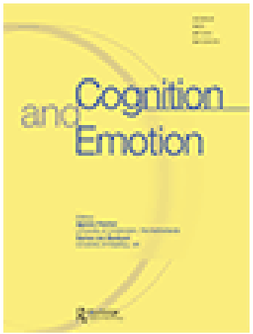

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The effect of shame on anger at others: awareness of the emotion-causing events matters

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ABSTRACT

Numerous studies have found that shame increases individuals' anger at others. However, according to recent theories about the social function of shame and anger at others, it is possible that shame controls individuals' anger at others in specific conditions. We replicated previous findings that shame increased individuals' anger at others' unfairness, when others were not aware of the individual's experience of shameful events. We also found for the first time that shame controlled or even decreased individuals' anger at others' unfairness, when others were aware of the individual's experience of shameful events. The results were consistent when shame was induced by either a recall paradigm or an imagination paradigm, and in either the ultimatum game or the dictator game. This suggests that shame strategically controls individuals' anger at others to demonstrate that they are willing to benefit others, when facing the risk of social exclusion. Our findings highlight the interpersonal function of shame and deepen the understanding of the relationship between shame and anger at others.

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Shame; anger at others; event awareness; unfairness; interpersonal function

Introduction

It is stated that shame increases anger at others (see two reviews, Elison, Garofalo, & Velotti, 2014; Velotti, Elison, & Garofalo, 2014). Many studies concerning shame as a trait (shame-proneness) found that people who more frequently experience shame or are more likely to experience shame, are more prone to anger and aggression (Harper & Arias, 2004; Harper, Austin, Cercone, & Arias, 2005; Scott et al., 2015; Tangney et al., 1996; Tangney, Wagner, Fletcher, & Gramzow, 1992, but also see some exceptions Jakupcak, Tull, & Roemer, 2005; Lutwak, Panish, Ferrari, & Razzino, 2001). A few studies concerning shame as a state also found that people who are exposed to a shameful event get more angry (than who are not exposed to it), according to self- and peer-reports (Pivetti, Camodeca, & Rapino, 2016; Thomaes, Stegge, Olthof, Bushman, & Nezlek, 2011).

Based on these findings, some researchers proposed that anger at others is motivated by the painful feeling of shame (pain theory of shame) (Elison et al., 2014; Lewis, 1971). There are two steps to link shame to anger at others. The first step is that shame feeling is painful and similar to physical pain. After moral transgression or incompetence exposure, ashamed people perceive their self-image and social-image as being damaged (Gausel & Leach, 2011). Since one of the most important fundamental human motives is to feel good about oneself, shame is overwhelming and emotionally painful (Tangney, 1993). The experience of shame and physical pain are alike and they are associated with similar

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physiological responses (Elison et al., 2014). They both activate the anterior cingulate region of the brain (Eisenberger, Lieberman, & Williams, 2003; Michl et al., 2014) and enhance cortisol and immune system activity (Dickerson & Kemeny, 2004; Dickerson, Gruenewald, & Kemeny, 2009). The second step is that the discomfort from pain elicits anger at others. Studies have found that individuals suffering from physical pain have more anger towards others (Burns, 1997; Carson et al., 2005). Berkowitz's (2012) cognitive-neoassociation model indicates that physical pain could automatically evoke anger at others without conscious evaluation. According to the theory of evolution, physical pain is usually associated with physical threat from others (e.g. a sudden attack) (Elison et al., 2014). To effectively increase the chances of survival, when experiencing physical pain, individuals equip themselves with anger (at others) and get ready to fight back as quickly as possible, even prior to higher-level cognitive appraisals (Elison et al., 2014). The similarity between shame (social pain) and physical pain could result in people adopting the same strategy (e.g. anger towards others) to deal with social threat (e.g. a decline in social value and rank) (Berkowitz, 2012; Elison et al., 2014). The automatic association between shame and anger at others may be adaptive in some conditions (e.g. expressing anger at your peer who keeps talking about your weakness). Additionally, some researchers believed that shame is the most painful feeling for individuals (Tangney & Dearing, 2003), and so changing the feeling of shame to that of anger at others may ease the painful feeling to some extent (Elison et al., 2014; Thomaes et al., 2011).

Nevertheless, according to the functional accounts of emotions, emotions help people to solve some basic problems in daily life and promote physical and social survival (Keltner & Gross, 1999). The pain theory of shame may oversimplify the roles of shame and anger (considering shame as a pain and anger as a reflex of pain acquired through evolution) and neglect the social function of shame and anger at others. Recent theories focusing on the social function of emotions could provide a new view on the relationship between shame and anger at others (Sell et al., 2017; Sznycer et al., 2016).

Sell et al. (2017) proposed that the social function of anger is bargaining for respect and better treatment. Anger at others warns others that they have to place more weight on the angry individual's welfare; otherwise, angry individuals will inflict costs on them. In other words, anger at others sends a signal to others that the cost of reciprocity with the angry individual will increase. Consequently, anger may increase the possibility that others end the reciprocity with angry individuals, if the bargaining power (the ability to confer benefits or costs) of the angry individuals does not significantly increase in the reciprocity (Sell, Eisner, & Ribeaud, 2016). On the other hand, maintaining a positive reciprocal relationship with other social members is important for individuals to survive in the human society (Trivers, 1971; Zhu, Jin, et al., 2017; Zhu, Shen, et al., 2017). The information threat theory argues that shame not only warns people of their decreased social value and the risk of social exclusion, but also motivates them to defend against social devaluation (Sznycer et al., 2016). For example, ashamed individuals tend to tolerate poor treatment from others (e.g. accept subordination) and sacrifice their own benefits for others (e.g. increase prosocial behaviour) in order to demonstrate their social value in reciprocity (de Hooge, Breugelmans, & Zeelenberg, 2008; de Hooge, Verlegh, & Tzioti, 2014; Gilbert, 2000; Wicker, Payne, & Morgan, 1983). Thus, it is possible that individuals experiencing shame sometimes control anger towards others even when others treat them poorly, for the sake of protecting themselves from being excluded. No study has yet found that state shame controls (does not increase) anger at others in some specific conditions.

In trying to reconcile the contradictory opinions above, we investigated whether the influence of shame is endogenous or exogenous (also called integral or incidental) matters. The influence of the emotion on subsequent feelings or behaviours is denoted as endogenous or exogenous based on whether the emotion is directly related to the current situation or not[1] (de Hooge et al., 2008; Garg, Inman, & Mittal, 2005). A typical method of changing the influence of shame is manipulating whether others who interact with the participants in the current situation are aware of the participants' shame-causing events (shortcomings) (see de Hooge et al., 2008; de Hooge et al., 2014). In our studies, after a specific emotion (shame or neutral emotion) was induced, participants played an economic game with others. We supposed that when the influence of shame is endogenous, that is, when ashamed participants play the economic game with others who know their shame-causing events (awareness condition), shame would control participants' anger at

others. In this case, participants' social value perceived by others has been reduced as their shortcomings have been exposed and participants directly face the risk of social exclusion. The social motivation underlying shame could urge participants to attempt to increase their social value, in order to prevent being excluded. This in turn helps to decrease anger at others and tolerate poor treatment. Here, the social need of maintaining reciprocity outweighs the automatic pain-anger linkage. It is also supposed that when the influence of shame is exogenous, that is, when ashamed participants play the economic game with others who do not know their shame-causing events (no-awareness condition), shame would increase participants' anger at others. In this condition, others would not devalue participants given that they have no idea of participants' shortcomings. There is no social need for shame to suppress anger at others. Therefore, the only effect of shame on participants is a painful feeling. The pain automatically evokes anger at others (Berkowitz, 2012; MacDonald & Leary, 2005). Our hypotheses are in line with de Hooge et al.'s (2008) findings. When others knew the participants' shame-causing events, the ashamed participants increased costly prosocial behaviour with others (increasing their social value); when others did not know the participants' shame-causing events, the ashamed participants did not increase costly prosocial behaviour any more (there was no need to demonstrate their social value to others) (de Hooge et al., 2008).

Besides the influence of the shame (endogenous vs. exogenous), a boundary factor that may change the effect of shame on anger at others is unfairness level. Studies have found that people's anger at allocators increases with unfairness level of allocations in economic games (Pillutla & Murnighan, 1996). Thus, when facing extremely unfair or extremely fair allocations, individuals' anger could be very high or very low respectively, and there could be no scope for shame to increase or decrease anger at others (a ceiling effect or a floor effect). We would control this factor, trying to identify whether and when it may influence the effect of shame on anger at others.

We also planned to measure participants' feeling of being devalued according to others' allocations as a dependent variable. Measuring devaluation is helpful to understand the effect of shame on anger at others. If shame increases or decreases anger at others in specific conditions but not the feeling of being devaluated, we could exclude the explanation that the effect of shame on anger at others is because ashamed individuals interpret other's behaviour in a more negative or more positive way.

Our studies investigated how individuals' anger at others varies based on whether they feel ashamed and on whether others know the shameful events these individuals experienced. In Study 1A ($N = 80$), we induced shame through a recall paradigm and investigated the effect of shame on anger at others in the awareness condition during the ultimatum game (UG). Study 1B is a replication of Study 1A with a larger example size ($N = 148$) and by controlling self-esteem. In Study 2 ($N = 373$), we induced shame through an imagination paradigm and investigated the effect of shame on anger at others in both the awareness and no-awareness conditions. In Study 3 ($N = 240$), we replicated the results of Study 2 in the dictator game (DG) by controlling shame-proneness. We report all data exclusions, manipulations, and measures.

Study 1A

Methods

Participants and design

Using MorePower software (Campbell & Thompson, 2012), we determined the minimum sample size to be seventy-six participants, which could provide adequate power ($1 - \beta = .80$) and medium-sized effect (partial $\eta^2 = 0.06$). Eighty college students participated in a series of unrelated experiments for a monetary payment. Three participants who misunderstood the experimental instructions or did not complete the task were excluded, leaving seventy-seven participants (46 females, $M_{age} = 20.03$ years, $SD_{age} = 2.62$) in the analyses. The study had a 3 (unfairness level: unfair vs. relatively unfair vs. fair, a within-subject factor) × 2 (emotion condition: shame vs. control, a between-subject factor) mixed design. ANOVAs were performed for anger, devaluation, and rejection rate.

Procedure

A typical recall paradigm was used to induce shame (de Hooge et al., 2008). Participants in the shame and control conditions were respectively asked to recall and write a shameful event or an event that happened on a normal weekday. After writing, the participants rated how much shame, fear, sadness, guilt, and anger at others they felt (0 = not at all, 10 = very strong).

Then participants imagined that five players read the shameful events (shame condition) or the

normal weekday events (control condition) that they just wrote down and imagined that they would play the UG with each of these five players for once after the players were aware of their emotion-causing events. In the UG, there were a proposer and a responder. At the first stage, the proposer proposed a way of dividing ten Chinese yuan between himself and the responder. At the second stage, the responder chose to accept or reject the proposal. If accepted, the proposer and the responder received money as proposed by the proposer. If rejected, no one received any money. Participants always played as the responder and the players as the proposers. The proposals of five proposers were respectively 9:1 (nine Chinese yuan for the proposer and one Chinese yuan for the responder), 8:2, 7:3, 6:4, and 5:5. The presentation order of the proposals was random. The proposals of 9:1 and 8:2 were clustered as the unfair proposals, 7:3 and 6:4 as the relatively unfair proposals, and 5:5 as the fair proposal. The clustering was based on the following reasons. First, only the proposal of 5:5 meets the principle of absolute fairness. Second, a meta-analysis showed that the proposers in the UG on average offer 30% to 40% of their endowment to the responder (Oosterbeek, Sloof, & Van De Kuilen, 2004). We used the same clustering criteria across all the studies. The participants were asked to rate the extent to which they felt angry at and devalued by each proposer based on their proposals (0 = not at all, 6 = very strong), and to decide whether to reject each proposal. The sequence of the measurements was counterbalanced. In the end, we also asked the participants to complete a quiz to check whether they understood the instructions correctly (e.g. "Were the proposers aware of the shameful event (or the normal weekday event) that you wrote?").

Results and discussion

Manipulation checks

The participants' shame ratings were significantly higher in the shame than control condition, $F(1,75) = 102.26$, $p < .001$, partial $\eta^2 = .577$ (see Table S1 in Electronic Supplementary Material 1, ESM 1). In the shame condition, shame ratings were significantly higher than other emotion ratings, all Fs > 9.81, all ps < .003, all partial η^2s > .205. This suggested that our manipulation of shame was successful. In addition, all the participants involved in the analysis correctly understood that the proposers were aware of their emotion-causing events.

Anger

The main effect of unfairness level was significant, $F(2,150) = 356.18$, $p < .001$, partial $\eta^2 = .826$ (see Table 1). The result was consistent with those of previous studies, which showed that people's anger towards the proposers increases when the proposals become more unfair (e.g. Pillutla & Murnighan, 1996). The main effect of the emotion condition was not significant, $F(1,75) = 1.60$, $p = .211$, partial $\eta^2 = .021$. The interaction effect was significant, $F(2,150) = 3.41$, $p = .036$, partial $\eta^2 = .044$. A simple effect analysis was conducted. When facing relatively unfair proposals, the participants in the shame condition felt less angry at the proposers than did those in the control condition ($F(1,75) = 5.37$, $p = .023$, partial $\eta^2 = .067$). When facing unfair or fair proposals the participants' anger at the proposers did not significantly differ between the shame and control conditions ($F(1,75) = .03$, $p = .859$, partial $\eta^2 < .001$; $F(1,75) < .01$, $p = .967$, partial $\eta^2 < .001$, respectively).

Devaluation

The main effect of unfairness level was significant ($F(2,150) = 365.27$, $p < .001$, partial $\eta^2 = .830$), which meant that the participants were more likely to feel devalued with the decrease in the money offered by the proposers. The main effect of the emotion condition and the interaction effect were not significant, all Fs < .61, all ps > .438, all partial η^2s < .008. The results implied that shame does not change individual's perception of devaluation according to others' unfair behaviour.[2]

Table 1. Means (and standard deviations) of participants' anger ratings and devaluation ratings in Study 1A.

	Anger			Devaluation		
Proposal	Shame		Control	Shame		Control
Unfair	4.19 (1.33)	=	4.25 (1.51)	4.65 (0.96)	=	4.72 (1.19)
Relatively unfair	2.03 (1.25)	<	2.74 (1.44)	2.58 (1.32)	=	2.89 (1.32)
Fair	0.21 (0.52)	=	0.21 (0.62)	0.54 (1.12)	=	0.63 (1.17)

Note: The " = " mark indicates that there is no significant difference between means, ps > .05. The "<" mark indicates that the former mean is significantly smaller than the latter one, ps < .05.

We found for the first time that shame did not increase or even decreased anger at others, when others were aware of the participants' emotion-causing events, which is different from previous findings that shame increases anger at others (Harper et al., 2005; Harper & Arias, 2004; Scott et al., 2015; Tangney et al., 1996; Thomaes et al., 2011). However, Study 1A was embedded in a few unrelated experiments. The other experiments might have exerted unclear influence on Study 1A. Another limitation is that many non-significant results were found. This could be because the sample size was too small to identify a small effect of shame on anger at others. To overcome these limitations, we recruited participants to perform only relevant tasks and used a larger sample size in Study 1B. Additionally, self-esteem was measured and controlled, considering that individuals with extremely high self-esteem are more likely to feel angry at others when disputed by others (Baumeister, Smart, & Boden, 1996).

Study 1B

Methods

Participants and design

The minimum sample size was determined to be 120 participants, which could provide adequate power ($1 - \beta = .80$) and small- to medium-sized effect (partial $\eta^2 = 0.04$). One hundred and forty-eight college students participated in the experiment for course credits. Twenty participants who did not write their events or did not complete the task were excluded, leaving 128 participants (81 females, $M_{age} = 18.85$ years, $SD_{age} = 0.80$) in the analyses. The study had a 3 (unfairness level: unfair vs. relatively unfair vs. fair, a within-subject factor) × 2 (emotion condition: shame vs. control, a between-subject factor) mixed design. ANOVAs and ANCOVAs (controlling self-esteem) were performed.

Procedure

Based on the procedure of Study 1A, some changes were made in Study 1B. 1) The participants did not perform any unrelated tasks. 2) The Rosenberg Self-Esteem Scale, which is used to measure people's self-esteem (Rosenberg, 1979), was administered before the experiment.

Results and discussion

Manipulation checks

Participants' shame ratings were significantly higher in the shame than control condition, $F(1,126) = 33.90$, $p < .001$, partial $\eta^2 = .212$ (Table S2 in ESM 1). In the shame condition, the shame ratings were significantly higher than the other emotion ratings, $F(1,53) > 7.69$, $p < .008$, partial $\eta^2 > .127$. Our manipulation of shame was successful. In addition, all the participants involved in the analysis correctly understood that the proposers were aware of their emotion-causing events.

Anger

The main effect of unfairness level was significant, $F(2,252) = 301.66$, $p < .001$, partial $\eta^2 = .705$ (see Table 2). The main effect of emotion condition and the interaction effect were not significant ($F(1,126) < .01$, $p = .995$, partial $\eta^2 < .001$; $F(2,252) = .35$, $p = .708$, partial $\eta^2 = .003$, respectively). Consistent with the results of Study 1A, shame did not increase the participants' anger at others. Together, the results of Studies 1A and 1B supported our hypotheses that shame controls or decreases anger at others, when others were aware of the participants' emotion-causing events.

Devaluation

The main effect of unfairness level was significant ($F(2,252) = 346.13$, $p < .001$, partial $\eta^2 = .733$). The main effect of emotion condition and the interaction effect were not significant ($F(1,126) = .13$, $p = .716$, partial $\eta^2 = .001$; $F(2,252) = .76$, $p = .468$, partial $\eta^2 = .006$, respectively), which suggested that shame does not change people's perception of devaluation.

Table 2. Means (and standard deviations) of participants' anger ratings and devaluation ratings in Study 1B.

	Anger			Devaluation		
Proposal	Shame		Control	Shame		Control
Unfair	3.80 (1.81)	=	3.92 (1.70)	4.19 (1.78)	=	4.14 (1.71)
Relatively unfair	2.31 (1.51)	=	2.30 (1.36)	2.81 (1.54)	=	2.56 (1.43)
Fair	0.57 (1.28)	=	0.47 (1.15)	0.63 (0.94)	=	0.70 (1.26)

Note: The " = " mark indicates that there is no significant difference between means, $ps > .05$.

Self-esteem

There was no significant difference between the shame and control conditions in self-esteem, $F(1,126) = .807$, $p = .371$, partial $\eta^2 = .006$. The ANCOVAs showed that the statistical results of anger and devaluation were the same when the effect of self-esteem was controlled. Self-esteem did not significantly affect anger or devaluation ($F(1,125) < .01$, $p = .696$, partial $\eta^2 = .001$; $F(1,125) = .13$, $p = .718$, partial $\eta^2 = .001$, respectively).

Consistent with Study 1A, Study 1B showed that shame did not increase anger at others, when others' were aware of the participants' emotion-causing events. In Studies 1A and 1B, shame was evoked by a recall paradigm. In Study 2, we tried to evoke shame through an imagination paradigm and see if previous results could be replicated. Moreover, a new factor (event awareness) was added, which meant that we also tested whether shame increases anger at others when others are not aware of the individuals' shameful events.

Study 2

Methods

Participants and design

In trying to detect the three-way interaction effect, the minimum sample size was determined to be 320 participants, which could provide adequate power ($1 - \beta = .80$) and small-sized effect (partial $\eta^2 = 0.015$). Three hundred and seventy-three college students participated in the experiment for course credits. Thirty-five participants who did not correctly understand the experimental instructions or did not complete the task, were excluded, leaving 338 participants (181 females, $M_{age} = 19.56$ years, $SD_{age} = 1.05$) in the analyses. The study had a 3 (unfairness level: unfair vs. relatively unfair vs. fair, a within-subject factor) × 2 (emotion condition: shame vs. control, a between-subject factor) × 2 (event awareness: awareness vs. no-awareness, a between-subject factor) mixed design. ANOVAs were performed.

Procedure

We extended Study 1B by changing the following parts. 1) An imagination paradigm was used to induce shame (adapted from de Hooge et al., 2008). The participants imagined that they were required to give a presentation as a part of a terminal examination, with forty fellow students present. In the shame condition, the participants imagined that they gave a very terrible presentation, during which everything went completely wrong (e.g. lots of grammatical mistakes in slides; stumbling over words; not finishing the presentation on time; no one understanding the report). In the control condition, the participants imagined that they gave an average-level presentation, during which nothing special happened. After the imagination, the participants rated how much shame, fear, sadness, guilt, anger at others, and anger at self they felt (0 = not at all, 10 = very strong). 2) A between-subject factor, event awareness (awareness vs. no-awareness), was added. In the awareness condition, five fellow students, who just saw the participants' presentation, played as the proposers in the UG. In the no-awareness condition, five fellow students, who did not see participants' presentation, played as the proposers in the UG. To justify this, in the no-awareness condition, participants were informed that the fellow students who played as the proposers had finished their presentation the day before the participants' presentation, and so were not required to see the participants' presentation that day and knew nothing about it.

Results and discussion

Manipulation checks

The participants' shame ratings were significantly higher in the awareness and no-awareness shame conditions than the awareness and no-awareness control conditions, all Fs > 109.12, all ps < .001, all partial η^2s > .409 (Table S3 in ESM 1). There were no significant difference between the awareness and no-awareness shame conditions in the shame ratings, $F(1,163) = .25$, $p = .621$, partial $\eta^2 = .002$. In the awareness and no-awareness shame conditions, the shame ratings were significantly higher than were the other emotion ratings (all Fs > 5.19, all ps < .025, all partial η^2s > .055). Our manipulation of shame was successful. All the participants involved in the analysis correctly understood whether the proposers were aware of their emotion-causing events.

Anger

The main effect of unfairness level was significant, $F(2,668) = 820.79$, $p < .001$, partial $\eta^2 = .711$ (see Figure 1 and Table 3). The main effects of emotion condition and event awareness were not significant ($F(1,334) = .32$, $p = .572$, partial $\eta^2 = .001$; $F(1,334) = .03$, $p = .866$, partial $\eta^2 < .001$, respectively). The two-way interaction of event awareness and emotion condition

were significant, $F(1,334) = 12.49$, $p < .001$, partial $\eta^2 = .036$. The two-way interaction of unfairness level and emotion condition and the two-way interaction of unfairness level and event awareness were not significant ($F(2,668) = .19$, $p = .830$, partial $\eta^2 = .001$; $F(2,668) = .40$, $p = .673$, partial $\eta^2 = .001$, respectively). The three-way interaction was significant ($F(2,668) = 8.04$, $p < .001$, partial $\eta^2 = .024$), which indicated that the effect of shame on anger at the proposers depended on unfairness level and event awareness.

To understand the significant three-way interaction, we explored the interaction effects of the event awareness and emotion condition in different unfairness levels by conducting simple effect analysis. In the fair level, the interaction effect was not significant, $F(1,334) = .10$, $p = .747$, partial $\eta^2 < .001$. This could be because all the anger ratings were very low in these conditions, and there was not enough scope for shame to decrease anger (floor effect). In the unfair and relatively unfair levels, the interaction effects of event awareness and emotion condition were significant ($F(1,334) = 11.57$, $p = .001$, partial $\eta^2 = .033$; $F(1,334) = 13.09$, $p < .001$, partial $\eta^2 = .038$, respectively). Further analyses showed that in the fair level there was no significant difference in anger ratings between the awareness shame and awareness control conditions (($F(1,334) < .01$, $p = .937$, partial $\eta^2 < .001$) or between the no-awareness shame and no-awareness control conditions (($F(1,334) = .19$, $p = .665$, partial $\eta^2 < .001$). In the unfair and relatively unfair levels, the anger ratings were significantly lower in the awareness shame than awareness control condition ($F(1,334) = 5.28$, $p = .022$, partial $\eta^2 = .016$; $F(1,334) = 4.13$, $p = .043$, partial $\eta^2 = .012$, respectively) and the anger ratings were significantly higher in the no-awareness shame than no-awareness control condition ($F(1,334) = 6.37$, $p = .012$, partial $\eta^2 = .019$; $F(1,334) = 9.72$, $p = .002$, partial $\eta^2 = .028$, respectively). These results supported our hypotheses that shame controls anger at others when others are aware of the individuals' emotion-causing events, whereas shame increases anger when others are not aware of the individuals' emotion-causing events.

Devaluation

The main effects of unfairness level and event awareness were significant ($F(2,668) = 796.37$, $p < .001$, partial $\eta^2 = .705$; $F(1,334) = 7.58$, $p = .006$, partial $\eta^2 = .022$, respectively). The main effect of emotion condition was not significant, $F(1,334) = .28$, $p = .599$, partial $\eta^2 = .001$. The two-way interaction effect of event awareness and emotion condition, two-way interaction effect of unfairness level and emotion condition, and three-way interaction effect were not significant ($F(1, 334) = 1.37$, $p = .242$, partial $\eta^2 = .004$; $F(2, 668) = .39$, $p = .679$, partial $\eta^2 = .001$; $F(2, 668) = 1.57$, $p = .209$, partial $\eta^2 = .005$, respectively). The non-significant main effect of emotion condition, two-way interaction effects related to emotion condition, and the three-way interaction effect implicated that shame did not change the individuals' perception of devaluation according to others' behaviour. Interestingly, the two-way interaction effect of unfairness level and event awareness was significant ($F(2,668) = 6.53$, $p = .002$, partial $\eta^2 = .019$). Further analyses revealed that in the unfair and relatively unfair levels, the devaluation ratings were higher in the awareness than no-awareness condition ($F(1,336) = 11.62$, $p = .001$, partial $\eta^2 = .033$; $F(1,336) = 4.70$, $p = .031$, partial $\eta^2 = .014$, respectively). In the fair level, the devaluation ratings showed no significant difference between the awareness and no-awareness conditions, $F(1,336) = .03$, $p = .855$, partial $\eta^2 < .001$. A possible explanation is that when people are faced with unfairness, they may have two ways to interpret it. On way is to think that the allocator is selfish. The other way is to think that the allocator hates me. In the awareness condition, when the participants' emotion-causing events were exposed to others (which meant others were aware of information related to the participants), they were more inclined to interpret the unfairness through the second way (e.g. the allocator hates me, because he or she read what I wrote about myself). Consequently, when proposals were unfair, the devaluation rating was higher in the awareness than the no-awareness condition. When people are faced with a fair proposal, they would not feel devalued.

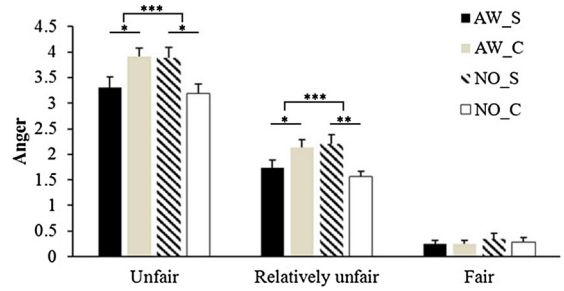

Figure 1. Mean anger ratings (± SE) in different conditions in Study 2. Event awareness: awareness (AW) vs. no-awareness (NO); Emotion condition: shame (S) vs. control (C). ***$p < .001$, **$p < .01$, *$p < .05$.

Table 3. Means (and standard deviations) of participants' anger ratings and devaluation ratings in Study 2.

		Awareness			No-awareness		
	Proposal	Shame		Control	Shame		Control
Anger	Unfair	3.31 (1.92)	<	3.91 (1.58)	3.89 (1.72)	>	3.20 (1.73)
	Relatively unfair	1.73 (1.47)	<	2.14 (1.35)	2.21 (1.44)	>	1.56 (1.05)
	Fair	0.24 (0.67)	=	0.24 (0.68)	0.34 (1.06)	=	0.28 (0.87)
	Unfair	4.17 (1.65)	=	4.27 (1.64)	3.70 (1.95)	=	3.44 (1.91)
Devaluation	Relatively unfair	2.32 (1.48)	=	2.46 (1.45)	2.27 (1.45)	=	1.86 (1.32)
	Fair	0.43 (1.01)	=	0.42 (0.90)	0.38 (1.02)	=	0.43 (1.10)

Note: The " = " mark indicates that there is no significant difference between means, *p*s > .05. The "<" mark indicates that the former mean is significantly smaller than the latter one, *p*s < .05. The ">" mark indicates that the latter mean is significantly smaller than the former one, *p*s < .05.

In line with Studies 1A and 1B, Study 2 showed that hame did not increase anger at others, when others' were aware of the participants' emotion-causing events. Moreover, Study 2 replicated the results of previous studies that shame increased anger at other (e.g. Elison et al., 2014; Thomaes et al., 2011), when others' were not aware of the participants' emotion-causing events. In Studies 1A, 1B, and 2, many channels were offered for participants to show their emotions and attitudes, including revealing their anger, complaining being devalued, and rejecting proposals. The participants' choices in different channels might influence each other to some extent. Therefore, in Study 3, we focused on the effect of shame on anger in the DG. Shame-proneness is an important variable associated with anger at others (Harper et al., 2005; Tangney et al., 1996). To exclude the potential effect of shame-proneness on anger at others, we controlled shame-proneness in Study 3.

Study 3

Methods

Participants and design

The minimum sample size was determined to be 192 participants, which could provide adequate power ($1 - \beta = .80$) and small to medium-sized effect (partial $\eta^2 = 0.025$). The predetermined effect size was adjusted according to the finding of Study 2. Two hundred and forty college students participated in the experiment for course credits. Twenty participants, who misunderstood the experimental instructions or did not complete the task, were excluded, leaving 220 participants (126 females, $M_{age} = 21.77$ years, $SD_{age} = 4.69$) in the analyses. Study had a 3 (unfairness level: unfair vs. relatively unfair vs. fair, a within-subject factor) × 2 (emotion condition: shame vs. control, a between-subject factor) × 2 (event awareness: awareness vs. no-awareness, a between-subject factor) mixed design. ANOVAs and ANCOVAs (controlling shame-proneness) were performed.

Procedure

In Study 3, some changes were made based on Study 2. 1) Participants imagined that they played the DG after the imagination of the emotion-causing event. In the DG, there were a dictator and a receiver. The dictator could divide ten Chinese yuan between the receiver and himself/herself. The receiver had no choice but to accept the division. Participants, who always acted as the receiver, played the DG with each of five different players, who acted as the dictator, for once. 2) The participants were only asked to rate the extent of anger at each dictator (0 = not at all, 6 = very strong). 3) The Test of Self-Conscious Affect, which is used to measure people's shame-proneness (Tangney & Dearing, 2003), was completed by participants before the experiment.

Results and discussion

Manipulation checks

The participants' shame ratings were significantly higher in the awareness and no-awareness shame conditions than the awareness and no-awareness control conditions, all *F*s > 75.40, all *p*s < .001, all partial η^2s > .416 (Table S4 in ESM 1). There were no significant differences between the awareness and no-awareness shame conditions in the shame ratings, $F(1,108) = 1.66$, $p = .200$, partial $\eta^2 = .015$. In the awareness and no-awareness shame conditions, the shame ratings were significantly higher than the other emotion ratings (all *F*s > 5.77, all *p*s < .020, all partial η^2s > .097). Our manipulation of shame was successful. In addition, all the participants involved in the analysis correctly understood whether the proposers were aware of their emotion-causing events.

Anger

The main effect of unfairness level was significant, $F(2,432) = 361.50$, $p < .001$, partial $\eta^2 = .626$ (see Figure 2 and Table 4). The main effects of emotion condition and event awareness were not significant ($F(1,216) = 2.05$, $p = .154$, partial $\eta^2 = .009$; $F(1,216) = .31$, $p = .581$, partial $\eta^2 < .001$, respectively). The two-way interaction of event awareness and emotion condition were significant, $F(1,216) = 5.58$, $p = .019$, partial $\eta^2 = .025$. Further analyses showed that in the awareness level, the anger ratings revealed no significant difference between shame and control conditions, $F(1,106) = .44$, $p = .510$, partial $\eta^2 = .004$; In the no-awareness level, the anger ratings was higher in the shame than control condition, $F(1,110) = 7.17$, $p = .009$, partial $\eta^2 = .061$. The two-way interaction effect of unfairness level and emotion condition, the two-way interaction effect of unfairness level and event awareness, and the three-way interaction effect were not significant ($F(2,432) = 1.17$, $p = .311$, partial $\eta^2 = .005$; $F(2,432) = .28$, $p = .757$, partial $\eta^2 = .001$; $F(2,432) = 1.75$, $p = .175$, partial $\eta^2 = .008$, respectively).

To confirm whether we could replicate the results of Study 2, we also explored the interaction effects of the event awareness and emotion condition in different unfairness levels in Study 3 as we did in Study 2. In the fair level, the interaction effect was not significant, $F(1,216) = 2.33$, $p = .128$, partial $\eta^2 = .011$. This could be because all the anger ratings were very low in these conditions, and there was not enough scope for shame to decrease anger (a floor effect). In the unfair and relatively unfair levels, the interaction effects of event awareness and emotion condition were significant ($F(1,216) = 4.10$, $p = .044$, partial $\eta^2 = .018$; $F(1,216) = 5.23$, $p = .023$, partial $\eta^2 = .024$, respectively). Further analyses showed that in the fair level there was no significant difference in anger ratings between the awareness shame and awareness control conditions ($F(1,216) = .56$, $p = .456$, partial $\eta^2 = .003$) or between the no-awareness shame and no-awareness control conditions ($F(1,216) = .1.98$, $p = .161$, partial $\eta^2 = .009$). In the unfair and relatively unfair levels, the anger ratings were significantly lower in the awareness shame than awareness control condition ($F(1,216) = .26$, $p = .609$, partial $\eta^2 = .001$; $F(1,216) = .24$, $p = .628$, partial $\eta^2 = .001$, respectively) and the anger ratings were significantly higher in the no-awareness shame than no-awareness control condition ($F(1,216) = 5.45$, $p = .025$, partial $\eta^2 = .019$; $F(1,216) = 7.45$, $p = .007$, partial $\eta^2 = .034$, respectively). These results supported our hypotheses that shame controls anger at others when others are aware of participants' emotion-causing events, whereas shame increases anger when others are not aware of participants' emotion-causing events.

Shame-proneness

There was no significant difference among the awareness shame, awareness control, no-awareness shame, and no-awareness control conditions in shame-proneness, $F(1,216) = .48$, $p = .699$, partial $\eta^2 = .007$. The ANCOVAs showed that the statistical results of anger ratings were the same when the effect of shame-proneness was controlled and shame-proneness did not significantly affect anger at dictators, $F(1,215) = .16$, $p = .689$, partial $\eta^2 = .001$.

General discussion

We explored the relationship between shame and anger at others in different conditions. Shame did not increase anger at others' unfair allocations in the awareness condition across all studies, while it did so in the no-awareness condition in Studies 2 and 3. Our findings were not caused by the effect of self-esteem (Study 1B) or shame-proneness (Study 3). Our findings were also not caused by change in devaluation perception (Studies 1A, 1B, and 2). Together, the results support our assumption that event awareness moderates the effect of shame on anger at others.

Previous studies considered shame as a pain, which automatically evoke anger at others (a reflex acquired through evolution) (see a review, Elison et al., 2014). It is also proposed that turning shame (e.g. blaming oneself) into anger at others (e.g. finding an excuse

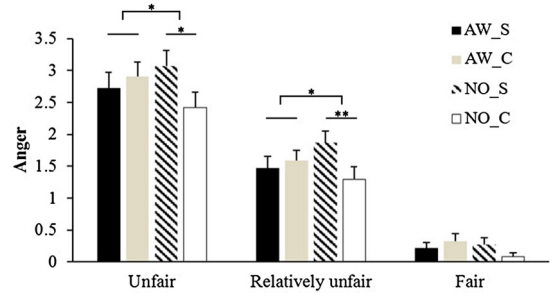

Figure 2. Mean anger ratings (± SE) in different conditions in Study 3. Event awareness: awareness (AW) vs. no-awareness (NO); Emotion condition: shame (S) vs. control (C). $^{**}p < .01$, $^{*}p < .05$.

Table 4. Means (and standard deviations) of participants' anger ratings in Study 3.

	Awareness			No-awareness		
Division	Shame		Control	Shame		Control
Unfair	2.73 (1.84)	=	2.91 (1.64)	3.06 (1.88)	>	2.28 (1.73)
Relatively unfair	1.47 (1.31)	=	1.59 (1.15)	1.86 (1.38)	>	1.19 (1.34)
Fair	0.22 (0.63)	=	0.32 (0.87)	0.27 (0.80)	=	0.09 (0.43)

Note: The " = " mark indicates that there is no significant difference between means, *ps* > .05. The ">" mark indicates that the latter mean is significantly smaller than the former one, *ps* < .05.

to blame others) might ease the individuals' painful feelings (Thomaes et al., 2011). Anger at others seems to play a role as a painkiller. Those previous views could explain why we found that ashamed participants had increased anger at others when others' did not know their emotion-causing events, but could not explain why ashamed participants did not have increased anger at others when others knew their emotion-causing events.

Introducing the social function of shame and anger at others is conducive to the understanding of shame-anger linkage. Besides causing painful feelings, shame motivates people to defend against social devaluation when their social value is decreasing and their risk of being excluded from social reciprocity is increasing. Tolerating poor treatment is a way of demonstrating individuals' social value to others (de Hooge et al., 2008; Gilbert, 2000; Wicker et al., 1983). Besides the possible role of easing emotional pain from shame, anger at others functions to bargain for better treatment from others (Sell et al., 2017). Anger at others signals the increased cost for others during the reciprocity, which could result in the end of the reciprocity. When the shame-causing events are exposed to others, shame urges individuals to increase their social value perceived by others and causes feelings of pain at the same time. To meet the need for increased social value, individuals should decrease their anger at others to prepare for tolerating poor treatments. To meet the need for easing the emotional pain, individuals should increase anger at others to stop blaming themselves. This conflict of needs could be the reason why shame did not increase anger at others in the awareness condition. When the shame-causing events are not exposed to others, individuals' social value is not decreased in others' mind. There is no need for shame to motivate people to demonstrate their social value. Then the only effect of shame is causing pain. Pain automatically evokes anger at others (Berkowitz, 2012). This is why shame increased anger at others in the no-awareness condition. Combining the pain theory and the social function theory of emotions with our findings, we provide new theoretical insight into the role of shame and anger at others in the shame-anger linkage.

Studies have revealed that shame strategically adjusts people's motivation (de Hooge, Zeelenberg, & Breugelmans, 2010) and behaviour (de Hooge et al., 2008; Leach & Cidam, 2015) to defend themselves against social devaluation. However, this study is the first to find that shame strategically influences another emotion according to people's social need. Our findings extend the knowledge about shame's effect. Future studies may investigate how shame affects other emotions, such as fear and anxiety, in different conditions. For example, when an individual's shame-causing event (e.g. giving a bad presentation) is exposed to person A, the ashamed individual may be more fearful or anxious to deliver another presentation to person A than to a person who knows nothing about the individual's shame-causing event.

It was consistently found that shame increased anger at others in the no-awareness condition (Studies 2 and 3) and it did not do so in the awareness condition (Studies 1A, 1B, 2, and 3). Nevertheless, the effect sizes of the different studies varied. To provide more insight into the consistency of the findings, we conducted a meta-analysis following procedures outlined in the book by Rosenthal (1991). The results of the meta-analysis showed that when others knew the individuals' emotion-causing events, shame decreased anger at others in the relatively unfair condition and had no significant effect in the unfair and fair conditions; when others did not know the individual's emotion-causing events, shame increased anger at others in the unfair and relatively unfair conditions and had no significant effect in the fair condition (Table 5). The results still supported our assumptions. A possible reason why the effect size of shame varied in the awareness condition is that the participants' ability to control anger differs. The pain induced by shame automatically evokes anger at others (Berkowitz, 2012; MacDonald & Leary, 2005). Even though in

Table 5. Meta-analytic effect of shame on anger at others across studies.

	Awareness (across 4 studies)			No-awareness (across 2 studies)		
Conditions	Cohen's *d*	95% CI	*p*	Cohen's *d*	95% CI	*p*
Unfair	−0.170	[−0.35,0.01]	.061	0.413	[0.17,0.65]	< .001
Relatively unfair	−0.198	[−0.38,−0.02]	.032	0.510	[0.27,0.75]	< .001
Fair	−0.008	[−0.19,0.17]	.930	0.159	[−0.08,0.40]	.192

Note: The negative Cohen's *d* indicates that the anger ratings were lower in the shame than control condition. The positive Cohen's *d* indicates that the anger ratings were higher in the shame than control condition. CI represents the confidence interval.

the awareness shame condition, individuals are motivated to decrease anger at others, some individuals with a low ability to regulate anger could only ensure that the anger at others does not increase.

Consistent with previous studies (Pillutla & Murnighan, 1996), our studies revealed that anger at the proposers increased with unfairness level. In Studies 2 and 3, there was a significant two-way interaction effect of event awareness and emotion condition on anger ratings in the unfair and relatively unfair levels, but not in the fair level. This could be owing to a floor effect, as the anger ratings were very low in the fair level. No apparent ceiling effect was found.

It is worth noting that shame could increase individuals' anger at others even when others know their shame-causing events in some special situations. In most social situations, keeping a positive reciprocity with others is one of the most important targets in social life. Individuals demonstrate their social value by providing benefits to others, for the sake of maintaining social reciprocity and getting long-term benefits. This is similar to our finding that shame had participants emotionally prepare to give up some money to demonstrate their value to others when their shortcomings were exposed to others. However, in some social conditions without official systems to ensure the social order, people need to maintain their reputation of toughness by showing they are capable of revenge, to protect themselves from being repeatedly bullied (Cohen & Nisbett, 1994). When one's shortcomings, especially about ability/intent for revenge, is exposed, the most effective way to restore their reputation of toughness and to scare away potential bullies is equipping themselves with anger at others and fighting against others instead of giving up their benefits, especially when there is a huge audience (let more potential bullies know your toughness). Future studies may investigate how the social context influences the relationship between shame and anger at others.

In our studies, we focused on shame's effect on anger at others (not anger at self) in trying to understand it from a social perspective. Anger at self and others are related to different appraisals and action tendencies (de Hooge et al., 2014; Ellsworth & Tong, 2006). It could be an interesting topic for future studies to investigate how shame affects anger at self in different situations. Nevertheless, it is beyond the scope of our studies.

A limitation of the present studies is that we did not measure anger-related aggressive behaviour. Though some studies did consider the rejection in the UG to indicate aggression (e.g. Prasad et al., 2017), other studies revealed that the rejection in the UG could be driven by various emotions and motivations besides anger and aggression (Kaltwasser, Hildebrandt, Wilhelm, & Sommer, 2016; Yamagishi et al., 2012). The rejection in the UG may not purely represent aggression. We advise that future studies use typical paradigms (e.g. the point subtraction aggression paradigm) to measure aggression instead of the UG (see a review, Geniole, MacDonell, & McCormick, 2017) and test whether event awareness moderates the effect of shame on aggression.

In conclusion, the present studies demonstrated that the event awareness moderates the effect of shame on anger at others. When others do not know the individuals' emotion-causing events, shame evokes anger at others automatically (Berkowitz, 2012; MacDonald & Leary, 2005). When others know the individuals' emotion-causing events and are inclined to devalue them, the individuals control their anger at others and are ready to suffer poor treatment, to prove their social value for others and to prevent themselves from social exclusion (Sznycer et al., 2016). Our findings deepen the understanding of the relation between shame and anger at others from a social perspective.

Notes

1. An example of endogenous influence is that you felt guilty because of bumping into a little girl and the guilt made you send the girl to the hospital. An example of

exogenous influence is that you felt guilty because of bumping into a little girl and the guilt made you give some money to a beggar on your way home (the spillover effect of guilt).

2. The psychological mechanism of the rejection in the UG is complicated. Studies have found that it could be driven by various emotions (e.g. anger and spite) and motivations (e.g. aggression, assertiveness, and prosociality) (Güth, 1995; Kaltwasser et al., 2016; Pillutla & Murnighan, 1996; Wang et al., 2011; Yamagishi et al., 2012). As there are still debates on the causes of the rejection in the UG, we did not simply consider the rejection rate as an index of aggression behaviour. In our studies, we focused on anger and devaluation, but we still reported the results of the rejection rate in the supplementary materials (see Tables S5 and S6 in ESM 2), which might provide some information for future studies.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

Baumeister, R. F., Smart, L., & Boden, J. D. (1996). Relation of threatened egoism to violence and aggression: The dark side of high esteem. *Psychological Review*, *103*(l), 5–33.

Berkowitz, L. (2012). A different view of anger: The cognitive-neoassociation conception of the relation of anger to aggression. *Aggressive Behavior*, *38*(4), 322–333.

Burns, J. W. (1997). Anger management style and hostility: Predicting symptom-specific physiological reactivity among chronic low back pain patients. *Journal of Behavioral Medicine*, *20*(6), 505–522.

Campbell, J. I. D., & Thompson, V. A. (2012). Morepower 6.0 for ANOVA with relational confidence intervals and Bayesian analysis. *Behavior Research Methods*, *44*(4), 1255–1265.

Carson, J. W., Keefe, F. J., Goli, V., Fras, A. M., Lynch, T. R., Thorp, S. R., & Buechler, J. L. (2005). Forgiveness and chronic low back pain: A preliminary study examining the relationship of forgiveness to pain, anger, and psychological distress. *Journal of Pain*, *6*(2), 84–91.

Cohen, D., & Nisbett, R. E. (1994). Self-protection and the culture of honor: Explaining southern violence. *Personality & Social Psychology Bulletin*, *20*(5), 551–567.

de Hooge, I. E., Breugelmans, S. M., & Zeelenberg, M. (2008). Not so ugly after all: When shame acts as a commitment device. *Journal of Personality and Social Psychology*, *95*(4), 933–943.

de Hooge, I. E., Verlegh, P. W. J., & Tzioti, S. C. (2014). Emotions in advice taking: The roles of agency and valence. *Journal of Behavioral Decision Making*, *27*(3), 246–258.

de Hooge, I. E., Zeelenberg, M., & Breugelmans, S. M. (2010). Restore and protect motivations following shame. *Cognition and Emotion*, *24*(1), 111–127.

Dickerson, S. S., Gruenewald, T. L., & Kemeny, M. E. (2009). Psychobiological responses to social self threat: Functional or detrimental? *Self and Identity*, *8*(2–3), 270–285.

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, *130*(3), 355–391.

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does rejection hurt? An fMRI study of social exclusion. *Science*, *302* (5643), 290–292.

Elison, J., Garofalo, C., & Velotti, P. (2014). Aggression and violent behavior shame and aggression : Theoretical considerations. *Aggression and Violent Behavior*, *19*(4), 447–453.

Ellsworth, P. C., & Tong, E. M. W. (2006). What does it mean to be angry at yourself? Categories, appraisals, and the problem of language. *Emotion*, *6*(4), 572–586.

Garg, N., Inman, J. J., & Mittal, V. (2005). Incidental and task-related affect: A re-inquiry and extension of the influence of affect on choice. *Journal of Consumer Research*, *32*(1), 154–159.

Gausel, N., & Leach, C. W. (2011). Concern for self-image and social image in the management of moral failure: Rethinking shame. *European Journal of Social Psychology*, *41* (4), 468–478.

Geniole, S. N., MacDonell, E. T., & McCormick, C. M. (2017). The point subtraction aggression paradigm as a laboratory tool for investigating the neuroendocrinology of aggression and competition. *Hormones and Behavior*, *92*, 103–116.

Gilbert, P. (2000). The relationship of shame, social anxiety and depression: The role of the evaluation of social rank. *Clinical Psychology & Psychotherapy*, *7*(3), 174–189.

Güth, W. (1995). On ultimatum bargaining experiments—A personal review. *Journal of Economic Behavior & Organization*, *27*(3), 329–344.

Harper, F. W. K., & Arias, I. (2004). The role of shame in predicting adult anger and depressive symptoms among victims of child psychological maltreatment. *Journal of Family Violence*, *19*(6), 367–375.

Harper, F. W. K., Austin, A. G., Cercone, J. J., & Arias, I. (2005). The role of shame, anger, and affect regulation in men's perpetration of psychological abuse in dating relationships. *Journal of Interpersonal Violence*, *20*(12), 1648–1662.

Jakupcak, M., Tull, M. T., & Roemer, L. (2005). Masculinity, shame, and fear of emotions as predictors of men's expressions of anger and hostility. *Psychology of Men & Masculinity*, *6*(4), 275–284.

Kaltwasser, L., Hildebrandt, A., Wilhelm, O., & Sommer, W. (2016). Behavioral and neuronal determinants of negative reciprocity in the ultimatum game. *Social Cognitive and Affective Neuroscience*, *11*(10), 1608–1617.

Keltner, D., & Gross, J. J. (1999). Functional accounts of emotions. *Cognition and Emotion*, *13*(5), 467–480.

Leach, C. W., & Cidam, A. (2015). When is shame linked to constructive approach orientation? A meta-analysis. *Journal of Personality and Social Psychology*, *109*(6), 983–1002.

Lewis, H. B. (1971). Shame and guilt in neurosis. *Psychoanalytic Review*, *58*(3), 419–438.

Lutwak, N., Panish, J. B., Ferrari, J. R., & Razzino, B. E. (2001). Shame and guilt and their relationship to positive expectations and anger expressiveness. *Adolescence*, *36*(144), 641–653.

MacDonald, G., & Leary, M. R. (2005). Why does social exclusion hurt? The relationship between social and physical pain. *Psychological Bulletin*, *131*(2), 202–223.

Michl, P., Meindl, T., Meister, F., Born, C., Engel, R. R., Reiser, M., & Hennig-Fast, K. (2014). Neurobiological underpinnings of shame and guilt: A pilot fMRI study. *Social Cognitive and Affective Neuroscience*, *9*(2), 150–157.

Oosterbeek, H., Sloof, R., & Van De Kuilen, G. (2004). Cultural differences in ultimatum game experiments: Evidence from a meta-analysis. *Experimental Economics*, *7*(2), 171–188.

Pillutla, M. M., & Murnighan, J. K. (1996). Unfairness, anger, and spite: Emotional rejections of ultimatum offers. *Organizational Behavior and Human Decision Processes*, *68*(3), 208–224.

Pivetti, M., Camodeca, M., & Rapino, M. (2016). Shame, guilt, and anger: Their cognitive, physiological, and behavioral correlates. *Current Psychology*, *35*(4), 690–699.

Prasad, S., Narayanan, J., Lim, V. K. G., Koh, G. C. H., Koh, D. S. Q., & Mehta, P. H. (2017). Preliminary evidence that acute stress moderates basal testosterone's association with retaliatory behavior. *Hormones and Behavior*, *92*, 128–140.

Rosenberg, M. (1979). *Conceiving the self*. New York: Basic Books.

Rosenthal, R. (1991). *Meta-analytic procedures for social research*. Newbury Park, CA: SAGE.

Scott, L. N., Stepp, S. D., Hallquist, M. N., Whalen, D. J., Wright, A. G. C., & Pilkonis, P. A. (2015). Daily shame and hostile irritability in adolescent girls with borderline personality disorder symptoms. *Personality Disorders: Theory, Research, and Treatment*, *6*(1), 53–63.

Sell, A., Eisner, M., & Ribeaud, D. (2016). Bargaining power and adolescent aggression: The role of fighting ability, coalitional strength, and mate value. *Evolution and Human Behavior*, *37*(2), 105–116.

Sell, A., Sznycer, D., Al-Shawaf, L., Lim, J., Krauss, A., Feldman, A., … Tooby, J. (2017). The grammar of anger: Mapping the computational architecture of a recalibrational emotion. *Cognition*, *168*, 110–128.

Sznycer, D., Tooby, J., Cosmides, L., Porat, R., Shalvi, S., & Halperin, E. (2016). Shame closely tracks the threat of devaluation by others, even across cultures. *Proceedings of the National Academy of Sciences*, *113*(10), 2625–2630.

Tangney, J. P. (1993). Guilt and shame. In C. G. Costello (Ed.), *Symptoms of depression* (pp. 161–180). New York: Wiley.

Tangney, J. P., & Dearing, R. L. (2003). *Shame and guilt*. New York: Guilford Press.

Tangney, J. P., Hill-Barlow, D., Wagner, P. E., Marschall, D. E., Borenstein, J. K., Sanftner, J., … Gramzow, R. (1996). Assessing individual differences in constructive versus destructive responses to anger across the lifespan. *Journal of Personality and Social Psychology*, *70*(4), 780–796.

Tangney, J. P., Wagner, P., Fletcher, C., & Gramzow, R. (1992). Shamed into anger? The relation of shame and guilt to anger and self-reported aggression. *Journal of Personality and Social Psychology*, *62*(4), 669–675.

Thomaes, S., Stegge, H., Olthof, T., Bushman, B. J., & Nezlek, J. B. (2011). Turning shame inside-Out: "Humiliated fury" in young adolescents. *Emotion*, *11*(4), 786–793.

Trivers, R. L. (1971). The evolution of reciprocal altruism. *The Quarterly Review of Biology*, *46*(1), 35–57.

Velotti, P., Elison, J., & Garofalo, C. (2014). Shame and aggression: Different trajectories and implications. *Aggression and Violent Behavior*, *19*(4), 454–461.

Wang, C. S., Sivanathan, N., Narayanan, J., Ganegoda, D. B., Bauer, M., Bodenhausen, G. V., & Murnighan, K. (2011). Retribution and emotional regulation: The effects of time delay in angry economic interactions. *Organizational Behavior and Human Decision Processes*, *116*(1), 46–54.

Wicker, F. W., Payne, G. C., & Morgan, R. D. (1983). Participant descriptions of guilt and shame. *Motivation & Emotion*, *7*(1), 25–39.

Yamagishi, T., Horita, Y., Mifune, N., Hashimoto, H., Li, Y., Shinada, M., … Simunovic, D. (2012). Rejection of unfair offers in the ultimatum game is no evidence of strong reciprocity. *Proceedings of the National Academy of Sciences*, *109*(50), 20364–20368.

Zhu, R., Jin, T., Shen, X., Zhang, S., Mai, X., & Liu, C. (2017). Relational utility affects self-punishment in direct and indirect reciprocity situations. *Social Psychology*, *48*, 19–27.

Zhu, R., Shen, X., Tang, H., Ye, P., Wang, H., Mai, X., & Liu, C. (2017). Self-punishment promotes forgiveness in the direct and indirect reciprocity contexts. *Psychological Reports*, *120*(3), 408–422.