal Interactions and Longevity

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As anticipated, daily positive interpersonal interactions predicted longevity. In the context of daily positive interpersonal interactions, the association of Positive Relations with Others and mortality was reduced. This pattern of findings may suggest that daily positive interpersonal interactions and Positive Relations with Others converge to produce purposeful efforts to prioritize positivity (see[11]) in social relationships. From this perspective, daily positive interpersonal interactions offer frequent opportunities to skillfully orchestrate social encounters in ways that fortify deeply-rooted bonds that are mutually gratifying. When daily encounters are intentional in fostering positive feelings with and about social partners, these repeated encounters likely stimulate health-promoting processes that increase longevity in similar ways as Positive Relations with Others, more generally.

Our findings reveal that the association of daily positive interpersonal interactions with mortality was robust not only to an anticipated comparable contribution of Positive Relations with Others, but also to interpersonal stressors and to the well-established link with social integration (e.g.,[2]). Of note, associations of daily positive events and health outcomes also were found to be independent from other psychosocial mechanisms, such as daily affect, in prior work[18,24]. It is possible that a daily assessment approach for capturing interpersonal interactions enriches recollection of experiencing positive interactions in daily life. Interactions with close others usually are pleasurable[26,36], increasing the likelihood that each and every such encounter may not be particularly special or memorable. For this reason, reporting positive interpersonal interactions nearer in time to when they occurred may have boosted recall of some encounters that otherwise might have been overlooked due to the regularity of such experiences.

An anticipated association of daily interpersonal stressors with longevity was not detected in this investigation. Our focus on exposure to interpersonal stressors, and specifically

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on occurrence of arguments or avoided arguments each day, may not have fully captured incremental risk of repeated exposures to these and other types of negative interactions. In prior work examining negative daily experiences with family members and drawing from the same daily dataset[25], negative daily experiences were not associated with risks to heart health. Notably however, negative daily experiences with family members were associated with health risks among older, but not younger, adults. Likewise, feelings of daily loneliness were linked with poor aging outcomes (e.g., weaker grip strength, slower gait speed, more functional limitations) in another study of daily experiences from the NSDE[14]. Importantly, in a study of adults with chronic illness, accumulated daily stressors contributed to increased mortality risk (e.g., [22]), whereas proportion of days exposed to stress was not associated with mortality risk.

Strengths and Limitations

Findings from this investigation of social connection and daily interpersonal interactions should be considered in light of both notable strengths and study limitations. Data for this investigation were from the large, national MIDUS study, and from a companion study with daily assessments, the NSDE. Additionally, our investigation highlighted positive experiences when engaging with others as distinct contributors to longevity.

Foremost among study limitations, assessment of Positive Relations with Others and of daily interpersonal interactions did not include characteristics of social partners. When interaction partners were identified as family members in prior work, anticipated health benefits of positive daily experiences generally were not detected[22]. Additionally, a central aim of our work is distinguishing Positive Relations with Others from established indicators of social connection. To date, our work does not incorporate other positive aspects of social relationships, such as feelings of belongingness. It also merits mention that interpersonal interactions were

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assessed across only 8 days in the NSDE project. Extending the duration of daily assessments may contribute to greater detection of interpersonal stressors, which occur with less frequency than positive interpersonal interactions.

As reported elsewhere[12,18], although recruited nationally, the MIDUS sample included more participants who were White, educated, and affluent than the general population. For this reason, findings may not generalize to interpersonal experiences of individuals from other cultural, ethnic, or socioeconomic backgrounds. Additionally, this study included a representative subsample of MIDUS participants who also completed the NSDE project, yielding a smaller sample with a mortality risk that was somewhat lower than the full MIDUS study sample.

Conclusions

Findings from this study highlight the benefits of having social ties that are mutually warm and meaningful. Of particular note, daily positive interpersonal interactions contributed to mortality, even when accounting for recognized benefits of Positive Relations with Others and of social integration. Daily positive interactions with others, often experienced as routine encounters, may accrue over time to cement lasting bonds that enhance quality and quantity of life. In this way, leveraging daily interpersonal interactions to strengthen new and existing social ties has potential to advance health and longevity, one interaction at a time.

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Table 1. Descriptive statistics for analytical sample (N=1757).

Variable	Mean (SD)	Range	%
Age	56.7(12.2)	33-84	
Sex (female)			56.5
Education			
High school/GED			29.3
Some college			30.2
College or more			40.5
Race			
White			90.1
Black			3.0
Other			6.1
Chronic conditions	2.7 (3.6)	-0.1-28.8	
Positive relations	5.9 (1.0)	2-7	
Social integration	2.6 (1.1)	0-4	
Days with positive social interactions	4.7 (2.2)	0-8	
Days with interpersonal stressors	1.7 (1.8)	0-7	
Time to death (years)	12.0 (4.8)	0.7-19.7	

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Table 2. Cox proportional hazard models estimating Positive Relations with Others and mortality risk (N=1757). Hazard ratios and 95% confidence intervals are shown.

Variable	Model 1			Model 2		
	HR	95% CI	p-value	HR	95% CI	p-value
Positive Relations with Others	0.88	[0.79-0.98]	.018	0.91	0.82-1.01	.067
Social integration	0.96	[0.89-1.05]	.40	0.97	0.90-1.06	.53
Daily social interactions						
Positive	--	--		0.93	0.89-0.97	.001
Interpersonal stressors	--	--		1.04	0.99-1.11	.14
Age	1.11	[1.10-1.12]	.000	1.12	1.10-1.13	.000
Sex (1=female)	0.76	[0.64-0.91]	.003	0.80	0.66-96	.015
Race (ref. = NH White)						
NH Black	1.42	[0.86-2.36]	.18	1.38	0.85-2.26	.20
Other	0.97	[0.70-1.34]	.83	0.94	0.68-1.31	.73
Educations (ref. = High school or GED)						
Some college	0.99	[0.78-1.23]	.94	1.07	0.86-1.34	.55
College or more	0.72	[0.58-0.90]	.004	0.80	0.63-1.00	.053
Chronic conditions	1.08	[1.05-1.10]	.000	1.08	1.05-1.10	.000

Model 1: Adjusted for social integration and covariates
Model 2: Model 1 + daily positive interactions and interpersonal stressors
Note: NH = Non-Hispanic

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Table 3. Cox proportional hazard models estimating Positive Relations with Others and mortality risk (N=1757). Hazard ratios and 95% confidence intervals are shown.

Variable	Model 2a			Model 2b		
	HR	95% CI	p-value	HR	95% CI	p-value
Positive Relations with Others	0.90	[0.81-1.00]	.051	0.89	[0.80-0.98]	.023
Social integration	0.98	[0.90-1.06]	.57	0.96	[0.88-1.05]	.36
Daily social interactions						
Positive	0.93	[0.90-0.97]	.001	--	--	
Interpersonal stressors	--	--		1.03	[0.97-1.09]	.29
Age	1.11	[1.10-1.13]	.000	1.11	[1.10-1.12]	.000
Sex (1=female)	0.80	[0.67-0.97]	.020	0.76	[0.63-0.91]	.003
Race (ref. = NH White)						
NH Black	1.38	[0.84-2.28]	.21	1.43	[0.86-2.35]	.17
Other	0.95	[0.69-1.31]	.75	0.96	[0.70-1.33]	.81
Educations (ref. = High school or GED)						
Some college	1.06	[0.85-1.33]	.57	0.99	[0.80-1.23]	.93
College or more	0.81	[0.64-1.02]	.067	0.71	[0.57-0.89]	.003
Chronic conditions	1.08	[1.05-1.10]	.000	1.07	[1.05-1.10]	.000

Model 2a: Adjusted for daily positive social interactions and covariates
Model 2b: Adjusted for daily interpersonal stressors and covariates
Note: NH = Non-Hispanic

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