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If at first you don't succeed: the neuroendocrine impact of using a range of strategies during social conflict

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Using a variety of cognitive or behavioral strategies to manage stressful situations may be more adaptive than relying on a narrow selection. Although research has explored the psychological benefits of a range of coping responses, the physiological impact within and across stressful situations has not been examined. Moreover, research has primarily relied upon self-reports of what people believe they generally do across stressful situations, which may be subject to recall bias. This study observed and coded the range of behavioral response strategies that young adults ($n = 74$, mean age 18.1) used to manage a laboratory-based, interpersonal conflict task and collected self-reports of the cognitive strategies used to manage similar stressors. Analyses examined the impact of response range on cortisol activity during the task. Greater range of observed response strategies predicted lower cortisol reactivity ($t(133) = 2.65$; $p = .009$), whereas the range of self-reported strategies was unrelated to cortisol reactivity ($t(133) = .53$; $p = .60$). Results support observational assessment as an important supplement to self-reports of responses to stress and suggest that the range of strategies used to manage the momentary demands of a stressful situation may help explain individual differences in the impact of stress on physiological systems.

Keywords: stress; observational assessment; coping; cortisol; reactivity

Introduction

Responding to a potential threat engages the resources of cognitive, behavioral, and physiological systems. The release of cortisol is one of the main methods through which the body exacts a physiological response to internal and external challenges. An adaptive stress response is characterized by the rapid release of cortisol to meet the demands of the situation, followed by a return to baseline cortisol levels once the stressor no longer poses a threat (McEwen & Wingfield, 2003). Associations have been observed between dysregulated patterns of stress reactivity, such as exaggerated or blunted responses, and a range of physical and mental health problems (McEwen & Wingfield, 2003; Miller, Chen, & Zhou, 2007).

Despite several decades of research on individual differences in cortisol responses to stressful experiences, much remains to be learned. Coping strategies, or methods by which individuals attempt to manage difficult situations, are increasingly being examined as predictors of physiological reactivity to stress. Cortisol activity has been hypothesized to reflect, in part, the extent to which coping strategies facilitate an

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adaptive cognitive and behavioral response to stress (Nicolson, 1992); however, studies of the relation between coping and cortisol activity have yielded inconsistent results. For example, engaged efforts to change qualities of the stressor or stressful environment, often referred to as active or approach coping, have been associated with lower levels of daily cortisol (O'Donnell, Badrick, Kumari, & Steptoe, 2008), lower cortisol following an exam (Nicolson, 1992), as well as exaggerated cortisol reactivity in response to romantic conflict (Gunlicks-Stoessel & Powers, 2009). Disengaged or passive strategies have been similarly associated with varied results (Denson, Spanovic, & Miller, 2009; Zoccola, Dickerson, & Zaldivar, 2008) and other studies have observed no relation of cortisol to emotion- (Master et al., 2009) or problem- (van Eck, Nicolson, Berkhof, & Sulon, 1996) focused coping.

Managing complex stressful situations may require individuals to apply multiple strategies that span a number of different categories (e.g., approach, avoidance, etc.). However, coping research has typically examined the consequences of a single cognitive/behavioral strategy or general coping style, rather than the breadth of responses employed (Folkman & Moskowitz, 2004). Only recently has research highlighted the importance of attending to the use of a diverse repertoire of coping strategies to meet the demands of stressful situations (e.g., coping flexibility; Cheng, 2001; Duhacheck & Kelting, 2009). As compared to reliance on a single coping strategy, the use of a range of self-reported coping strategies has been associated with positive psychological outcomes, including lower anxiety (Cheng, 2001), decreased depression (Fresco, Williams, & Nugent, 1996) and greater perceived control over pain (Haythornthwaite, Menefee, Heinberge, & Clark, 1998). To date, no study has investigated how the range of response strategies during stress is related to individual differences in cortisol reactivity.

The bulk of existing research on individual differences in coping has relied on retrospective self-reports of coping, which may present a barrier to controlled assessment of the associations between coping and physiological responses to stress. Self-reports of coping reflect cognitive conceptualizations of how individuals believe they manage stressful situations, which may not accurately reflect or fully capture the range of cognitive and/or behavioral responses actually used in a particular situation. In a study of college students, there was a significant difference between participants' self-reported coping after a stressful situation and how they described their coping efforts as they observed their responses to the situation on videotape (Spangler, Pekrun, Kramer, & Hofmann, 2002). Observation and coding of behavioral responses in the context of a stressful situation offers the advantage of witnessing what individuals actually "do" during a challenge. While self-reports of coping are often used with the expectation that they provide an account consistent with the actual behavioral methods individuals rely on to cope with stress, there are conceptual differences between the information gathered from self-report and observation-based behavioral assessment tools. Behavioral strategies reflect observable responses used to meet the demands of a given stressful situation as it unfolds, while self-reports require a more global, retrospective evaluation of one's pattern of responses employed to manage typically encountered challenging situations. As such, supplementary objective observations of how individuals manage the momentary demands of a discrete stressful situation could offer useful information on the physiological consequences of coping responses.

Prior research on the consequences of employing a range of cognitive or behavioral response strategies has typically focused on the benefits of flexible responding across different stressful situations, with little attention to how using a variety of strategies *within* a single situation may influence psychological or physiological outcomes. Examination of the range of responses within a discrete situation allows for a more specific assessment of associations between these efforts and physiological reactivity to stress. Moreover, a within-situation approach provides the advantage of a standardized stressful stimulus across individuals, yielding a more controlled assessment of relations between the range of response strategies and physiological reactivity.

Interpersonal conflict represents a powerful context in which to observe the range of strategies individuals use to respond to and manage stressful situations. Conflictual dyadic interactions can be characterized as dynamic and unpredictable, requiring a diverse array of response strategies. The range of responses used may become evident during the "give and take" of stressful interactions, as individuals attempt to manage the various challenges posed by an uncooperative individual. Previous research has assessed behavioral and cortisol responses to stressful interpersonal interactions, however, much of the literature involving young adult or adult populations has focused on interactions between individuals with a pre-existing relationship. For example, several studies have evaluated cortisol reactivity during conflictual discussions between romantic partners, with an emphasis on the influence of positive and negative conflict behaviors (Keicolt-Glaser et al., 1996; Robles, Shaffer, Malarkey, & Kiecolt-Glaser, 2006). An exception lies in the research of Stroud and colleagues, who have measured physiological reactivity to a laboratory-based social rejection stressor among undergraduates with no prior relationship history. However, the range of coping strategies used during this challenge was not assessed (Stroud, Salovey, & Epel, 2002; Stroud, Tanofsky-Kraff, Wilfley, & Salovey, 2000). To our knowledge, there is little, if any, research on the relation between range of coping or behavioral responses and physiological reactivity to an interpersonal stressor involving dyads without a prior relationship history.

The current study aims to expand the literature with an investigation of the physiological consequences of employing a range of self-reported coping strategies and observed behavioral response strategies. Self-reports of the range of strategies typically used to manage a broad number of social stressors were collected, and "real-time" behavioral responses to a simulated social conflict interaction were observed and coded. Relations between the range of observed and self-reported response strategies and cortisol levels during the social interaction were examined. It was hypothesized that a greater range of response strategies, assessed by either self-report or by behavioral observation, would be associated with lower cortisol as compared to a smaller range of responses.

Methods

Participants

Participants were 74 university students (38 men and 36 women) recruited from Introductory Psychology classes (mean age = 18.11, SD = 7.54; 83.8% Caucasian, 6.8% Hispanic, 2.7% African-American, 2.7% Asian, 2.7% Other, 2.7% No answer).

The majority of the sample reported an average family income of $80,000 or higher (44.6% $100,000+, 23% $80,000–$99,000, 8.1% $60,000–$79,999, 8.1% $45,000–$59,999, 9.5% $30,000–$44,999, 4.1% $0–$29,999). Participants were drawn from a larger study that recruited students who were raised in continuously married families by both biological parents (see Luecken, Kraft, & Hagan, 2009). The study was approved by the Institutional Review Board of Arizona State University, and all participants signed informed consent forms prior to participation.

Procedure

Participation occurred on a weekday afternoon between 1 and 5 pm. Participants were asked to refrain from use of alcohol the night before participation, cold medication on the day of participation, and caffeine, energy drinks, eating, smoking, and exercise for at least 2 hours prior to participation. Compliance was queried prior to participation, and those who did not comply were rescheduled. After providing informed consent, participants rested for 15 minutes, after which the baseline salivary cortisol sample was collected. Participants then completed a 10-minute role-play task. Immediately after the completion of the task, the second saliva sample was collected. The third and fourth samples were collected 20 and 40 minutes later, respectively. Participants completed questionnaires after the role-play.

Role-play task

The role-play task was chosen to reflect a naturalistic interpersonal stressor, which previous research has demonstrated results in diverse emotional and behavioral responses (Larkin, Semenchuk, Frazier, Suchday, & Taylor, 1998; Semenchuk & Larkin, 1993). For 10 minutes, participants role-played a challenging social situation (requesting a neighbor to turn down loud music so he/she can study for an important exam) with a same-sex research assistant. The research assistant maintained a neutral expression and posture while following an ordered series of scripted responses indicating a refusal to cooperate (e.g., "I've never asked you to turn down your music"; "I like it like this"; "I don't see why I should").

Measures

Range of self-reported response strategies

Following the role-play task, individuals' self-reported strategies for responding to social stress were measured with the Responses to Stress Questionnaire (RSQ; Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). The RSQ provides a reliable assessment of cognitive responses to frequently occurring social stressors similar in quality to the role-play task (e.g., having problems with a friend, being left out/rejected, fighting with others, etc.) and has been validated for use with young adults (Connor-Smith et al., 2000). The RSQ assesses 10 categories of voluntary coping strategies across three broad coping constructs. A Primary Control Engagement construct reflects categories of responses (problem-solving, emotional expression, emotional regulation) aimed at actively changing the situation or one's emotional reaction to the situation (e.g., "I try to think of different ways to change

the problem or fix the situation.''). Secondary Control Engagement coping captures categories of responses (cognitive restructuring, positive thinking, acceptance, distraction) focused on adapting to the situation (e.g., ''I think about the things I am learning from the situation.''). The Disengagement construct assesses categories of responses (denial, avoidance, wishful thinking) that emphasize withdrawal or escape from the situation (e.g., ''I try to stay away from people and things that make me feel upset or remind me of the problem.''). Each of the 10 categories consisted of three items (30 items total) rated for usage on a four-point scale, where 1 = Not at all, 2 = A little, 3 = Some, and 4 = A lot. In order to reliably capture consistent use of a given category, a ''1'' was assigned (indicating endorsement of the category) if a participant responded with a ''3'' or ''4'' on two of the three items within the category. Otherwise, the category was scored as a ''0'' to reflect limited use of that strategy. A range of responses score was calculated by summing across the number of endorsed RSQ categories. Thus, self-reported range of responses scores could range from 0 to 10. Higher values represent use of a greater range of strategies in response to social stressors.

Range of behavioral response strategies

Videotapes of the task were divided into 30-second intervals and each interval was coded for the absence or presence (coded as 0 or 1) of 29 different categories of behavioral responses. Initial behavioral response categories were developed using the RSQ categories as a guide for responses that could be observed. For example, a category of attempts to engage in problem-solving with the neighbor (e.g., ''Do you have any ideas about how to resolve this problem?'') was created, analogous to the problem-solving category on the RSQ. However, not all categories from the RSQ are observable in behavior (e.g., wishful thinking). Additional categories were also developed to capture behavioral response strategies without clear parallels to the cognitive strategies measured by the RSQ (e.g., threatening to call an authority figure). A complete list of behavioral response categories is provided in Appendix 1. Two members of the research team coded the videotapes until reliability (kappa) of 0.85 was achieved. Interrater reliability was high for all categories, ranging from 0.85 to 0.99. The observed range of responses score was calculated by summing the number of behavioral response categories observed at least once across the role-play task. Thus, behavioral response range scores could range from 0 to 29. Higher values indicate use of a greater range of behavioral response strategies during the task.

Cortisol sampling

Four saliva samples were collected immediately before, after, and 20 and 40 minutes after the role-play task. Samples were obtained with the Salivette device (Sarstedt, Rommelsdorf, Germany) and were stored frozen at 0° F for 1–3 months before being shipped on dry ice to Salimetrics (State College, PA) for analysis of free cortisol using high-sensitive enzyme immunoassay. The test has a range of sensitivity from .007 to 1.8 μg/dl, and average intra- and inter-assay coefficients of variation 4.13% and 8.89%. Cortisol values were log-transformed in SPSS (base 10 logarithm) to correct for deviations from normality.

Data analyses

Multilevel linear modeling was conducted using SPSS MIXED to evaluate the impact of the range of responses on cortisol reactivity to the social challenge task. A two-level model was examined with the repeated cortisol measures as the outcome variable. Level-1, or the "within-person" variables, included *time,* which represents the order of the cortisol sample (i.e., first, second, third, or fourth cortisol sample per person), and *time*^{2}, which represents the curvilinear pattern of cortisol across the task. Level-2, or "between-person" variables, included the predictor (either self-reported response range or behavioral response range, each entered as a continuous variable) and relevant covariates. All analyses controlled for gender and time of day (to account for potential individual differences in cortisol that might arise due to the diurnal pattern of the hormone throughout the day).[1] Consistent with the notation of Raudenbush and Bryk (2002), a β symbol denotes the regression coefficients from the multilevel model. The final equation was as follows:

$$\begin{aligned}\text{Log-transformed cortisol} = {} & \beta_0 + \beta_1(\text{TIME}) + \beta_2(\text{TIME}^2) + \beta_3(\text{TIME OF DAY}) \\ & + \beta_4(\text{GENDER}) + \beta_5(\text{GENDER} * \text{TIME}) \\ & + \beta_6(\text{GENDER} * \text{TIME}^2) + \beta_7(\text{RANGE}) \\ & + \beta_8(\text{RANGE} * \text{TIME}) + \beta_9(\text{RANGE} * \text{TIME}^2)\end{aligned}$$

In this equation, RANGE refers to either self-reported response range or behavioral response range and the coefficients β_8 and β_9 reflect the linear and curvilinear associations, respectively, between range of responses and cortisol.

Results

Range of self-reported and behavioral response strategies

On average, participants self-reported a response range of 4.47 different types of strategies (SD = 1.73; range = 0–9) to manage social stressors typical among this age group. During the 10-minute role-play task, participants displayed an average behavioral response range of 14.65 (SD = 2.80; range = 9–22). Scores for self-reported and behavioral response ranges were not correlated ($R = -.05$, $p = .69$). Male and female participants did not differ on the behavioral range of responses used across the task ($p = .31$), however, self-reported response range was greater among females (mean = 4.94, SD = 1.47) than males (mean = 4.08, SD = 1.69; $t(71) = -2.325$, $p < .05$).

Cortisol responses to the task

Significant reactivity to the task was observed across baseline, task, and recovery measures of cortisol in the sample, controlling for gender and time of day (β = –.068, SE = .007, $t(144) = -9.6$, $p < .01$). A gender difference in cortisol reactivity to the task was statistically significant ($p = .020$), with males exhibiting higher reactivity. Time of day predicted average cortisol level ($p = .024$), but did not predict reactivity ($p = .44$).

Association between range of response strategies and cortisol reactivity

Multilevel models predicting cortisol from self-reported range of response strategies and controlling for gender and time of day found no relation between self-reported response range and cortisol reactivity to the task ($p = .60$), or average cortisol levels across the task ($p = .78$). In contrast, the range of behavioral response strategies was a significant predictor of cortisol reactivity during the task ($\beta = .005$, SE $= .0019$, $t(133) = 2.65$, $p = .009$; see Table 1). Individuals who employed a greater range of observed behavioral responses displayed lower cortisol reactivity to the task compared to individuals who displayed a smaller range of responses (see Figure 1). Although total cortisol output during the task appeared lower among those who displayed a greater range of behavioral response strategies, this association did not reach statistical significance ($\beta = .03$, SE $= .02$, $t(146) = 1.96$, $p = .052$).

Sex differences

Exploratory analyses were conducted to investigate potential differences in the relation of response range to cortisol activity between male and female participants. Sex and the self-reported range of responses did not interact to predict cortisol reactivity to the task ($p = .45$) or average cortisol levels across the task ($p = .77$). The interaction of sex and the range of behavioral responses, however, significantly predicted cortisol reactivity to the task ($\beta = .01$, SE $= .004$, $t(132) = 2.93$, $p = .004$), but was not associated with average cortisol levels across the task ($p = .10$). Further

Table 1. Multilevel modeling of cortisol activity as a function of range of response strategies.

Fixed effects	β	SE	*t*	*p*
Range of behavioral response strategies				
Intercept	−.92	.060	−15.43	<.01
Time of day	−.001	.0004	−2.41	.019
Time	.31	.039	7.97	<.01
Time^2	−.069	.007	−9.19	<.01
Gender	−.038	.085	.46	.65
Gender × time	−.12	.055	−2.12	.035
Gender × time^2	.027	.011	2.59	.011
Behavioral response range	.030	.015	1.96	.052
Behavioral response range × time	−.029	.010	−2.90	.004
Behavioral response range × time^2	.005	.0019	2.65	.009
Range of self-reported response strategies				
Intercept	−.94	.06	−15.99	<.01
Time of day	−.0007	.0004	−1.90	.062
Time	.33	.040	8.29	<.01
Time^2	−.071	.008	−9.33	<.01
Gender	−.025	.08	.30	.77
Gender × time	−.108	.057	−1.9	.059
Gender × time^2	.025	.011	2.27	.025
Self-reported response range	.010	.036	.28	.78
Self-reported response range × time	−.007	.024	−.31	.76
Self-reported response range × time^2	.0024	.0047	.53	.60

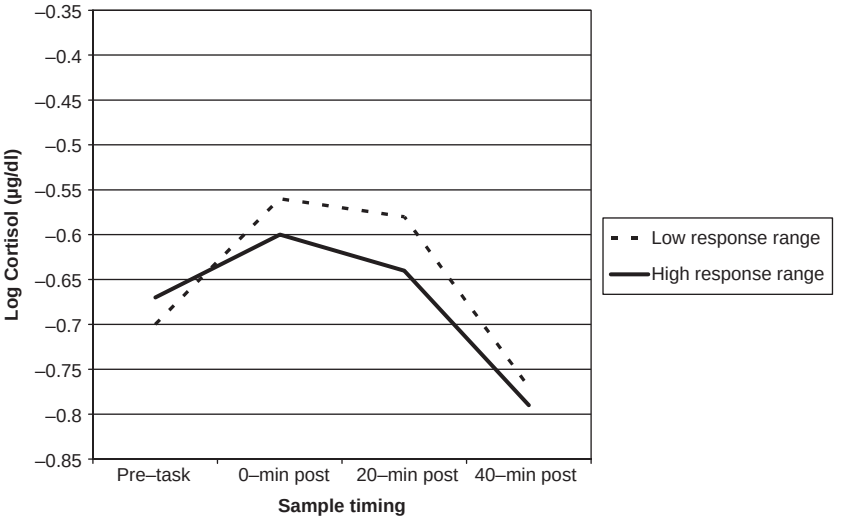

Figure 1. Cortisol response as a function of the range of behavioral response strategies used during the role-play task. Cortisol values are log-transformed. The "Low range" of responses were set at 1 SD below the mean of response range during the task; the "High range" of responses were set at 1 SD above the mean on response range during the task.

analyses were conducted separately with male and female participants, however, the findings should be interpreted cautiously given the restrictions of the small sample size. Among female participants, the association between behavioral response range and cortisol reactivity was similar to the overall sample, such that females who demonstrated a greater range of behavioral responses exhibited lower cortisol reactivity to the task relative to females who utilized a smaller range of behavioral responses ($\beta = .01$, $SE = .003$, $t(66) = 4.14$, $p \leq .01$). Among males, behavioral response range was not significantly related to cortisol reactivity ($p = .80$) or average cortisol levels across the task ($p = .52$).

Discussion

The current study examined the physiological consequences of employing a range of response strategies to manage social stress. Participants' self-reports of the array of coping strategies typically used in response to commonly occurring social stressors were collected. The range of participants' behavioral responses was also observed during a standardized stressful social interaction. We hypothesized that using a greater range of self-reported or observed responses to manage social stress would be associated with lower cortisol reactivity to the task. As predicted, those who employed greater diversity in their behavioral responses during the task, as measured by observation, exhibited lower cortisol reactivity to the task compared to those who utilized a less diverse set of behavioral responses. The range of self-reported coping response strategies, however, was not associated with the pattern of cortisol activity during the task.

The negative association between the range of observed behavioral responses and cortisol reactivity to interpersonal stress may be explained by a myriad of factors.

Psychological flexibility, defined in part as the "ability to adapt to fluctuating situational demands," has been identified as a key contributor to physical functioning (Kashdan & Rottenberg, 2010, p. 866). The employment of a more varied pattern of behavioral response strategies may reflect a high sense of self-efficacy, which has been associated with lower cortisol activity (Benight et al., 1997; Schaeffer & Baum, 1984; Schwerdtfeger, Konermann, & Schonhofen, 2008). A strong belief in one's capability to reach a desired outcome in a stressful situation may facilitate approach behavior and a willingness to undertake a variety of different strategies towards resolution. Relatedly, the use of multiple strategies may be a reflection of hopefulness and optimism with regard to one's ability to resolve a challenging situation. Prior research has associated hope with a broadening of one's repertoire of "thought-action tendencies" (Fredrickson, 1998) and positive health outcomes (Richman et al., 2005).

A difference was found between the predictive influence of behavioral and self-reported response range on cortisol reactivity to stress. While a greater range of behavioral response strategies during the stressful task predicted lower cortisol reactivity, the range of self-reported responses to general forms of social stress was not related to cortisol output during the task. These contrasting findings may be understood in light of the conceptual differences between responses obtained through observation and responses measured by self-report. The strategies measured by behavioral observation reflected responses that were overt, acute, and demonstrable (i.e., behavioral methods employed to manage the immediate demands of a conflict interaction). The self-reported strategies, conversely, were inherently covert and relied upon retrospective cognitive appraisal (i.e., how individuals perceived their own cognitive responses to social stress). Moreover, self-reports of response strategies were completed with reference to a broad number of social stressors, while behavioral responses were collected during a single stressful interpersonal conflict task. Results from the current study suggest that physiological stress reactivity may relate more strongly to the variability with which individuals enact *behavioral* responses to a discrete social stressor than to the range of unique *cognitive* strategies individuals employ to cope with social stress more broadly. The physiological or psychological impact of the flexible use of cognitive coping strategies may be more evident in longer-term health effects.

Self-report and behavioral assessment were employed in the present investigation to avoid the potential biases of reliance on a single data source and provide an important contribution to research dominated by the use of self-reports. Although multimethod approaches are often undertaken with an expectation that data sources will correspond with each other, this may not always occur. The current findings revealed a lack of convergence between the observed range of behavioral responses employed during a stressful social task and the range of self-reported cognitive strategies used in response to social stress. In the current study, the self-reported and behavioral assessments of individual responses to stress may have captured non-overlapping cognitive and behavioral qualities of a single construct. Kagan (2009) uses a metaphor of a "thick curtain punctuated with a large number of tiny holes" to describe the challenges facing researchers who use multiple measures to assess a given construct (p. 23). The observations garnered from each curtain hole (i.e., each measure) provide a unique perspective on a given construct and notably, one that may not correlate with the vantage points provided by other measures (Kagan, 2009).

A lack of concordance among measures may not indicate the failure of a given assessment tool to adequately assess the construct of interest, but rather the necessity of multiple measures to capture its complexities. However, it may also be the case that self-report and behavioral observation methods reflect distinct constructs related to individual responses to stress. Despite the wealth of studies that investigate cognitive and behavioral responses to stress, debate continues over the definition and measurement of coping as a construct (Folkman & Moskowitz, 2004). Self-report has been the predominant method of assessing coping across existing studies, with little research exploring the use of behavioral observation as a comparable (or non-comparable) measurement strategy. Results from the current study suggest the need for additional research that explores the association between behavioral response strategies, traditional self-report assessments of coping, and related constructs (e.g., emotion regulation).

Although examination of sex differences was not a primary goal of this study, it was interesting that males exhibited higher reactivity to the role-play task than females. These findings diverge from research that observed elevated cortisol responses to interpersonal rejection stressors among females relative to males (Stroud et al., 2000, 2002). In contrast, higher cortisol responses to goal-directed tasks among males have been noted (Kirschbaum, Wust, & Hellhammer, 1992; Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004). It has been theorized that women are more physiologically aroused by social stress and rejection, while men exhibit a greater response to status- and achievement-oriented challenges (Del Giudice, Ellis, & Shirtcliff, 2011; Stroud et al., 2002). Our findings do not appear to support this theory. Exploratory analyses suggested that the impact on cortisol reactivity of employing a greater range of behavioral responses may be more profound for females than males. Although the small sample size requires caution in interpretation, further investigation of sex differences in the effect of behavioral responses on cortisol reactivity is warranted.

Several limitations to the present study should be considered. The sample consisted of primarily Caucasian, middle-class young adults in a university setting. The results may not apply to a broader, more heterogeneous population. The current study provides one method for measuring the range of responses to a discrete situation, and results may not generalize across a variety of contexts. In the current study, there was variation in the total number of behavioral responses employed. Controlling for the total number of behavioral responses in our statistical models did not change the relation of response range to cortisol reactivity. However, individual differences in task engagement may have affected cortisol reactivity. Future studies may directly address this concern by investigating the physiological consequences of behavioral response range when participants are limited to use of a fixed number of total responses across a stressful task. Some studies have attended to the extent to which individuals are able to vary their coping responses to match the qualities of the stressor, observing improved outcomes when specific strategies are applied to match a situation's perceived controllability (i.e., use of problem-focused strategies during controllable situations and emotion-focused strategies during uncontrollable situations; for review, see Folkman & Moskowitz, 2004). Participants' perceptions of control over stressor outcomes/resolutions were not collected in the current study. Future research should evaluate the dimension of controllability to advance understanding of the physiological consequences of varied patterns of responding to stress.

In conclusion, the present study examined the range of responses used to manage stressful social situations in an effort to better understand individual differences in physiological reactivity to stress. Behavioral observation of individual responses to a stressful task was employed to expand upon the perspective provided by traditional self-report coping assessments. A greater range of observed behavioral response strategies was associated with lower cortisol reactivity during a discrete interpersonal stressor, however, self-reported range of responses to general social stressors bore no relation to cortisol output during the task. The findings suggest the range of behavioral responses to stress may be an important contributor to understanding individual differences in the impact of stress on physiological systems and support the use of behavioral assessments to collect information on the nature of responses to stress not captured by self-report coping measures. Future research may build upon the results of the current study to advance comprehensive assessments of stress management strategies and their relation to physical health.

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Note

1. Hormonal contraceptive use and the total number of behavioral responses during the interaction were also evaluated as potential covariates. Their inclusion did not change the pattern or significance of findings. Therefore, neither was retained in statistical models.

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Appendix 1. Behavioral response categories

1. Participant makes a direct request to turn down the music.
2. Participant bargains/suggests a compromise.
3. Participant suggests alternative solution.
4. Participant engages in problem-solving with the neighbor.
5. Participant explains why she/he needs the neighbor to turn down the music.
6. Participant uses moral/social argument to persuade.
7. Participant explains how the neighbor would benefit if music was turned down.
8. Participant attempts to understand neighbor's perspective.
9. Participant notes differences in his/her perspective and neighbor's perspective.
10. Participant tries to change the neighbor's perspective.
11. Participant explains his/her emotional experience.
12. Participant compliments or attempts to build rapport.
13. Participant validates neighbor's feelings.
14. Participant makes friendly appeal.
15. Participant uses humor.
16. Participant gives up/acquiesces.
17. Participant explains what he/she would do if the situation were real.
18. Participant talks about unrelated things.
19. Participant patronizes, mocks, or uses sarcasm.
20. Participant blames, criticizes, or insults the neighbor.
21. Participant insists or demands the neighbor turn down the music.
22. Participant threatens revenge.
23. Participant threatens violence.
24. Participant threatens to call an authority figure.
25. Participant argues with the neighbor.
26. Participant uses expletives.
27. Participant begs or pleads.
28. Participant whines or complains.
29. Participant apologizes to the neighbor.