Title

Are You Feeling What I'm Feeling? Emotional Similarity Buffers Stress

Journal

SOCIAL PSYCHOLOGICAL AND PERSONALITY SCIENCE, 5(5)

ISSN

1948-5506

Authors

Townsend, Sarah SM
Kim, Heejung S
Mesquita, Batja

Publication Date

2014

DOI

10.1177/1948550613511499

Social Psychological and Personality Science
2014, Vol. 5(5) 526-533

DOI: 10.1177/1948550613511499
spps.sagepub.com

Are You Feeling What I'm Feeling? Emotional Similarity Buffers Stress

Sarah S. M. Townsend[1], Heejung S. Kim[2], and Batja Mesquita[3]

Abstract

We examine the idea that it is beneficial for people in threatening situations to affiliate with others who are experiencing similar, relative to dissimilar, emotions. Pairs of participants waited together and then engaged in a laboratory stressor (i.e., giving a speech). We created an index of each pair's emotional similarity using participants' emotional states. We also measured how threatening participants perceived the speech task to be (i.e., whether they had high vs. low dispositional fear of public speaking). We hypothesized that perceiving greater threat in the situation would be associated with greater stress, but interacting with someone who is emotionally similar would buffer individuals from this heightened stress. Confirming our hypotheses, greater initial dyadic emotional similarity was associated with a reduced cortisol response and lower reported stress among participants who feared public speaking.

Keywords

emotional similarity, threat, stress, neuroendocrinology, dyadic interactions

Imagine going skydiving for the first time: riding in the hull of a plane and preparing to jump out once you reach 1,300 ft. For someone who is anxious and nervous in this situation, having another person there, experiencing the same situation, may help reduce stress. However, this benefit might only occur if this other person is also having the same *emotional* experience of that situation. That is, perhaps skydiving with another person who is happy and relaxed will have little effect on this first time skydiver, but skydiving with someone who is also nervous will help her to feel less stressed. Indeed, having similar emotions to another person validates one's own feelings and appraisals (Frijda & Mesquita, 1994; Keltner & Haidt, 2001; Locke & Horowitz, 1990), which may offer individuals a sense of certainty or predictability and, therefore, lead to lower levels of stress (e.g., Dickerson & Kemeny, 2004). Thus, emotional similarity to an interaction partner may be associated with decreased stress responses in anxiety-provoking or threatening situations.

We tested this possibility in the present research by examining the benefit of interacting with an emotionally similar, versus dissimilar, person during a potentially threatening situation (i.e., preparing for a public speaking task). Specifically, we tested whether emotional similarity would buffer individuals who perceive the situation to be threatening (i.e., those with a high fear of public speaking) from heightened stress. We focus on individuals' experiences of stress indexed by both their affective and neuroendocrine responses.

Desire for and Benefits of Emotional Similarity

People prefer to interact with others who are experiencing similar emotions (e.g., Gump & Kulik, 1997; Kulik & Mahler, 2000). Schachter (1959) proposed the *emotional similarity hypothesis* based on his findings that women facing a novel threat strongly prefer to be with another person, especially when the other person is facing a similar threat. This preference is validated by findings demonstrating that interactions between emotionally similar people are more satisfying than interactions between people who are emotionally dissimilar (Locke & Horowitz, 1990). Consistent with this, emotional similarity is associated with a variety of interpersonal benefits, including greater empathy (e.g., Preston & de Waal, 2002), greater interpersonal coordination (Hatfield, Cacioppo, & Rapson, 1994; Preston & de Waal, 2002; Totterdell, 2000), and less conflict and greater cooperation among group members (e.g., Barsade, 2002).

[1] Department of Management and Organization, Marshall School of Business, University of Southern California, Los Angeles, CA, USA
[2] University of California, Santa Barbara, CA, USA
[3] University of Leuven, Leuven, Belgium

Corresponding Author:
Sarah S. M. Townsend, Department of Management and Organization, Marshall School of Business, University of Southern California, Los Angeles, CA 90089, USA.
Email: sarah.townsend@marshall.usc.edu

In addition, emotional similarity is associated with better relationship outcomes (Anderson, Keltner, & John, 2003; Gonzaga, Campos, & Bradbury, 2007; Van Kleef et al., 2008; Zajonc, Adelmann, Murphy, & Niedenthal, 1987). For example, Van Kleef and colleagues (2008) revealed that people who are in distress experience greater closeness to a conversation partner when that partner mirrors their distress than when he or she does not mirror it. Moreover, Anderson, Keltner, and John (2003) found that emotional similarity also has benefits for longer term relationships. Specifically, dating partners' emotional similarity predicted their current relationship satisfaction, increases in their relationship satisfaction over time, and whether the relationship would end in the next 6 months. Additionally, college roommate pairs' emotional similarity at the end of the year predicted greater feelings of closeness and estimates of a higher likelihood of continuing the friendship in the future.

Emotional Similarity, Threat, and Stress

Given the clear social and interpersonal benefits associated with emotional similarity, we examine whether affiliation with emotionally similar others might also carry individual-level benefits when people encounter threatening situations. Feeling similar emotions to an interaction partner not only increases feelings of closeness to that person (e.g., Van Kleef et al., 2008), it also validates individuals' own understandings (e.g., Locke & Horowitz, 1990), which may help provide people with a sense of certainty or predictability in the situation. Importantly, such perceptions of predictability are associated with reduced stress responses (e.g., Dickerson & Kemeny, 2004). For instance, information that confirms individuals' beliefs and expectations is associated with more adaptive stress responses, even when that information is negative (e.g., Townsend, Major, Sawyer, & Mendes, 2010). Thus, we theorize that sharing a threatening situation with someone whose emotional profile is similar to one's own will attenuate people's stress responses.

Although there is some evidence that affiliation with emotionally similar others is associated with lower stress responses to threatening situations, this work is limited. For example, some findings demonstrate that people in anxiety-provoking situations report reduced anxiety when they are in the presence of others who are in the same situation; however, only participants who were firstborn children showed such reduced anxiety (Wrightsman, 1960; also see Epley, 1974). In addition, studies examining stress-related benefits have often equated situational similarity with emotional similarity by operationalizing emotional similarity as two people being in the same situation (e.g., both anticipating a scary event) and dissimilarity as two people being in different situations (e.g., one anticipating a scary event and the other anticipating an innocuous event; e.g., Gump & Kulik, 1997; Kulik, Mahler, & Moore, 1996; Schachter, 1959). However, individuals do not always have the same emotional responses, even given identical situations. Thus, it remains unclear whether any observed reduction in individuals' stress responses stems from the similarity of their partners' emotional state or from merely sharing a threatening or anxiety-provoking situation with them. In the present study, we isolate the role of emotional similarity by examining how the degree of concordance between the emotional states of two people in the same potentially threatening situation influences their experiences of stress.

Moreover, it is important to note that even in a given anxiety-provoking situation, people vary in how threatening they perceive the situation to be and individuals who perceive more threat show greater stress responses than individuals who perceive less threat (e.g., Dickerson & Kemeny, 2004; Gaab, Rohleder, Nater, & Ehlert, 2005; Townsend, Major, Gangi, & Mendes, 2011). Thus, in the present study, we examine the benefits of emotional similarity among people who perceive high versus low levels of threat in the situation (i.e., people with high vs. low dispositional fear of public speaking). Although individuals who perceive greater threat typically experience higher levels of stress, interacting with an emotionally similar partner may buffer people from this heightened stress.

The Current Research

The current study examined whether emotional similarity between two individuals would buffer their stress responses during a potentially threatening situation. In a dyadic interaction situation, individuals were randomly paired, given time to interact, and then asked to engage in the same stressor (i.e., giving a speech). We modeled this stressor after the first half of the Trier Social Stress Task (Kirschbaum, Pirke, & Hellhammer, 1993). We measured the similarity between the two individuals' emotional profiles as well as participants' dispositional fear of public speaking, which we used to index whether participants perceived the situation as threatening (i.e., high fear of public speaking) versus relatively nonthreatening (i.e., low fear of public speaking).

We hypothesized that, overall, greater perceptions of threat would be associated with a greater stress response, but emotional similarity to an interaction partner would moderate this association. Specifically, we hypothesized that among participants who interacted with an emotionally *dis*similar person, perceiving greater threat would be associated with a greater stress response. However, participants who interacted with an emotionally similar person would be buffered from heightened stress, such that perceptions of threat in the situation would be less predictive of their stress responses. Looking at it differently, we also predicted that emotional similarity to a partner would be particularly beneficial for, and strongly attenuate the stress responses of, those who perceived high levels of threat in the situation. However, among participants who were less afraid of public speaking, emotional similarity to their partner would have less of an impact on their experience of stress.

Our primary measure of stress was participants' cortisol responses. Cortisol is a catabolic hormone and an end product of activation of the hypothalamic–pituitary–adrenal cortical (HPA) axis (Dickerson & Kemeny, 2004; McEwen, 1998; Lovallo & Thomas, 2000). The HPA axis is activated by the

experience of general stress (McEwen, 1998) as well as of a variety of negative psychological states including social evaluative threat (Dickerson & Kemeny, 2004), shame (Gruenewald, Kemeny, Aziz, & Fahey, 2004), and mental effort (Lovallo et al., 1985). To provide support for our interpretation of cortisol as an index of stress in this context, we also examined participants' self-reported experiences of stress.

In our approach, we focus on the similarity of interaction partners' *overall* emotional profiles. Specifically, each member of the dyad reported how much she was feeling a broad range of emotions, representing each of the four quadrants of the circumplex model of affect that is marked by valence and arousal (Barrett & Russell, 1998). We then correlated dyad members' responses and used the correlation coefficient as our index of emotional similarity. A similar measure has been used to examine changes in emotional profile during the acculturation process (De Leersnyder, Mesquita, & Kim, 2011). We do not doubt that the content of emotions, such as experiences of positive emotions or negative emotions, is tied to individuals' stress responses. However, above and beyond this, we aimed to examine the effect of experiencing emotions that are either similar or dissimilar to those of an interaction partner.

Method

Participants

Participants were 52 female undergraduate students (26 dyads) who received either course credit or US$20.

Procedure and Materials

Fear of Public Speaking. Before the experiment, participants completed an online measure of fear of public speaking as part of a larger set of questionnaires. Using a scale from 1 (*not at all*) to 8 (*very much*), they reported how true 4 items were of them: "I feel uncomfortable giving a public speech," "I get very anxious if I have to give a speech," "I am shy," and "I have difficulty speaking up in class." We averaged items to create a composite, $\alpha = .87$ ($M = 5.00$, $SD = 1.78$).

Session Scheduling. Experimental sessions were scheduled between 2:30 p.m. and 6:30 p.m. when cortisol levels are at their waking nadir and we followed standard procedures for collecting salivary cortisol (Kirschbaum & Hellhammer, 1994). Two participants were scheduled for each session. One day in advance of their scheduled lab visit, participants were e-mailed guidelines asking them to refrain from activities that could influence their cortisol levels (e.g., exercising or drinking caffeinated beverages within 4 hr of their scheduled time).

Arrival. When participants arrived at the lab, they were greeted by two experimenters who were unaware of participants' dispositional fear of public speaking, their dyadic emotional similarity, and the study hypotheses. The experimenters confirmed that participants did not know each other, and then escorted them into separate experiment rooms. Next, participants filled out a screening questionnaire on which they reported whether they had exercised, drank caffeine or alcohol, or smoked on the day of the experiment ($0 = no$, $1 = yes$). As all of these factors increase cortisol levels (e.g., Gotthardt et al., 1995; Lovallo, Farag, Vincent, Thomas, & Wilson, 2006; Petrides et al., 1994), we added across these scores and used the sum as a covariate in the cortisol analysis (as in Townsend et al., 2011). We also asked participants to report the time they woke that morning and the first day of their last menstruation. Saliva samples were collected 4 times from each participant throughout the study using a saliva collection kit (Salivette, Sartstedt Inc.).[1] After participants had been in the lab for 20 min, the first saliva sample was collected.

Speech Anticipation and Emotional Similarity Measure. The experimenters then brought the participants together into one experimental room and informed them that, as part of the study, they would each be giving a 1-min speech "in front of a small audience, while being videotaped." Following convention, this marked the onset of the stressor (e.g., Eisenberger, Taylor, Gable, Hilmert, & Lieberman, 2007; Page-Gould, Mendes, & Major, 2010; Townsend et al., 2011).[2] The termination of the stressor was when participants finished delivering their speech.

Next, participants completed an emotions questionnaire, which we used to index emotional similarity. Participants reported how much they were feeling a list of 21 emotions *at the present moment*. Specifically, participants reported how much they were feeling pleased, content, happy, miserable, unhappy, aroused, hyper, alert, stressed, quiet, upset, irritable, ashamed, anxious, nervous, afraid, relaxed, calm, at ease, interested, and strong. These emotions were selected to represent a broad range of emotional experiences and include emotions representing each of the four quadrants of the circumplex model of affect.

Information Exchange. To ensure that participants would become aware of each other's emotional states, we had them exchange their completed mood questionnaires. The experimenter explained that in order to get to know each other, they should review their partner's answers and pay careful attention to how the other person responded to each question. Participants then had 2 min to read their partners' responses. The experimenter left the room for this period.

Speech Preparation and Interaction. After the 2-min period, the experimenter returned to the room and gave each participant a sheet of paper on which to prepare her speech on the advantages of living in the Santa Barbara area. All participants had some knowledge of Santa Barbara—they were undergraduates attending the University of California at Santa Barbara and had been enrolled for at least 1 month prior to participation in the study. Participants were told that they would be giving their speeches in separate rooms and were given 3 min to outline their ideas.

An experimenter then returned to the room and explained that before they delivered their speeches participants would have another opportunity to get to know each other by engaging

in a short discussion. Specifically, the experimenter instructed participants to talk about how they were feeling about the upcoming speech task and asked participants to be frank about their thoughts and to pay attention to each other's comments. This afforded participants another opportunity to become aware of their partners' emotional state. The experimenter then left the room for 5 min while the dyad engaged in their discussion. Subsequently, the experimenters separated the participants, escorting one into a second experimental room.

Speech and Reported Stress. Next, the experimenters each set up a video camera on a tripod and instructed participants to deliver their 1-min speeches. After the speech, participants went through a waiting period for 70 min, and then reported how stressed, anxious, nervous, and afraid they felt on a scale from 1 (*not at all*) to 7 (*very much*), $\alpha = .81$ ($M = 1.99$, $SD = .78$). This was followed by a short demographic questionnaire. Participants provided the final saliva samples during the waiting period (see below for collection schedule) and were then thoroughly debriefed.

Saliva Sample Collection Schedule. In addition to saliva Sample 1 to measure the baseline cortisol levels, the participants provided three more saliva samples at 30, 50, and 90 min after learning that they would be giving a speech (i.e., the stressor onset). Our saliva-sampling schedule was designed to capture participants' cortisol levels during and after the stressor, as it is not just the peak level of cortisol but also sustained elevation that can indicate divergent stress responses. Our first two reactivity saliva samples were timed to capture responses during the stressor, given that peak cortisol responses often occur 21–40 min from the onset of acute psychological stressors (Dickerson & Kemeny, 2004). The final sample can be conceptualized as a recovery measure. The samples were stored in a freezer at approximately −20°C until shipped on dry ice to be analyzed by the California National Primate Research Center at the University of California, Davis. Salivary concentrations of cortisol were estimated in duplicate with commercial radioimmunoassay kits (Diagnostics Products, Los Angeles, CA).

Results

Calculation of Emotional Similarity

To measure dyads' emotional similarity, we correlated each participant's responses on the 21-item emotional profile questionnaire with those of her partner (as in Anderson et al., 2003). This resulted in one correlation coefficient for each dyad, which served as our index of emotional similarity. We chose to use the correlation between partners' emotional profiles as our measure because this is the best index of similarity in the *shape* of response profiles and it is less affected by individual differences in scale usage, which impact the *level* and *spread* of profiles. Higher correlations indicate greater similarity between partners' emotional profiles ($M\ r = .32$, ranging from −.36 to .88).

Benefits of Emotional Similarity

Analysis Plan. Given our dyadic data, we conducted multilevel regression analyses, in which participants were nested within dyads (Kenny, Kashy, & Cook, 2006). All models were analyzed with Statistical Package for the Social Sciences 20.0 Mixed Models (IBM, New York) using a repeated statement. An unstructured variance–covariance matrix was fitted to estimate the error variance. For these analyses, our predictors were the dyads' emotional similarity (grand-mean centered), participants' own fear of public speaking (grand-mean centered), and their partners' fear of public speaking (grand-mean centered). We also entered the multiplicative interaction of own fear of public speaking × dyads' emotional similarity to test whether the effect of participants' fear of public speaking was moderated by emotional similarity. This allowed us to examine our hypothesis that people who deemed the speech task threatening would be buffered from experiencing heightened stress when they interacted with an emotionally similar partner.

Cortisol Response. To examine participants' cortisol levels, we looked at their overall profile of cortisol responses by calculating the *area under the curve with respect to ground* (AUCg; Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003). AUCg measures the profile of cortisol levels over repeated time points in relation to zero. We selected this measure because the cortisol measurements taken over the course of stressor are not independent and our primary interest was in participants' overall levels of stress throughout the study. Additionally, covariates for this analysis included baseline cortisol level (grand-mean centered), time since awakening (grand-mean centered), menstrual phase (−1 = *follicular*, 1 = *luteal*), and number of cortisol influencing factors (grand-mean centered).[3]

The multilevel regression analysis predicting cortisol responses revealed main effects of both emotional similarity and participants' fear of public speaking. At average levels of emotional similarity, the more participants feared public speaking, the greater their cortisol levels, $b = 18.44$, $t(29.06) = 2.82$, $p = .009$. In addition, at average levels of fear of public speaking, the more similar participants' emotional profiles were to their partners' profiles, the lower participants' cortisol levels, $b = -67.92$, $t(16.14) = -2.68$, $p = .02$.

Importantly, these effects were qualified by a significant interaction between participants' fear of public speaking and emotional similarity, $b = -45.06$, $t(24.95) = -2.67$, $p = .01$, $SE = 16.88$; see Figure 1. As predicted, when dyads had low levels of emotional similarity, participants' fear of public speaking was associated with greater cortisol, $b = 34.42$, $p < .001$. In contrast, participants were buffered from this threat when dyads had high levels of emotional similarity; their fear of public speaking was not associated with their cortisol levels, $b = 2.46$, $p = .79$. In addition, among participants who feared

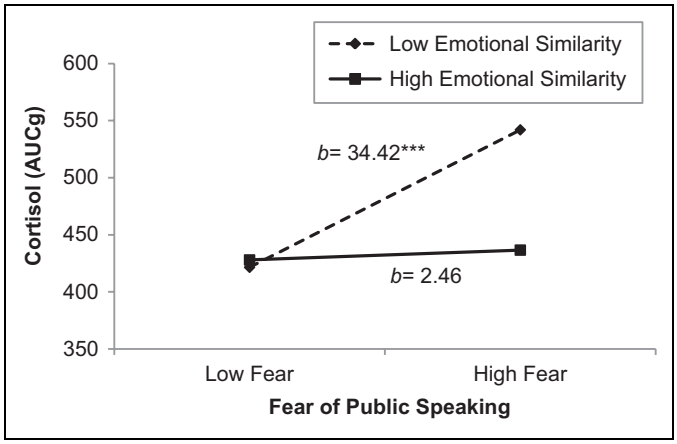

Figure 1. Cortisol responses (AUCg) plotted ± 1 *SD* from the mean on participants' fear of public speaking and the emotional similarity of the dyad. AUCg = area under the curve with respect to ground; *SD* = standard deviation. ***$p < .001$.

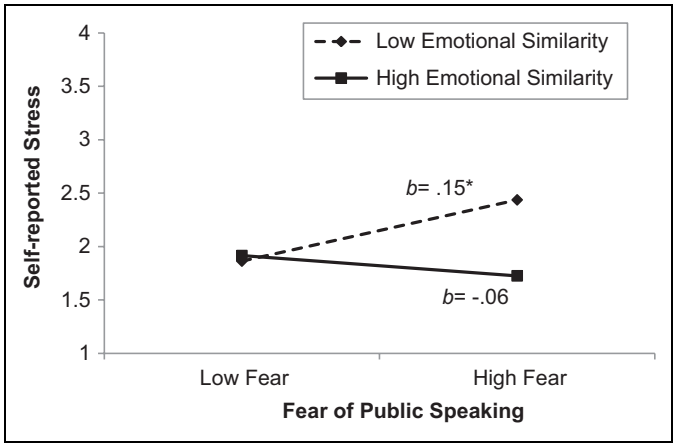

Figure 2. Self-reported stress following the speech plotted ± 1 *SD* from the mean on participants' fear of public speaking and the emotional similarity of the dyad. *SD* = standard deviation. *$p < .05$.

public speaking, greater emotional similarity to their partner was associated with lower cortisol, $b = -146.76$, $p = .002$, however, among participants who were not afraid of public speaking, emotional similarity was not associated with cortisol levels, $b = 10.91$, $p = .76$.

Self-Reported Stress. The multilevel regression analysis predicting self-reported stress following the speech revealed no significant main effects of fear of public speaking or emotional similarity, $ps > .19$. However, our hypothesized interaction was significant, $b = -.30$, $t(38.62) = -2.21$, $p = .03$, $SE = .14$ (see Figure 2). As predicted, and consistent with the cortisol results, when dyads had low levels of emotional similarity, participants' fear of public speaking was associated with reporting greater stress, $b = .15$, $p = .03$. In contrast, participants were buffered from this threat when dyads had high levels of emotional similarity; their fear of public speaking was not associated with their reported levels of stress, $b = -.06$, $p = .44$. Further, emotional similarity was associated with less self-reported stress among participants who feared public speaking, $b = -.99$, $p = .03$; however, it was not associated with self-reported stress among participants who were not afraid of public speaking, $b = .06$, $p = .88$.[4]

Discussion

The present results show that sharing a threatening situation with a person who is in a similar emotional state, in terms of her overall emotional profile, buffers individuals from experiencing the heightened levels of stress that typically accompany threat. Overall, participants who perceived the situation to be threatening (i.e., who were afraid of public speaking) showed higher cortisol levels compared to participants who did not perceive the situation to be particularly threatening. As predicted, emotional similarity moderated this relationship between perceptions of threat and stress responses. Specifically, for participants with emotionally *dis*similar partners, perceiving greater threat was associated with experiencing greater stress. However, for those with emotionally similar partners, perceiving greater threat was not associated their experiences of stress. These results provide evidence that emotional similarity to an interaction partner buffers individuals against experiencing heightened stress during threatening situations. It is important to note that these results also suggest that interacting with someone who is emotionally *dis*similar may be damaging to those who are in a difficult or threatening situation, but have a relatively minimal impact on those who are in a more comfortable situation.

By revealing individual-level benefits of emotional similarity, our findings are an important addition to earlier work demonstrating the relational benefits of interacting with emotionally similar others (Anderson et al., 2003; Hatfield et al., 1994; Preston & de Waal, 2002; Totterdell, 2000; Van Kleef et al., 2008). Specifically, our work extends the range of benefits offered by emotional similarity to include buffering stress during threatening situations. That this buffering is evident in participants' cortisol levels is particularly important, given the potential health implications. Although activation of the HPA axis facilitates the release of glucose, which increases energy to deal with short-term threats, prolonged or recurrent activation can compromise the resilience of these systems, laying the groundwork for chronic mental and physical health disorders (McEwen, 1998).

In addition, our work suggests that the desire to buffer oneself from heightened stress is one additional factor that may contribute to individuals' preferences for interacting with people who are experiencing similar emotions (e.g., Gump & Kulik, 1997; Kulik & Mahler, 2000). If emotionally similar others are more likely to attenuate one's stress response in threatening situations, they may be preferred or sought out for that reason.

Measuring Versus Manipulating Emotional Similarity and Threat

In our research, we elected to measure, instead of manipulate, both the level of threat participants perceived in the situation

(i.e., their fear of public speaking) and the degree of dyads' emotional similarity (i.e., the correlation in their overall emotional states). An alternative approach would have been to manipulate these variables. For example, we could have varied the level of threat inherent in the situation by changing whether participants' speeches were being evaluated. In addition, we could have placed dyad members in different emotional states, for instance, by having them watch videos designed to elicit different emotional responses. Although directly manipulating independent variables allows researchers to minimize confounds, this experimental approach may be limited in its generalizability to instances in which people share a particular situation.

In contrast, our correlational approach has the benefit of allowing us to examine whether similarity (or difference) in individuals' idiosyncratic emotional responses to the same situation influences their experiences of stress. Indeed, people are often in the same situation as others; however, they may have very different emotional responses to them. Our work suggests that, when the situation is perceived as threatening, convergent emotional responses can decrease stress.

Boundary Conditions and Future Research

Future research should examine whether the stress-buffering benefit of emotional similarity extends to all emotions. For example, according to an emotion-as-social-information perspective (e.g., Van Kleef, 2009), seeing another person display an emotional expression that implies danger may lead one to infer greater danger and, therefore, exacerbate one's experience of stress. Thus, emotional similarity to an interaction partner who is afraid may be stress inducing because interacting with this person may worsen the first individual's interpretation of the situation and increase the degree to which that person feels afraid. In addition, when one's interaction partner is also the target of his or her negative emotion, such as anger or disgust, similarity on these emotions may be more harmful than beneficial. Future work should examine the role of potential moderators such as the type and target of emotion (e.g., outward-focused fear and anger vs. self-focused shame and anxiety).

Given that our all of our participants were female, further research is needed to examine whether males also benefit from interacting with someone who is emotionally similar. In this initial test of our hypotheses, we elected to recruit and run females, instead of males, because women are more affiliative (Taylor et al., 2000), which may make them more likely to be influenced by the emotions of an interaction partner. However, we predict a similar pattern of results among men. Indeed, Anderson and colleagues (2003) found that although female roommate pairs showed somewhat greater emotional similarity than male pairs, these differences were not significant.

In addition, our focus was on the benefits of emotional similarity for stress. It remains unclear how emotional similarity might affect other aspects of people's experiences. For instance, does having a similar emotional profile to an interaction partner enhance dyadic performance on a collective task? Finally, although our results show that emotional similarity to a partner has an important effect beyond mere situational similarity, additional work is needed to examine the interplay between these constructs. For example, would emotional similarity to a partner decrease people's experiences of stress even if that partner were facing a different situation (e.g., if she was going to take a difficult test instead of giving a speech)?

In sum, when people are in a threatening situation, interactions with emotionally similar others are beneficial. Thus, a person going skydiving for the first time might indeed be better off with another person who is equally as anxious and nervous than with someone who is happy and relaxed, particularly if she is afraid of heights.

Acknowledgment

The authors would like to thank members of the Cultural Psychology Laboratory at UCSB, as well as Dr. David Sherman and Dr. Lisa Jaremka for useful comments on earlier versions of this article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by a University of California Faculty Senate Research Grant.

Notes

1. We used Salivettes because they are a convenient method for saliva collection, handling, and laboratory processing, and research has shown that salivary cortisol measurement with Salivettes is a reliable prediction method of total and calculated free serum cortisol levels (Poll et al., 2007).
2. These times correspond to approximately 15, 35, and 75 min following the beginning of the speech.
3. The saliva samples for two participants, in two different dyads, did not contain enough saliva to assay. Therefore, our sample size for the cortisol analyses is reduced by two dyads.
4. We also examined whether these key interaction effects held when controlling for participants' levels of specific emotions. First, we created four composites from our set of 21 emotions, based on a principle components factor analysis: general negative emotion (miserable, unhappy, upset, irritable, ashamed, aroused), high arousal positive emotion (pleased, content, happy, interested, strong, hyper, alert), low arousal positive emotion (relaxed, calm, at ease, quiet), and emotional stress (stressed, anxious, nervous, afraid). Participants' general negative emotion was negatively correlated with emotional similarity ($r = -.32$, $p < .05$), however, other correlations were not significant ($-.08 < r\text{s} < .17$, $p\text{s} > .1$). We then reran our multilevel regression analyses, entering one of the four composites at a time as a covariate. Overall, the inclusion of these covariates did not change the significance or pattern of the reported interaction effects, suggesting that it is (dis)similarity in dyad

members' overall emotional patterns, combined with their perceptions of threat in the situation that influences experiences of stress. The sole exception was that the interaction effect on self-reported stress, but not cortisol, was no longer significant ($p = .21$) when controlling for participants' low arousal positive emotion.

References

Anderson, C., Keltner, D., & John, O. P. (2003). Emotional convergence between people over time. *Journal of Personality and Social Psychology*, *84*, 1054–1068. doi:10.1037/0022-3514.84.5.1054

Barrett, F. L., & Russell, J. A. (1998). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology*, *74*, 967–984. doi:10.1037/0022-3514.74.4.967

Barsade, S. G. (2002). The ripple effects: Emotional contagion and its influence on group behavior. *Administrative Science Quarterly*, *47*, 644–675. doi:10.2307/3094912

De Leersnyder, J., Mesquita, B., & Kim, H. S. (2011). Where do my emotions belong? A study of immigrants' emotional acculturation. *Personality and Social Psychology Bulletin*, *37*, 451–463. doi:10.1177/0146167211399103

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, *130*, 355–391. doi:10.1037/0033-2909.130.3.355

Eisenberger, N. I., Taylor, S. E., Gable, S. L., Hilmert, C. J., & Lieberman, M. D. (2007). Neural pathways link social support to attenuated neuroendocrine stress responses. *Neuroimage*, *35*, 1601–1612. doi:10.1016/j.neuroimage.2007.01.038

Epley, S. W. (1974). Reduction of the behavioral effects of aversive stimulation by the presence of companions. *Psychological Bulletin*, *81*, 271–283. doi:10.1037/h0036389

Frijda, N. H., & Mesquita, B. (1994). The social roles and functions of emotions. In S. Kitayama & H. R. Markus (Eds.), *Emotion and culture: Empirical studies of mutual influence* (pp. 51–87). Washington, DC: American Psychological Association. doi:10.1037/10152-002

Gaab, J., Rohleder, N., Nater, U. M., & Ehlert, U. (2005). Psychological determinants of the cortisol stress response: The role of anticipatory cognitive appraisal. *Psychoneuroendocrinology*, *30*, 599–610. doi:10.1016/j.psyneuen.2005.02.001

Gonzaga, G. C., Campos, B., & Bradbury, T. (2007). Similarity, convergence, and relationship satisfaction in dating and married couples. *Journal of Personality and Social Psychology*, *93*, 34. doi:10.1037/0022-3514.93.1.34

Gotthardt, U., Schweiger, U. J., Fahrenberg, J., Lauer, C. J., Holsboer, F., & Heuser, I. (1995). Cortisol, ACTH, and cardiovascular response to a cognitive challenge paradigm in aging and depression. *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology*, *268*, 865–873.

Gruenewald, T. L., Kemeny, M. E., Aziz, N., & Fahey, J. L. (2004). Acute threat to the social self: Shame, social self-esteem, and cortisol activity. *Psychosomatic Medicine*, *66*, 915–924.

Gump, B. B., & Kulik, J. A. (1997). Stress, affiliation, and emotional contagion. *Journal of Personality and Social Psychology*, *72*, 305–319. doi:10.1037/0022-3514.72.2.305

Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1994). *Emotional contagion*. New York, NY: Cambridge University Press.

Keltner, D., & Haidt, J. (2001). Social functions of emotions. In T. J. Mayne & G. A. Bonanno (Eds.), *Emotions: Current issues and future directions* (pp. 192–213). New York, NY: Guilford.

Kenny, D. A., Kashy, D., & Cook, W. L. (2006). *Dyadic data analysis*. New York, NY: Guilford Press.

Kirschbaum, C., & Hellhammer, D. H. (1994). Salivary cortisol in psychoneuroendocrine research: Recent developments and applications. *Psychoneuroendocrinology*, *19*, 313–333.

Kirschbaum, C., Pirke, K. M., & Hellhammer, D. H. (1993). The 'Trier Social Stress Test'—A tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology*, *28*, 76–81. doi:10.1159/000119004

Kulik, J. A., & Mahler, H. I. M. (2000). Social comparison, affiliation, and emotional contagion under threat. In J. Suls & L. Wheeler (Eds.), *Handbook of social comparison: Theory and research* (pp. 295–320). New York, NY: Plenum. doi:10.1007/978-1-4615-4237-7_15

Kulik, J. A., Mahler, H. I. M., & Moore, P. J. (1996). Social comparison and affiliation under threat: Effects on recovery from major surgery. *Journal of Personality and Social Psychology*, *71*, 967–979. doi:10.1037/0022-3514.71.5.967

Locke, K. D., & Horowitz, L. M. (1990). Satisfaction in interpersonal interactions as a function of similarity in level of dysphoria. *Journal of Personality and Social Psychology*, *58*, 823–831. doi:10.1037/0022-3514.58.5.823

Lovallo, W. R., Farag, N. H., Vincent, A. S., Thomas, T. L., & Wilson, M. F. (2006). Cortisol responses to mental stress, exercise, and meals following caffeine intake in men and women. *Pharmacology, Biochemistry, and Behavior*, *83*, 441–447.

Lovallo, W. R., & Thomas, T. L. (2000). Stress hormones in psychophysiological research: Emotional, behavioral, and cognitive implications. In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (2nd ed., pp. 342–367). New York, NY: Cambridge University Press.

Lovallo, W. R., Wilson, M. F., Pincomb, G. A., Edwards, G. L., Tompkins, P., & Brackett, D. J. (1985). Activation patterns to aversive stimulation in man: Passive exposure versus effort to control. *Psychophysiology*, *22*, 283–291.

McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *New England Journal of Medicine*, *338*, 171–179. doi:10.1056/NEJM199801153380307

Page-Gould, E., Mendes, W. B., & Major, B. (2010). Intergroup contact facilitates physiological recovery following stressful intergroup interactions. *Journal of experimental social psychology*, *46*, 854–858. doi:10.1016/j.jesp.2010.04.006

Petrides, J. S., Mueller, G. P., Kalogeras, K. T., Chrousos, G. P., Gold, P. W., & Deuster, P. A. (1994). Exercise-induced activation of the hypothalamic-pituitary-adrenal axis: Marked differences in the sensitivity to glucocorticoid suppression. *Journal of Clinical Endocrinology and Metabolism*, *79*, 377–383.

Poll, E. M., Kreitschmann-Andermahr, I., Langejuergen, Y., Stanzel, S., Gilsbach, J. M., Gressner, A., & Yagmur, E. (2007). Saliva collection method affects predictability of serum cortisol. *Clinica Chimica Acta: International Journal of Clinical Chemistry and*

Diagnostic Laboratory Medicine, *382*, 15–19. doi:10.1016/j.cca.2007.03.009

Preston, S. D., & de Waal, F. B. M. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences*, *25*, 1–72. doi:10.1017/S0140525X02000018

Pruessner, J. C., Kirschbaum, C., Meinlschmid, G., & Hellhammer, D. H. (2003). Two formulas for computation of the area under the curve represent measures of total hormone concentration versus time-dependent change. *Psychoneuroendocrinology*, *28*, 916–931. doi:10.1016/S0306-4530(02)00108-7

Schachter, S. (1959). *The psychology of affiliation*. Stanford, CA: Stanford University Press.

Taylor, S. E., Klein, L. C., Lewis, B. P., Gruenewald, T. L., Gurung, R. A., & Updegraff, J. A. (2000). Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. *Psychological review*, *107*, 411–429. doi:10.1037/0033-295X.107.3.411

Totterdell, P. (2000). Catching moods and hitting runs. *Journal of Applied Psychology*, *85*, 848–859. doi:10.1037/0021-9010.85.6.848

Townsend, S. S. M., Major, B., Gangi, C. E., & Mendes, W. B. (2011). From "in the air" to "under the skin": Cortisol responses to social identity threat. *Personality and Social Psychology Bulletin*, *37*, 151–164. doi:10.1177/0146167210392384

Townsend, S. S. M., Major, B., Sawyer, P. J., & Mendes, W. B. (2010). Can the absence of prejudice be more threatening than its presence? It depends on one's worldview. *Journal of Personality and Social Psychology*, *99*, 933–947. doi:10.1037/a0020434

Van Kleef, G. A. (2009). How emotions regulate social life the emotions as social information (EASI) model. *Current Directions in Psychological Science*, *18*, 184–188. doi:10.1111/j.1467-8721.2009.01633.x

Van Kleef, G. A., Oveis, C., Van der Löwe, I., LuoKogan, A., Goetz, J., & Keltner, D. (2008). Power, distress, and compassion: Turning a blind eye to the suffering of others. *Psychological Science*, *19*, 1315–1322. doi:10.1111/j.1467-9280.2008.02241.x

Wrightsman, L. S. Jr. (1960). Effects of waiting with others on changes in level of felt anxiety. *Journal of Abnormal and Social Psychology*, *61*, 216–222. doi:10.1037/h0040144

Zajonc, R. B., Adelmann, K. A., Murphy, S. T., & Niedenthal, P. M. (1987). Convergence in the physical appearance of spouses. *Motivation & Emotion*, *11*, 335–346. doi:10.1007/BF00992848

Author Biographies

Sarah S. M. Townsend is an assistant professor of management and organization at the Marshall School of Business at the University of Southern California. Her research examines how expectations and emotions moderate people's responses during interpersonal and intergroup interactions.

Heejung S. Kim is an associate professor in the Department of Psychological and Brain Sciences at the University of California, Santa Barbara. Her research focuses on cultural and genetic influences on the use and effects of self-expression.

Batja Mesquita is a professor of psychology and director of the Center for Social and Cultural Psychology at the University of Leuven, Belgium. Her research is on social and cultural processes in emotions. She is a senior editor for psychological science.