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Daily Interpersonal Experience Partially Explains the Association between Social Rank and Physical Health

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Abstract

Background—Socioeconomic position is a well-established risk factor for poor physical health.

Purpose—This study examines whether the effects of lower social rank on physical health may be accounted for by differences in daily social experience.

Methods—In a large community sample ($N=475$), we examined whether subjective social rank is associated with self-rated health, in part, through positive and negative perceptions of daily interpersonal interactions, assessed using ecological momentary assessment.

Results—Higher social rank was associated with higher average perceived positivity of social interactions in daily life (e.g., $B=.18$, $p<.001$), but not with perceived negativity of social interactions. Further, the association between social rank and self-rated physical health was partially accounted for by differences in perceived positivity of social interactions. This effect was independent of well-characterized objective markers of SES and personality traits.

Conclusions—Differences in the quality of day-to-day social interactions is a viable pathway linking lower social rank to poorer physical health.

Keywords

socioeconomic status; socioeconomic position; ecological momentary assessment; social interactions; physical health

Physical health disparities by socioeconomic position are a major public health concern. There is longitudinal evidence that both objective (e.g., income relative to a social reference group) and subjective (e.g., perceptions of income, education, occupation relative to a social reference group) measures of social rank explain more variance in physical health than material resources^{1,2} (e.g., income). Additionally, a large literature confirms that social hierarchies create context for and constrain the social behavior of individuals as well as their interaction partners (e.g., references 3 and 4). Hence, one reason social rank may be more closely related to illness and disease (compared to economic resources) is because it is more

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closely related to patterns of social behavior and interpersonal experiences that either promote disease or protect against it.

Not all social behaviors differ by social rank, and not all social behaviors that do differ by social rank are viable mediators of disease processes. One candidate social behavior is social dominance. For example, both human and primate studies have linked expressions of dominance with establishing and maintaining social hierarchies and risk for poor health⁵. In humans, exposure to dominant behavior expressed by interaction partners has been shown to be more common at lower levels of socioeconomic status⁶, and to induce transient elevations in blood pressure⁷, which have potential long-term implications for cardiovascular disease⁸. Further, interpersonal stress such as exposure to dominance results in greater autonomic stress response when individuals are also lower in perceived social rank⁹, suggesting that at lower levels of social rank interpersonal stressors may not only be more frequent, but also more severe in terms of health risk.

One way to operationalize social rank is to assess individuals' perceived standing in a social hierarchy¹⁰, often measured in health research using the MacArthur Scales of Subjective Social Status (SSS)¹¹. This subjective measure of relative social rank has been shown to predict health above and beyond traditional indicators of socioeconomic status (SES; e.g., education, income, occupation)² and consists of two visual analog scales. The first asks individuals to rate their standing in relation to the national population (e.g., United States), and the second asks them to rate their standing in relation to their "community," where participants define community as they choose.

One previous study has examined the association between static measures of SSS and interpersonal behavior. In this cross-sectional study, higher perceived social rank was associated with a more warm and dominant interpersonal style (i.e., actors' personality) as reported by both study participants (i.e., actor) as well as their spouses¹². Hence, this reliable association between social rank and social behavior was not simply due to self-report bias or common method variance. Further, psychosocial risk factors (e.g., depressive symptoms, poor marital quality) associated with these variations in social behavior mediated the relationship between SSS and self-rated health in individual persons¹³, suggesting that socially stratified differences in interpersonal behavior may help explain the link between SSS and physical health.

Importantly, differences in social behavior (either by an actor or his or her interaction partner) may also create differences in the quality of our social interactions and relationships. For example, the well-supported complementarity principle from interpersonal theory and research states that the complementary response to warm and dominant behavior is warm and submissive (e.g., agreeable) behavior from interaction partners¹⁴. Hence, previous findings showing hierarchically patterned differences in social dominance suggest that higher social rank should be reliably associated with more pleasant and agreeable social interactions and less interpersonal stress. However, no studies have empirically examined this theoretical expectation that higher rank is associated with more pleasant and agreeable day-to-day interactions as it relates to socioeconomic position or physical health (*cf.*, reference 15).

Ecological Momentary Assessment (EMA) provides an ecologically valid estimate of social experiences in the natural environment by indexing daily experience directly and in “real time,” as opposed to relying on a single general self-report questionnaire, which is likely influenced by recall bias¹⁶. More specifically, (EMA) is a method of collecting behavioral and psychosocial data as they occur in the natural environment, typically using portable devices programmed for recurrent data collection at prespecified time intervals. By obtaining reports of daily life experiences close to the time at which they occur, this method allows us to circumvent the recall biases of retrospective report and capture the momentary experience of individuals in real time. Further, assessing the daily experience of individuals of differing social rank is one way to examine the notion that broad social determinants of health may exact much of their influence through more micro-level differences in daily social experience (e.g., reference 17).

Importantly, significant statistical associations between perceived social rank (SSS), the perceived quality of social interactions, and physical health could be due to confounding with personality characteristics. For example, associations between SSS and features of social interactions may result from common response characteristics that reflect individual differences in personality, such as the tendency to experience negative emotions (e.g., neuroticism) or sociability (e.g., extraversion)^{18,19}. Similarly, neuroticism may bias self reports of physical health and has been shown to have substantive associations with objective measures of physical health²⁰. Thus, personality may confound apparent associations between self-report measures as well as apparent associations between these measures and objective physical health. Controlling for such personality factors significantly strengthens conclusions about links between these measures in cross-sectional data.

The Current Study

This study examines whether positive and negative aspects of daily social interactions mediate the association between lower social rank and poorer self-rated physical health. To answer this question we test: 1) whether the perceived quality of daily social interactions, reported in the moment using EMA, covary reliably with self-reported social rank; 2) whether this is independent of objective SES (i.e., resources) and potentially confounding personality traits such as neuroticism and extraversion; and 3) whether differences in daily social interactions help explain the association between social rank and self-rated physical health.

Self-rated health is often considered a poorer measure of physical health than “harder” health outcomes such as biomarkers, an alternative and more expensive method for assessing current health and risk for disease. However, the association of self-rated health with mortality has been shown to be similar to or greater than a panel of biomarkers^{21–23}. Self-rated health also does not simply reflect momentary mood²⁴ or differences in recent acute illness²⁵, as is sometimes suggested. Further, self-rated health has consistently been found to predict morbidity, mortality, and other important health outcomes,^{26,27} over and above many known risk factors for poor health, including potentially confounding personality characteristics^{26,28}. It has been suggested that the incremental predictive utility of self-rated

health may be due to its accuracy and inclusiveness as a measure of health status (e.g., incorporating knowledge of genetic risk, experiential knowledge).²⁹

Data and Methods

Participants

Participants were drawn from the Adult Health and Behavior Project – Phase 2 (AHAB-II), a healthy sample of working adults. AHAB-II participants were recruited from the community primarily through mass direct mailings of recruitment letters to individuals randomly selected from voter registration lists and other public domain lists. Participants who responded to the recruitment letter were screened for eligibility. To be eligible to participate in AHAB-II, individuals had to be between the ages of 30–54 years and currently working at least 25 hours per week outside of the home. Due to other goals of the study, individuals were excluded from participation if they had a history of cardiovascular disease, schizophrenia or bipolar disorder, chronic hepatitis, renal failure, neurological disorder, lung disease requiring drug treatment, or stage 2 hypertension (SBP/DBP ≥ 160/100). Additionally, individuals who excessively consumed alcohol (≥ 5 portions 3–4 times per week), used fish-oil supplements, or were prescribed any medications with autonomic effects (e.g., cardiovascular, psychotropic, glucocorticoid, lipid-lowering, diabetic, or weight-loss medications) were excluded. Women who were pregnant were also excluded. Individuals with less than 8th grade reading skills, shift workers, and those who could not otherwise complete the protocol were excluded. Seven individuals were excluded from analyses due to insufficient compliance with ambulatory monitoring. Participants received compensation up to \$410, depending on extent of participation in visits as well as compliance with the protocol. A community sample of 494 men and women completed the ambulatory protocol in the period between March 2008 and October 2011. 483 of the participants (98%) identified their race as either Black or White. Because these were the two groups most well-represented in the sample, restricting the sample to Blacks and Whites allowed us to examine race as a moderator in a parsimonious manner.

Procedure

The study was conducted in compliance with the University of Pittsburgh Institutional Review Board. The study involved seven visits, some of which are not relevant to the current report. Informed consent was obtained at visit 1 along with demographic variables, and personality was assessed at visit 4.

At visit 2, participants were trained to use the PDA device (Palm Z22, software: Satellite Forms) and practiced responding to questions using the PDA before entering the field for monitoring. Once in the field, participants completed a practice day of monitoring and received feedback on compliance. After this practice day, participants completed a 4-day monitoring protocol (3 working days and 1 nonworking day). Subjects were not presented with the option to opt out of monitoring for periods of time and no days were excluded from analyses due to lack of compliance. The monitoring protocol consisted of two 2-day monitoring periods, usually one period at the beginning of the workweek and another at the end of the workweek, with at least one non-monitoring day in between. Participants were

prompted to answer self-report EMA interviews approximately hourly during waking hours on these 4 days. Compliance was defined as full completion (answering all questions) of the hourly interview. Compliance differed between subjects. Using the timing of the beginning and end of day interviews (which participants were instructed to complete immediately upon waking and right before entering bed), we estimated the number of expected interviews completed (1/hour) and compared this to the number of observed interviews completed. The average number of hourly reports missed was 6 reports over the course of 4 monitoring days, indicating that, on average, participants missed 1 to 2 hourly reports per day during the monitoring period. Presented another way, participants, on average, responded to 54.5 hourly interviews over the 4-day monitoring period, indicating that they responded to between 13 and 14 interviews per day. Some participants ($n = 50$ out of 483 participants; 10% of the current sample) completed more than 4 monitoring days at the request of the researchers due to problems with some of their assessments or equipment and these participants completed more hourly interviews on average (mean = 65.7) as a result of this additional monitoring. When these participants are excluded, results indicate that the remaining participants responded to closer to 13 interviews per day on average.

Importantly, because an hourly report was completed does not mean the participant's ratings were anchored to a recent social interaction (i.e., one that occurred within the past 10 minutes), as not every participant had a recent social interaction every hour. The average number of *recent* social interactions rated by participants was 28 (range = 5 – 71). The number of missed prompts did not differ as a function of whether the prompt occurred before 5:00PM or after 5:00PM (using 5:00PM as a proxy for the end of the workday). When timing of missed interviews was examined in more detail, we found that the most commonly missed hourly interviews were the first prompt in the morning and the last prompt at night. Despite this pattern, interaction with family and friends were still well represented in the data (see “Quality of social interactions” in measures section below). While in the field, participants received four scheduled telephone calls from study staff, and staff were always available by cell phone for technical support.

Measures

Social rank—Participants self-reported perceived social rank using the MacArthur Scale of subjective social status at visit 1, prior to visit 2 and the 4-day EMA monitoring period (described in “Procedure”). This measure of subjective social rank consists of two visual analogue scales, one rating perceived status within the US and one rating status within the community. This 10-rung ladder scale has shown good test-retest reliability as well as construct validity^{13,30}. Higher scores indicate higher social standing. In the present sample, both the U.S. and community measures of social rank ranged from 2 to 10, indicating that no participant endorsed the lowest rung of either ladder, perhaps due to the relatively high objective SES of the current sample.

Self-rated health—Self-rated health is a widely used, one-item measure which asks participants to respond to the statement, “Compared to others your age, would you say your health is...” on a 5-item Likert scale ranging from “excellent” to “poor.” This question was assessed at visit 1 (prior to visit 2 and the 4-day EMA monitoring period and concurrent

with social rank). This measure has been found to be a highly robust predictor of death and disease²⁹, and is thought to index the cognitive averaging of individual's perceptions of their health. Lower scores reflect better health.

Quality of social interactions—As previously noted, EMA data were collected between visits 2 and 3. Participants were asked to respond to diary questions approximately hourly during waking hours for four days. At each hourly interview, participants identified and rated their most recent social interaction. Only those interactions that were rated as having occurred within the ten minutes before the interview prompt were included. Notably this measure of “recent” social interactions showed a correlation of .99 with a measure that included ratings of relatively less recent (past hour) social interactions, though it was more normally distributed. Additionally, hourly ratings captured all forms of interactions. On average, participants reported that 31% of social interactions were with coworkers, 19% with acquaintances or strangers, and the other 50% with family and friends. During each interview, the quality of the most recent social interaction was measured using four items, two items that measured negative aspects of social interaction (“someone treated you badly?” and “someone in conflict with you?”), and two items that measured positive aspects of the interaction (“pleasant interaction?” and “agreeable interaction?”). All items were scored on a scale from 1 to 6, with 1 being the strongest “No” and 6 being the strongest “Yes.” The two items in each scale were averaged at each relevant hourly observation and then those scale scores were averaged across observations within person, resulting in a mean score for each study participant on each scale. A previous study examining a subsample of individuals from the current cohort found that positive and negative social interaction items were best treated as separate constructs rather than two ends of a continuous dimension³¹. We confirmed this factor structure in the full sample; compared to a one-factor solution, a two factor solution was a significantly better fit to the data (AIC = 92.6 vs. 11240.9), and the two-factor solution evidenced good model fit (comparative fix index = .99, root mean square error of approximation = .06)³².

Control variables—Participants self-reported age, race/ethnicity, and gender as well as family income, highest level of education completed, and primary job title and responsibilities.

Objective SES was well-characterized in this sample. Income was divided into fifteen categories, ranging from <\$5,000 to \$250,000. To render categories more easily interpretable, income was recoded to the midpoint of each of the fifteen categories (\$225,000 for the highest category). Education was divided into four categories ranging from high school or GED completion or less to a graduate degree. Job information was assessed during a structured interview and used to classify participants into the following three groups based on Standard Occupation Classification (SOC) codes (US Department of Labor, 2000 SOC System): blue collar, sales and administrative support, and white collar. These groups were converted to an interval scale (e.g., 1, 2, 3). SOC codes can be used to create six job classifications instead of the three used here. The current three group aggregates were used because they parallel occupational categories used in previous studies of SES and health (e.g., reference 33). Results of a principal components analysis including

education level, occupational class, and income revealed that all three indices of SES loaded on one common factor (i.e., only one eigenvalue greater than 1, greater than 60% of variance explained, and all loadings greater than .70). Hence, family income, education, and occupational class were standardized and then aggregated to form a composite SES score for each individual, which was then used as a control variable.

In addition to these standard control variables, participants also completed neuroticism and extraversion items from the self-report version of the NEO-PI-R³⁴. These scales have been found previously to have adequate internal consistency (Cronbach's $\alpha > .85$) and convergent and discriminant validity³⁴.

Results

Sample characteristics are presented in Table 1; this is a highly educated, employed sample of mostly White (17% Black) men and women.

Partial correlations of the primary study variables controlling for age, sex, and race are shown in Table 2. Higher U.S. and community rank were associated with lower trait levels of neuroticism, higher levels of extraversion, and better self-rated health. Interestingly, neither U.S. nor community rank was reliably associated with mean negativity of social interactions. However, higher U.S. and community rank were both significantly associated with mean *positivity* of social interactions.

In addition to simply controlling for race, sex, and age, analyses also examined whether race, sex, and age moderated the relationship between perceived social rank and social interactions. There were no significant interactions between these variables and either measure of social rank on mean positivity or negativity of social interactions (all $p > .05$). Hence, higher social rank was similarly associated with positivity of social interactions in both Blacks and Whites, men and women, and across the age range, suggesting this association is robust to a number of demographic characteristics.

Unlike these subjective measures of social rank, objective SES was *not* reliably associated with mean positivity of social interactions or extraversion. However, similar to subjective measures of social rank, SES was associated with lower levels of neuroticism and better self-rated health and was also unrelated to negativity of social interactions. Further, the association between social rank and positivity of social interactions was independent of SES; after controlling for SES, higher community and U.S. rank remained significantly associated with the positivity of social interactions ($B = .18, p < .001$ and $B = .17, p < .01$, respectively).

To ensure that the relationship between higher subjective social rank and mean positivity of daily social interactions was not due to confounding with personality variables, analyses further controlled for neuroticism and extraversion. In models controlling for age, sex, race, SES and social rank, neuroticism was significantly associated with less mean positivity in social interactions ($B = -.17, p < .01$), and extraversion was associated with more positivity on average ($B = .18, p < .001$). Despite significant associations between personality and positivity of social interactions, the relationship between perceived social rank and positivity of social interactions was not accounted for by these personality factors; positivity of

interactions remained significantly associated with both community and U.S. rank after personality measures were controlled ($B = .11, p < .01$ and $B = .13, p < .05$, respectively). The relationship between social rank and positivity of social interactions is not simply due to confounding by personality traits.

Lastly, analyses explored whether differences in positivity of social interactions may account for social rank differences in physical health. A visual representation of this mediational pathway and statistical results can be seen in Figure 1. An SPSS macro was used to test for significant mediation using bootstrapping, which provides high statistical power and also reduces the risk of Type I error compared to other common techniques for testing the significance of a mediational path^{35, 36}. Positivity of social interactions accounted for a significant portion of the association between U.S. social rank and self-rated health as well as community social rank and self-rated health [both $b = -.008$ (95% CI: $-.02, -.001$); both $R^2 = .13$]. Although the indirect path was significant, there remained a significant direct effect of social rank on self-rated health after adjustment for mean positivity of social interactions. Hence, positivity of social interactions partially explains the association between perceived social subordination and poorer self-rated physical health.

Discussion

Higher perceived social rank, independent of reference group (U.S. or “community”), was reliably associated with more positive interpersonal experiences as measured by EMA as well as better self-rated health. The cross-sectional association between perceived social rank and self-rated health was partially explained by the positivity of daily interpersonal experiences (i.e., due to the fact that both higher social rank and better health were significantly associated with more positive interpersonal experiences). These associations were independent of well-characterized SES (income, education, occupation) as well as the potentially confounding personality characteristics of neuroticism and extraversion. Interestingly, there was no reliable association between social rank and average levels of negative interpersonal interactions as measured by EMA. Significant associations with positive, but not negative, social interactions instills additional confidence that associations with positive experiences are not simply due to common method variance or to social desirability or other forms of response bias.

Results are consistent with prior work examining social rank and individual differences in interpersonal behavior. Higher ranking individuals evidence a reliable tendency to be more warm and dominant¹², which, according to interpersonal theory and research¹⁴, should be associated with warm but less dominant (e.g., agreeable, pleasant) behavior of interaction partners. Current findings suggest that higher social rank is, in fact, associated with more pleasant and agreeable interactions as suggested by theory. Hence, social rank, like many other individual difference characteristics, is associated not only with reliable intrapersonal differences (general tendency to be more warm and dominant) but also reliable differences in interpersonal experience (more pleasant and agreeable social interactions), consistent with the idea of a dynamic interplay between social environments and individual characteristics^{37, 38}.

Reliable associations of SSS with average positivity but not negativity of interpersonal experiences in this study could mean that only the positivity of these experiences reliably differs by social rank. However, results may also be due to the fact that negative interpersonal experiences were operationalized as overt social conflict (“someone treated you badly?” and “someone in conflict with you?”), whereas questions related to positive social interactions were less extreme (“agreeable interaction?” and “pleasant interaction?”). Although lower ranking individuals did not report overtly being treated badly or engaging in overt conflict to a significantly greater degree than their higher ranking counterparts, they do describe their interactions as less pleasant and agreeable, less easy, on average. Interpersonal stressors and transgressions associated with social rank may be similar to those associated with race, and other marginalized group memberships (e.g., microaggressions)³⁹, in that they are carried out in the form of smaller, less salient differences in social experiences and are not necessarily direct or easily identifiable.

Limitations and Conclusions

Generalization of these findings is strengthened by the large sample size and the null findings for moderation by age, sex, and race. However, this was a well-educated, employed sample and social rank could have less unique predictive utility for health in lower SES populations (e.g., perhaps perceptions or cognitive averaging of social status matter less when resources are very low). We are not aware of data suggesting that SSS is less predictive of physical or mental health at lower levels of SES. Nonetheless, patterns of associations in this sample may differ from patterns found in lower SES samples, such as individuals living in poverty. Further, negative aspects of social interactions that differ from the two questions asked in this study could vary reliably by social rank even though the specific questions used here did not. For example, results may have been different if we asked more subtle questions such as the degree to which interactions were uncomfortable, difficult, or negative instead of asking more directly about social conflict. There may also be additional facets of personality (other than neuroticism and extraversion) not measured here that confound the relationships among self-reports of social rank, momentary social interactions, and self-rated health. Additionally, analyses presented here did not examine social behavior directly, but rather individual differences in perceptions of social interactions. Hence, we cannot be sure that these differences in interpersonal experience are due to differences in social behavior or differences in specific social behaviors such as dominance, as implied from previous work. Our measure of social rank is a subjective self-report and was not objectively measured (*cf.*, reference 1).

Additionally, perceived quality of social interactions as measured by EMA could have been biased by lack of compliance. Although compliance was very good, we certainly cannot rule out the possibility that individuals were less likely to answer the hourly questionnaire if they had experienced a negative interaction. Notably noncompliance seems unlikely to differ reliably by all variables of interest (perceived social rank, social interaction quality, and self-rated health) and thus is not likely to be responsible for observed covariation between these constructs. Our primary outcome measure also has limitations. Although self-rated health shows predictive utility comparable to a panel of biomarkers, it is biologically non-specific compared to these “harder” indicators of risk for poor health. Further, like these biomarkers,

self-rated health is a proxy for health, not a direct measurement of incident disease or death. Additionally, differences in positivity of social interactions accounted for a modest portion of the shared variance between perceived social rank and self-rated health ($R^2 = .13$) after controlling for SES and personality factors. Thus, this is certainly not the only plausible mechanism linking perceived social rank to self-rated physical health.

Lastly, these data are cross-sectional and this is an important limitation for their interpretation. Analyses cannot establish that perceived social rank leads to differences in daily social interactions, which in turn lead to increased risk for poor health. It seems likely that perceptions of social rank have a dynamic association with social experiences; however, we conceptualize recurring patterns of social experience as the proximal experience linking global perceptions of social rank to the occurrence of disease in individual persons. These findings establish that, at one point in time, social rank and self-reported health appear to covary between persons in part because both covary with the positivity of daily social interactions. Findings from this study do not establish, for example, that if the positivity of social interactions were increased among individuals of lower social rank then self-rated health would improve. Such conclusions cannot be drawn from cross-sectional observational data.

This is the first study to show that the quality of daily social interactions differs by subjective social rank, linking this broad social risk factor to the more proximal social experiences of individuals. It is also the first study to show that these individual differences in daily social experience may help explain physical health disparities in social rank. Further, these effects were independent of well-characterized objective SES and potentially confounding personality factors. Broad social factors reflecting social stratification or perceived social subordination may partially influence health by influencing the quality of our daily social lives. Experimental studies manipulating perceived social rank and examining the effect on the quality of social interactions as well as an acute measure of biology that may indicate a pathway to disease (e.g., cardiovascular reactivity, wound healing) would help begin to establish the plausibility of a causal pathway among these variables. As with many models in behavioral medicine, the differences in time-course between social-psychological experiences and disease processes necessitate multiple different study designs that can show links between acute differences in social experience and differences in long-term disease states or, at least, their progression.

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A: U.S. social rank **B: Community social rank** **Figure 1.**

Results of mediational analyses of the association between subjective social rank and self-rated health as mediated by the average of ecological momentary assessments of positivity during social interactions. Values are unstandardized betas. Models control for age, sex, race, neuroticism, extraversion, and objective resources as indexed by a composite measure of socioeconomic status. * $p < .05$ ** $p < .01$ *** $p < .001$, ns = not significant. The value in parentheses = c' , the direct effect from social rank to self-rated health. (Panel A: social rank in the U.S.; Panel B: social rank in one's self-defined community).

Table 1

Sample Demographic Characteristics (N=483)

Education, N (%)	
HS or GED	30 (6.2)
Some college	110 (22.8)
Bachelor's	184 (38.1)
Graduate degree	159 (32.9)
Occupation, N (%)	
Blue collar	65 (13.4)
Sales, admin. support	94 (19.5)
White collar	324 (67.1)
Race, N (%)	
White	400 (82.8)
Black	83 (17.2)
Sex, N (%)	
Male	228 (47.2)
Female	255 (52.8)
Mean Family Income	\$78.2 ± \$49.2 ^a
Mean U.S. Rank	6.1 ± 1.5 ^a
Mean Community Rank	6.6 ± 1.5 ^a

^aMean ± standard deviation

Table 2

Partial correlations among primary study variables.

	1	2	3	4	5	6	7	8
1. SSSus		.61***	.47***	.10*	-.01	-.15***	.13**	-.21***
2. SSSc			.22***	.15***	-.03	-.17***	.21***	-.18***
3. SES				-.07	.02	-.13***	.04	-.17***
4. Interaction positivity					-.67***	-.23***	.24***	-.16***
5. Interaction negativity						.24***	-.08	.15***
6. Neuroticism							-.33***	.24***
7. Extraversion								-.16***
8. Self-rated health								

Values are correlations controlling for age, sex, and race. Lower scores on self-rated health reflect better health.

* $p < .05$,

** $p < .01$,

*** $p < .001$.