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Social Class Rank, Threat Vigilance, and Hostile Reactivity

Michael W. Kraus¹, E. J. Horberg², Jennifer L. Goetz³,
and Dacher Keltner²

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Abstract

Lower-class individuals, because of their lower rank in society, are theorized to be more vigilant to social threats relative to their high-ranking upper-class counterparts. This class-related vigilance to threat, the authors predicted, would shape the emotional content of social interactions in systematic ways. In Study 1, participants engaged in a teasing interaction with a close friend. Lower-class participants—measured in terms of social class rank in society and within the friendship—more accurately tracked the hostile emotions of their friend. As a result, lower-class individuals experienced more hostile emotion contagion relative to upper-class participants. In Study 2, lower-class participants manipulated to experience lower subjective socioeconomic rank showed more hostile reactivity to ambiguous social scenarios relative to upper-class participants and to lower-class participants experiencing elevated socioeconomic rank. The results suggest that class affects expectations, perception, and experience of hostile emotion, particularly in situations in which lower-class individuals perceive their subordinate rank.

Keywords

social class, socioeconomic status, emotion, threat

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The material lives of upper- and lower-class individuals differ markedly and translate to class-based differences in social-cognitive tendencies (e.g., Snibbe & Markus, 2005; Stephens, Markus, & Townsend, 2007). Lower-class individuals tend to experience a lower sense of personal control and increased vulnerability to health and psychological hardships (e.g., W. Johnson & Krueger, 2005, 2006). Lower-class individuals also tend to be more vigilant to the potential threats in their external environment, relative to their upper-class counterparts (E. Chen & Matthews, 2001; Gallo & Matthews, 2003). In the present research, we advance the current literature by documenting how this heightened threat vigilance among lower-class individuals shapes several critical emotion processes during their social interactions.

In the present research, we draw on recent theoretical analyses of threat (MacDonald & Leary, 2005) and conceptualizations of social class as, in part, a pervasive form of rank in society (Kraus, Piff, & Keltner, 2009). Guided by this theorizing, we hypothesize that lower-class-rank individuals—defined in terms of (a) objective social class rank in society (e.g., income, education), (b) social class rank within an interaction, and (c) subjective perceptions of social class rank—will demonstrate heightened threat reactivity in their perception and experience of hostile emotion as actors in dyadic interactions with friends (Study 1) and in their expectations about the future hostile actions of others (Study 2).

Threat Vigilance and Hostile Reactivity

Building on early formulations of fight-or-flight tendencies, theorists have recently argued that mammals evolved a threat detection system that enables the organism to respond adaptively to different kinds of survival-related threats (Blascovich & Mendes, 2000; MacDonald & Leary, 2005; Pickett & Gardner, 2005; Williams, 2007; Williams, Forgas, & von Hippel, 2005). The threats that activate this system can be physical—a fast approaching large object or extremely loud sound. Social stimuli can likewise trigger this threat detection system, including social rejection (MacDonald & Leary, 2005; Panksepp, Herman, Conner, Bishop, & Scott, 1978), stigmatization (Mendes, Major, McCoy, & Blascovich, 2008), and, the focus of this article, actual or perceived subordinate rank within social hierarchies (Chow, Tiedens, & Govan, 2008; Ohman, 1986).

¹University of California, San Francisco, San Francisco, CA, USA

²University of California, Berkeley, Berkeley, CA, USA

³Middlebury College, Middlebury, VT, USA

Corresponding Author:

Michael W. Kraus, University of California, San Francisco, Health Psychology Department, 3333 California St. Suite 465, San Francisco, CA 94143

Email: michael.kraus@ucsf.edu

When activated in humans, this threat detection system triggers several processes (for a review, see MacDonald & Leary, 2005): Threat triggers an attentional vigilance that predisposes the individual to detect threat in ambiguous social interactions (e.g., Pickett & Gardner, 2005). Threat triggers elevated sensitivity to the anger of others; for example, people with social anxiety disorders who experience chronic threat in social encounters tend to show heightened emotional responses in the amygdala to anger faces (Evans et al., 2008). Threat triggers elevated sympathetic autonomic nervous system arousal, which enables fight-or-flight tendencies (MacDonald & Leary, 2005). And threat triggers specific emotional tendencies, including increased hostile emotion (Berkowitz, 1993; Gallo & Matthews, 2003). In the present research, we extend what is known about threat vigilance by exploring how hostile emotions (e.g., anger, contempt) that signal threat are shaped by a pervasive form of rank in society: social class.

Social Class Rank and Threat Vigilance

Converging lines of inquiry suggest that lower rank is likely to lead individuals to experience heightened reactions to threat. Several studies of both human and nonhuman social groups suggest that lower ranking positions lead to greater threat vigilance (e.g., Sapolsky, 1982; Sapolsky & Ray, 1989; Williams, 2007). For instance, lower-ranking nonhuman primates tend to exhibit chronically elevated physiological threat responses (Sapolsky, Alberts, & Altmann, 1997) and demonstrate heightened levels of aggression relative to their higher-ranking counterparts (Belzung & Anderson, 1986; Southwick, 1967). In humans, lower-ranking, stigmatized individuals tend to expect more hostile and rejecting reactions from others, relative to higher-ranking individuals (e.g., Mendoza-Denton, Downey, Purdie, Davis, & Pietrzak, 2002; Page-Gould, Mendoza-Denton, & Tropp, 2008; Panksepp et al., 1978; Williams, 2007). Moreover, experiences of rank-based rejection feed into experiences of hostile reactivity. To illustrate, in a manipulation of rank-based rejection, individuals excluded during a game of virtual catch among three players tended to experience increased anger and to respond with increased antisocial behavior relative to individuals who were not excluded (Chow et al., 2008).

Social class is among the most pervasive sources of rank in human social hierarchy, determining access to valued materials, health services, educational institutions, and social clubs (Snibbe & Markus, 2005). Social class derives directly from the material conditions that define an individual's social position in society (Kraus et al., 2009). Furthermore, researchers have recently started to understand how aspects of social class determine a person's rank within society and in turn shape reactions to threat.

A rank-based conceptualization of social class suggests that lower-class individuals are likely to experience increased threat reactivity through three sources of social class rank.

First, social class arises from material wealth, including a person's income (e.g., Kluegel & Smith, 1986), financial debt (e.g., Drentea, 2000), occupational prestige (Oakes & Rossi, 2003), educational attainment (Snibbe & Markus, 2005; Stephens et al., 2007), or any combination of one or more of these components (e.g., Kraus & Keltner, 2009). In essence, living in a social environment characterized by reduced material resources in comparison to wealthier individuals is likely to activate patterns of thought and action that are consistent with experiences of lower rank (e.g., Kraus et al., 2009; Lachman & Weaver, 1998). As a result, individuals with lower income, education, or occupation status are likely to exhibit heightened threat reactivity.

Several studies have documented correlations between lower social class—measured in terms of objective material resources (e.g., reduced education and income)—and heightened threat reactivity. Objective resource-based measures of lower-class consistently covary with physiological measures that index, albeit with some degree of ambiguity, increased threat sensitivity. For example, lower-class children reacted to threatening and ambiguous written social scenarios with increased heart rate and blood pressure (E. Chen & Matthews, 2001). With regard to hostility and aggression, lower-class mothers tend to report more hostile emotions and to suppress their nonhostile emotions in response to hypothetical stories of their child's anger (Martini, Root, & Jenkins, 2004). In addition, objective material-resource-based measures of social class consistently show associations with measures of cynicism and mistrust toward others, trait hostility, and aggressive tendencies (for a review, see Gallo & Matthews, 2003).

A second perspective suggests that since markers of material wealth (e.g., clothing, social behavior) signal one's upper or lower social class to others (Bourdieu, 1985), and do so even in brief social encounters (Kraus & Keltner, 2009), a person's objective material resources are likely to determine rank *within interactions*. This second form of social class rank is likely to activate patterns of threat reactivity among lower-class individuals, specifically in contexts where they are lower in social class than others with whom they share an interaction.

Research supports this within-interaction perspective on social class rank. Studies of nonhuman species show that within-group subordinate rank predicts poor health outcomes (Blanchard, Sakai, McEwen, Weiss, & Blanchard, 1993; Kaplan & Manuck, 1999; Sapolsky, 1982). Pertinent to the current studies, within-context social class rank also predicts threat reactivity. Research on university students at an elite university found that objectively middle-class students felt stigmatized at an elite private university—as a result of being surrounded by relatively affluent students—and as a result had greater concerns about their own academic competency relative to their upper-class counterparts (S. E. Johnson, Richeson, & Finkel, 2011).

A third perspective suggests that subjectively construed social class rank also shapes thought and action in ways that

are independent of objective material resources. Unlike measures of objective social class, subjective perceptions of social class rank more directly assess a person's *perceptions* of his or her position in the socioeconomic hierarchy vis-à-vis others in his or her society, community, or culture (e.g., Kraus et al., 2009). Perceptions of social class rank are only moderately correlated with objective measures of social class (Adler, Epel, Castellazzo, & Ickovics, 2000), and research suggests that these class-based rank perceptions have important implications for an individual's health. For example, even after accounting for objective material resource measures of social class, participants reporting lower subjective social class rank—by ranking themselves on a ladder representing social class rank in society (Adler et al., 2000)—experienced poorer self-rated health and more negative affect (Adler et al., 2000), and poorer physiological health including vulnerability to a flu virus (Cohen et al., 2008) and diabetes (Singh-Manoux, Adler, & Marmot, 2003), relative to their counterparts of upper subjective socioeconomic status.

The aforementioned lines of research suggest that social class rank—defined as objective rank in society, as rank within an interaction, or as subjectively construed rank—shapes construals of the social environment. In the present research, we build on this previous work. More specifically, we expected that individuals experiencing lower objective social class rank in society (Studies 1 and 2), lower social class rank within an interaction (Study 1), and lower subjective construals of social class rank (Study 2) would exhibit heightened threat reactivity in their emotion expectations, perception, and experience, relative to their upper-class, high-ranking counterparts.

The Present Research

We examined the influence of social class rank perceptions on hostile reactivity across two studies that measure social class rank and reactivity in unique ways. More specifically, in Study 1 we examined how objective social class rank in society and social class rank within a friendship influence the perception and experience of hostile emotions between friends as they teased one another. In Study 2, we manipulated participants' subjective construals of their social class rank relative to a comparison individual (e.g., Kraus, Côté, & Keltner, 2010), testing the hypothesis that both objective social class rank in society and manipulated subjective social class rank would influence individuals' expectations about hostility in hypothetical situations. We predicted that lower-class-rank individuals would more accurately track hostile emotions in interactions (Study 1), experience greater contagious hostile emotion in response to the construed hostility of a friend (Study 1), and indicate greater expectations about future hostility in hypothetical situations (Study 2), relative to upper-class-rank individuals. Moreover, in Study 2 we explored whether individuals who are low in

two independent sources of social class rank—objective social class rank in society and subjective construal of social class vis-à-vis others—would be particularly likely to exhibit hostile reactivity.

Our research advances previous studies by exploring, and directly testing, a potential mechanism—perceptions of social class rank—that may explain previously documented associations between social class and threat vigilance (e.g., Gallo & Matthews, 2003). Moreover, the present studies extend previous research by examining how class-based threat reactivity is likely to manifest across three components of hostile emotion in interactions: expectations, perception, and experience.

Our central prediction that lower social class rank predicts increased hostile reactivity is subject to several alternative explanations, which we tested in our analyses. A first is a baseline dysphoric affect explanation. Measures of lower social class consistently predict self-reports of dysphoria and negative affect (Keltner, Gruenfeld, & Anderson, 2003; Link, Lennon, & Dohrenwend, 1993). Given this, it is plausible that class-based influences upon baseline affect account for any influences of class upon hostile reactions to specific stimuli. Second, given associations between anxiety and aggression (e.g., Ayduk, Downey, Testa, Yen, & Shoda, 1999), class-based hostile emotion reactivity could be the result of social class influences upon baseline anxiety. Third, given that in social interactions, emotion perceptions and experiences may be based, in part, on the expressivity of interaction partners (Hall, Rosip, Smith Lebeau, Horgan, & Carter, 2006), we sought to determine whether class-based hostile emotion reactivity is independent of class-related differences in self-report tendencies for outward expression of emotions. Finally, we also examined whether lower social class would predict increased hostile reactivity independently of demographic variables theorized to covary with social class (ethnicity, friendship quality).

Study 1: Social Class Rank and Hostile Emotion Contagion in Interactions Between Friends

In Study 1, we determined whether social class rank—operationalized as either objective social class or high versus low social class relative to one's friend—would predict two components of the threat vigilance system in an interaction: (a) the perceptual tracking of hostile emotion in others during an interaction, indexed as correlations between peer and self-report estimates (Robins & John, 1997), and (b) hostile emotion contagion.

Emotion contagion refers to the transmission of emotion from one interaction partner to another (Hatfield, Cacioppo, & Rapson, 1994). The question of differences in emotion contagion across social classes is crucial, given the pervasiveness of contagion's effects on emotion experience within

relationships and groups (Barsade, 2002). In general, emotions are powerfully contagious: Laughter spreads from one interaction partner to another (e.g., Provine, 1992), roommates' emotions tend to converge over the course of a year living together (Anderson, Keltner, & John, 2003), and emotions can spread through social networks within geographical communities (Fowler & Christakis, 2008). Emotion contagion arises through conscious and nonconscious processes (Kelly & Barsade, 2001), including facial mimicry, emotional expressiveness of one's interaction partners, and perceptions of other individuals' emotions (Barsade, 2002).

Positive emotions prove to be particularly contagious within close relationships (e.g., Anderson & Thompson, 2004; Stinson & Ickes, 1992). In Study 1, therefore, we expected to find evidence of positive emotion contagion between friends, regardless of social class rank. Critical to our theorizing on social class, we also predicted that lower-class-rank participants, but not upper-class-rank participants, would experience greater contagious responses to the hostile emotions of their friends. Moreover, we predicted that this hostile emotion contagion would be mediated by lower-class-rank participants' tendency to more readily track the hostile emotions of their friend. Alongside these hypotheses, we explored several possible explanations of these predicted contagion effects, including baseline dysphoric affect or anxiety, partner emotional expressivity, and friendship quality.

Method

Participants. A total of 244 female undergraduates (122 friendship dyads) between the ages of 18 and 25 were recruited for the study from classroom announcements and advertisements posted around the university campus seeking friends to participate in a study. The ethnic distribution of this sample was approximately 46.1% Caucasian, 38.2% Latina, 13.2% African American, and 2.5% multiethnic. Participants had been friends for an average of 2.5 years ($M = 31.52$ months, $SD = 36.32$).

Procedure. Pairs of friends received a packet of questionnaires to complete separately at home before they attended a main laboratory session together, approximately 1 week later. This packet assessed age, ethnicity, social class, and a variety of measures of their personality and friendship behaviors not considered in this study.

During the laboratory session, participants sat across from each other at a small table in a 10' × 17' laboratory room. First, they independently completed questions assessing their baseline emotions and dysphoric affect. Friends then engaged in a teasing interaction for approximately 3–5 min. In the teasing interaction, each participant was assigned a pair of initials (A.D. or L.I.) and was given several minutes to generate a nickname for her friend based on these initials and then tell an amusing story—real or fictitious—to justify the nickname (Keltner, Young, Heerey, Oemig, & Monarch, 1998). Following the teasing interaction, participants rated the emotions they felt during the interaction and estimated

their friend's emotions. Videos of the teasing interaction were recorded by unobtrusive video cameras directly facing each participant.

Measures

Social class. Social class was assessed in terms of objective social class rank in society and relative social class rank in the friendship. To compute these measures, we used participants' reports of the educational attainment of their parents and approximate average household income during childhood. Education was assessed using six categories: (a) did not finish high school, (b) finished high school, (c) some college, (d) bachelor's degree, (e) some graduate work, and (f) advanced degree. Income was assessed using seven categories: (a) less than \$11,000, (b) \$11,000–\$20,999, (c) \$21,000–\$30,999, (d) \$31,000–\$40,999, (e) \$41,000–\$50,999, (f) \$51,000–\$60,999, and (g) more than \$60,999.

Approximately 56.9% of mothers and 47.6% of fathers had high school graduation as their highest level of education completed. Median childhood income was between \$41,000 and \$50,999. Income and education measures were standardized and then averaged to create a composite measure of overall objective social class rank in society.

To classify participants as upper or lower social class rank within the friendship, we classified one member of each dyad as lower class and one as upper class based on their relative differences in self-reported overall objective social class. Four dyads were excluded from this analysis because each participant's overall social class was identical to that of her partner and we could not categorize one of the partners as lower or upper class relative to her friend.

Ethnicity. Participants indicated their ethnicity from among a list of 13 options. Ethnicity was then coded into two categories (1 = *European American*, 0 = *non-European American*; Lachman & Weaver, 1998).

Dysphoric affect. Participants completed the 21-item Center for Epidemiological Studies Depression Scale (Radloff, 1977) by describing how they felt during the past week (e.g., "I thought my life had been a failure") using a 4-point scale (1 = *rarely or none of the time*, 4 = *most of the time*; $\alpha = .91$).

Self-reports of own emotions and estimates of partner's emotions. Prior to the teasing task, participants provided baseline ratings of the extent to which they felt each of 23 positive and negative emotions "right now," using a 9-point Likert-type scale (0 = *no emotion*, 8 = *extreme emotion*). After the interaction, they made the same ratings regarding self- and friend-emotions during the teasing interaction (hereafter called "teasing emotions"). Composites were created for positive ($\alpha = .90$) and negative ($\alpha = .83$) emotions for both self-teasing emotions and estimates of friend's teasing emotions. Discrete emotion composites for hostile emotions (anger, disgust, contempt, and irritation; $\alpha = .68$), self-conscious emotions (embarrassment, guilt, and shame; $\alpha = .63$), anxiety (fear, discomfort, anxiety; $\alpha = .79$), joy (amusement, joy,

Table 1. Raw Correlations Among Participant Objective Social Class Rank, Emotions at Baseline, Emotions During the Teasing Interaction, Dysphoric Affect, and Emotion Expressivity

	Objective SC	B hostile	B self-conscious	B fear	B positive	T hostile	T self-conscious	T fear	T positive	Dysphoric affect	Emotion expressivity
Objective SC	—										
B hostile	-.22*	—									
B self-conscious	-.03	.51*	—								
B fear	-.02	.34*	.62*	—							
B positive	-.08	.23*	.24*	.11 [†]	—						
T hostile	-.29*	.49*	.19*	.21*	.29*	—					
T self-conscious	-.04	.12 [†]	.33*	.31*	.12 [†]	.33*	—				
T fear	.03	.14*	.34*	.40*	.10	.27*	.61*	—			
T positive	-.04	.21*	.18*	.14*	.78*	.24*	.05	.02	—		
Dysphoric affect	-.19*	.24*	.43*	.37*	-.01	.18*	.12 [†]	.14*	-.01	—	
Emotion expressivity	.12 [†]	-.06	-.14*	-.16*	.11 [†]	-.15*	-.17*	-.12 [†]	.15*	-.33*	—

SC = social class; B = baseline emotion; T = teasing interaction emotion.
[†] $p < .10$. * $p < .05$.

happy, and enthusiastic; $\alpha = .83$), and appreciation (appreciation, love, and gratitude; $\alpha = .78$) were also created.

Emotional expressivity. Individual differences in emotion expression were determined using a 16-item measure of emotional expressivity (King & Emmons, 1990). The measures used 7-point Likert-type scales (e.g., "People can tell from my facial expressions how I am feeling"; $M = 5.14$, $SD = 0.69$).

Results and Discussion

Social class, emotion, and friendship quality. We first examined raw correlations among objective social class rank in society, emotion ratings at baseline, emotion ratings during the teasing interaction, dysphoric affect, and emotion expressivity. Table 1 displays these correlations. Aligning with previous research, lower objective social class rank in society was associated with increased hostile emotion experience at baseline and during the teasing interaction (Gallo & Matthews, 2003). Also replicating past research, lower objective social class rank was associated with increased dysphoric affect (Link et al., 1993). Finally, social class was marginally positively associated with emotion expressivity, aligning with research suggesting that high-status individuals are more expressive in interactions (Hall et al., 2006).

To determine if friendship quality varied by social class and could possibly influence hostile emotion contagion between the friends, we looked at the at-home assessment of the length of the friendship, ratings of how much time participants spent with their friend (1 = *less than once a month*, 5 = *every day*), ratings of how sure participants were that the friendship would continue in years to come (1 = *not at all*, 5 = *completely*), ratings of how committed participants were to the friendship (1 = *not at all*, 5 = *completely*), and ratings of how much each participant cares about the friendship (1 = *not at all*, 5 = *very much*). Participants' self-reports of their social class were uncorrelated to these measures of

relationship closeness ($r_s = -.07$ to $.08$, *ns*), suggesting that friendship quality cannot account for class-based hostile emotion patterns.

Social class rank and hostile emotion tracking. Next, we determined if relative social class rank in the friendship would predict an aspect of hostile emotion perception: the accurate tracking of the friend's hostile emotions during the interaction. Emotion tracking in an interaction reflects the extent that a perceiver's perceptions of a target's emotions covary with the emotion experience of the target (Fletcher & Kerr, 2010). We expected lower-ranking friends, more vigilant to threat, to be more attuned to (and less blissfully unaware of) any fluctuations in the hostile emotions of their friend, experienced during the interaction.¹ To index tracking accuracy, we computed two correlations: one between upper-class participants' emotions with their lower-class partner's estimates of these emotions and one between lower-class participants' emotions and their upper-class partner's estimates. Correlations were computed for all discrete emotions and for our overall composites for positive and negative emotion (see Table 2). We then computed a Fisher z statistic to compare these correlations between lower- and upper-class participants.

As shown in Table 2, both upper- and lower-class individuals judged their partner's positive and negative emotions with levels of tracking accuracy that exceeded statistical levels of significance, in keeping with studies showing that friends are attuned to one another's internal states (Stinson & Ickes, 1992). However, when examining discrete emotions, we found that although all participants were equally good at tracking their partner's discrete positive emotions, fear, and self-conscious negative emotions, only lower-class-rank participants were able to track the hostile emotions of their partner, a result consistent with our hostile reactivity hypothesis.

Social class rank and hostile emotion contagion. Next, we predicted that relative to upper-class-rank individuals, lower-class-rank participants would exhibit greater hostile emotion

Table 2. Correlations Between Friend Emotions and Perceiver Estimates of Friend Emotions as a Function of Social Class Rank Within the Friendship (Study 1)

	Friend negative emotions				Friend positive emotions		
	Hostile	Anxiety	Self-conscious	Negative	Joy	Appreciation	Positive
Lower-class perceiver	.31**	.27**	.24*	.27**	.39**	.36**	.39**
Upper-class perceiver	.09	.26**	.22*	.24*	.42**	.38**	.41**
Fisher z	2.27*	< 1	< 1	< 1	< 1	< 1	< 1

* $p < .05$. ** $p < .01$.

Table 3. Emotion Contagion Between Baseline Emotions and Emotions Experienced During the Teasing Interaction as a Function of Social Class Rank Within the Friendship (Study 1)

Emotion time point		Negative emotions			Positive emotions			
Baseline	Tease	Hostile	Anxiety	Self-conscious	Negative	Joy	Appreciation	Positive
Upper class	Lower class	.30**	.10	.13	.23*	.30**	.24*	.32**
Lower class	Upper class	-.06	.14	.06	.04	.39**	.27**	.40**
Fisher z		2.96**	< 1	< 1	1.47	< 1	< 1	< 1

* $p < .05$. ** $p < .01$.

contagion, by becoming more similar to the hostile emotions of their partner during the teasing interaction. In contrast, we expected upper-class-rank people to be relatively unaffected by the hostile emotions of their partner during the interaction.

We first tested contagion based on friends' within-interaction social class rank. We computed cross-lagged correlations between upper-class participants' emotions at baseline and lower-class participants' emotions during the teasing interaction, and vice versa (e.g., Anderson et al., 2003). We then computed a Fisher z statistic to compare the cross-lagged correlations between lower- and upper-class-rank participants.

Results were consistent with our hypothesis (see Table 3). Although upper-class-rank participants' self-reports of their experience of hostile emotions during the interaction were uncorrelated with their lower-class-rank partner's baseline hostile emotions, lower-class participants' hostile emotions became more similar to the baseline hostile emotions of their upper-class partner over the course of the interaction. Moreover, the Fisher z test confirmed that these two hostile emotion cross-lagged correlations significantly differed from one another.

Other findings represented in Table 3 replicate previous studies of the contagious nature of positive emotion (Fowler & Christakis, 2008). Regardless of social class, positive emotions proved to be quite contagious among friends, whereas anxiety and the self-conscious emotions were not contagious.

We also examined hostile emotion contagion as a function of objective social class rank in society while accounting for the dyadic nature of our data and the dyadic interdependence

in hostile emotion ratings (intra-class $r = .32$), by using the actor-partner interdependence model (APIM; Kenny, Kashy, & Cook, 2006). We predicted actor hostile emotions during the teasing interaction with actor and partner overall objective social class in society and baseline hostile emotion. In addition, to rule out ethnicity effects we entered actor and partner ethnicity and their interaction into the model. Finally, to determine class-based emotion contagion, we computed an interaction between partner objective social class and partner baseline hostile emotion (the *contagion interaction*). We would have evidence in support of our contagion hypothesis if the contagion interaction significantly positively predicted actor hostile emotions during the teasing interaction, suggesting that lower-class actors' hostile emotions during the interaction were particularly related to the baseline hostile emotions of their upper-class partner.

In the analysis predicting actor teasing hostile emotions, actor baseline hostile emotions emerged as a significant predictor $t(204.45) = 7.65, p < .001, b = .32$, suggesting, not surprisingly, that participants' own baseline hostile emotions contributed to the hostile emotions they experienced during the teasing interaction. More importantly and aligning with our contagion hypothesis, the contagion interaction between partner objective social class and partner baseline hostile emotion was also significant, $t(209.23) = 2.52, p < .05, b = .10$. This latter result confirms that, compared to participants reporting higher levels of objective social class rank, lower-class-rank actors experienced teasing hostile emotions based on the baseline hostile emotions experienced by their upper-class partner. Moreover, this effect held even while accounting for actor, $t(196.44) = -1.26, ns, b = -.07$, and

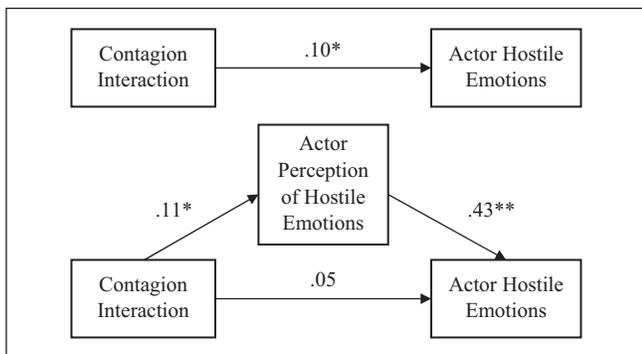


Figure 1. Model of the relationship between the interaction of partner social class and partner baseline hostile emotion (the contagion interaction) and actor hostile emotion during the teasing interaction, mediated by actor perceptions of hostile emotions. Numbers indicate unstandardized mixed-model coefficients.

* $p < .05$. ** $p < .01$.

partner ethnicity, $t(196.44) = 0.33$, ns , $b = .02$, and their interaction, $t(110.04) = -1.05$, ns , $b = -.05$, which were all unrelated to actor teasing hostile emotions. The analysis also revealed a marginally significant main effect of partner baseline hostile emotions, $t(206.16) = 1.71$, $p = .09$, $b = .07$, and no effect of actor, $t(214.24) = -1.11$, ns , $b = -.06$, or partner, $t(213.95) = 0.89$, ns , $b = -.05$, objective social class rank on actor teasing hostile emotions.

Mechanisms of class-based hostile emotion contagion. Next, we tested four possible mechanisms to explain class-based hostile emotion contagion: baseline dysphoric affect, baseline anxiety, partner emotional expressivity, and class-based hostile emotion perception. For each analysis, we added actor and partner scores for each of the four potential mechanisms to the original APIM. We first examined the influence of baseline dysphoric affect, anxiety, and emotional expressivity. In the APIM, actor dysphoric affect, $t(214.10) = 0.39$, ns , $b = .02$, actor baseline anxiety, $t(217.12) = -0.04$, ns , $b = -.00$, and partner emotion expressivity, $t(213.50) = 0.35$, ns , $b = .01$, were all unrelated to actor hostile emotions during the interaction. Only actor emotion expressivity scores were marginally related to actor hostile emotions during the interaction, $t(213.55) = -1.86$, $p = .06$, $b = -.08$. Moreover, the relationship between actor hostile emotion during the tease and the contagion interaction remained significant after accounting for these variables, $ts = 2.45$ to 2.68 , $ps < .05$, $bs = .10$ to $.11$. These results suggest that hostile emotion contagion is independent of baseline emotion states or partner emotion expressivity.

Finally, we determined if objective lower-class participants' hostile emotion contagion was based on the tendency to track their friend's hostile emotions during the social interaction. To test this hypothesis, we added actor and partner perceptions of hostile emotions to the original APIM to determine if these perceptions accounted for class-based hostile emotion contagion (cf. West, Popp, & Kenny, 2008). As can be seen in Figure 1, actor perceptions of friend hostile

emotion emerged as a significant predictor of actor teasing hostile emotion, $t(218.99) = 12.46$, $p < .01$, $b = .43$, suggesting that experiencing contagion of hostile emotions in the interaction was based on perceiving those emotions in one's partner. Moreover, after accounting for this mediator, the contagion interaction no longer predicted actor teasing hostile emotions, $t(215.69) = 1.43$, $p = .15$, $b = .05$. In addition, the indirect effect of the contagion interaction on actor teasing hostile emotion, through actor estimates of friend emotion, was significant (Sobel $z = 2.11$, $p < .05$). Overall, the results of this analysis suggest that during a dynamic social interaction with a friend, lower-class individuals—measured in terms of objective social class rank or relative social class rank within a friendship—exhibit elevated hostile emotion tracking and contagion, relative to their upper-class counterparts.

In Study 2, we attempted to more directly test the causal association between social class rank and hostile reactivity by systematically manipulating temporary perceptions of social class rank and then assessing the extent participants had future expectations for the hostile behavior of others. We predicted that two sources of lower-class rank—objective social class rank and subjective perceptions of social class rank—would independently influence hostile reactivity. Moreover, we tested the interaction of these sources of rank to explore whether both being low in objective social class and subjective perceptions of social class rank would make participants particularly likely to experience hostile reactivity.

Study 2: Social Class Rank, Resources, and Expectations of Hostile Intentions

In Study 2, we extended previous research linking social class to hostile emotion (Gallo & Matthews, 2003) by manipulating perceptions of social class rank and by investigating whether social class rank would predict a third component of the threat detection system: future expectations of the hostile behaviors of others. To test this hypothesis, we measured participants' overall objective social class rank using assessments of educational attainment and income. Participants were then experimentally manipulated to temporarily experience low versus high relative social class rank in comparison to a potential interaction partner. They then completed ambiguous story stems about an actor behaving in a social situation.

Method

Participants and procedure. A total of 91 adults from an online community sample maintained by a retail website participated in the study. Participants were on average 37 years of age ($SD = 13.03$). The majority of participants were

female (68.1%) and European American (75.8%). Participants also identified as African American (5.5%), Latino/a (7.7%), Asian American (6.6%), or another ethnic category (7.7%; numbers exceed 100.0% because some participants self-identified with more than one ethnic category). In a 20-min survey, participants first rated the same emotions as in Study 1. They then engaged in a writing-based induction of low or high social class rank, and finally they provided narrative-derived expectations of hostility, following a paradigm developed by Bushman and Anderson (2002). In this paradigm, participants complete a story with their own conclusion, the statements being coded for level of hostility. Following this task, participants filled out demographic information about their own objective social class rank. Finally, participants were thanked, debriefed, and paid \$5 for their participation.

Manipulation of relative social class rank. Manipulation of participants' social class rank was adapted from a similar manipulation used in previous research (Kraus et al., 2010; Piff, Kraus, Côté, Cheng, & Keltner, 2010). In this manipulation, participants were presented with a ladder with 10 rungs. Participants were instructed to "think of the ladder above as representing where people stand in the United States" (see Adler et al., 2000). Participants were then assigned to either a low or high relative social class rank position, based on the following instructions:

Now, please compare yourself to the people at the very bottom (top) of the ladder. These are people who are the worst (best) off—those who have the least (most) money, least (most) education, and the least (most) respected jobs. In particular, we'd like you to think about how you are different from these people in terms of your own income, educational history, and job status. Where would you place yourself on this ladder relative to these people at the very bottom (top)?

Participants were then instructed to place themselves on the ladder relative to the person at the very top or bottom (1 = *bottom rung*, 10 = *top rung*; $M = 5.87$, $SD = 1.69$). Participants then imagined themselves "in a getting acquainted interaction with one of the people you just thought about from the ladder above." In particular, participants were instructed to "think about how the differences between you might impact what you would talk about, how the interaction is likely to go, and what you and the other person might say to each other." Participants were instructed to write no more than five sentences. The purpose of this writing task was to heighten the salience of the manipulated social class rank of the imagined interaction partner.

Expectations for hostile behavior. Participants read two stories from Bushman and Anderson's (2002) hostile attribution measure. In the first story, the protagonist has just been involved in a car accident with another person. In the second story, the protagonist is waiting at a restaurant an especially

long time for a meal. After reading each story, participants read a prompt asking "What will happen next?" and were instructed to come up with a total of five unique possibilities for what will happen at the end of each story. Stories were presented in counterbalanced order.

Three independent raters, blind to experimental condition, tabulated the number of aggressive or hostile behaviors, thoughts, and feelings that participants listed when completing the story stems. Coder ratings were highly intercorrelated ($r_s = .56$ to $.69$, $p_s < .001$) and reliable with each other ($\alpha = .72$). The tabulated frequencies of hostile behaviors, thoughts, and feelings were averaged to create a composite of hostile attributions ($M = 0.65$, $SD = 0.67$).

Measures

Baseline emotions. To control for premanipulation affect, participants filled out emotion ratings for the same list of 23 emotion words as in Study 1. In this study, self-reported social class was independent of baseline hostile emotions ($p > .13$).

Objective social class. To assess objective social class, we standardized and averaged participants' highest education completed and their annual household income. Education was assessed using four categories: (a) did not finish high school, (b) high school graduate or some college, (c) college graduate, or (d) postgraduate degree. Annual family income was assessed using eight categories: (a) $< \$15,000$, (b) $\$15,001$ – $\$25,000$, (c) $\$25,001$ – $\$35,000$, (d) $\$35,001$ – $\$50,000$, (e) $\$50,001$ – $\$75,000$, (f) $\$75,001$ – $\$100,000$, (g) $\$100,001$ – $\$150,000$, and (h) $> \$150,000$. Participants had a median annual family income of $\$50,001$ – $\$75,000$ and a median educational attainment of college graduation.

Results and Discussion

To determine the success of our manipulation, we compared participants' placement on the ladder in the two conditions (lower or upper rank). The t test confirmed our expectations, as participants in the upper-class-rank condition rated themselves significantly higher in social class rank ($M = 6.26$) than did their lower-class-rank counterparts ($M = 5.39$), $t(89) = -2.51$, $p < .05$.

Next, we sought to determine if lower-class-rank individuals reported greater expectations for future hostile behavior, relative to upper-class-rank individuals. To conduct this analysis, we computed a linear regression predicting expectations for future hostile behavior with the social class rank manipulation (coded as -1 for lower rank and 1 for upper rank), objective social class rank in society, and their interaction, while controlling for baseline hostile emotion, gender, and ethnicity. The results reveal the predicted main effect for the subjective rank manipulation, $\beta = -.25$, $t(84) = -2.60$, $p < .05$, suggesting that lower-class-rank participants report more hostile expectations, relative to

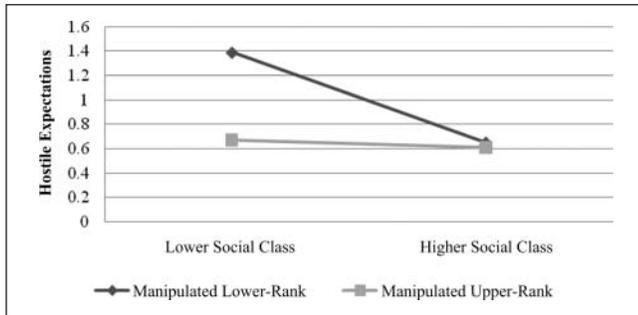


Figure 2. Future expectations for hostile behavior as a function of manipulated subjective social class rank and objective social class rank

upper-class-rank participants. A main effect for objective social class rank, $\beta = -.31$, $t(85) = -3.18$, $p < .01$, was also observed, suggesting that reduced objective social class rank predicts greater expectations for future hostile behaviors. In addition to these effects, baseline hostile emotion, $\beta = .10$, $t(84) = 1.05$, ns , and gender, $\beta = -.13$, $t(84) = -1.30$, $p = .20$, were not related to future hostile expectations. Ethnicity was marginally related to hostile expectations, $\beta = .17$, $t(84) = 1.78$, $p = .08$, with European American participants more likely to exhibit future hostile expectations.

Interestingly, a significant interaction emerged between the subjective rank manipulation and participants' objective social class, $\beta = .29$, $t(84) = 2.99$, $p < .01$ (see Figure 2): Although participants with manipulated upper social class rank showed low expectations for future hostile behavior, regardless of their objective social class rank in society, $t(84) = -0.11$, ns , participants manipulated to experience temporary lower social class rank tended to exhibit the most hostile expectations when they were also lower in objective social class rank, $t(84) = -4.36$, $p < .01$. In essence, people with lower objective social class rank in society exhibited greater hostile reactivity, particularly when they were in contexts where they were also lower in subjective social class rank. We return to the implications of this interaction in the general discussion.

General Discussion

We have claimed that lower-class individuals, belonging to lower rank in the socioeconomic hierarchy, are characterized by increased threat vigilance to hostile emotions during social interactions. Two studies provided evidence in support of this hypothesis. In Study 1, both objective social class rank and relative social class rank in a friendship predicted the tendency for lower-class individuals' hostile emotions to converge with those of their friend during a teasing interaction, and to do so because of the greater tendency, among these individuals, to accurately track their friend's hostile emotions. In Study 2, individuals with lower manipulated subjective perceptions of social class rank and objective

social class rank both exhibited elevated expectations for future hostile behavior.

Importantly, the present studies documented how different dimensions of threat vigilance associated with lower social class emerge in three different ways: in the forms of tracking of others' hostile emotions, hostile emotion contagion, and expectations of hostile behavior. Moreover, the effects were shown across university and nationwide samples and across three operationalizations of social class—as objective social class rank in society, rank within an interaction, and subjectively construed rank. We also ruled out several alternative explanations of our findings concerning class and hostile reactivity. Namely, the tendency for lower-class-rank individuals to be more vigilant and reactive to hostile emotions could not be attributed to class-related differences in friendship quality, ethnicity, dysphoric affect, partner emotion expressivity, or baseline emotion states. Finally, the studies documented a psychological mechanism—perceptions of social class rank—that accounts for the association between social class and hostile reactivity. Together, these analyses strongly suggest that social class rank influences threat perceptions and hostile reactivity independent of preexisting emotional dispositions and other cultural factors associated with social class (Hall et al., 2006; Link et al., 1993).

Before turning to the implications and future directions of our current research, the interaction between participant objective social class rank and manipulated subjective social class rank on hostile reactivity observed in Study 2 warrants comment. In essence, individuals with the lowest objective social class tended to display increased hostile reactivity when they were also subjectively lower in rank in imagined interactions with others. That people with elevated objective social class did not show increased hostile reactivity when they were of lower rank suggests that increased material resources may function as a strong buffer against more immediate stressors and the threat reactions that ensue. Select evidence dovetails with this speculation. For example, upper-social class individuals are buffered from experiencing stress while caring for a sick relative (Ayalon, 2008) or during conflict in close relationships (McLeod & Kessler, 1990). Moreover, this interaction relates to theory and research suggesting that individuals with high social power—that is, elevated control and freedom—are less contextually oriented and tend to shape their social environments using their own traits and dispositions, rather than shifting their cognitions to align with the social context (e.g., S. Chen, Lee-Chai, & Bargh, 2001; Guinote, 2008; Keltner et al., 2003; Kraus et al., 2009).

The interaction in Study 2 also suggests that lower-class individuals may be particularly likely to react to social threats when their lower rank is made salient. Given that elite colleges and universities employ some of the most educated individuals and serve many people from upper-class backgrounds (Snibbe & Markus, 2005), it is interesting to consider the results from Study 1 in this context. More specifically, it

is possible that elite university contexts chronically activate lower-class participants' perceptions of their lower rank and in turn heighten the threat vigilance of these individuals, relative to their upper-class counterparts. Such a pattern would align with previous research indicating that lower status groups experience chronic expectations for rejection in university contexts (Croizet & Claire, 1998; Mendoza-Denton et al., 2002) and represents an important area of future research.

Caveats and Future Directions

Notwithstanding the consistency with which our results showed that lower-class rank predicts increased hostile reactivity, a few limitations are worth noting. First, though the current results represent some of the first evidence suggesting that lower-class individuals are more vigilant of threats and reactive to hostile emotions in social interactions than upper-class-rank individuals, the results are based on self-report measures of emotion, and future research should examine physiological processes related to anger, including cardiovascular responses (e.g., Ekman, Levenson, & Friesen, 1983) and cortisol reactivity (Taylor, Lerner, Sage, Lehman, & Seeman, 2004). The present research strongly suggests that lower-class individuals may experience chronically elevated sympathetic autonomic nervous system responses within relatively common and informal social exchanges, such as the friendly teasing exchanges studied in the present work.

Second, the current investigation assessed social class in the United States, and as such the conclusions herein must be investigated in other countries and cultures where social class ideologies are different (e.g., capitalism, socialism) or status disparities between rich and poor individuals are more or less pronounced. For instance, it is possible that lower-class individuals in countries that exhibit more egalitarian class ideologies experience less hostile reactivity. In addition, the Study 1 sample consisted of all female participants, and future research is necessary to understand the role gender might play in hostile emotion contagion processes or hostile reactivity more generally. For example, given research suggesting that emotion contagion is more prevalent among women (e.g., Doherty, 1997), the observed hostile emotion contagion is likely to be particularly pronounced within all-female interactions. As well, the present research has shown consistent effects across various measures of childhood and adult social class rank. Nevertheless, future research will benefit from understanding how social class changes over time and the relative influences of current and family social class background on behavior (e.g., Griskevicius, Delton, Robertson, & Tybur, in press).

One of the promises of the present research is its relevance to class-based negative health and well-being trends (e.g., Adler et al., 1994). Health researchers have documented a direct link between hostile cognitions or behavioral patterns and a variety of poor cardiovascular and endocrine

responses to stress (e.g., Gallo & Matthews, 2003; Miller, Smith, Turner, Guijarro, & Hallet, 1996). Guided by these findings, recent research has begun to investigate trait-level hostility as a mediator of the relationship between lower class and poorer health. For example, trait-level hostility helps to explain the relationship between lower class and poorer metabolic functioning (blood glucose, cholesterol; Lehman, Taylor, Kiefe, & Seeman, 2005) and perceived health (Gallo, Smith, & Cox, 2006). The current research suggests that one of the means by which trait-level hostility affects health is through hostile reactivity within daily social interactions. Future research is needed to test this possibility.

The findings in the present investigation are also noteworthy, given recent evidence suggesting that lower-class individuals tend to behave more prosocially in interactions, relative to upper-class individuals (Piff et al., 2010). One possible way of thinking about these two lines of inquiry is that threat sensitivity predisposes lower-class individuals to more prosocial behavior to mitigate social threat. This would be in keeping with Taylor and colleagues' theoretical claims suggesting that engaging in affiliative, prosocial behavior is one response strategy to threat (Taylor, 2006).

It is also possible that in situations where lower-class individuals perceive threat—such as the situations studied in the present investigation (e.g., teasing interactions)—these individuals may be less likely to behave prosocially because of their increased hostile reactivity in these contexts. As well, given that hostile emotions and prosocial emotions (e.g., compassion) are typically directed toward other individuals (e.g., Goetz, Keltner, & Simon-Thomas, 2010), future research is necessary to determine if lower-class individuals' general emotion experiences are disproportionately other oriented and if, in turn, upper-class individuals are more likely to experience emotions that are self-oriented (e.g., pride; Tracy & Robins, 2007). Such findings would dovetail with research suggesting that lower-class individuals are more contextual in their perceptions of social outcomes, relative to upper-class individuals (Kraus et al., 2009).

Conclusion

Social class determines a person's material wealth, shapes an individual's choices, and predicts the emotions an individual is likely to experience in social interactions. The present research shows that class-based reactions to hostility have short-term consequences for interactions and, pending future investigations, potentially far-reaching consequences for overall health and well-being, particularly for people of lower social class.

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Note

1. The predicted relationship between lower social class rank and heightened tracking accuracy does not reflect a prediction about greater mean-level correspondence in hostile emotion ratings. Rather, tracking accuracy reflects participants' relative sensitivity to their friend's hostile emotions (for a review, see Fletcher & Kerr, 2010).

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