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Subjective Socioeconomic Status Matters Less When Perceived Social Support Is High: A Study of Cortisol Responses to Stress

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Abstract

Low objective and subjective socioeconomic status (SES) is associated with the experience of frequent stressors known to have physiological costs. We tested whether perceived social support, a key health-protective resource, buffered the association between lower subjective SES and cortisol responses to an acute stressor. Participants ($N = 115$; 54.78% female; age $M = 19.56$) reported subjective SES and perceived support, completed a social-evaluative stressor task, and provided saliva for cortisol assessment. There was a significant interaction of subjective SES with support predicting linear change in cortisol stress responses, $\gamma = .08$, $z = 2.34$, $p = .02$. When support was low, subjective SES was strongly related to cortisol, and those who reported lower subjective SES exhibited higher cortisol during recovery than those who reported higher subjective SES. When support was high, those who reported higher and lower subjective SES exhibited similar cortisol responses. These results highlight the important protective role that supportive relationships can have when subjective SES is low.

Keywords

subjective socioeconomic status, perceived social support, cortisol, stress

Two decades of research have established that lower socioeconomic status (SES), whether measured *objectively* (e.g., income, educational history, or occupational prestige) or *subjectively* (i.e., perception of one's status; Adler, Epel, Castellazzo, & Ickovics, 2000), is robustly associated with higher mortality and morbidity (Adler, 2009; Adler et al., 1994). Pathways linking lower subjective and objective SES to poorer health include the experience of more frequent stressors, greater perceived stress, and/or heightened physiological responses to stressors (e.g., cortisol responses; Adler et al., 2000; Adler & Stewart, 2010; Senn, Walsh, & Carey, 2014). Emerging research also suggests that those with lower objective and subjective SES are more communally focused (Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012) and are more likely to turn to others when faced with potential stressors (Piff, Stancato, Martinez, Kraus, & Keltner, 2012). Daily perceived social support, however, has been associated with *lower* cortisol responses to stressors (Eisenberger, Taylor, Gable, Hilmert, & Lieberman, 2007). Thus, we hypothesized that perceived social support would buffer cortisol stress responses for those who reported lower subjective SES.

Subjective SES and Health

While objective measures of SES may include self-reports of income, occupation, education background, or assets, subjective SES is typically measured by asking individuals to consider how they rank in terms of income, job prestige, and education *compared to others* in their country (Adler et al., 2000). Subjective SES reflects individuals' perceived SES relative to others and it is believed to "more accurately capture[s] subtle aspects of social status" (Operario, Adler, & Williams, 2004, p. 238). For example, a bachelor's degree from a prestigious university may confer more social status than the same degree from a lesser known university (Operario et al.,

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2004). Individuals may also incorporate their familial or spousal SES or future educational or occupational opportunities when determining their subjective SES (Singh-Manoux, Adler, & Marmot, 2003). Lower subjective SES in adulthood has been associated with poorer self-rated health, higher levels of depression, greater susceptibility to cold viruses, and higher mortality, as well as markers of angina and respiratory illness (Cohen, Alper, Adler, Treanor, & Turner, 2008; Goodman, Huang, Schafer-Kalkhoff, & Adler, 2007; Macleod, Davey Smith, Metcalfe, & Hart, 2005; Singh-Manoux et al., 2003). In *all* of these studies, subjective SES remained a significant predictor even when controlling for objective SES and in some cases was a better predictor (e.g., Cohen et al., 2008; Goodman et al., 2007). This research highlights the utility of incorporating both objective and subjective measures of SES into studies to clarify the relative importance of material resources versus social rank in understanding the link between social class context and health (Kraus et al., 2012).

Subjective SES and Stress

Lower subjective SES is believed to influence health, in part, via increased exposure to stressors (i.e., threatening events; Lazarus & Folkman, 1984), greater perceived stress, heightened reactivity to stressors, and fewer resources to cope with stressors (Adler et al., 2000; Adler & Stewart, 2010; Senn et al., 2014). For example, if two individuals with equal qualifications are facing a job interview, if one perceives lower status, the stakes for the interview may feel higher and therefore more threatening. Lower subjective SES is associated with heightened vigilance for potential threats (Kraus, Horberg, Goetz, & Keltner, 2011), which may have long-term physiological consequences. Recent functional magnetic resonance imaging research has demonstrated that lower subjective SES is associated with greater neural activity in areas related to mentalization under social-evaluative conditions, which could indicate greater focus on the evaluation (Muscatell et al., 2016). Mentalization, in turn, predicted greater inflammatory responses, which may contribute to physiological wear and tear over time.

One type of threat strongly linked to physiological stress responses is social-evaluative threat. Social-evaluative threat, when one's status, self-esteem, or valued aspect of identity is threatened, is a potent elicitor of the stress hormone cortisol (Dickerson & Kemeny, 2004), which plays an important role in day-to-day metabolic, immune, and autonomic regulation (Lovallo & Thomas, 2000). It has been proposed that individuals with either exaggerated or blunted cortisol responses to stressors could have future health risks (Phillips, Ginty, & Hughes, 2013), but longitudinal research has yet to precisely characterize the trajectories associated with health vulnerability. However, if lower subjective SES is associated with greater attunement to social-evaluative threats or stressors (Muscatell et al., 2016), it may also be associated with greater acute cortisol responses to these stressors.

A growing number of studies have examined the relationship between SES and cortisol responses to acute stressors, but the findings are mixed. A number of studies have found that objective SES was not associated with cortisol responses to acute stressors in a variety of populations (Carpenter, Shattuck, Tyrka, Geracioti, & Price, 2011; Hackman, Betancourt, Brodsky, Hurt, & Farah, 2012; Lovallo, Farag, Sorocco, Cohoon, & Vincent, 2012; Steptoe, Kunz-Ebrecht, Wright, & Feldman, 2005), while others have found lower objective SES to be associated with smaller (Kristenson, Kucinskiene, Bergdahl, & Orth-Gomer, 2001) and larger (Fiocco, Joober, & Lupien, 2007) increases in cortisol. In a study of college students, higher subjective status within individuals' dormitory floors was associated with larger cortisol responses to a stressor (Gruenewald, Kemeny, & Aziz, 2006). Lower subjective SES has also been linked to less cortisol habituation to a social-evaluative laboratory stressor in middle-aged women (Adler et al., 2000), which is consistent with heightened threat vigilance associated with lower subjective SES. This mixed pattern of results suggests that the link between SES and cortisol reactivity to acute stressors may be moderated by a third variable. The support derived from one's social relationships may be one such variable.

Social Relationships as a Stress Buffer

Those who perceive that they have more social support tend to report lower life stress (Cohen & Hoberman, 1983) and exhibit a 35% *increased* likelihood of survival compared to those who perceive less support (Holt-Lunstad, Smith, & Layton, 2010). Neural evidence finds that perceived support is associated with reduced threat sensitivity and lower cortisol responses to acute social-evaluative stressors (Eisenberger et al., 2007).

Several theories of resilience propose that social support plays an important role in providing psychological and physiological buffering for those who report lower-subjective or -objective SES backgrounds. The "shift-and-persist" model theorizes that having a "stable positive role model" in childhood improves cognitive, emotional, and behavioral responses to the frequent and impactful stressors than those from lower- subjective and -objective SES backgrounds face (Chen & Miller, 2012). Consistent with this framework, several studies have found that childhood experiences of traumatic stressors (e.g., exposure to violence) are associated with dysregulated cortisol responses to stressors (i.e., greater increases cortisol in response to an acute stressor); however, this relationship may not emerge among children who have a nurturing family environment (although traumatic stressors, such as violence, may not be the same stressors children of low SES typically confront; e.g., Hibel, Granger, Blair, & Cox, 2011). Thus, social relationships may be valuable psychosocial resources under stressful conditions for those reporting low subjective or objective SES.

When those who report lower objective or subjective SES or those who are made to feel lower in subjective SES are confronted with potential stressors, they are more likely to turn

toward their social network than those who have higher SES (Piff et al., 2012). This may occur because those who report lower subjective and objective SES tend to be more communally focused (Kraus et al., 2012), and they report greater meaning in life when spending time with others (Kushlev, Dunn, & Ashton-James, 2012). Although social relationships are a promising moderator in the relationship between SES and physiological responses to acute stressors, only one study, to our knowledge, has examined this. In this study of college-aged students, the presence of two supportive audience members during a social-evaluative stressor was associated with lower proinflammatory cytokine reactivity in lower subjective SES participants, which is believed to be a health protective pattern of reactivity (John-Henderson, Stellar, Mendoza-Denton, & Francis, 2015). Given that both cortisol and inflammatory responses are sensitive to the social-evaluative context (e.g., Dickerson, Gruenewald, & Kemeny, 2009; Dickerson & Kemeny, 2004), this suggests that a similar relationship may emerge with cortisol and warrants an examination of the relationship between subjective SES, perceived support, and acute cortisol stress responses.

The Present Study

We tested whether perceived social support may moderate the association of subjective SES with cortisol responses to an acute laboratory stressor. Drawing on theoretical and empirical evidence, our key hypothesis was that subjective SES and perceived support would interact to predict more favorable cortisol trajectories for those who reported lower subjective SES and higher perceived support than those who reported lower subjective SES and lower perceived support.

We also sought to rule out alternative explanations for the hypothesized patterns. First, we examined the effect of objective SES to rule out the possibility that subjective SES represents the same construct rather than a measure that reflects a more nuanced understanding of one's social rank, which may be uniquely related to psychological processes.

Method

Participants

Eligible participants[1] ($N = 115$) completed a larger study on physiological responses to laboratory and daily life stressors. They were recruited via the university student portal website and campus flyers. Eligible participants had to be 18 years or older, nonsmokers, fluent in English, without serious mental or physical illnesses, and typically awake before 10:00 a.m. Additionally, participants could not have been pregnant or taking hormonal contraceptives. These requirements ensured interpretability of cortisol assessments (Kirschbaum, Kudielka, Gaab, Schommer, & Hellhammer, 1999; Lovallo & Thomas, 2000; Rohleder & Kirschbaum, 2006). Participants were compensated US$20 for their participation. The final study sample was 54.78% female with a mean age of 19.56 (standard deviation [SD] = 2.11). Participants were of the following ethnic background groups: 59.13% Asian, 13.91% European, 9.57% Middle Eastern, 9.57% Chicano/Latino, and 7.83% Other.

Procedure

Participants came to the lab between 12:00 and 6:00 p.m. to account for the diurnal rhythm of cortisol. They gave informed consent and began a 40-min baseline period during which they completed questionnaires. Afterward, they participated in an adapted version of the Trier social stress test (Kirschbaum, Pirke, & Hellhammer, 1993), which reliably elicits psychological and physiological stress responses. Participants had 5 min to prepare speeches as if they were interviewing for a job in their field. They then completed brief questionnaires and delivered their 5-min speech in front of two evaluators. Evaluators were trained to remain stoic during the task and refrain from giving verbal or nonverbal feedback to participants. The speech was followed by a 40-min recovery period. Saliva samples were taken at the end of the baseline period, immediately after the speech, and 10, 25, and 40 min into the recovery period to capture peak reactivity and recovery.

Measures

Demographics. Age, ethnicity, and gender were assessed via self-report.

Body mass index (BMI). BMI was calculated based on self-reported height and weight.

Minutes since waking. Participants reported the time they woke up the morning of the laboratory session, and the difference between the time they woke up and the time of their session was calculated.

Subjective SES. Subjective SES was measured with the MacArthur Scale of Social Status (Adler et al., 2000). This scale shows a 10-rung ladder and asks participants to "think of this ladder as representing where people stand in the United States. At the top of the ladder are the people who are the best off—those who have the most money, most education, and most respected jobs." Participants ranked themselves by selecting a number from 1 to 10 that corresponded with each rung of the ladder.

Objective SES. Objective SES was measured by averaging mothers' and fathers' highest level of education based on the following possible options: elementary school (1), junior high (2), high school (3), some college/no degree (4), junior college (5), college (6), some graduate school/no degree (7), and graduate school (8). This measure was selected instead of a measure of occupation (also included in the surveys) because parental occupation can change over time, but parental education is relatively stable (Shavers, 2007).

Table 1. Correlations and Descriptive Statistics for SES, Support, and Covariates.

Variables	*M* (*SD*)	Subj. SES	Obj. SES	Support	Gender[a]	Age	Wake
Subj. SES	6.37 (1.71)						
Obj. SES	5.26 (1.45)	.25*					
Support	3.77 (0.73)	.20*	.10				
Gender[a]	0.45	.04	.02	−.04			
Age	19.56 (2.11)	−.09	−.11	.07	−.03		
Wake	350.06 (198.54)	.01	.08	.01	−.15	.002	
BMI	22.64 (3.83)	.01	.07	.05	.17	.13	.01

Note. Point biserial correlation coefficients presented for correlations with gender. SES = socioeconomic status; Subj. SES = subjective SES; Obj. SES = objective SES; support = perceived social support; wake = minutes between awakening and session start time; BMI = body mass index; *SD* = standard deviation.
[a]0 = *female* and 1 = *male*.
*p < .05.

Perceived social support. We used the 12-item positive portion of the Positive and Negative Social Exchanges Scale (Newsom, Nishishiba, Morgan, & Rook, 2003). Participants were asked to think about people in their lives and to indicate how often the items described their interactions with these people (0 = *never*, 4 = *very often*). Examples of items included the following: "In the past month, how often did the people you know . . . ," "suggest ways that you could deal with problems you were having," and "do social or recreational activities with you?" Items were averaged and higher scores indicate higher support ($\alpha = .92$; see Online Supplemental Materials for additional information about the selection of this measure).

Cortisol. Saliva was collected with a Salivette device (Sarstedt, Inc., Newton, NC) and stored at −20°C. Saliva samples were centrifuged and assayed using standard enzyme-linked immunoassay procedures (Diagnostic Systems Laboratories, Inc., Webster, TX) at the University General Clinical Research Center. Samples were assayed in duplicate and averaged. The sensitivity of the assay was <0.012 μg/dl, and interassay and intra-assay coefficients of variance were less than 8%. The natural log of cortisol was used to account for nonnormality. No other measures of endocrine activity were assessed.

Data Analytic Strategy and Initial Cortisol Analyses

Tools for determining sample size for adequately powered studies using multilevel modeling with continuous predictors are not well established. However, simulation studies suggest that coefficient and variance estimates are minimally biased when N is at least 50 at Level 2 (Maas & Hox, 2005). The sample in this study is more than twice the recommended size ($N = 115$).

Cortisol trajectories in response to the social-evaluative stressor were analyzed using multilevel modeling with the "xtmixed" command in STATA/IC Version 13.1 (StataCorp, 2013). This method of analysis accounts for the nested nature of the data (i.e., cortisol assessments [Level 1] nested within each participant [Level 2]) and models both within-person change over time and between-person differences in cortisol responses over time (Blackwell, Mendes de Leon, & Miller, 2006; Hruschka, Kohrt, & Worthman, 2005; Snijders & Bosker, 2012). Thus, we were able to examine how individual-level factors (i.e., perceived social support and subjective SES) influenced change in cortisol over time. The interaction between the linear form of time, subjective SES, and perceived support (Time × SES × Support) represents the effect of the interaction between subjective SES and perceived support on the linear slope of cortisol throughout the study. The second interaction between the quadratic form of time, subjective SES, and perceived support (Time × Time × SES × Support) represents the effect of the interaction between subjective SES and support on the quadratic slope of cortisol responses. We used maximum likelihood estimation, because it best tests for differences in fixed effects when random effects are held constant (Snijders & Bosker, 2012), and we specified an unstructured covariance matrix. A model with a random intercept for individuals and a random slope for the linear form of time best fit the data.

Results

Sample Characteristics

The means, *SD*s, and correlations between the primary constructs and demographic and control variables are reported in Table 1. Only subjective SES was correlated with any other variables. It was positively correlated with both objective SES and social support.

Cortisol Stress Responses

The model predicting cortisol responses to the stressor included gender as a covariate; the interaction between the linear form of time, subjective SES, and perceived support; and the interaction between the quadratic form of time, subjective SES, and perceived support as fixed effects. The interaction between subjective SES and perceived support was not significantly associated with the quadratic slope of cortisol responses,[2] $p = .17$; therefore, the quadratic rate of change in cortisol responses was equal across levels of subjective SES and perceived support. However, the linear slope of cortisol was not equal across levels of subjective SES and

Table 2. Multilevel Between-Person Effects of the Interaction Between Subjective SES and Perceived Social Support on Cortisol Responses.

Variables	Coefficients (RSE)	95% CI
Fixed effects		
Intercept	−1.55 (.08)***	[−1.70, −1.40]
Gender[a]	0.42 (.11)***	[0.21, 0.64]
Time	0.20 (.05)***	[0.09, 0.30]
Time × Time	−0.05 (.01)***	[−0.07, −0.02]
Perceived social support	−0.03 (.08)	[−0.18, 0.12]
Time × Perceived Social Support	0.01 (.02)	[−0.03, 0.05]
Subjective SES	−0.01 (.04)	[−0.08, 0.07]
Time × Subjective SES	−0.01 (.01)	[−0.03, 0.01]
Subjective SES × Perceived Social Support	0.001 (.05)	[−0.09, 0.09]
Time × Subjective SES × Perceived Social Support	0.03 (.01)**	[0.01, 0.05]
Random effects	Estimate	
Random intercept ($\hat{\sigma}_0{}^2$)	0.23 (.05)	[0.15, 0.37]
Random slope ($\hat{\sigma}_1{}^2$)	0.002 (.004)	[0.0001, 0.07]
Covariance ($\hat{\sigma}_{01}$)	0.02 (.01)	[−0.01, 0.04]
Residual variance	0.20 (.03)	[0.15, 0.27]

Note. Based on 115 participants with 563 longitudinal records. SES = socioeconomic status; RSE = robust standard errors; CI = confidence interval.
[a]0 = *female* and 1 = *male*.
*p < .05. **p < .01. ***p < .001.

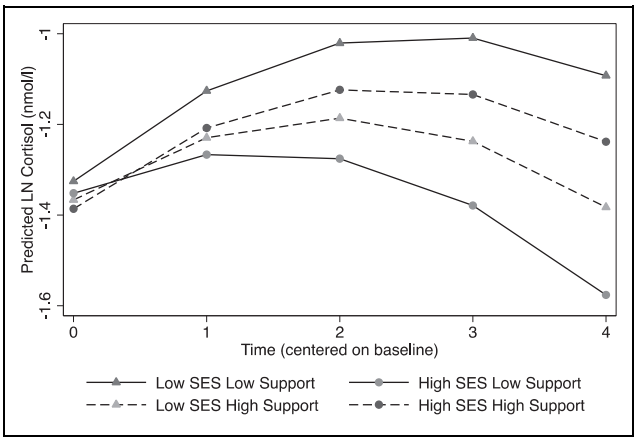

Figure 1. Predicted cortisol responses when subjective socioeconomic status and perceived support are set at one standard deviation above and below their means.

perceived support. Consistent with hypotheses, there was a significant Time × Subjective SES × Support interaction, $\gamma = .08$, $z = 2.32$, $p = .02$, 95% confidence interval (CI) [0.01, 0.14].

To further probe the Time × Subjective SES × Support interaction, we removed the four-way interaction between the quadratic form of time, subjective SES, and perceived support and reran the model[3] (see Table 2), which eases the interpretation of model coefficients. In this model, the three-way interaction between time, subjective SES, and perceived support was significant, $\gamma = .03$, $z = 3.36$, $p = .001$, 95% CI [0.01, 0.05]. To understand this effect, we interpreted the main effect of subjective SES conditional on perceived support and time (Hoffman, 2015).[4] Lower subjective SES was associated with higher overall cortisol responses for an average level of perceived support at baseline, $\gamma = -.01$, $p = .85$ (see Note 4). However, as perceived support increased, subjective SES was *less strongly*, negatively associated with cortisol, $p = .98$. The significant Time × Subjective SES × Support interaction indicated that the relationship between subjective SES and cortisol responses was stronger for those with lower perceived social support and became linearly stronger over the course of the study, $\gamma = .03$, $z = 3.36$, $p = .001$, 95% CI [0.01, 0.05]. In other words, subjective SES mattered more in predicting cortisol responses to the stressor when perceived support was low—especially late in recovery.

Figure 1 demonstrates the spreading throughout the study between those with lower (−1 *SD*) perceived support of varying subjective SES (the solid lines) and those with higher (+1 *SD*) perceived support and varying subjective SES (the dashed lines). To better understand the impact of this interaction, we tested the significance of the subjective SES and perceived support interaction at each time point. The interaction between subjective SES and perceived support was not significant at baseline, $p = .98$ (Time 0); at Time 1, $p = .44$; or at Time 2, $p = .13$. The interaction between subjective SES and perceived support was, however, significant at Time 3, $z = 2.18$, $p = .03$, 95% CI [0.01, 0.18], and at Time 4, $z = 2.68$, $p = .01$, 95% CI [0.03, 0.22]. This indicates that at Times 3 and 4, subjective SES mattered more when perceived support was low than when perceived support was high.

Next, we tested the effect of support when subjective SES was 1 *SD* below the mean. When subjective SES was low, there was not a significant effect of perceived support at Times 3 or 4 (i.e., the difference between triangles at Time 3 and the difference between triangles at Time 4 in Figure 1), p values $\geq .11$. Next, we tested the effect of SES when perceived support was 1 *SD* above the mean. There was not a significant effect of subjective SES when perceived support was high at Times 3 or 4 (i.e., the difference between the dashed lines at Time 3 and the difference at Time 4 in Figure 1), p values $\geq .52$. Finally, we tested the effect of subjective SES when support was 1 *SD* below the mean. At both Time Points 3 and 4, $z = -2.90$, $p = .004$, 95% CI [−0.18, −0.04], and $z = -3.62$, $p < .001$, 95% CI [−0.22, −0.07], respectively, there was a significant effect of subjective SES when support was low (i.e., the differences between the solid lines in Figure 1): When perceived support was low at Time Points 3 and 4, the effect of subjective SES was significant. This indicates that for those who reported low support, subjective SES was a strong predictor of cortisol recovery. Figure 1 illustrates that those who reported lower subjective SES and lower support exhibited significantly greater cortisol during recovery than those who reported higher subjective SES and lower support.

Alternative Explanations

The next set of analyses tested whether other related variables explained the relationship between subjective SES, perceived support, and cortisol trajectories. In the model with Time × Time × Subjective SES × Support and Objective SES, the three-way interaction between time, subjective SES, and perceived support remained the same, $z = -2.26$, $p = .02$, 95% CI [0.01, 0.14]. Furthermore, when subjective SES was replaced with objective SES, Time × SES × Support interaction did not significantly predict cortisol trajectories, $p = .79$.

Discussion

Our results were consistent with the prediction that perceived support would be protective for those who reported lower subjective SES. When perceived support was high, subjective SES was not significantly associated with cortisol responses during recovery—higher perceived support buffered the association between lower subjective SES and cortisol responses. When perceived support was low, subjective SES was strongly associated with cortisol responses during recovery. Those who reported lower subjective SES and lower support exhibited significantly greater cortisol during the last two recovery time points than those who report higher subjective SES and lower support.

These findings contribute to a small but emerging literature on the role of perceived support in buffering cortisol responses to stressors (e.g., Eisenberger et al., 2007; Wirtz et al., 2006). This study is also one of few examining the interactive effect that support and subjective SES can have on physiological responses to acute stressors (i.e., John-Henderson et al., 2015). Recent research has highlighted the important role of context in understanding and replicating psychological findings (van Bavel, Mende-Siedlecki, Brady, & Reinero, 2016), and our work underscores the importance of considering the social/relational context when evaluating the correlates of subjective SES. Social-relationship norms that emphasize communality for those who report lower subjective SES may set a foundation that helps lower status individuals benefit from positive social relationships when facing stressors (Kraus et al., 2012; Piff et al., 2012). Our findings illustrate that social relationships can buffer against stressors, which may potentially offset the physiological costs of repeated stressor exposure for those who report lower subjective SES.

For those who reported higher support, subjective SES was not a robust predictor of cortisol responses. It is possible that those in our sample who reported lower subjective SES and higher support differed in meaningful ways from other low-subjective SES samples. For example, our participants were in college, and it is possible that our sample may have been comprised of students who had "shifted-and-persisted" in the past (Chen & Miller, 2012). As a result, this group may be more likely to be impacted by current perceived support. It is beyond the scope of this study to tease apart the possibility that our sample was particularly resilient, but future studies should examine community members (rather than college students), who report lower subjective SES.

Our finding that subjective SES was less strongly associated with cortisol responses when social support was high, especially in recovery, is in line with evidence suggesting that perceived support can be beneficial under conditions of stress (Eisenberger et al., 2007). The exact mechanism associated with the physiological stress-buffering effect of perceived support, however, is not known. One possibility is threat processing. Although those who report lower subjective SES are more threat vigilant (Kraus et al., 2011), neural research finds that perceived social support reduces threat sensitivity and threat responding and, subsequently, reduces cortisol responses to threat (Eisenberger et al., 2007). Without the potential threat-reducing effects of perceived support, those who reported lower subjective SES may have been at risk for perceiving more threat during the stressor and, therefore, mounting a larger increase in cortisol. Indeed, this was the cortisol pattern observed on the lower end of both subjective SES and support. Ancillary analyses (not reported) indicated that the interaction between subjective SES and perceived support was not associated with perceived threat/stress, which suggests that these factors were not mediators of cortisol responses. However, there is reason to believe that threat processing may operate implicitly at a neural level (Eisenberger et al., 2007). Future investigations should examine the neural underpinnings of threat to explore its potential meditational role.

Why was higher subjective SES and lower support linked to lower cortisol responses during recovery? Lower cortisol responses to acute stressors are sometimes characterized as health-protective responses and other times as representative of physiological dysregulation. The long-term consequences of varying cortisol responses to acute stressors on health are not well studied, and without knowing the long-term influence that each pattern has on health, it is difficult to speculate about the potential mechanisms of each pattern of response on health. Furthermore, the mechanisms linking support with cortisol responses may vary by levels of subjective SES. Habituation, or exhibiting lower cortisol responses to an acute stressor experienced previously, may reflect "healthy adaptation to novel stress[ors]" (Adler et al., 2000, p. 588). In the future, findings from studies presenting the same stressor multiple times could clarify the potential health impact of higher and lower cortisol responses to stressors (Adler et al., 2000).

In this study, objective SES did not interact with perceived support to predict cortisol responses nor were the key findings explained by the contributions of objective SES. We interpret this as evidence that subjective SES may better capture subtle variations in perceived social standing than objective measures (Singh-Manoux et al., 2003). This may be particularly relevant to college samples because college is a transition period for students from childhood SES toward adult SES. Future work should continue to explore the influence of subjective SES and perceived support on acute stress responses in diverse community samples to better understand these processes. Studying younger adults, as we have, may provide meaningful

information about the trajectory of the association between SES and responses to stressors across the life span and in those potentially shifting in subjective SES.

A strength of the study is that the sample was ethnically diverse. However, this also complicated the interpretation of the relationship between SES, support, and ethnic background. Asian background samples are less likely to seek support (Taylor et al., 2004), but our findings are in line with research that suggests that perceived support buffers stressor responses in this group (Taylor, Welch, Kim, & Sherman, 2007). Future studies should replicate our findings in larger subsamples of all ethnic background groups. Moreover, a larger study would allow for an examination of the potential association of gender with the subjective SES-support interaction. Because women tend to be more communal (Cross & Madson, 1997), perceptions of lower support may be associated with greater cortisol responses in higher SES women and higher still in lower SES women.

Our work suggests that perceived support is important for understanding the relationship between subjective SES and cortisol responses to stressors. In the large body of literature on SES, lower subjective and objective status contexts are often characterized as resource insufficient in all domains. However, this study suggests that social relationships may be a powerful resource for those reporting lower subjective SES. Overall, the findings of this study illustrate that the impact of supportive relationships may vary by subjective social class. A better understanding of the long-term consequences of perceived support would allow it to be responsibly integrated into interventions aimed at improving the well-being of individuals with lower social status.

Authors' Note

This work was completed, in part, while Dickerson was serving at the National Science Foundation. Any opinion, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation. This study was drawn from a data set used in published reports.

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Supplemental Material

The supplemental material is available in the online version of the article.

Notes

1. One hundred and twenty-four individuals consented to participant in the study, but nine participants' data were excluded from the analyses. One participant did not meet the medication eligibility criteria (as she was taking hormonal contraceptives), one participant declined to complete the speech task, one participant's session was interrupted by a fire alarm, and one participant received a pilot version of the protocol. One participant was excluded due to baseline cortisol levels measuring more than four *SD*s above the mean and another because of missing cortisol values due to a laboratory error. Three participants were excluded because they did not complete the support measure.
2. See Table S1 in the Online Supplemental Materials for statistical information for nonsignificant findings.
3. We maintained the quadratic form of time because the model fit best when the change in cortisol over time was represented quadratically. The quadratic form of time simply does not interact with subjective socioeconomic status and perceived support.
4. Some of the effects described herein are not significant, because they reflect the effect of a given variable when all other variables are equal to 0 (i.e., the mean of each variable due to centering). Nevertheless, interpreting these lower order effects helps to elucidate the direction and pattern of the significant three-way interaction.

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