

FEAR IS THE KIND-KILLER? THE RELATIONSHIP BETWEEN ECOLOGICAL
HARSHNESS AND FEAR EXPRESSION

by

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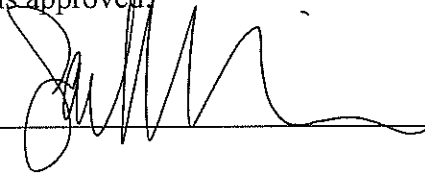
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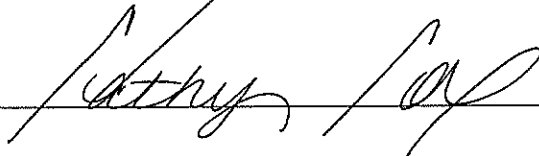
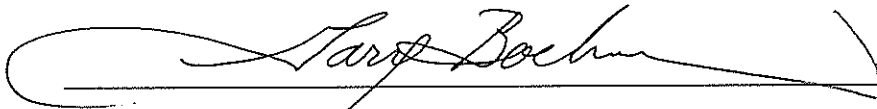
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Fear is the Kind-Killer? The Relationship between Ecological Harshness and Fear Expression

In harsh environments, signals of vulnerability are often a risk factor for victimization. Prisons provide a clear example of a harsh environment in which emotional displays of weakness make one a target. As one inmate explained, “If one person takes you for a pussy, there’s going to be another twenty that will take you for a pussy” (Rhys, 2010). Indeed, an in-depth qualitative analysis of prison dynamics found that inmates who appear weak are more likely to be taken advantage of by their peers (e.g., demanding resources and food) and that expressions of fear invite even greater risk of exploitation or physical harm (Crewe, 2012). To avoid this fate, inmates often suppress the expression of fear (Haney, 2001), which is known to make faces appear less dominant and more naïve (Hess et al., 2000; Marsh et al., 2005).

The idea that expressions of fear may invite exploitation instead of assistance is at odds with much research in social psychology, which suggests that fearful faces should prompt prosocial responses in observers. In particular, this body of work finds that fearful faces elicit approach motivation in perceivers (Kaltwasser et al., 2017; Hammer & Marsh, 2015; Marsh et al., 2005; Springer et al., 2007), which is reasoned to emerge from a desire to help the fearful person. However, whether this ambiguous behavioral response actually reflects a prosocial motivation likely depends on the relationship between the perceiver’s own needs and goals, and contextual factors which modify the costs and benefits of prosocial behavior. For example, some research finds that the tendency to approach fearful targets depends on situational factors, such as the relationship between the perceiver and the target or the superordinate goals of approaching them (Bossuyt et al., 2014; Paulus & Wentura,

2013). Such findings highlight the importance of applying an affordance management perspective to the study of behavioral responses to fear.

According to the affordance management perspective of social psychology, a single social cue, such as the expression of an emotion, can result in a range of behavioral responses depending on the needs and goals of different perceivers (Neuberg et al., 2020). Because developing in a harsh ecological context greatly influences goals throughout the life course (e.g., Ellis et al., 2009), as well as the costs and benefits of prosocial behavior (Wang et al., 2009), it is likely that people from harsh versus benign ecological backgrounds will act upon the opportunities posed by a fearful person in divergent ways.

Drawing on this logic, I propose that perceivers' early life ecology will moderate prosocial responses to fearful people. For those from benign, high socioeconomic status (SES) ecologies – a context that favors the development of long-term, cooperative relationships, fearful people may present an opportunity to build alliances in exchange for help. For those from harsh, low SES ecologies – in which long-term cooperative investments are less likely to pay off and exploitative behaviors are advantageous – fearful people may represent a low-cost target of harm. Accordingly, I predict that fearful people will be perceived by all to pose more of an opportunity for exploitation and less of a threat compared to non-fearful people, but that prosocial responses to fearful people will diverge according to the childhood ecologies of perceivers. Specifically, I predict that a benign early life ecology will be associated with greater prosocial responding to fearful people, while childhood exposure to a harsh, low SES ecology will be associated with relatively less prosocial behavior. Further, I predict that in order to avoid exploitation, people will express less fear in the presence of those from a harsh (vs. benign) ecology.

The Social Interpretation of Fear

Facial expressions are powerful social signals that convey information about an expresser's environmental condition, behavioral intent, and enduring personality traits (Darwin, 1872; Hess et al., 2008; Todorov et al., 2015). For example, research finds that people expressing happiness are perceived to be more sociable, trustworthy, and to be of higher social class than less happy faces (Bjornsdottir & Rule, 2017; Li et al., 2021). Others find that people expressing shame are perceived to be of lower social status and more committed to social norms compared to those expressing other emotions (Martens et al., 2012; Shariff & Tracy, 2009). Together, these findings demonstrate that emotion expression – beyond providing an indication of the expresser's acute emotional state – also conveys information about enduring characteristics of the expresser which are important for social perception.

Much of social psychological research focuses on Ekman's (1992; Jack et al., 2014) six basic emotions: happiness, surprise, sadness, anger, disgust, and fear. However, some of these emotions have been more rigorously studied than others. For example, the social information communicated by angry facial expressions is relatively well understood. Much research finds that expressers with angry faces are perceived as having violent intent and a capacity to inflict damage on the perceiver (Carver & Harmon-Jones, 2009; Öhman, et al., 2001; Sell et al., 2014). This characterization is in line with the actual cognitive and behavioral responses of angry people (Sell et al., 2009). For example, feeling angry is associated with more confrontational behavior and direct aggression towards others, relative to other emotions (Molho et al., 2017; Novaco, 2016).

In contrast, the social message conveyed by fear is not well understood, as relatively few studies have examined social perceptions of fearful expression. Among studies that have addressed this question, most have focused only on a narrow set of interpersonal judgements, finding that fearful people are perceived to be more immature (Marsh et al., 2005), socially submissive (Montepare & Dobish, 2003), and to have a higher affiliative desire than less fearful faces (Hess et al., 2000). These perceptions provide a glimpse into the drivers of social reactions to fearful expression, but extant research has yet to examine how these perceptions may lead to divergent behavioral responses to fearful people. While fear expression has been found to influence interpersonal judgements, it is less clear how environmental factors known to moderate prosocial motivations might influence the relationship between these perceptions and the resulting behavioral response.

Understanding how perceptions of the affordances posed by fearful people interact with perceivers' own motivational states is important for several reasons. First, because fear is a universally recognized facial expression (Elfenbein & Ambady, 2002), its expression and others' interpretations of its expression are both cross-culturally ubiquitous parts of human social life. Second, fear is a threat-relevant distress signal (Whalen et al., 2009), making this emotion and its interpretation particularly pertinent to survival. An emotion with direct bearing on survival, such as fear, should be accompanied by a suite of evolved psychological mechanisms for both perception and expression. Finally, broadening the characterization of the social interpretation of fear will serve as a crucial first step to understanding individual differences in responses to fearful others, and the contexts in which people should display or conceal this emotional expression.

Form and Function

Studying the physical form of a trait can often provide insight into its evolutionary function (Wake, 1992). The fearful facial expression is characterized by raised eyebrows, widened eyes, an increased distance between the eyes and eyebrows, and a typically agape or pulled back mouth position (Ekman & Friesen, 1978). Widened eyes may be the most important component of a fearful face, as it is the most recognized feature, and the detail people spend the most time looking at when deciding whether a face is expressing fear (Adolphs et al., 2005; Wells et al., 2016). Some research finds that widened eyes serve to increase the fearful individual's visual field in response to the threat they are reacting to (Becker, 2009; Lee et al., 2013). This improves sensory acquisition by allowing the expresser to take in more visual information when threatening environmental cues indicate they must be vigilant (Susskind et al., 2008). Together, these results indicate that an expression of fear is engaged when an individual is vulnerable to, and vigilant of, a salient threat.

Accordingly, some psychologists have turned to the morphology of fearful facial expressions to gain information about their social function – specifically, the structural similarity of fearful faces to infant faces. Because fearful expressions give the appearance of larger eyes and a more rounded face shape compared to a resting expression, fearful faces are implicitly associated with infant faces (Hammer & Marsh, 2015). This structural similarity even impacts interpersonal judgements, as fearful people are rated as more dependent, more naïve, and younger than people expressing other emotions (Marsh et al., 2005; Sacco & Hugenberg, 2009). These morphological similarities are thought by some to be the result of selective pressure, with researchers positing that the fearful expression evolved to appear similar in structure to infant faces, in order to elicit prosocial responding from others (Marsh

et al., 2005). Indeed, humans express significantly more fear than other closely related ape species (Herrmann et al., 2011). This greater propensity for fearfulness is thought to facilitate cooperative care and elicit prosocial responses from others (Grossmann et al., 2022).

According to this view, the expression of fear should be interpreted as a solicitation for help, and motivate prosocial behavior from perceivers. Previous findings on the perceptions of fearful people appear to support this view.

Affiliation

Affiliative desire is one of the few well-documented social perceptions attributed to people who express fear. Compared to those expressing other basic emotions, people expressing fear are perceived as especially affiliative (Hess et al., 2000; Marsh et al., 2005). The evaluation of fearful people as expressing a desire to affiliate with the perceiver is in line with the theorized function of fear to elicit help from others. Signaling an interest in interaction should entice perceivers to initiate a social relationship that may provide protection or otherwise aid the fearful individual in overcoming the threat they are facing.

Dominance

In addition to being perceived as more affiliative, fearful faces are perceived as being less dominant than faces bearing other emotional expressions (except for sadness; Hess et al., 2000; Knutson, 1996; Montepare & Dobish, 2003; Sutherland et al., 2016). This signal is particularly important for social interactions, as all human societies are structured along status hierarchies. Physical dominance is one route to achieving high status and its associated benefits (Cheng et al., 2013). Thus, relative position in the hierarchy influences several aspects of social life, including mating success and access to resources (Lin, 1990; Schmitt, 2015). Perceptions of others' dominance could have major impacts on social interactions and

shape inferences of related traits, such as someone's physical strength, technical skill, and social status.

Accordingly, fearful faces are rated as less masculine – a trait closely linked with dominance – than faces expressing other emotions (Archer, 2006; Marsh et al., 2005). This finding likely reflects assumptions that fearful expressers embody traits that are more female-typical than male-typical, such as affiliative desire, warmth, kindness, and low physical dominance. When asked to categorize androgynous models by gender, participants rated happy and fearful faces as most feminine, compared to angry or neutral faces (Hess et al., 2009). Additionally, feminine faces are more easily recognized as expressing fear than masculine faces (Deska et al., 2018), and women are rated as more likely to express fear than men due to a decrease in perceived dominance (Hess et al., 2005). Together, these results suggest that feeling and expressing fear is more expected of individuals embodying cues of low social and physical dominance.

While femininity is associated with fearful expression, the relationship between fear expression and low dominance also holds when controlling for expresser sex. For example, one group of researchers eliminated the effect of target sex, by asking participants to rate the likelihood of various members of an alien species to express fear (Hess et al., 2010). The aliens varied in levels of dominance and were said to have three genders: men and women who were both described as highly educated and employed as engineers and doctors, and a third gender described as nurturing caregivers. Participants rated the low dominance aliens most likely to experience fear, regardless of gender or social role. Thus, fear appears to signal submissiveness regardless of the sex or gender role of the expresser.

Although fearful expressions may have been shaped by selection for the purpose of eliciting help, actual responses to fearful people may not always align with the goals of the expresser. If fear communicates submission, this expression may also be perceived as an opportunity for exploitation. Expressing fear may indicate that one doesn't have the social standing or physical formidability to survive a threat. Thus, people expressing fear should be perceived by others as being weaker, less physically dominant, and of lower status than people with a neutral expression. However, perceptions of the exploitative opportunity posed by fearful people have not been empirically examined so far. Understanding a broader range of the functional inferences made about fearful targets will be necessary to understand the motivations underlying behavioral responses to fearful individuals.

Behavioral Responses to Fear

In order to understand behavioral responses to fearful people, it is useful to employ an affordance management approach to social psychology. This approach states that the mind's primary job is to identify threats and opportunities in the social environment, and to act upon these affordances in order to maximize opportunities and minimize threats to the self (Neuberg & Schaller, 2016). Thus, people may perceive the same stimulus differently, according to the affordances that stimulus presents within the environmental and social context of each perceiver (Neuberg et al., 2020). Individual differences in the perceived opportunities and threats associated with a particular stimulus may therefore result in differing behavioral responses. So, although fear may lead people to view the fearful person as young, submissive, and affiliative, the nature of the affordances signaled by this expression should depend on the needs and goals of the perceiver (Gibson, 1979; McArthur & Baron, 1983), and should result in behavioral responses meant to meet those goals.

For example, the resource abundance and stability associated with benign ecologies promotes the maintenance of long-term cooperative relationships (Zhu et al., 2019). As a result, an individual from a benign ecology may perceive a fearful person as an opportunity to form a cooperative bond by rendering aid which may be reciprocated later. In contrast, the unpredictable and limited nature of resource availability endemic in harsh ecologies has been found to promote less prosocial (Jirsaraie et al., 2019; Wu et al., 2020) and more opportunistic behavior (Wang et al., 2009). Thus, individuals from a harsh environment may view the same fearful person as an opportunity for exploitation. A widened view of fear which considers the impact that exposure to ecological harshness has on the interpretation and response to this emotion may explain why exploitation is observed in harsh real-world environments and prosociality is observed in benign laboratory environments.

Prosocial Approach

Several studies utilizing the Approach Avoid Task (AAT) have concluded that the dominant response to fearful facial stimuli is a prosocial one. In the AAT, participants are instructed to categorize on-screen stimuli by pushing a lever away from themselves (simultaneously reducing the size of an on-screen stimulus, as if moving away from it), or pulling the lever toward themselves (simultaneously increasing the size of an on-screen stimulus, as if bringing it closer). The speed and frequency of either lever pulling or pushing is meant to indicate the perceiver's behavioral motivation – with a tendency toward pulling interpreted as a motivation to approach the stimulus, and a tendency toward pushing interpreted as a motivation to avoid the stimulus (Chen & Bargh, 1999). Research examining responses to fearful faces in the AAT have found that people exhibit a greater tendency to approach fearful faces, relative to neutral or angry ones (Hammer & Marsh, 2015;

Kaltwasser et al., 2017; Marsh et al., 2005; Springer et al., 2007). This reaction is assumed to reflect a natural inclination to approach fearful individuals for the purpose of rendering aid (for an exception, see Wilkowski & Meier, 2010).

Although several studies have converged on the finding that people tend to approach fearful faces, a number of methodological issues limits one's ability to draw definitive conclusions from this body of work. For example, of the studies that found a tendency for approach-based responding, most had small sample sizes of less than 50 participants across all conditions (Hammer & Marsh, 2015; Kaltwasser et al., 2017; Marsh et al., 2005; Springer et al., 2007), and some of these samples were overwhelmingly composed of women (e.g., Hammer & Marsh, 2015; Marsh et al., 2007). Given that women are more affiliative and less opportunistic than men (Björkqvist, 2018; Duncan & Peterson, 2010; Taylor et al., 2000), some of the previously reported results may actually reflect a female-typical response to fearful targets.

Further, it is difficult to interpret the results of approach-avoid tasks because – although behavioral approach could be evidence of motivation to help – it can also be evidence of motivation to harm (Beyer, et al., 2017; Lobbestael et al., 2016). Because participants in previous fear research were simply instructed to “approach” or “avoid” to categorize faces by emotion (Hammer & Marsh, 2015; Marsh et al., 2005; Springer et al., 2007), it is unclear how responders were perceiving the costs, benefits, and goals of the encounter. The implications of approaching fearful people, and the degree of prosocial motivation driving approach behavior are therefore unclear, because participants were not explicitly informed what approaching or avoiding would accomplish. For example, in one AAT study, when approaching was said to facilitate aggressing against an opponent by

attacking them, angry participants chose to approach; when avoiding was said to facilitate aggressing against an opponent by stubbornly turning away from them, angry participants chose to avoid (Bossuyt et al., 2014). This study exemplifies the importance of understanding superordinate goals of responders, because the same response can have contradictory motivations.

Adding to these issues, no research has provided perceivers with an option to behave opportunistically toward a fearful target. For example, in one study examining behavioral responses to a fearful target, participants were given the option to pledge to donate money to the target (Marsh et al., 2007). With this task, participants' only choices were to behave more or less prosocially. However, allowing both the option to give and take from a fearful target would provide a more in depth understanding of the behavioral responses elicited by fear, and the qualities of perceivers which impact those responses. To date, the potential for an opportunistic behavioral response to fearful people has not been empirically tested or ruled out, despite sound logic to expect this motivation to shape the behavior of some people.

Fear Expression and Suppression

The possibility of opportunistic motivations to approach fearful people has been dismissed in previous research, following the logic that evolution could not select for a facial expression that invites exploitation, due to high fitness costs to the expresser (Marsh et al., 2005). While it is true that traits which impair survival and reproductive success should be selected against, the possibility of opportunistic responding to fearful people cannot be ruled out based on this reasoning alone. The explanation put forth by Marsh and colleagues (2005) assumes no flexibility on the part of the expresser to distinguish between contexts in which expressing fear would be beneficial rather than harmful. Instead, I argue that when there are

conditions in which a trait is detrimental (as may be the case with fearful expression in the presence of potential aggressors), an accompanying sensitivity to those conditions should also evolve. Given that fearful expression does appear to serve the function of eliciting help in certain contexts (e.g., in the presence of ingroup members; Chiao et al., 2008), this communicative tool is likely to have been maintained by selection due to the survival benefits it confers in the right situation. Therefore, if fear primarily functions as a tool to elicit help from others, that tool should be most effective if used on those who are likely to be more motivated to behave prosocially than opportunistically. Thus, people should be more likely to express fear in the presence of those who are perceived as likely to help, and more likely to suppress fearful expression in the presence of those who are likely to harm.

Ecology, Prosociality, and Opportunism

Although much research suggests that the dominant response when encountering a fearful person is a prosocial one, there is likely not a single, appropriate response to fearful people. For instance, helping others requires a commitment of time, energy, and resources such that the helper incurs a cost in order to aid their benefactor (Eisenberg et al., 2006; Kurzban et al., 2015). Despite the costs, prosocial behavior is thought to occur in anticipation of long-term payoffs, such as later reciprocation or other indirect benefits like reputation boosts, which may facilitate the formation of cooperative bonds with others (Mohtashemi & Mui, 2003; Trivers, 1971). However, these benefits may not be available in all situations, and some perceivers may not be able to afford the upfront costs of prosocial behavior. So how should a person respond to someone who is expressing fear? The appropriate and adaptive response likely varies based on contextual factors, such as ecological harshness.

Ecology and Prosociality

A harsh ecology is characterized by heightened morbidity and mortality risk in the environment, due to factors beyond individual control. Harshness is largely dependent on the availability of resources in the local ecology, and one's exposure to ecological harshness is typically measured by their SES (Belsky et al., 1991). In contrast, a benign ecology is characterized by relatively predictable, abundant resource access and a reduced risk of mortality (Neuberg & Sng, 2013). Exposure to ecological harshness early in development (i.e., before age ten) is key in shaping cognitions, behaviors, and social relationships (Ellis et al., 2009), and has a lasting impact on psychology into adulthood (Del Giudice et al., 2011). In particular, ecological harshness imposes demands on resource acquisition and survival which impact the costs and benefits associated with behaving prosocially versus opportunistically.

Specifically, when resources are already constrained and environmental cues indicate that the typical benefits associated with helping (e.g., future reciprocity) are unlikely to come to fruition, prosocial behavior can be risky or even maladaptive (Zhu et al., 2019). Consistent with this, research finds that people with low SES expect to engage in fewer prosocial acts throughout their lives than people with high SES do (Segal et al., 2001). In another study, people from economically deprived neighborhoods behaved less prosocially than people from affluent neighborhoods in the same country (Henrich et al., 2010). Even within the same city, people from economically deprived neighborhoods kept more resources for themselves in a Dictator Game, were less willing to help a confederate out by taking a survey, and were less likely to return a lost letter, than people from secure and affluent neighborhoods (Nettle et al., 2011). Additionally, a large metaanalysis of eight international

studies consisting of over 30,000 participants found that relative to those from low SES backgrounds, high SES people are more likely to donate to charity, volunteer, offer help to others, and exhibit trustworthy behavior in economic games (Körndorfer et al., 2015).

Additionally, greater exposure to the increased mortality risk and unpredictability endemic in harsh ecologies has been shown to decrease prosocial behavior. For example, people with greater early life exposure to violence and unpredictability behave less prosocially in the Dictator Game (Jirsaraie et al., 2019; Wu et al., 2020). Maltreated adolescents (subjected to a greater threat of death than non-maltreated participants) expressed greater perceptions of unpredictability in their environment, which was associated with decreased prosociality (Dickerson et al., 2019). Further, those who experienced more early life exposure to poverty and household unpredictability less likely to do volunteer work later in life (Lichter et al., 2002). Together, these findings point to a reduced prosocial motivation in people from harsh ecologies, relative to what is observed in those from benign ecologies.

Ecology and Opportunism

Beyond a lack of prosocial responding, exposure to ecological harshness has also been found to increase people's likelihood of engaging in opportunistic behavior – behavior which exploits immediate opportunities, regardless of the risks or moral implications (Figueredo & Jacobs, 2009; Jonason et al., 2010). For example, childhood exposure to harshness is associated with exploitative and aggressive responding (Book et al., 2016; Davis & Reyna, 2015; Fatima & Shiekh, 2014; Greitemeyer & Sagioglou, 2016; Karriker-Jaffe et al., 2009). Additionally, growing up in a harsh and unpredictable environment increases one's likelihood of committing a violent crime in adulthood, relative to people who

experienced environmental stability in childhood (Pickett et al., 2012; Szepeswol et al., 2019).

While opportunistic behaviors such as these are detrimental in the long run, they may be adaptive when environmental cues indicate that long-term investments are unlikely to pay off (Bjorklund & Hawley, 2014; Wang et al., 2009). Thus, the ecological landscape associated with harshness predisposes people to behave *less* prosocially and *more* opportunistically than would be optimal in a benign ecology. Consequently, people hold ecology-based stereotypes that people from harsh, low SES environments are more opportunistic (Williams et al., 2016), and less prosocial (Varnum, 2013) than people from benign, high SES environments. In light of this, perceivers from harsh ecological backgrounds should be expected to exhibit less prosocial responding to fearful people than perceivers from benign ecological backgrounds. Rather, exposure to early life harshness should be associated with a greater preference to exploit the opportunity posed by someone displaying cues of weakness and vulnerability, such as a fearful person.

The Current Research

The current research aims to address three key gaps in the literature. Specifically, to 1) extend our understanding of the affordances conveyed by the expression of fear; 2) examine the impact of ecological harshness on the behavioral response to fearful expression; 3) examine the impact of audience ecological harshness on the decision to express or suppress fear. I predict that fearful people will be perceived as less threatening and more of an opportunity (for exploitation or cooperation) than non-fearful people, and that these perceived affordances will not vary as a function of perceiver ecology. Additionally, I predict that people experiencing fear will be aware of ecology-based differences in the likelihood of

behaving prosocially versus opportunistically, and accordingly opt to suppress – rather than express – fear in the presence of an audience from a harsh ecology.

Study 1

Study 1 was designed to characterize social perceptions of fearful people and to examine whether these perceptions interact with perceivers' early life ecology to impact prosocial responding. Previous research examining social perceptions of fearful targets has focused on a narrow set of characteristics, such as maturity, dominance, and affiliative desire (Hess et al., 2000; Marsh et al., 2005; Sutherland et al., 2016). To build upon this work, the current study assessed a range of interpersonal judgments that are conceptually related to the costs and benefits of behaving prosocially. I predicted that people from both harsh and benign childhood environments would perceive fearful people as posing more of an opportunity for exploitation (naïve, exploitable, and previously victimized) and less of a threat (physically formidable, high in social status, and likely to retaliate) than non-fearful individuals. I further predicted that these affordance perceptions would interact with perceivers' childhood exposure to ecological harshness to influence prosocial responding to the fearful person, such that greater opportunity and lower threat would be associated with less prosocial behavior by those from harsh ecologies, compared to those from benign ecologies.

Method

Participants and Study Design. Previous research examining prosocial responses to fearful people found an effect size of $d = .63$ (Marsh et al., 2007). Based on this, an *a priori* power analysis was conducted using G*power (Version 3.1; Faul et al., 2007), which revealed that a total sample size of 82 was needed to have adequate power (i.e., 0.8) to detect an effect of

three predictors (emotion, opportunity, and threat). In order to ensure adequate power for additional paths and interaction effects, and to account for potential exclusions, I collected data from 300 workers on Amazon's Mechanical Turk (MTurk) who participated in exchange for \$2.00, with a chance to win an additional \$25 Amazon gift card. After excluding participants for failing bot checks ($n = 3$) and attention checks ($n = 5$), the final data analytic sample was $N = 292$ (52.74% female; $M_{\text{age}} = 35.16$; $SD = 9.01$). Participants completed the study online and were randomly assigned to one of two emotion expresser conditions: fear ($n = 144$) or neutral ($n = 148$). Target perceptions and perceiver childhood ecology were measured as continuous variables.

Procedure. After consenting and completing bot checks, participants were given the cover story that the study was meant to examine the accuracy of personality perceptions of a person based on their review of a movie. Participants were then informed that they would see a movie review written by a previous MTurk participant, before providing their perception of that person's likely personality and behavior. At this point, participants were also informed that they would have the opportunity to enter for a chance to win a \$25 Amazon gift card at the end of the study. After indicating their sex and answering a distractor question about which movie genres they prefer, participants were randomly assigned to view a same-sex target with a neutral or fearful expression and movie review.

Target Stimuli. Participants viewed a short movie review said to have been written by a previous participant, for at least 1 min. Each review had a photo of a same-sex target with either a neutral or fearful expression (see Figure 1). Target photos were obtained from the publicly available FACES Database (Ebner et al., 2010), and were pre-rated for emotion expression. The top of the review displayed a fake MTurk Worker ID, and the review text

had the target’s purported opinions on different aspects of the movie, including the plot, special effects, acting, sadness, scariness, and a star rating. All text except that reviewing the movie’s scariness was identical between conditions. In the fearful target condition, it stated, “This movie was really scary. I am easily scared by things, so this movie terrified me”. In the control condition, the text stated, “This movie wasn’t scary. I don’t really get scared by things, so this movie didn’t bother me”.

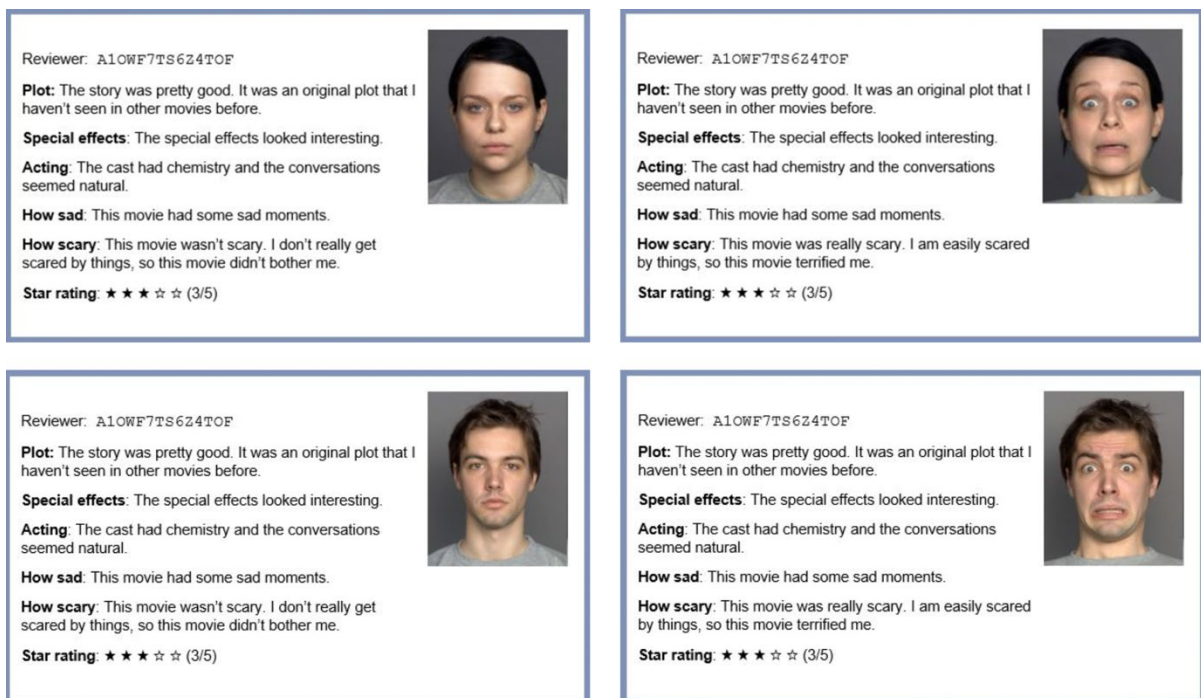


Figure 1. Movie review presented to participants to manipulate target emotion. Top left: neutral female condition; top right: fearful female condition; bottom left: neutral male condition; bottom right: fearful male condition.

Prior to this study, a small pilot study was conducted to pre-test the effectiveness of the target stimuli at depicting emotional neutrality and fear. One hundred and thirteen undergraduate participants (91.20% female; $M_{age} = 19.34$, $SD = 2.52$) from the Texas Christian University Sona subject pool participated in exchange for course credit. An

independent-samples t-test was conducted to examine whether the fearful target was perceived as expressing more fear than the neutral target. Results revealed that the fearful target ($M = 5.76$, $SD = 1.13$) was indeed perceived as more fearful than the control target ($M = 1.64$, $SD = .85$), $t(111) = -21.87$, $p \leq .001$, $d = 4.13$.

Target Perceptions

Naivete. Perceived target naivete was measured using five items developed for this study, based on previously identified cues to exploitability (Buss & Duntley, 2008). Participants marked their agreement on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*) that each of the following items described the target: “Gullible,” “Immature,” “Naïve,” “Young,” and “Trusting.” All items were averaged into a composite measure of naivete ($\alpha = .79$).

Exploitability. Perceived target exploitability was measured using five items from a sexual exploitability measure, adapted to refer to exploitability more generally (Goetz et al., 2012). Participants marked on a seven-point scale (1: *Extremely difficult*; 7: *Extremely easy*) how easy it would be for someone to do each of the following to the target: “Take advantage of him/her,” “Manipulate him/her,” “Pressure him/her,” “Deceive him/her,” and “Pull one over on him/her”. All items were averaged into a composite measure of exploitability ($\alpha = .89$).

Previous Victimization. Perceived history of target victimization was measured using five items developed for this study. Participants marked how likely on a seven-point scale (1: *Extremely unlikely*; 7: *Extremely likely*) it was that the target has experienced each of the following scenarios: “been physically assaulted before,” “been mugged before,” “been

scammed before,” “been sexually assaulted before,” and “been abused before”. All items were averaged into a composite measure of victimization ($\alpha = .91$).

Physical Formidability. Perceived target formidability was measured using five items adapted from formidability questions developed by Wilson et al. (2017). Rather than having participants estimate specific values of height, weight, and bench press ability, the questions have been adapted to this study to measure targets’ relative height and weight compared to the average man or woman, on a seven-point scale (1: *Far below average*; 7: *Far above average*). Participants were also be shown a same-sex body muscularity array (Ralph-Nearman & Filik, 2018; 2020) and be asked to choose one of the seven body types arranged from least muscular to most muscular that most likely resembled the target’s body. Finally, participants answered the question, “Imagine that you are arguing with this person and he/she becomes physically threatening. If you were to be in a fight with this person, how capable would he/she be of physically harming you?” on a seven-point scale (1: *Not at all capable*; 7: *Very capable*). All items were averaged into one composite measure of formidability ($\alpha = .86$).

Social Status. Perceived target status was measured using the single-item MacArthur Scale of Subjective Social Status (Adler et al., 2000). Participants were shown an image of a ladder with 10 rungs with the instructions, “Think of this ladder as showing where people stand in their communities. People define community in different ways. Please define it in whatever way is most meaningful to you. At the top of the ladder are the people who have the highest standing in their community. At the bottom of the ladder are the people who have the lowest standing in their community. Please indicate the number of the rung that you would place [the target] at”.

Likelihood of Retaliation. Likelihood of retaliation was measured using three items developed for this study. Participants were asked how much they agree with the following items, on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*): “He/she would get revenge against someone who wronged him/her,” “He/she would go to great lengths to get even with somebody who hurt him/her,” and “He/she holds grudges against people who have treated him/her unfairly”. All items were averaged into a composite measure of retaliation ($\alpha = .86$).

Prosocial Behavior. After completing a single-item measure of the target’s fearfulness on a seven-point scale (1: *Not at all fearful*; 7: *Extremely fearful*) as a manipulation check, participants were given the opportunity to respond to the target prosocially or opportunistically. A screen was displayed, reminding participants that they would be able to enter for a chance to win a \$25 gift card at the end of the study. Participants were informed that they currently had ten gift card entries. However, because the reviewer was supposedly a previous MTurk participant, participants were told that they now had the ability to give any number of their entries to the reviewer or keep the entries for themselves. After verifying that they understood their options and the result of each decision (i.e., reducing the reviewer’s odds of winning the gift card, improving the reviewer’s odds of winning the gift card), respondents indicated how many entries they wanted to give to the reviewer on a scale from 0-10.

Participant Ecology. Finally, participants reported their early life exposure to ecological harshness using a well-validated three-item measure of subjective childhood SES (Mittal et al., 2015). Participants indicated on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*) their agreement with the following statements about their life before age ten:

“My family usually had enough money for things growing up”, “I grew up in a relatively wealthy neighborhood”, and “I felt relatively wealthy compared to the other kids in my school”. All items were averaged into a composite measure of childhood SES ($\alpha = .86$).

Safety of participants’ childhood neighborhoods was measured using the six-item crime safety subscale of the Neighborhood Environment Walkability Scale (Cerin et al., 2006). Participants indicated on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*) their agreement with statements about their neighborhood before age ten. Example items include, “My neighborhood and streets were well lit at night”, “There was a high crime rate in my neighborhood”, and “The crime rate in my neighborhood made it unsafe to go on walks during the day”. All items were averaged into a composite measure of childhood safety ($\alpha = .82$).

Childhood unpredictability was measured using a previously validated three-item measure of exposure to an unpredictable childhood environment (Mittal et al., 2015). Participants indicated on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*) their agreement with the following statements about their life before age 10: “Things were often chaotic in my house”, “People often moved in and out of my house on a pretty random basis”, and “I had a hard time knowing what my parent(s) or other people in my house were going to say or do from day-to-day”. All items were averaged into a composite measure of childhood unpredictability ($\alpha = .90$).

Adult SES was measured using a well-validated three-item measure of current subjective SES (Griskevicius et al., 2011). Participants indicated on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*) their agreement with the following statements about their life currently: “I don’t need to worry too much about being able to pay my bills”, “I

have enough money to buy things I want”, and “I feel relatively wealthy these days”. All items were averaged into a composite measure of adult SES ($\alpha = .85$).

Data Analytic Strategy

See Table 1 for correlations between variables. First, an independent-samples t-test was conducted using IBM SPSS (Version 26) statistical software, in order to confirm that the fearful target was perceived as more fearful than the neutral target. Following this, all models were estimated using MPlus statistical software (Version 7.4; Múthen & Múthen, 2012). A confirmatory factor analysis (CFA) was then conducted to verify the use of target naivete, exploitability, and victimization in a latent factor of opportunity. A latent factor of threat, comprised of target formidability, status, and retaliation was also estimated using CFA. An additional CFA was conducted to verify the use of participant childhood SES, neighborhood safety, and unpredictability in a latent factor of ecological harshness.

Next, structural equation modeling (SEM) was used to test the hypothesized pathway between fearful expression and perceivers’ prosocial behavior. All significance tests were two-tailed, and model fit was determined using the χ^2 test of model fit, the root mean square residual (RMSEA), the comparative fit index (CFI), and the standard root mean square residual (SRMR). The model was considered to be of adequate fit to the data if χ^2 was not significant ($p > .05$), the value of RMSEA was less than .05 with an upper bound of the 90% confidence interval (CI) less than .10, the value of the CFI was greater than .95, and if the value of SRMR was less than .05 (Browne & Cudeck, 1989; Hu & Bentler, 1999).

Results

T-test: Manipulation Check. First, an independent samples t-test was conducted to examine whether the fearful targets were perceived as more fearful than the neutral targets. The results

revealed that the fearful targets ($M = 5.85, SD = 1.10$) were indeed perceived as more fearful than the neutral targets ($M = 3.68, SD = 2.16$), $t(290) = -10.75, p \leq .001, d = 1.27$.

Table 1

Study 1 correlations between perceived target affordances, prosocial behavior, and perceiver childhood (cSES) and adult (aSES) socioeconomic status.

	Exploitability	Victimhood	Formidability	Status	Retaliation	Prosocial Behavior	cSES	aSES
Naivete	.75***	.71***	-.59***	-.32***	-.46***	.50***	.60***	.61***
Exploitability		.71***	-.49***	-.26***	-.56***	.46***	.50***	.47***
Victimhood			-.57***	-.23*	-.71***	.52***	.52***	.49***
Formidability				.71***	.61***	.57***	.63***	.61***
Status					.76***	.54***	.48***	.53***
Retaliation						.60***	.55***	.52***
Prosocial Behavior							.51***	.47***
cSES								.75***

Note. * $p \leq .05$, ** $p \leq .01$, and *** $p \leq .001$.

CFA: Target Affordances. Next, latent variables of perceived opportunity and threat were estimated using CFA. Target perceptions were estimated as two separate constructs rather than one latent opportunity variable, because opportunity and threat are evaluated independently by perceivers, rather than constituting two endpoints of one continuum (Lassetter et al., 2021). Target naivete, exploitability, and victimhood each loaded well onto the latent variable of opportunity. Target formidability, status, and retaliation each loaded well onto the latent variable of threat (see Table 2 for statistics). Thus, all subsequent analyses utilized the latent opportunity and threat variables.

Table 2
Summary of Study 1 CFA Factor Loadings.

Factor		B	β	SE	t
Perceived Opportunity	Naivete	1.00	.86***	.03	29.06
	Exploitability	1.07	.81***	.04	22.26
	Victimhood	1.24	.83***	.04	23.88
Perceived Threat	Formidability	1.00	.81***	.04	15.86
	Social Status	1.01	.72***	.07	13.50
	Retaliation	1.57	.70***	.04	20.93
Perceiver Childhood Ecology	SES	1.00	.70***	.04	17.92
	Safety	1.58	.92***	.03	33.83
	Unpredictability	.31	.10	.03	1.78

Note. *** $p \leq .001$.

CFA: Perceiver Ecology. A latent variable of perceiver childhood ecology was estimated using CFA. Perceiver childhood SES, neighborhood safety, and unpredictability were each

entered into the model. Although childhood SES and childhood neighborhood safety loaded well onto the latent variable (see Table 2), childhood unpredictability did not. Due to this, all subsequent analyses involving childhood ecology utilized childhood SES. Although childhood SES and childhood neighborhood safety were highly correlated (see Table 3), childhood SES was chosen for analyses because it is a standard measure of ecological harshness (see e.g., Adler et al., 2000; Maranges et al., 2021).

Table 3
Study 1 correlations between childhood and adult ecology variables

	Childhood Safety	Childhood Unpredictability	Adult SES
Childhood SES	.85***	.46***	.75***
Childhood Safety		.47***	.67***
Childhood Unpredictability			.56***

Note. * $p \leq .05$, ** $p \leq .01$, and *** $p \leq .001$.

SEM: Hypothesized Model. Next, SEM was used to test the hypothesized pathway between fearful expression and perceiver prosocial behavior (see Figure 2 for hypothesized model). Before testing the hypothesized moderating effect of childhood SES, a base model of the relationships between emotion condition, latent opportunity and threat, and prosocial behavior was first tested. Five structural regression paths were specified as follows: emotion condition (dummy coded: neutral = 0; fear = 1) to each opportunity and threat, emotion condition to prosocial behavior, and each opportunity and threat to prosocial behavior. The

base model (Model 1.1) was initially of poor fit to the data (see Table 4 for model fit statistics).

Table 4
Summary of Study 1 model fit indices and modifications.

Model	$\chi^2 (df)$	CFI	RMSEA	RMSEA CI ₉₀	SRMR
Model 1.1	119.92 (17)***	.78	.23	.21-.26	.24
Model 1.2	84.44 (23)***	.82	.22	.18-.16	.18
Model 1.3	25.81 (27)	.93	.05	.03-.08	.04

Note. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Next, three additional structural regression paths were specified (Model 1.2): childhood SES to prosocial behavior, and the interaction between childhood SES and each opportunity and threat to prosocial behavior. Although greater prosocial behavior was marginally significantly predicted by higher childhood SES, $b = .39$ ($SE = .21$), $t = 1.89$, $p = .059$, prosocial behavior was not predicted by the interaction between childhood SES and opportunity ($p = .829$) or threat ($p = .952$). Contrary to the hypothesis, exposure to ecological harshness in childhood did not moderate the relationship between the perceived affordances posed by fearful targets and the decision to behave prosocially toward them. As such, these paths were dropped from the model.

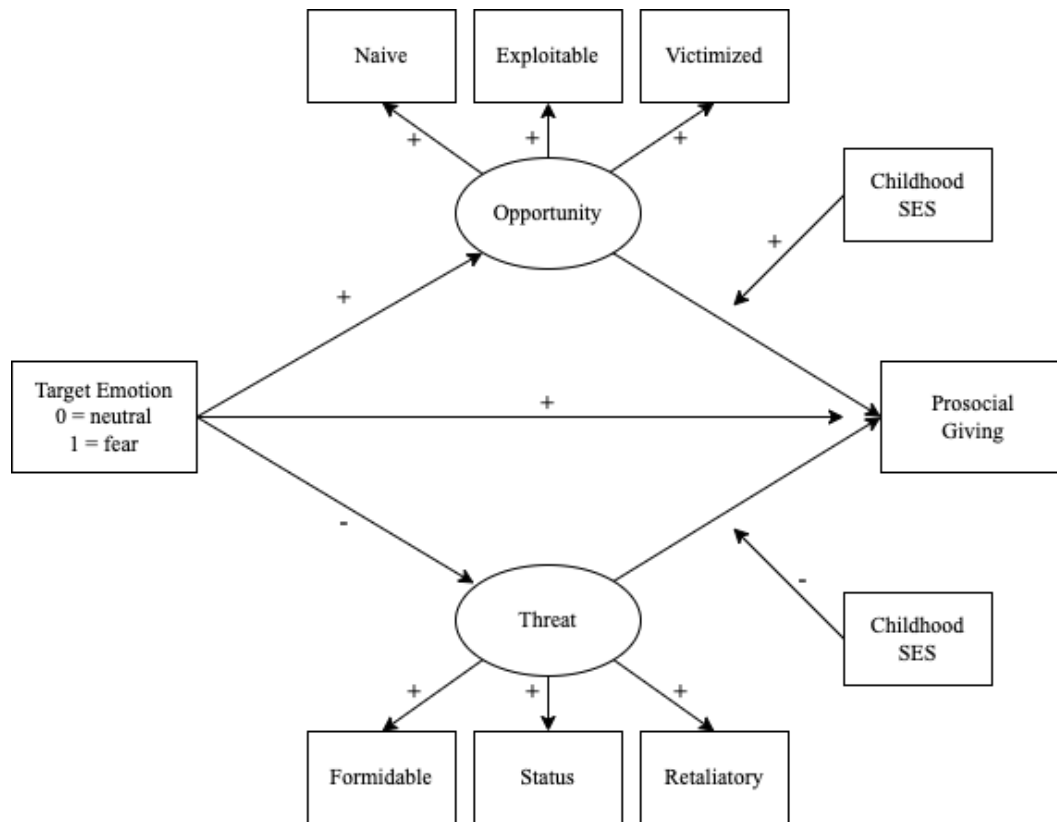


Figure 2. Hypothesized path model of the relationship between target fear expression and prosocial behavior, mediated by latent perceived opportunity and threat, and moderated by perceiver childhood SES. Plus (+) indicates a predicted positive relationship, and minus (-) indicated a predicted negative relationship.

SEM: Alternative Model. Next, I examined whether childhood SES moderated the relationships between emotion condition and perceived opportunity and threat. Four structural regression paths were added to the base model: childhood SES to each opportunity and threat, and the interaction between childhood SES and emotion condition to each opportunity and threat. This model (Model 1.3) was of adequate fit to the data (see Figure 3 for final model). The results revealed that emotion condition was a significant predictor of perceived opportunity, $b = .49$ ($SE = .22$), $t = 2.32$, $p = .026$, and threat, $b = -.52$ ($SE = .20$), $t = -2.57$, $p = .010$, such that fearful targets were seen as more of an opportunity and less of a threat than neutral targets. In turn, greater perceived opportunity, $b = .25$ ($SE = .09$), $t = 2.87$,

$p = .004$, and greater perceived threat, $b = .47$ ($SE = .08$), $t = 5.86$, $p \leq .001$, each predicted more prosocial giving behavior. Emotion condition was also associated with prosocial behavior, $b = .16$ ($SE = .05$), $t = 3.00$, $p = .003$, such that participants gave more to fearful targets than neutral ones.

Looking at the impact of perceiver ecology, higher childhood SES was associated with perceiving all targets as both posing more of an opportunity, $b = .74$ ($SE = .09$), $t = 7.82$, $p \leq .001$, and a threat, $b = .61$ ($SE = .08$), $t = 7.75$, $p \leq .001$. These effects were qualified by a significant interaction between emotion condition and childhood SES on each perceived opportunity, $b = -.16$ ($SE = .07$), $t = -2.12$, $p = .035$, and threat, $b = .22$ ($SE = .22$), $t = 1.94$, $p = .040$. Importantly, the results of this model remained unchanged when controlling for adult SES ($p = .231$) and age ($p = .915$).

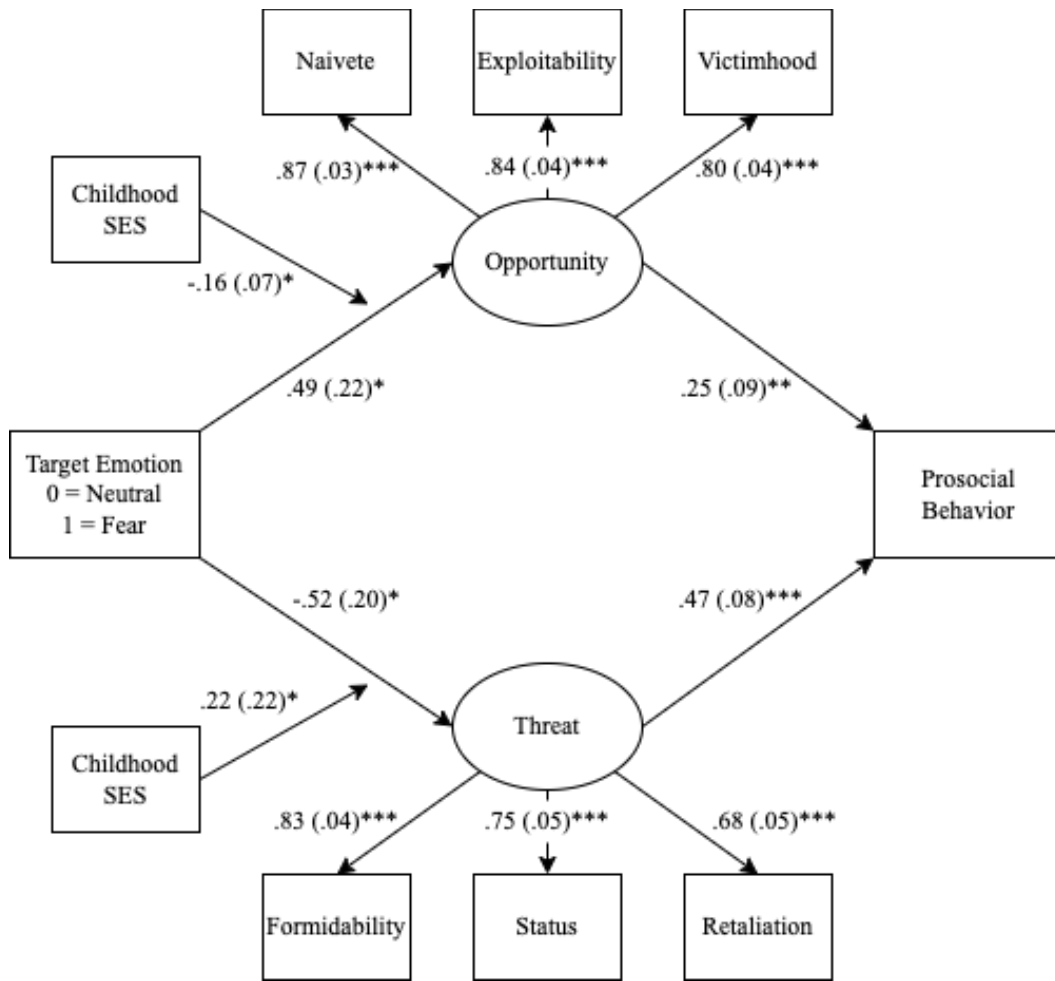


Figure 3. Final model of the relationship between target fear expression and prosocial behavior, mediated by latent perceived opportunity and threat, and moderated by perceiver childhood SES. Standard errors are in parentheses. $*p \leq .05$, $**p \leq .01$, and $***p \leq .001$.

Next, I unpacked the interaction between emotion condition and childhood SES on perceived opportunity by examining the relationship between childhood SES and opportunity across conditions. Simple slope tests revealed that higher childhood SES was associated with greater perceived opportunity in both the fear, $b = .40$ ($SE = .05$), $t = 8.09$, $p \leq .001$, and neutral conditions, $b = .56$ ($SE = .06$), $t = 10.05$, $p \leq .001$. Additionally, looking at the relationship between emotion condition and opportunity for those with relatively low and high childhood SES ($\pm 1 SD$) revealed that those with low childhood SES saw fearful targets

as significantly more of an opportunity than neutral targets, $b = .35$ ($SE = .15$), $t = 2.32$, $p = .021$. However, target emotion was unrelated to the opportunity perceived by those with high childhood SES ($p = .499$). Thus, although perceivers from more benign ecologies rated both fearful and neutral targets as more of an opportunity than perceivers from harsh ecologies, the perceptions of those with low childhood SES were more nuanced. Individuals with more harsh, low SES early life experience rated fearful targets as more of an opportunity than neutral targets. These results were contrary to the hypothesis that people from all ecologies would not differ in their perceptions of the affordances posed by fearful people.

Finally, probing the interaction between emotion condition and childhood SES on perceived threat revealed that higher childhood SES was associated with greater perceived threat in both the fear, $b = .52$ ($SE = .05$), $t = 11.03$, $p \leq .001$, and neutral conditions, $b = .48$ ($SE = .05$), $t = 9.15$, $p \leq .001$. Additionally, for those with low childhood SES, fearful targets were seen as less of a threat than neutral targets, $b = -.25$ ($SE = .14$), $t = -1.97$, $p = .047$. Among participants with high childhood SES, however, emotion condition had no impact on the perceived threat posed by targets, $b = -.15$ ($SE = .14$), $t = -1.03$, $p = .304$. Similar to the opportunity results, these results indicate that those from benign environments perceived others as posing a greater threat than those from harsh ecologies did, regardless of the emotion expressed by the target. However, only those with low childhood SES viewed fearful targets as less threatening than neutral targets.

Discussion

The results of Study 1 revealed that fearful people were perceived as more of an opportunity (naïve, exploitable, victimized), and less of a threat (formidable, high status, likely to retaliate) than non-fearful people. Additionally, I found that people behaved more

prosocially toward targets they perceived as either a threat *or* an opportunity. Contrary to the hypothesis, perceivers' early life ecologies did not influence the relationship between the affordances posed by fearful people and decision to behave prosocially or opportunistically toward them. Instead, perceivers' early life ecological harshness impacted the perception of the affordances posed by fearful and non-fearful targets. Those who grew up in relatively benign, high SES environments rated both fearful and neutral people as posing more of an opportunity *and* threat than those from relatively harsh, low SES environments.

Though people from more harsh ecologies perceived less opportunity and threat in others overall, their perceptions were more nuanced than the perceptions reported by those from benign ecologies. While a person's emotional expression did not impact the levels of opportunity and threat perceived by individuals with high childhood SES, individuals from low SES backgrounds perceived fearful people as more of an opportunity and less of a threat than neutral people. Although not predicted, this finding is in line with research which finds that people perceive greater affordances in others who are more likely to facilitate or obstruct the achievement of important goals (Neel & Lassetter, 2019). This finding suggests that people from harsh environments view fearful people as particularly relevant to their goals.

However, it is important to note that participants in this study only viewed same-sex targets. Previous research has found that whether a target is of the same or opposite sex as the respondent impacts both emotion perception (Ye et al., 2019), and prosocial behavior toward targets (Simpson & Van Vugt, 2009). As such, it is unclear whether the observed pattern of results is explained by men and women's perceptions and prosocial responses to people generally, or due to the affordances specifically posed by same-sex targets.

Study 2

Study 2 was designed to replicate the results of Study 1 and examine whether the previous pattern of results would be moderated by target sex. The current study design was similar to that of Study 1, with the addition of a between-subjects target sex manipulation (same-sex vs. opposite-sex). I predicted that the pattern of results found in Study 1 would be replicated among participants in the same-sex condition. Although research on the effect of target sex in both emotion perception (Ye et al., 2019) and prosociality (Simpson & Van Vugt, 2009) suggest that moderation by target sex is likely, I did not have a specific hypothesized pattern of results. As such, all analyses on the potential moderating effect of target sex were exploratory.

Method

Participants and Study Design. Due to the exploratory nature of this study, efforts were made to maximize power by collecting as many participants as possible during the study period. Thus, 547 undergraduates from the Texas Christian University Sona subject pool participated in exchange for course credit, with a chance to win an additional \$25 Amazon gift card. After excluding participants for failing attention checks ($n = 22$), the final data analytic sample was $N = 525$ (60.95% female; $M_{\text{age}} = 19.48$; $SD = 1.66$). Participants completed the study online and were randomly assigned to one of two target emotion conditions: fear ($n = 263$) or neutral ($n = 262$). Participants were also randomly assigned to one of two target sex conditions: same-sex ($n = 247$) or opposite sex ($n = 278$). Target perceptions and perceiver childhood ecology were measured as continuous variables.

Procedure. After consenting, participants were given the cover story that the study was meant to examine the accuracy of personality perceptions of a person based on their review

of a movie. They then indicated their sex and answered a distractor question about which movie genres they prefer. Participants were randomly assigned to view either a same- or opposite-sex target with either a neutral or fearful expression and movie review, and completed the same procedure used in Study 1.

Target Stimuli. Male and female target stimuli were identical to those used in Study 1, with one modification. Rather than a bogus MTurk worker ID at the top of the image, a bogus Sona ID was used at the top of the image.

Data Analytic Strategy

See Table 5 for correlations between variables. First, an independent-samples t-test was conducted using IBM SPSS (Version 26) statistical software, in order to confirm that the fearful target was perceived as more fearful than the neutral target. Following this, all models were estimated using MPlus statistical software (Version 7.4; Múthen & Múthen, 2012). As in Study 1, CFAs were conducted to verify the use latent opportunity and threat variables. Next, structural equation modeling (SEM) was used to test whether the pathway between fearful expression and perceivers' prosocial behavior found in Study 1 was replicated, before testing for interactions with target sex. All significance tests were two-tailed. Following the hypothesized model, alternative models were tested (see below).

Table 5

Study 2 correlations between perceived target affordances, prosocial behavior, and perceiver childhood (cSES) and adult (aSES) socioeconomic status.

	Exploitability	Victimhood	Formidability	Status	Retaliation	Prosocial Behavior	cSES	aSES
Naivete	.71***	.68**	-.33***	-.31***	-.21***	-.08	.02	.00
Exploitability		.63***	-.41***	-.31***	-.29***	-.09*	.07	.01
Victimhood			-.28**	-.32**	-.32***	-.01	.00	-.05
Formidability				.61***	.84***	.07	.00	.00
Status					.75***	.08	.02	.07
Retaliation						-.01	-.04	-.02
Prosocial Behavior							.14**	.09*
cSES								.60***

Note. * $p \leq .05$, ** $p \leq .01$, and *** $p \leq .001$

Results

T-test: Manipulation Check. First, an independent samples t-test was conducted to examine whether the fearful targets were perceived as more fearful than the neutral targets. The results revealed that the fearful targets ($M = 5.83$, $SD = 1.20$) were indeed perceived as more fearful than the neutral targets ($M = 1.41$, $SD = .84$), $t(523) = -49.16$, $p \leq .001$, $d = 4.28$.

CFA: Target Affordances. Next, latent variables of perceived opportunity and threat were estimated using CFA. Target naivete, exploitability, and victimhood each loaded well onto the latent variable of opportunity. Likewise, target formidability, status, and retaliation each loaded well onto the latent variable of threat (see Table 6 for statistics). Thus, all subsequent analyses utilized the latent opportunity and threat variables.

Table 6
Summary of Study 2 CFA Factor Loadings.

Factor		B	β	SE	t
Perceived Target Opportunity	Naivete	1.00	.85***	.04	16.94
	Exploitability	1.91	.91***	.04	21.04
	Victimhood	.97	.68***	.05	12.48
Perceived Target Threat	Formidability	1.00	.74***	.06	11.36
	Social Status	1.01	.73***	.06	10.32
	Retaliation	.99	.68***	.05	8.81

Note. *** $p \leq .001$.

SEM: Replication. SEM was used to test whether the pathway between fearful expression and perceiver prosocial behavior was moderated by perceiver childhood SES (as in Study 1),

and whether the a or b paths were further moderated by target sex. First, nine structural regression paths were specified as follows: emotion condition (dummy coded: neutral = 0; fear = 1) to each opportunity and threat, childhood SES to each opportunity and threat, and the interaction between childhood SES and emotion condition to each opportunity and threat, emotion condition to prosocial behavior, and each opportunity and threat to prosocial behavior. This model (Model 2.1) was of poor fit to the data (see Table 7 for model fit statistics). In contrast to Study 1, prosocial behavior was not predicted by emotion condition ($p = .822$) or perceived threat ($p = .955$). Further, there was no main effect of childhood SES on perceived opportunity ($p = .985$) or threat ($p = .287$), and no significant interaction effects between childhood SES and emotion condition on perceived opportunity ($p = .432$) or threat ($p = .097$).

Table 7
Summary of Study 2 model fit indices and modifications.

Model	$\chi^2(df)$	CFI	RMSEA	RMSEA CI_{90}	SRMR
Model 2.1	91.17 (27)***	.86	.08	.10-.14	.07
Model 2.2	128.33 (29)***	.78	.16	.22-.29	.12
Model 2.3	59.69 (43)***	.91	.14	.13-.15	.08
Model 2.4	20.69 (27)	.96	.07	.07-.10	.03

Note. * $p \leq .05$, ** $p \leq .01$, and *** $p \leq .001$.

SEM: Moderation by Target Sex. Because the pattern of results found in Study 1 was not replicated in this sample, I next examined whether target sex moderated the relationships between perceived affordances and prosocial behavior. To test this, three paths were added to the model. Prosocial behavior was regressed on target sex (dummy coded: same-sex = 0;

opposite sex = 1) and the interaction between target sex and each opportunity and threat (Model 2.2). However, neither target sex ($p = .540$), nor the interactions between target sex and opportunity ($p = .649$) or threat ($p = .424$) were associated with prosocial behavior. These results suggest that the sex of the target does not impact decisions to behave prosocially in this context. These three paths were subsequently dropped from the model.

Next, eight regression paths were specified to examine the possibility of a three-way interaction between emotion condition, childhood SES, and target sex on target perceptions (Model 2.3). These paths were target sex to opportunity and threat, the interaction between emotion condition and target sex to opportunity and threat, the interaction between childhood SES and target sex to opportunity and threat, and the three-way interaction between emotion condition, childhood SES, and target sex to opportunity and threat. The results revealed that target sex was not predictive of perceived opportunity ($p = .391$) or threat ($p = .821$). Additionally, there was no significant three-way interaction on opportunity ($p = .075$) or threat ($p = .236$), no interaction effect between childhood SES and target sex on opportunity ($p = .294$) or threat ($p = .445$), and no interaction between emotion condition and target sex on threat ($p = .399$). However, the interaction between emotion condition and target sex was significant, $b = -.14$ ($SE = .07$), $t = -2.03$, $p = .026$ (unpacked in the final model). Lastly, all non-significant paths were iteratively dropped from the model, yielding acceptable model fit (Model 2.4).

SEM: Final Model. The results of the final model (Model 2.4; see Figure 4) revealed that emotion condition was a significant predictor of perceived opportunity, $b = .66$ ($SE = .05$), $t = 12.19$, $p \leq .001$, and threat, $b = -.82$ ($SE = .10$), $t = -8.60$, $p \leq .001$, such that fearful targets were seen as more of an opportunity and less of a threat than neutral targets. Thus, the impact

of emotion on perceived affordances observed in Study 1 was replicated. In turn, greater perceived opportunity predicted less prosocial giving behavior, $b = -.16$ ($SE = .06$), $t = -2.62$, $p = .009$. Additionally, there was a significant interaction between emotion condition and target sex on opportunity, $b = -.16$ ($SE = .07$), $t = -2.21$, $p = .027$ (unpacked below). The results of the model remained unchanged when controlling for either adult SES ($p = .242$) or age ($p = .608$).

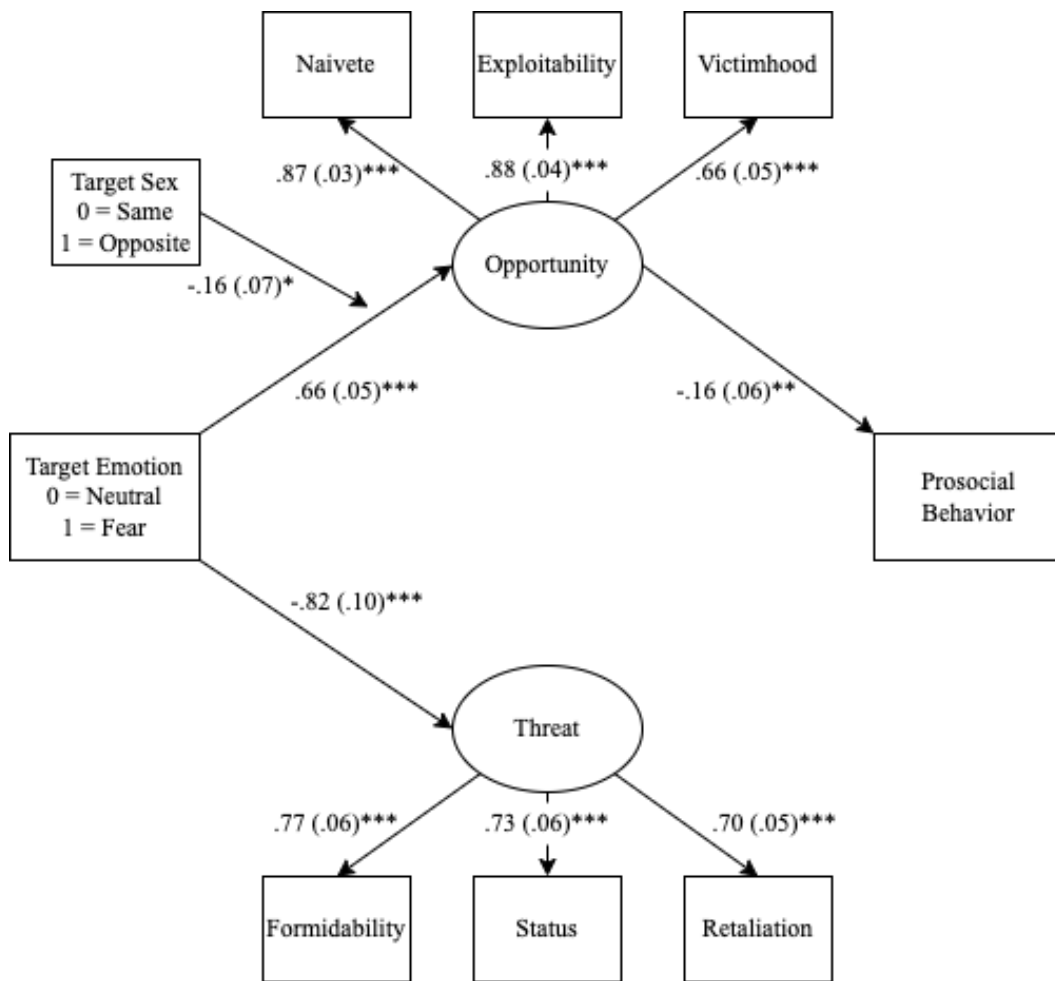


Figure 4. Final model of the relationship between target fear expression and prosocial behavior, mediated by latent perceived opportunity and threat, and (the relationship between fear expression and perceived opportunity) moderated by target sex. Standard errors are in parentheses. $*p \leq .05$, $**p \leq .01$, and $***p \leq .001$.

To unpack this interaction, I then examined the relationship between target sex and opportunity across conditions. Simple slope tests revealed that in the fear condition, viewing a same-sex target was associated with greater perceived opportunity compared to an opposite-sex target, $b = -.18$ ($SE = .09$), $t = -1.91$, $p = .041$. In the neutral condition, whether targets were the same- or opposite-sex of the perceiver had no impact on opportunity evaluations ($p = .572$). Additionally, looking at the relationship between emotion condition and opportunity for those assigned to view either same- or opposite-sex targets revealed that viewing fearful targets was associated with greater perceptions of opportunity in both same-sex, $b = .88$ ($SE = .10$), $t = 9.01$, $p \leq .001$, and opposite-sex targets, $b = .62$ ($SE = .09$), $t = 6.85$, $p \leq .001$.

Discussion

The results of Study 2 reveal that fearful people are perceived as more of an opportunity (naïve, exploitable, victimized), and less of a threat (formidable, high status, likely to retaliate) than non-fearful people, replicating Study 1. Perceived threat did not predict prosocial behavior, but greater opportunity did predict less prosociality toward targets. This finding is in contrast to the results of Study 1, in which perceivers were *more* prosocial towards targets deemed either an opportunity or a threat. The relationships between perceived affordances and prosocial behavior were not moderated by target sex, suggesting that this lack of replication was not explained by a difference in prosocial responses toward same- and opposite-sex targets. Instead, unmeasured differences between the two samples may explain these patterns (see General Discussion).

Target sex did moderate the relationship between emotion and perceived opportunity, however. Same-sex targets expressing fear were perceived as more of an opportunity than

opposite-sex targets expressing fear. Because men and women's social partners throughout life are more likely to be same-sex than opposite-sex (Kalmijn, 2002), same-sex targets may have been perceived as more relevant to perceivers (Neel & Lassetter, 2019), eliciting heightened perceptions of the opportunity posed by fearful same-sex targets. Together, the results of Studies 1 and 2 suggest that fearful people are generally viewed as a greater opportunity and a lesser threat than non-fearful people, but that a variety of individual or situational factors may impact perceptions of, and responses to, fearful people. Regardless of the nuances that shape prosocial decision making, it is likely that expressers are aware of the circumstances in which expressing fear would be beneficial or costly.

Study 3

The purpose of Study 3 was to examine whether the expression of fear is impacted by the ecology of those observing the expresser. This study draws on research which finds that people suppress emotional expression in situations where it is likely to harm them (Pauw et al., 2021). Because people raised in harsh (vs. benign) ecologies are stereotyped as being more exploitative (Williams et al., 2016), and less prosocial (Varnum, 2013), people experiencing fear should be sensitive to the potential costs and benefits of expressing fear to observers from different ecological backgrounds. I predicted that fear-induced (vs. control) participants would express less fear to observers from a harsh ecology compared to observers from a benign ecology. Additionally, I predicted that reduced fear expression toward individuals from a harsh ecology would be mediated by perceptions of those individuals as less prosocial, more exploitative, and more aggressive than individuals from a benign ecology.

Method

Participants and Study Design. Previous research examining emotion expression in participants exposed to either stress or control found an effect size of $d = .20$ (Ruan et al., 2020). Based on this, an *a priori* power analysis was conducted using G*power (Version 3.1; Faul et al., 2007), which revealed that a total sample size of 280 was needed to observe a small effect in four groups. In order to increase power for additional path analyses and potential exclusions, I collected data from 399 workers on Amazon's Mechanical Turk who participated in exchange for \$2.00, with a chance to win an additional \$25 Amazon gift card. After excluding participants for failing bot checks ($n = 11$) and attention checks ($n = 19$), the final data analytic sample was 369 (47.97% female; $M_{\text{age}} = 37.01$; $SD = 9.99$). Participants completed the study online and were randomly assigned to one of two observer ecology conditions: harsh observer ($n = 185$) or benign observer ($n = 184$). Participants were then randomly assigned to one of two emotion induction conditions: fear ($n = 186$) or control ($n = 183$).

Procedure

Cover Story. Participants were given the cover story that the study was meant to examine the accuracy of personality perceptions based on people's movie preferences. After consenting and completing bot checks, participants were informed that they would be paired with another participant and assigned to one of two roles within that pair – a movie reviewer or an observer. Participants were then reminded that there would be an opportunity at the end of the study to enter for a chance to win a \$25 gift card, and that each participant had three entries for the gift card drawing.

Each of the supposed participant roles were then explained. The movie reviewer would watch a scene from a movie and provide their opinion of the scene. The observer would then be shown the reviewer's opinion and evaluate the movie reviewer's personality. Additionally, participants were told that at the end of the study, the observer would decide how many gift card entries the movie reviewer would receive. Participants were told that the observer could choose to take entries from the reviewer for themselves, give some of their own entries to the reviewer, or do nothing so that each participant would retain their original three entries. In reality, all participants completed the movie reviewer role. Participants were not paired with another person, nobody evaluated the participants' personalities, and every participant received one gift card entry at the end of the study.

Observer Stimuli. Participants were asked to answer a few questions about themselves before being paired with an observer. These included sex, occupation, favorite food, hometown, and hobby. Responses to these questions were not used in any analyses (except for sex), and served to bolster the cover story that their responses that those of their partner would be exchanged. Participants then completed the Positive and Negative Affect Schedule Short-Form (PANAS-SF; Thompson, 2007) as a measure of their baseline emotion (including fear), before being randomly assigned to the harsh observer or benign observer condition.

Participants viewed a bogus report of the observer's answers. The observer's sex was marked as the same sex as the participant, and the answers to every question except for hometown were identical across conditions (see Figure 5). The harsh observer's hometown response stated, "Where I grew up was pretty dangerous and chaotic. We were all poor and there was a lot of crime". The benign observer's hometown response stated, "Where I grew

up was pretty nice and calm. Everybody was pretty wealthy and there wasn't any crime". After viewing the observer's answers for a minimum of 30 s, participants evaluated the observer's childhood SES, using the same childhood SES measure, modified to refer to the observer rather than the self.

1. What is your gender?

Man
 Woman
 Nonbinary / Other

2. What is your occupation?

3. What is your favorite food?

4. What is your hometown?

5. What is your hobby?

1. What is your gender?

Man
 Woman
 Nonbinary / Other

2. What is your occupation?

3. What is your favorite food?

4. What is your hometown?

5. What is your hobby?

Figure 5. Observer information presented to participants to manipulate perceptions of the observer's childhood exposure to ecological harshness. Left: benign (female) observer condition; right: harsh (female) observer condition. Information for male observers indicated that the observer's selected gender was, "Man", rather than, "Woman".

Emotion Stimuli. After completing an audio check, participants were randomly assigned to a fear induction or a control condition. Participants in the fear condition watched a scene (1 min, 48 s) from a horror movie entitled *A Tale of Two Sisters* (Kim et al., 2003). The scene gradually builds suspense and ends with an intense burst, and has effectively induced strong feelings of fear in previous studies (Drażkowski et al., 2021; Gomes et al., 2020; Reynaud et al., 2012). Participants in the control condition watched a scene (1 min 50 s) from a nature documentary entitled *The Secret Life of Birds* (Williams, 2011). The non-

narrated scene depicts a lone bird of paradise in its habitat, set to upbeat music, and has been used as a neutral control in previous research (Gomes et al., 2020).

Emotion Expression. After watching the video clip, participants were instructed to give their opinion of the video they saw to be displayed to the observer. Participants completed the PANAS-SF again to measure the intensity of fear expressed to the observers. For consistency with the cover story, participants also rated their enjoyment of the movie, how much they would like to see more of the movie, and whether they had seen the movie before. Following this, participants were informed that the observer received their responses and were instructed to answer three scales assessing their perception of the observer, presented in random order.

Observer Prosociality. Participants evaluated how prosocial they perceived the observer to be, using the Prosocialness Scale for Adults (Caprara et al., 2005). This scale was modified to refer to the observer rather than the self, and items assessing prosociality toward friends and family were omitted. The remaining eleven items assessing prosociality toward strangers were used. Participants indicated on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*) their agreement with statements about the observer. Example items include, “[He/She] tries to help others”, “[He/She] is empathetic to those who are in need”, and “[He/She] immediately helps those who are in need”. All items were combined into a composite measure of prosociality ($\alpha = .95$).

Observer Exploitativeness. Perceptions of the observer’s exploitive beliefs and behavior was measured using the 20-item Exploitive Manipulative Amoral Dishonesty Scale (Rogers et al., 2006). Items were modified to refer to the observer rather than the self. Participants indicated on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*) their

agreement with statements about the observer. Example items include, “[He/She] believes there’s a sucker born every minute, and smart people learn how to take advantage of them”, “[He/She] thinks that people are objects to be quietly manipulated for [his/her] own benefit”, and, “[He/She] thinks there is really no such thing as ‘right’ or ‘wrong’. It all boils down to what [he/she] can get away with”. All items were combined into a composite measure of exploitativeness ($\alpha = .81$).

Observer Aggression. Participants evaluated how aggressive they perceived the observer to be, using the 9-item physical aggression subscale of the Buss Perry Aggression Questionnaire (Buss & Perry, 1992). Items were modified to refer to the observer rather than the self. Participants indicated on a seven-point scale (1: *Strongly disagree*; 7: *Strongly agree*) their agreement with statements about the observer. Example items include, “Given enough provocation, [he/she] may hit another person”, “[He/She] gets into fights a little more than the average [man/woman]”, and “[He/She] has become so mad that [he/she] has broken things”. All items were combined into a composite measure of aggression ($\alpha = .91$).

Participant Demographics. Finally, participants reported their childhood SES, childhood neighborhood safety, and adult SES, using the same measures as the previous studies. Participants then reported their age and ethnicity before being debriefed.

Data Analytic Strategy

First, manipulation checks were conducted using t-tests. The first was to examine whether the harsh observer was perceived as having lower childhood SES than the benign observer. The second was to examine whether the fear-inducing movie clip elicited more fear than the control clip. Next, regression models were carried out using the Process macro for SPSS (Hayes, 2018) to test the main hypotheses. A moderated regression model was tested to

examine the effect of the interaction between emotion condition and observer ecology on fear expression. Lastly, a second-stage moderated parallel mediation model was tested to examine whether the relationship between observer ecology and fear expression, in each emotion condition, was mediated by perceptions of the observer's prosociality, exploitativeness, and aggression.

Results

Manipulation Checks. First, I conducted an independent-samples t-test to examine whether the harsh observer was perceived to come from a lower SES background than the benign observer. Results revealed that the harsh observer ($M = 1.61, SD = 1.03$) was indeed perceived as having lower childhood SES than the benign observer ($M = 5.89, SD = .98$), $t(367) = 40.84, p \leq .001, d = 4.25$.

Next, I conducted an independent-samples t-test to examine whether participants reported a greater change in fear from baseline after watching the fear-inducing movie clip than the control movie clip. Results revealed that the fear condition ($M = 2.31, SD = 1.98$) elicited an increase in fear from baseline, while the control condition ($M = -.20, SD = .79$) elicited a slight decrease in fear from baseline, a significant difference, $t(367) = -15.97, p \leq .001, d = 1.67$.

Fear Expression. Next, to examine how harsh observer ecology influenced fear expression, I conducted a moderated regression analysis using Model 1 of the Process macro. Change in fear was regressed on emotion condition (dummy coded: neutral = 0; fear = 1), observer childhood SES (centered), and the interaction between emotion condition and observer childhood SES. The results revealed a significant main effect of emotion condition, $b = 2.49$ ($SE = .16$), $t = 15.88, p \leq .001$, such that participants in the fear condition reported a greater

increase in fear than those in the neutral condition. There was not a main effect of observer childhood SES ($p = .574$), and there was not a significant interaction between emotion condition and observer childhood SES on fear expression ($p = .263$).

To examine the pattern of results, I next probed the non-significant interaction effect by examining the simple slopes within each emotion condition. As seen in Figure 6, the results revealed that for those in the neutral condition, there was no relationship between observer childhood SES and fear expression ($p = .574$). However, for those in the fear condition, lower observer childhood SES was associated with lower fear expression, $b = .10$ ($SE = .05$), $t = 2.18$, $p = .030$. Additionally, examining the effect of emotion condition on fear expression to observers perceived to have relatively low or high childhood SES ($\pm 1 SD$) revealed that, compared to those in the neutral condition, those in the fear condition expressed more fear to both low, $b = 2.32$ ($SE = .22$), $t = 10.43$, $p \leq .001$, and high childhood SES observers, $b = 2.67$ ($SE = .22$), $t = 12.00$, $p \leq .001$. Consistent with the hypothesis, fear-induced individuals expressed less fear to an observer when they perceived that observer as coming from a harsher ecology.

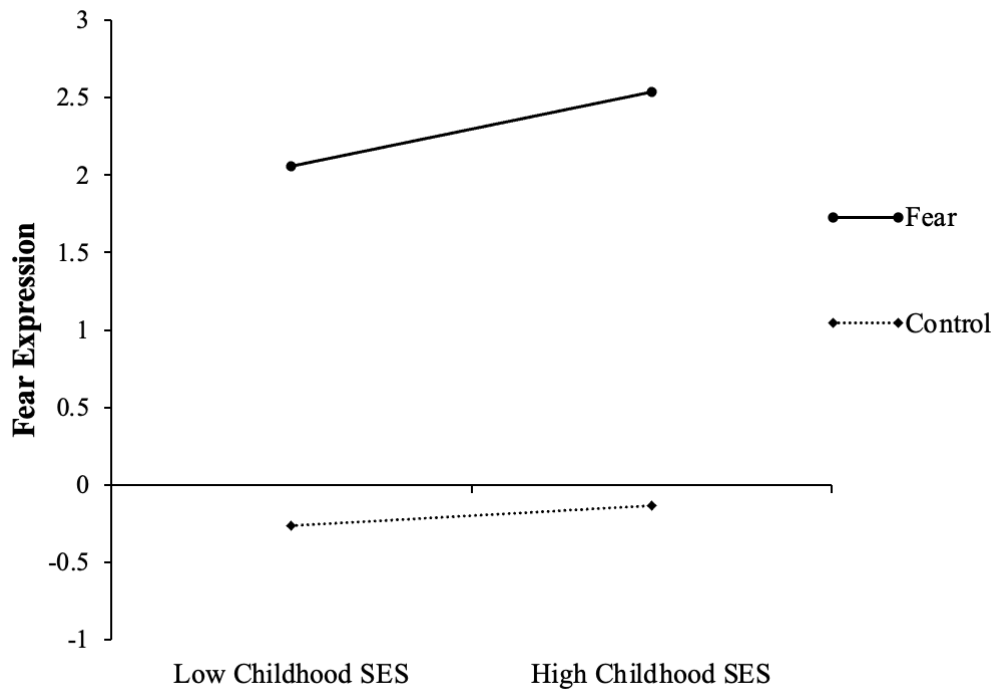


Figure 6. Fear expression as a function of exposure to a fear-inducing video (vs. control) and perceived childhood SES of the observer.

Mediation by Observer Traits. In order to examine whether reduced fear expression in the presence of an observer from a harsh ecology was mediated by perceptions of the observer’s prosociality, exploitativeness, and aggression, I conducted a moderated parallel mediation analysis using Model 14 of the Process macro. Observer prosociality, exploitativeness, and aggression were each regressed (centered) on observer childhood SES (centered); change in fear was regressed on observer prosociality, exploitativeness, and aggression, as well as the interaction between emotion condition and each of these factors. All results are reported while holding all other mediators constant. As seen in Figure 7, observer childhood SES was not predictive of perceived exploitativeness ($p = .262$). Lower observer childhood SES was associated with lower perceived prosociality, $b = .07$ ($SE = .02$), $t = 2.83$, $p = .005$, and higher perceived aggression, $b = -.08$ ($SE = .03$), $t = -3.04$, $p = .003$. However, no observer

perceptions were associated with fear expression ($ps < .421$), and the indirect effects of observer childhood SES on fear expression via prosociality (95% CI [-.25, .18]), exploitativeness (95% CI [-.34, .14]), and aggression (95% CI [-.23, .21]) were not significant.

Additionally, the interactions between emotion condition and each observer exploitativeness ($p = .143$) and aggression ($p = .246$) on fear expression were not significant. The results did reveal a significant interaction between emotion condition and observer prosociality on fear expression, $b = .33$ ($SE = .16$), $t = 2.06$, $p = .040$. To unpack this interaction effect, I examined the relationship between perceived prosociality and fear expression in each condition. Simple slopes tests revealed that observer prosociality was unrelated to fear expression in the neutral condition ($p = .754$). However, for those exposed to the fear-inducing clip, greater perceived prosociality was associated with greater fear expression, $b = .30$ ($SE = .12$), $t = 2.54$, $p = .011$. Further, the indirect effect of prosociality on the relationship between observer childhood SES and fear expression was significant in the fear condition, $b = .02$ ($SE = .02$), 95% CI [.06, .39].

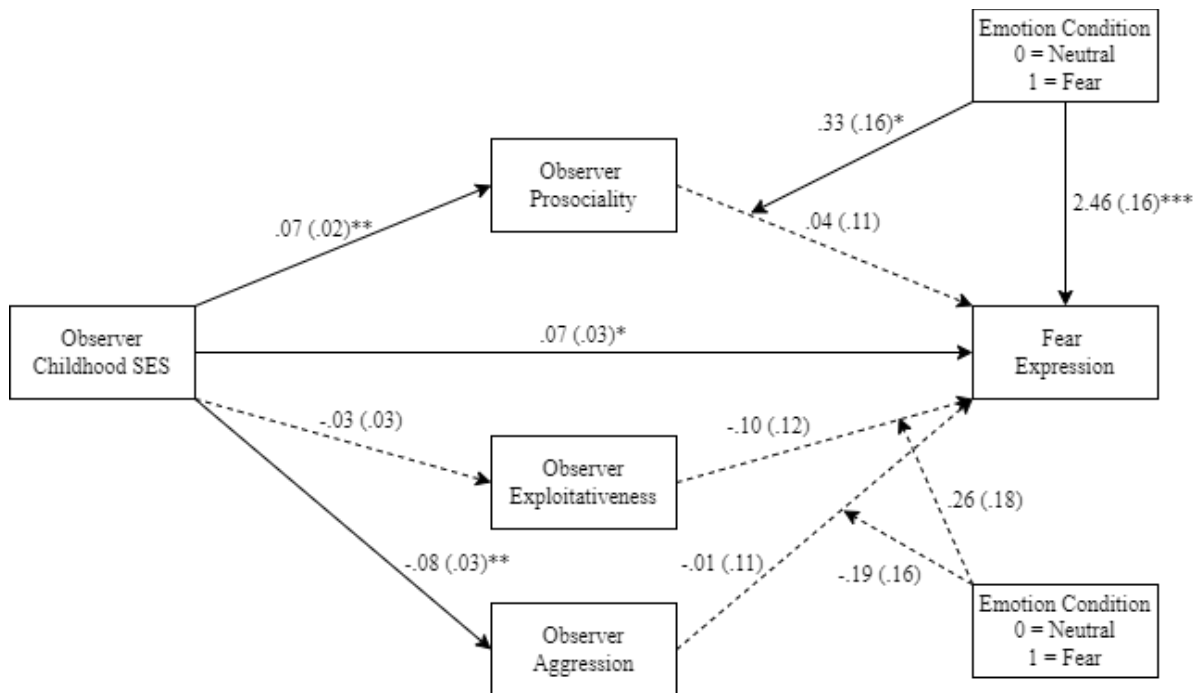


Figure 7. Unstandardized regression coefficients for the relationship between observer childhood SES and fear expression. As mediated by perceived observer prosociality (in the fear condition only), and not mediated by perceived observer exploitativeness or aggression. Standard errors are in parentheses. $*p \leq .05$, $**p \leq .01$, and $***p \leq .001$.

Discussion

These results of Study 3 reveal that when experiencing fear, people expressed less fear in the presence of an audience from a harsh ecology than a benign ecology. Additionally, consistent with the hypothesis, this reduced fear expression was driven by the perception of those from harsh, low SES backgrounds as less prosocial than those from benign, high SES backgrounds. However, the difference in fear expression between harsh and benign observers was not a drastic one. That people still expressed fear to the harsh observer suggests that they may not have been suppressing the emotional expression. Rather, fearful participants may have been amplifying their emotional expression toward the harsh observer, due to the perception that the observer was likely to behave prosocially. Previous research on emotion expression finds that more intense emotional expressions elicit more rapid and robust

responses from others (Clark & Finkel, 2005). That the relationship between observer ecology and fear expression was solely mediated by perceived prosociality suggests that fear expression was primarily driven by the perceived benefits of expressing fear to observers from benign ecologies – rather than the costs of expressing fear to observers from harsh ecologies.

Although I did not find support for the hypothesis that people would express less fear in the presence of someone from a harsh ecology, due to the perceived risk of displaying vulnerability to someone perceived as aggressive and exploitative, the current results do not provide evidence against this hypothesis. The potential cost of losing entries for the gift card drawing was directly related to the trait prosociality of the person making the decision. However, traits like exploitation and aggression may be more relevant to expressers when weighing costs that are more directly related to those traits, like a physical safety. Together, these findings indicate that fearful people express less fear in the presence of someone from a harsh early life environment than a benign environment, due to beliefs that people exposed to ecological harshness are less likely to help.

General Discussion

Much research examining responses to people expressing fear has found evidence suggesting a broad motivation to behave prosocially toward fearful people (Kaltwasser et al., 2017; Hammer & Marsh, 2015; Marsh et al., 2005; Springer et al., 2007). However, the possibility that fear may also elicit harmful, opportunistic responses from some has been dismissed without scientific investigation (Marsh et al., 2005). The current work aimed to address this gap by 1) characterizing a range of perceived affordances attributed to those who express fear, 2) assessing prosocial *and* opportunistic responses to fearful people, and 3)

examining the impacts of perceiver ecology and target sex – factors known to moderate the costs and benefits of prosocial behavior – on both the perception of, and response to, fearful people. In addition, the current work aimed to extend previous research by examining the influence of audience ecology on the decision to express or suppress fear.

Across two studies (Study 1 and Study 2), I found that fearful people were perceived as posing more of an opportunity and less of a threat than neutral, non-fearful people. In addition to replicating the finding that fearful people are viewed as especially naïve (Marsh et al., 2005; Sacco & Hugenberg, 2009), these results demonstrate that those expressing fear are also perceived as more exploitable, more likely to have been a victim, less physically formidable, lower in social status, and less likely to retaliate than a non-fearful person. Additionally, these perceptions were moderated by perceivers' childhood exposure to ecological harshness (Study 1) and targets' sex (Study 2).

In Study 1, people from benign, high SES childhood environments did not distinguish between fearful and neutral expressers, and evaluated all (same-sex) targets as posing greater opportunity and threat than people from harsh, low SES environments did. However, individuals with low childhood SES perceived fearful people as posing significantly more of an opportunity and less of a threat than neutral people. These ecology-based differences may be explained by recent work which finds that the degree of opportunity and threat attributed to an individual is positively associated with the perceived relevance of that individual to one's goals (Neel & Lasseter, 2019). Thus, people from benign ecologies – whose success benefits from predictable social environments (Chen et al., 2017) – may view their life goals as more likely to be impacted by people in general than people from harsh ecologies. Conversely, people from harsh ecologies – due to experiencing a reduced sense of control –

have been found to place greater weight on situational context when evaluating emotions compared to those from low SES backgrounds (Kraus et al., 2009). As such, it may be that people from harsh environments don't view people in general as exerting control over their own goals, except when a person embodies specific cues (such as fear) which pose relevant affordances.

In Study 2, the effects of perceiver childhood ecology found in Study 1 were not replicated – even among those who viewed same-sex targets. Instead, I found a moderating effect of target sex, such that men and women perceived same-sex targets as posing more of an opportunity and threat than opposite-sex targets. Again, it is likely that people perceive same-sex individuals as more relevant to the achievement and obstruction of their goals than opposite-sex. Indeed, a majority of men and women's competitive and cooperative relationships are with members of the same sex (Kalmijn, 2002; Russell et al., 2013), meaning that same-sex individuals likely exert a greater influence over one's life than opposite-sex individuals. However, the lack of an effect of perceiver childhood ecology on perceptions of same-sex targets remains unexplained. Although a primary difference between the MTurk sample of Study 1 and the undergraduate sample of Study 2 was age, age did not impact the results of either model. Nonetheless, it is highly likely that some other, unmeasured difference between the two samples is responsible for these divergent results.

Contrary to the hypothesis, perceiver ecology did not moderate the relationships between perceived opportunity or threat and prosocial behavior, in either Study 1 or Study 2. With respect to resources, some studies have found that cognitive and behavioral differences between those from harsh and benign childhood ecologies only emerge under conditions of acute stress (e.g., Mittal & Griskevicius, 2014, 2016, 2020). It is therefore possible that no

impact of childhood SES on prosocial or opportunistic responding was observed here, because the motivations typically active under conditions of harshness were not active. Additionally, the relationships between perceived affordances and prosocial behavior were not consistent between studies. In Study 1, I found that each greater opportunity and greater threat were associated with more prosocial (i.e., less opportunistic) responses. In Study 2, I found that greater opportunity was associated with less prosocial (i.e., more opportunistic) responses, and that threat was unrelated to prosocial behavior.

Although this combined pattern of results is difficult to interpret with certainty, these results provide initial support for the hypothesis that fearful expression should elicit opportunistic responses from some perceivers. Specifically, the hypothesis is supported by 1) the finding in Study 1 that fear predicted lower perceived threat, which in turn predicted more opportunistic behavior and 2) the finding in Study 2 that fear expression predicted higher perceived opportunity, which in turn predicted more opportunistic behavior. Although perceiver ecology did not explain these relationships, the current work is the first to demonstrate that fearful expression can elicit opportunistic as well as prosocial responses.

To my knowledge, this work is also one of the first to demonstrate the impact of audience effects in the decision to express fear. Despite no evidence in Studies 1 or 2 that people from harsh, low SES ecologies were less prosocial than people from benign, high SES backgrounds, Study 3 demonstrated that fearful people nonetheless perceived less prosociality in harsh observers. This finding is consistent with previous findings that people from harsh, low SES environments are assumed to be less altruistic than people of high SES (Varnum, 2013). Further, I found that the perception of reduced prosociality in people from harsh environments was associated with reduced fear expression to that observer. This result

suggests that when experiencing fear, people are sensitive to the relative costs and benefits implied by the ecological context of observers.

Strengths and Limitations

One major strength of the current work is the prosocial behavior task used in Studies 1 and 2. This task had the advantage of giving participants a clear choice between acting prosocially (by giving targets more), passively (by giving and keeping an equal amount of raffle entries), or opportunistically (by keeping more). Participants were aware of how each decision would impact themselves and the targets, in contrast to previous research on responses to fear, which primarily utilized the difficult to interpret AAT (Hammer & Marsh, 2015; Kaltwasser et al., 2017; Marsh et al., 2005; Springer et al., 2007). Additionally, whereas the extant literature has examined participants' decisions to either behave more or less prosocially toward fearful people (Marsh et al., 2007), the current work provided participants with a spectrum of behavioral choices ranging from and opportunistic to a prosocial response. The inclusion of a choice which harms (albeit mildly) the fearful target allows for a more nuanced understanding of responses to people expressing fear, and the perceptions which drive those responses.

The current work should be interpreted in the context of its limitations – many of which stem from the online nature of these studies. Examining these social interactions remotely presented a few unanticipated problems which may have obscured actual relationships between ecological harshness, prosocial behavior, and the perception and expression of fear. In particular, prosocial decision making is complex, and involves input from many different sources – including individual differences, relationship dynamics, and environmental context – to inform the decision to behave prosocially or opportunistically

(FeldmanHall et al., 2012). Thus, using two different populations in Study 1 (MTurk participants) and Study 2 (undergraduate participants) due to financial constraints likely resulted in unmeasured sample differences which were relevant to each group's perceptions of, and responses to, fearful people.

Additionally, the behavioral option available to perceivers was a financial one. In many cases in which a fearful person would be encountered, their concern is more likely to be one of physical safety (Mobbs et al., 2009). Therefore, by asking people to make a decision about a behavior which was not directly related to the problem being faced by the fearful person, may have introduced further complication to prosocial decision making that could not be accounted for. This relevance of prosociality to threat may have also impacted the results of Study 3. Had the cost and benefit of expressing fear been related to physical safety, rather than a small chance of resource acquisition, fearful people would have likely been more motivated to suppress – rather than just express less – fear in the presence of an observer from a harsh ecology. Further, fear expression likely would have been mediated by perceptions of observers' exploitativeness or aggression, as these traits are more relevant to physical safety concerns than resource ones.

Reporting fear expression online in Study 3 – though suitable to capture intentional expressions of subjective fear – did not allow for comparisons to objective fear. The inclusion of an objective measure of fear (e.g., heart rate, galvanic skin response) to compare before and after fear-induction would have allowed for a better understanding of the nature of participants' fear expression. Specifically, having both subjective and objective measures would have provided insight into whether people – upon learning the ecological background of the observer – emotionally regulated while watching the movie clip to reduce the objective

feeling of fear which they truthfully reported to the observer, or whether participants felt the same level of fear regardless of observer ecology, and chose to either suppress its expression to observers from harsh ecologies or intensify its expression to observers from benign ecologies.

In light of these limitations, future research examining behavioral responses to fear expression should prioritize the use of paradigms which are conceptually relevant to physical safety. Fear is an emotion primarily prompted by threats to physical safety (Mobbs et al., 2009). Thus, assessing interpersonal perceptions as well as opportunistic and behavioral responses which bear on physical safety would improve both the ecological validity and interpretability of future findings.

Conclusion

The present work makes three major contributions to our understanding of the social messages conveyed by fear, and the conditions which motivate its expression. First, people perceive fearful expressers as more of an opportunity and less of a threat than neutral expressers. Second, under some circumstances, people are motivated to behave opportunistically toward fearful individuals – calling into question previous research which refuted this possibility. Third, fearful individuals strategically express less fear according to the ecological background of those observing them, due to beliefs that they are less prosocial.

References

- Adler, N., Boyce, T., Chesney, M., Cohen, S., Folkman, S., Kahn, R., & Syme, S. (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist*, *49*(1), 15-24. doi: 10.1037/0003-066x.49.1.15
- Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. *Health Psychology*, *19*(6), 586-592.
- Adolphs, R., Gosselin, F., Buchanan, T., Tranel, D., Schyns, P., & Damasio, A. (2005). A mechanism for impaired fear recognition after amygdala damage. *Nature*, *433*(7021), 68-72. doi: 10.1038/nature03086
- Archer, J. (2006). Testosterone and human aggression: An evaluation of the challenge hypothesis. *Neuroscience and Biobehavioral Reviews*, *30*(3), 319-345. doi: 10.1016/j.neubiorev.2004.12.007
- Becker, M. (2009). Panic search. *Psychological Science*, *20*(4), 435-437. doi: 10.1111/j.1467-9280.2009.02303.x
- Bellair, P., McNulty, T., & Piquero, A. (2019). Persistent material hardship and childhood physical aggression. *Aggression and Violent Behavior*, *49*, 101309. doi: 10.1016/j.avb.2019.07.004
- Belsky, J., Steinberg, L., & Draper, P. (1991). Childhood experience, interpersonal development, and reproductive strategy: An evolutionary theory of socialization. *Child Development*, *62*(4), 647-670. doi: 10.1111/j.1467-8624.1991.tb01558.x

- Benenson, J., Pascoe, J., & Radmore, N. (2007). Children's altruistic behavior in the dictator game. *Evolution and Human Behavior, 28*(3), 168-175. doi: 10.1016/j.evolhumbehav.2006.10.003
- Beyer, F., Buades-Rotger, M., Claes, M., & Krämer, U. (2017). Hit or run: Exploring aggressive and avoidant reactions to interpersonal provocation using a novel fight-or-escape paradigm (FOE). *Frontiers in Behavioral Neuroscience, 11*. doi: 10.3389/fnbeh.2017.00190
- Bjorklund D., Hawley P. (2014) Aggression grows up: Looking through an evolutionary developmental lens to understand the causes and consequences of human aggression. In: Shackelford T., Hansen R. (eds) *The Evolution of Violence*. Springer, New York, NY. doi: 10.1007/978-1-4614-9314-3_9
- Björkqvist, K. (2018). Gender differences in aggression. *Current Opinion in Psychology, 19*, 39-42. doi: 10.1016/j.copsyc.2017.03.030
- Bjornsdottir, R., & Rule, N. (2017). The visibility of social class from facial cues. *Journal of Personality and Social Psychology, 113*(4), 530-546. doi: 10.1037/pspa0000091
- Book, A., Methot-Jones, T., Blais, J., Hosker-Field, A., Volk, A., & Visser, B. et al. (2016). Psychopathic traits and the cheater–hawk hypothesis. *Journal of Interpersonal Violence, 34*(15), 3229-3251. doi: 10.1177/0886260516669168
- Bossuyt, E., Moors, A., & De Houwer, J. (2014). On angry approach and fearful avoidance: The goal-dependent nature of emotional approach and avoidance tendencies. *Journal of Experimental Social Psychology, 50*, 118-124. doi: 10.1016/j.jesp.2013.09.009

- Browne, M., & Cudeck, R. (1989). Single sample cross-validation indices for covariance structures. *Multivariate Behavioral Research*, 24(4), 445-455. doi: 10.1207/s15327906mbr2404_4
- Buss, D., & Duntley, J. (2008). Adaptations for exploitation. *Group Dynamics: Theory, Research, and Practice*, 12(1), 53-62. doi: 10.1037/1089-2699.12.1.53
- Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, 63(3), 452-459. doi: 10.1037/0022-3514.63.3.452
- Cabeza de Baca, T., Barnett, M., & Ellis, B. (2016). The development of the child unpredictability schema: Regulation through maternal life history trade-offs. *Evolutionary Behavioral Sciences*, 10(1), 43-55. doi: 10.1037/ebs0000056
- Caprara, G., Steca, P., Zelli, A., & Capanna, C. (2005). A new scale for measuring adults' prosocialness. *European Journal of Psychological Assessment*, 21(2), 77-89. doi: 10.1027/1015-5759.21.2.77
- Cerin, E., Saelens, B., Sallis, J. and Frank, L., 2006. Neighborhood Environment Walkability Scale: Validity and development of a short form. *Medicine and Science in Sports and Exercise*, 38(9), pp.1682-1691.
- Chen, M., & Bargh, J. (1999). Consequences of automatic evaluation: Immediate behavioral predispositions to approach or avoid the stimulus. *Personality and Social Psychology Bulletin*, 25(2), 215-224. doi: 10.1177/0146167299025002007
- Chen, B., Shi, Z., & Sun, S. (2017). Life history strategy as a mediator between childhood environmental unpredictability and adulthood personality. *Personality and Individual Differences*, 111, 215-219. doi: 10.1016/j.paid.2017.02.032

- Cheng, J., Tracy, J., Foulsham, T., Kingstone, A., & Henrich, J. (2013). Two ways to the top: Evidence that dominance and prestige are distinct yet viable avenues to social rank and influence. *Journal of Personality and Social Psychology, 104*(1), 103-125. doi: 10.1037/a0030398
- Chiao, J., Iidaka, T., Gordon, H., Nogawa, J., Bar, M., & Aminoff, E. et al. (2008). Cultural specificity in amygdala response to fear faces. *Journal of Cognitive Neuroscience, 20*(12), 2167-2174. doi: 10.1162/jocn.2008.20151
- Clark, M., & Finkel, E. (2005). Willingness to express emotion: The impact of relationship type, communal orientation, and their interaction. *Personal Relationships, 12*(2), 169-180. doi: 10.1111/j.1350-4126.2005.00109.x
- Crewe, B. (2009). *The prisoner society: Power, adaptation, and social life in an English prison* (1st ed.). Oxford, England: The Oxford University Press.
- Darwin, C. (1872). *The expression of the emotions in man and animals* (5th ed.). New York: John Murray.
- Davis, J., & Reyna, C. (2015). Seeing red: How perceptions of social status and worth influence hostile attributions and endorsement of aggression. *British Journal of Social Psychology, 54*(4), 728-747. doi: 10.1111/bjso.12109
- Del Giudice, M., Ellis, B. and Shirtcliff, E., 2011. The Adaptive Calibration Model of stress responsivity. *Neuroscience and Biobehavioral Reviews, 35*(7), pp.1562-1592.
- Deska, J., Lloyd, E., & Hugenberg, K. (2018). The face of fear and anger: Facial width-to-height ratio biases recognition of angry and fearful expressions. *Emotion, 18*(3), 453-464. doi: 10.1037/emo0000328

- Dickerson, K., Milojevich, H., & Quas, J. (2019). Early environmental unpredictability: Implications for youth's perceptions and social functioning. *Journal of Youth and Adolescence*, 48(9), 1754-1764. doi: 10.1007/s10964-019-01052-9
- Drażkowski, D., Behnke, M., & Kaczmarek, L. (2021). I am afraid, so I buy it! The effects of anxiety on consumer assimilation and differentiation needs amongst individuals primed with independent and interdependent self-construal. *PLOS ONE*, 16(9), e0256483. doi: 10.1371/journal.pone.0256483
- Duncan, L. & Peterson, B. (2010). Gender and motivation for achievement, affiliation intimacy, and power. In J. Chrisler & D. McCreary (Eds.), *Handbook of gender research in psychology*. New York: Springer.
- Ebner, N., Riediger, M., & Lindenberger, U. (2010). FACES—A database of facial expressions in young, middle-aged, and older women and men: Development and validation. *Behavior Research Methods*, 42, 351-362. doi:10.3758/BRM.42.1.351
- Eisenberg, N., Fabes, R. A., & Spinrad, T. (2006). Prosocial development. In N. Eisenberg (Ed.), *Handbook of child psychology: Social, emotional, and personality development* (Vol. 3, 6th ed., pp. 646–718). Hoboken, NJ: Wiley
- Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion*, 6(3-4), 169-200. doi: 10.1080/02699939208411068
- Ekman, P., & Friesen, W. V. (1978). *Facial action coding system: A technique for the measurement of facial movement*. Palo Alto: Consulting Psychologists Press.
- Elfenbein, H., & Ambady, N. (2002). On the universality and cultural specificity of emotion recognition: A meta-analysis. *Psychological Bulletin*, 128(2), 203-235. doi: 10.1037/0033-2909.128.2.203

- Ellis, B., Figueredo, A., Brumbach, B. and Schlomer, G., 2009. Fundamental dimensions of environmental risk. *Human Nature*, 20(2), pp.204-268.
- Fatima, S., & Sheikh, H. (2014). Socioeconomic status and adolescent aggression: The role of executive functioning as a mediator. *The American Journal of Psychology*, 127(4), 419. doi: 10.5406/amerjpsyc.127.4.0419
- Faul, F., Erdfelder, E., Lang, A., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175-191. <https://doi.org/10.3758/bf03193146>
- Fay, A., & Maner, J. (2014). Embodied effects are moderated by situational cues: Warmth, threat, and the desire for affiliation. *British Journal of Social Psychology*, 54(2), 291-305. doi: 10.1111/bjso.12088
- FeldmanHall, O., Mobbs, D., Evans, D., Hiscox, L., Navrady, L., & Dalgleish, T. (2012). What we say and what we do: The relationship between real and hypothetical moral choices. *Cognition*, 123(3), 434-441. doi: 10.1016/j.cognition.2012.02.001
- Figueredo, A.J., Jacobs, W.J. (2009). Aggression, risk-taking, and alternative life history strategies: The behavioral ecology of social deviance. In: Frias-Armenta, M., Corral-Verdugo, V. (Eds.), *Biopsychosocial Perspectives on Aggression*. Nova Science Publishers, Hauppauge, NY.
- Gibson, J. (1979). *The ecological approach to visual perception* (1st ed.). Boston, MA: Houghton Mifflin.
- Goetz, C., Easton, J., Lewis, D., & Buss, D. (2012). Sexual exploitability: Observable cues and their link to sexual attraction. *Evolution and Human Behavior*, 33(4), 417-426. doi: 10.1016/j.evolhumbehav.2011.12.004

- Gomes, N., Silva, F., & Semin, G. (2020). The lasting smell of emotions: The effects of reutilizing fear sweat samples. *Behavior Research Methods*, 52(6), 2438-2451. doi: 10.3758/s13428-020-01412-5
- Greitemeyer, T., & Sagioglou, C. (2016). Subjective socioeconomic status causes aggression: A test of the theory of social deprivation. *Journal of Personality and Social Psychology*, 111(2), 178-194. doi: 10.1037/pspi0000058
- Grossmann, T. (2022). The human fear paradox: Affective origins of cooperative care. *Behavioral and Brain Sciences*, 1-43. doi: 10.1017/s0140525x2200067x
- Hammer, J., & Marsh, A. (2015). Why do fearful facial expressions elicit behavioral approach? Evidence from a combined approach-avoidance implicit association test. *Emotion*, 15(2), 223-231. doi: 10.1037/emo0000054
- Haney, C. (2001). *The psychological impact of incarceration: Implications for post-prison adjustment*. Santa Cruz, CA: U.S. Department of Health and Human Services.
- Hayes, A. (2018). *Introduction to mediation, moderation, and conditional process analysis* (2nd ed.). New York, NY: Guilford Press.
- Herrmann, E., Hare, B., Cissewski, J., & Tomasello, M. (2011). A comparison of temperament in nonhuman apes and human infants. *Developmental Science*, 14(6), 1393-1405. doi: 10.1111/j.1467-7687.2011.01082.x
- Henrich, J., Ensminger, J., McElreath, R., Barr, A., Barrett, C., & Bolyanatz, A. et al. (2010). Markets, religion, community size, and the evolution of fairness and punishment. *Science*, 327(5972), 1480-1484. doi: 10.1126/science.1182238

- Hess, U., Adams, R., Grammer, K., & Kleck, R. (2009). Face gender and emotion expression: Are angry women more like men?. *Journal of Vision*, 9(12), 19-19. doi: 10.1167/9.12.19
- Hess, U., Adams, R., & Kleck, R. (2005). Who may frown and who should smile? Dominance, affiliation, and the display of happiness and anger. *Cognition and Emotion*, 19(4), 515-536. doi: 10.1080/02699930441000364
- Hess, U., Adams, R., & Kleck, R. (2008). The role of facial expression in person perception. In N. Ambady & J. J. Skowronski (Eds.), *First impressions* (pp. 234-254). New York: Guilford Press.
- Hess, U., Blairy, S., & Kleck, R. (2000). The influence of facial emotion displays, gender, and ethnicity on judgments of dominance and affiliation. *Journal of Nonverbal Behavior*, 24(4), 265-283. doi: 10.1023/a:1006623213355
- Hess, U., Thibault, P., Adams, R., & Kleck, R. (2010). The influence of gender, social roles, and facial appearance on perceived emotionality. *European Journal of Social Psychology*, 40(7), 1310-1317. doi: 10.1002/ejsp.715
- Hu, L., & Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55. doi: 10.1080/10705519909540118
- Jack, R., Garrod, O., & Schyns, P. (2014). Dynamic facial expressions of emotion transmit an evolving hierarchy of signals over time. *Current Biology*, 24(2), 187-192. doi: 10.1016/j.cub.2013.11.064

- Jirsaraie, R., Ranby, K., & Albeck, D. (2019). Early life stress moderates the relationship between age and prosocial behaviors. *Child Abuse and Neglect*, 94, 104029. doi: 10.1016/j.chiabu.2019.104029
- Jonason, P., Koenig, B., & Tost, J. (2010). Living a fast life. *Human Nature*, 21(4), 428-442. doi: 10.1007/s12110-010-9102-4
- Jones, D., & Paulhus, D. (2013). Introducing the Short Dark Triad (SD3). *Assessment*, 21(1), 28-41. doi: 10.1177/1073191113514105
- Kalmijn, M. (2002). Sex segregation of friendship networks: Individual and structural determinants of having cross-sex friends. *European Sociological Review*, 18(1), 101-117. doi: 10.1093/esr/18.1.101
- Kaltwasser, L., Moore, K., Weinreich, A., & Sommer, W. (2017). The influence of emotion type, social value orientation and processing focus on approach-avoidance tendencies to negative dynamic facial expressions. *Motivation and Emotion*, 41(4), 532-544. doi: 10.1007/s11031-017-9624-8
- Karriker-Jaffe, K., Foshee, V., Ennett, S., & Suchindran, C. (2009). Sex differences in the effects of neighborhood socioeconomic disadvantage and social organization on rural adolescents' aggression trajectories. *American Journal of Community Psychology*, 43(3-4), 189-203. doi: 10.1007/s10464-009-9236-x
- Kim, J. (2003). *A Tale of Two Sisters*. South Korea; B.O.M. Film Productions Company.
- Knight, G. and Kagan, S., (1977). Development of prosocial and competitive behaviors in Anglo-American and Mexican-American children. *Child Development*, 48(4), p.1385. doi: 10.2307/1128497

- Knutson, B. (1996). Facial expressions of emotion influence interpersonal trait inferences. *Journal Of Nonverbal Behavior*, 20(3), 165-182. doi: 10.1007/bf02281954
- Kraus, M. & Callaghan, B., (2016). Social class and prosocial behavior: The moderating role of public versus private contexts. *Social Psychological and Personality Science*, 7(8), pp.769-777. doi: 10.1177/1948550616659120
- Kraus, M., Côté, S., & Keltner, D. (2010). Social class, contextualism, and empathic accuracy. *Psychological Science*, 21(11), 1716-1723. doi: 10.1177/0956797610387613
- Kraus, M., Horberg, E., Goetz, J., & Keltner, D. (2011). Social class rank, threat vigilance, and hostile reactivity. *Personality and Social Psychology Bulletin*, 37(10), 1376-1388. doi: 10.1177/0146167211410987
- Kraus, M., Piff, P., & Keltner, D. (2009). Social class, sense of control, and social explanation. *Journal of Personality and Social Psychology*, 97(6), 992-1004. doi: 10.1037/a0016357
- Kraus, M., Piff, P., Mendoza-Denton, R., Rheinschmidt, M., & Keltner, D. (2012). Social class, solipsism, and contextualism: How the rich are different from the poor. *Psychological Review*, 119(3), 546-572. doi: 10.1037/a0028756
- Kurzban, R., Burton-Chellew, M., & West, S. (2015). The evolution of altruism in humans. *Annual Review of Psychology*, 66(1), 575-599. doi: 10.1146/annurev-psych-010814-015355

- Lassetter, B., Hehman, E., & Neel, R. (2021). The relevance appraisal matrix: Evaluating others' relevance. *Journal of Personality and Social Psychology, 121*(4), 842-864. doi: 10.1037/pspi0000359
- Leary, M., Kelly, K., Cottrell, C., & Schreindorfer, L. (2013). Construct validity of the Need to Belong Scale: Mapping the nomological network. *Journal of Personality Assessment, 95*(6), 610-624. doi: 10.1080/00223891.2013.819511
- Lee, D., Susskind, J., & Anderson, A. (2013). Social transmission of the sensory benefits of eye widening in fear expressions. *Psychological Science, 24*(6), 957-965. doi: 10.1177/0956797612464500
- Lichter, D., Shanahan, M., & Gardner, E. (2002). Helping others? The effects of childhood poverty and family instability on prosocial behavior. *Youth and Society, 34*(1), 89-119. doi: 10.1177/0044118x02034001004
- Lin, N. (1990). Social resources and social mobility: A structural theory of status attainment. In R. L. Breiger (Ed.), *Social mobility and social structure* (pp. 247-271). Cambridge: Cambridge University Press.
- Lobbestael, J., Cousijn, J., Brugman, S., & Wiers, R. (2016). Approach and avoidance towards aggressive stimuli and its relation to reactive and proactive aggression. *Psychiatry Research, 240*, 196-201. doi: 10.1016/j.psychres.2016.04.038
- Ma, Y., Wang, C., & Han, S. (2011). Neural responses to perceived pain in others predict real-life monetary donations in different socioeconomic contexts. *Neuroimage, 57*(3), 1273-1280. doi: 10.1016/j.neuroimage.2011.05.003

- Manstead, A. (2018). The psychology of social class: How socioeconomic status impacts thought, feelings, and behaviour. *British Journal of Social Psychology*, 57(2), 267-291. doi: 10.1111/bjso.12251
- Maranges, H., Hasty, C., Maner, J., & Conway, P. (2021). The behavioral ecology of moral dilemmas: Childhood unpredictability, but not harshness, predicts less deontological and utilitarian responding. *Journal of Personality and Social Psychology*, 120(6), 1696-1719. doi: 10.1037/pspp0000368
- Marsh, A., Adams, R., & Kleck, R. (2005). Why do fear and anger look the way they do? Form and social function in facial expressions. *Personality and Social Psychology Bulletin*, 31(1), 73-86. doi: 10.1177/0146167204271306
- Marsh, A., Ambady, N., & Kleck, R. (2005). The effects of fear and anger facial expressions on approach- and avoidance-related behaviors. *Emotion*, 5(1), 119-124. doi: 10.1037/1528-3542.5.1.119
- Marsh, A., Kozak, M., & Ambady, N. (2007). Accurate identification of fear facial expressions predicts prosocial behavior. *Emotion*, 7(2), 239-251. doi: 10.1037/1528-3542.7.2.239
- Martens, J., Tracy, J., & Shariff, A. (2012). Status signals: Adaptive benefits of displaying and observing the nonverbal expressions of pride and shame. *Cognition and Emotion*, 26(3), 390-406. doi: 10.1080/02699931.2011.645281
- McArthur, L., & Baron, R. (1983). Toward an ecological theory of social perception. *Psychological Review*, 90(3), 215-238. doi: 10.1037/0033-295x.90.3.215
- Michałowski J. M., Drożdźiel D., Matuszewski J., Koziejowski W., Jednoróg K., Marchewka A. (2016) *Set of Fear Inducing Pictures (SFIP): The development and validation in*

fearful and non-fearful individuals. Behavior Research Methods, doi:10.3758/s13428-016-0797-y

Minton, H., & Schneider, F. (1980). *Differential psychology*. Prospect Heights: Waveland Press.

Miller, J., Kahle, S., & Hastings, P. (2015). Roots and benefits of costly giving: Children who are more altruistic have greater autonomic flexibility and less family wealth. *Psychological Science*, 26(7), 1038-1045. doi: 10.1177/0956797615578476

Mittal, C., & Griskevicius, V. (2014). Sense of control under uncertainty depends on people's childhood environment: A life history theory approach. *Journal of Personality and Social Psychology*, 107(4), 621-637. doi: 10.1037/a0037398

Mittal, C., Griskevicius, V., Simpson, J., Sung, S. and Young, E., 2015. Cognitive adaptations to stressful environments: When childhood adversity enhances adult executive function. *Journal of Personality and Social Psychology*, 109(4), pp.604-621.

Mittal, C., & Griskevicius, V. (2016). Silver spoons and platinum plans: How childhood environment affects adult health care decisions. *Journal of Consumer Research*, 43(4), 636-656. doi: 10.1093/jcr/ucw046

Mittal, C., Griskevicius, V., & Haws, K. (2020). From cradle to grave: How childhood and current environments impact consumers' subjective life expectancy and decision-making. *Journal of Consumer Research*, 47(3), 350-372. doi: 10.1093/jcr/ucaa003

Mobbs, D., Marchant, J., Hassabis, D., Seymour, B., Tan, G., & Gray, M. et al. (2009). From threat to fear: The neural organization of defensive fear systems in humans. *Journal of Neuroscience*, 29(39), 12236-12243. doi: 10.1523/jneurosci.2378-09.2009

- Mohtashemi, M., & Mui, L. (2003). Evolution of indirect reciprocity by social information: the role of trust and reputation in evolution of altruism. *Journal of Theoretical Biology*, 223(4), 523-531. doi: 10.1016/s0022-5193(03)00143-7
- Molho, C., Tybur, J., Güler, E., Balliet, D., & Hofmann, W. (2017). Disgust and anger relate to different aggressive responses to moral violations. *Psychological Science*, 28(5), 609-619. doi: 10.1177/0956797617692000
- Montepare, J., & Dobish, H. (2003). Contribution of emotion perceptions and their overgeneralizations to trait impressions. *Journal of Nonverbal Behavior*, 27(4), 237-254. doi: 10.1023/a:1027332800296
- Muthén, L. K., & Muthén, B. O. (1998-2012). Mplus user's guide (7th ed.). Los Angeles, CA.
- Neel, R., & Lassetter, B. (2019). The stigma of perceived irrelevance: An affordance-management theory of interpersonal invisibility. *Psychological Review*, 126(5), 634-659. doi: 10.1037/rev0000143
- Nettle, D., Colléony, A., & Cockerill, M. (2011). Variation in cooperative behaviour within a single city. *Plos ONE*, 6(10), e26922. doi: 10.1371/journal.pone.0026922
- Neuberg, S., & Schaller, M. (2016). An evolutionary threat-management approach to prejudices. *Current Opinion in Psychology*, 7, 1-5. doi: 10.1016/j.copsy.2015.06.004
- Neuberg, S., & Sng, O. (2013). A life history theory of social perception: Stereotyping at the intersections of age, sex, ecology (and race). *Social Cognition*, 31(6), 696-711. doi: 10.1521/soco.2013.31.6.696
- Neuberg, S., Williams, K., Sng, O., Pick, C., Neel, R., Krems, J., & Pirlott, A. (2020). Toward capturing the functional and nuanced nature of social stereotypes: An

- affordance management approach. *Advances in Experimental Social Psychology*, 245-304. doi: 10.1016/bs.aesp.2020.04.004
- Öhman, A., Lundqvist, D., & Esteves, F. (2001). The face in the crowd revisited: A threat advantage with schematic stimuli. *Journal of Personality and Social Psychology*, 80(3), 381-396. doi: 10.1037/0022-3514.80.3.381
- Oosterhof, N., & Todorov, A. (2008). The functional basis of face evaluation. *Proceedings of The National Academy of Sciences*, 105(32), 11087-11092. doi: 10.1073/pnas.0805664105
- Paulus, A., & Wentura, D. (2013). Threatening joy: Approach and avoidance reactions to emotions are influenced by the group membership of the expresser. *Cognition and Emotion*, 28(4), 656-677. doi: 10.1080/02699931.2013.849659
- Pauw, L., Medland, H., Paling, S., Moeck, E., Greenaway, K., & Kalokerinos, E. (2021). Social support predicts differential use, but not differential effectiveness, of expressive suppression and social sharing in daily life. *Psyarxiv*. doi: 10.31234/osf.io/ztw53
- Pickett, W., Molcho, M., Elgar, F., Brooks, F., de Looze, M., & Rathmann, K. et al. (2012). Trends and socioeconomic correlates of adolescent physical fighting in 30 countries. *Pediatrics*, 131(1), e18-e26. doi: 10.1542/peds.2012-1614
- Piff, P., & Moskowitz, J. (2018). Wealth, poverty, and happiness: Social class is differentially associated with positive emotions. *Emotion*, 18(6), 902-905. doi: 10.1037/emo0000387

- Ralph-Nearman, C., & Filik, R. (2018). New body scales reveal body dissatisfaction, thin-ideal, and muscularity-ideal in males. *American Journal of Men's Health*, 12(4), 740-750. doi: 10.1177/1557988318763516
- Ralph-Nearman, C., & Filik, R. (2020). Development and validation of new figural scales for female body dissatisfaction assessment on two dimensions: thin-ideal and muscularity-ideal. *BMC Public Health*, 20(1). doi: 10.1186/s12889-020-09094-6
- Reynaud, E., El Khoury-Malhame, M., Rossier, J., Blin, O., & Khalfa, S. (2012). Neuroticism modifies psychophysiological responses to fearful films. *Plos ONE*, 7(3), e32413. doi: 10.1371/journal.pone.0032413
- Rogers, M., Smoak, N., & Liu, J. (2006). Self-reported deviant computer behavior: A Big-5, moral choice, and manipulative exploitive behavior analysis. *Deviant Behavior*, 27(3), 245-268. doi: 10.1080/01639620600605333
- Ruan, Y., Reis, H., Clark, M., Hirsch, J., & Bink, B. (2020). Can I tell you how I feel? Perceived partner responsiveness encourages emotional expression. *Emotion*, 20(3), 329-342. doi: 10.1037/emo0000650
- Russell, E., DelPriore, D., Butterfield, M., & Hill, S. (2013). Friends with benefits, but without the sex: Straight women and gay men exchange trustworthy mating advice. *Evolutionary Psychology*, 11(1), 147470491301100. doi: 10.1177/147470491301100113
- Sacco, D., & Hugenberg, K. (2009). The look of fear and anger: Facial maturity modulates recognition of fearful and angry expressions. *Emotion*, 9(1), 39-49. doi: 10.1037/a0014081

- Safra, L., Tecu, T., Lambert, S., Sheskin, M., Baumard, N., & Chevallier, C. (2016). Neighborhood deprivation negatively impacts children's prosocial behavior. *Frontiers in Psychology, 7*. doi: 10.3389/fpsyg.2016.01760
- Schmitt, D. (2015). Fundamentals of human mating strategies. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 1-23). Hoboken: John Wiley & Sons.
- Segal, H., DeMeis, D., Wood, G., & Smith, H. (2001). Assessing future possible selves by gender and socioeconomic status using the Anticipated Life History Measure. *Journal of Personality, 69*(1), 57-87. doi: 10.1111/1467-6494.00136
- Sell, A., Cosmides, L., & Tooby, J. (2014). The human anger face evolved to enhance cues of strength. *Evolution and Human Behavior, 35*(5), 425-429. doi: 10.1016/j.evolhumbehav.2014.05.008
- Sell, A., Tooby, J., & Cosmides, L. (2009). Formidability and the logic of human anger. *Proceedings of The National Academy of Sciences, 106*(35), 15073-15078. doi: 10.1073/pnas.0904312106
- Shariff, A., & Tracy, J. (2009). Knowing who's boss: Implicit perceptions of status from the nonverbal expression of pride. *Emotion, 9*(5), 631-639. doi: 10.1037/a0017089
- Simpson, B., & Van Vugt, M. (2009). Sex differences in cooperation and prosocial behavior. *Altruism and Prosocial Behavior in Groups, 81-103*. doi: 10.1108/s0882-6145(2009)0000026007
- Springer, U., Rosas, A., McGetrick, J., & Bowers, D. (2007). Differences in startle reactivity during the perception of angry and fearful faces. *Emotion, 7*(3), 516-525. doi: 10.1037/1528-3542.7.3.516

- Stellar, J., Manzo, V., Kraus, M., & Keltner, D. (2012). Class and compassion: Socioeconomic factors predict responses to suffering. *Emotion, 12*(3), 449-459. doi: 10.1037/a0026508
- Susskind, J., Lee, D., Cusi, A., Feiman, R., Grabski, W., & Anderson, A. (2008). Expressing fear enhances sensory acquisition. *Nature Neuroscience, 11*(7), 843-850. doi: 10.1038/nn.2138
- Sutherland, C., Young, A., & Rhodes, G. (2016). Facial first impressions from another angle: How social judgements are influenced by changeable and invariant facial properties. *British Journal of Psychology, 108*(2), 397-415. doi: 10.1111/bjop.12206
- Szepeswol, O., Zamir, O., & Simpson, J. (2019). The effect of early-life harshness and unpredictability on intimate partner violence in adulthood: A life history perspective. *Journal of Social and Personal Relationships, 36*(5), 1542-1556. doi: 10.1177/0265407518806680
- Taylor, S., Klein, L., Lewis, B., Gruenewald, T., Gurung, R., & Updegraff, J. (2000). Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. *Psychological Review, 107*(3), 411-429. doi: 10.1037/0033-295x.107.3.411
- Thompson, E. (2007). Development and validation of an internationally reliable short-form of the Positive and Negative Affect Schedule (PANAS). *Journal of Cross-Cultural Psychology, 38*(2), 227-242. doi: 10.1177/0022022106297301
- Todorov, A., Olivola, C., Dotsch, R., & Mende-Siedlecki, P. (2015). Social attributions from faces: Determinants, consequences, accuracy, and functional significance. *Annual Review of Psychology, 66*(1), 519-545. doi: 10.1146/annurev-psych-113011-143831

- Trivers, R. L. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology*, 46, 35-57.
- Varnum, M. (2013). What are lay theories of social class?. *PLOS ONE*, 8(7), e70589. doi: 10.1371/journal.pone.0070589
- Wake, M. (1992). Morphology, the study of form and function in modern evolutionary biology. In D. Futuyma & J. Antonovics (Eds.), *Oxford Surveys in Evolutionary Biology* (pp. 289-346). New York: Oxford University Press.
- Wang, X., Kruger, D., & Wilke, A. (2009). Life history variables and risk-taking propensity. *Evolution and Human Behavior*, 30(2), 77-84. doi: 10.1016/j.evolhumbehav.2008.09.006
- Wells, L., Gillespie, S., & Rotshtein, P. (2016). Identification of emotional facial expressions: Effects of expression, intensity, and sex on eye gaze. *PLOS ONE*, 11(12), e0168307. doi: 10.1371/journal.pone.0168307
- Whalen, P., Davis, F. C., Oler, J. A., Kim, H., Kim, M. J., & Neta, M. (2009). Human amygdala responses to facial expressions of emotion. In P. J. Whalen & E. A. Phelps (Eds.), *The human amygdala* (p. 265–288). New York: The Guilford Press.
- Wiepking, P. and Breeze, B., 2011. Feeling poor, acting stingy: the effect of money perceptions on charitable giving. *International Journal of Nonprofit and Voluntary Sector Marketing*, 17(1), pp.13-24.
- Wilkowski, B., & Meier, B. (2010). Bring it on: Angry facial expressions potentiate approach-motivated motor behavior. *Journal of Personality and Social Psychology*, 98(2), 201-210. doi: 10.1037/a0017992

- Williams, I. (2011). *The Secret Life of Birds*. United Kingdom: BBC Studios.
- Williams, K., Sng, O., & Neuberg, S. (2015). Ecology-driven stereotypes override race stereotypes. *Proceedings of The National Academy of Sciences*, *113*(2), 310-315. doi: 10.1073/pnas.1519401113
- Willis, M., Windsor, N., Lawson, D., & Ridley, N. (2015). Situational context and perceived threat modulate approachability judgements to emotional faces. *PLOS ONE*, *10*(6), e0131472. doi: 10.1371/journal.pone.0131472
- Wilson, J., Hugenberg, K., & Rule, N. (2017). Racial bias in judgments of physical size and formidability: From size to threat. *Journal of Personality and Social Psychology*, *113*(1), 59-80. doi: 10.1037/pspi0000092
- Wu, J., Yuan, M., & Kou, Y. (2020). Disadvantaged early-life experience negatively predicts prosocial behavior: The roles of Honesty-Humility and dispositional trust among Chinese adolescents. *Personality and Individual Differences*, *152*, 109608. doi: 10.1016/j.paid.2019.109608
- Ye, Y., Zhuang, Y., Smeets, M., & Zhou, W. (2019). Human chemosignals modulate emotional perception of biological motion in a sex-specific manner. *Psychoneuroendocrinology*, *100*, 246-253. doi: 10.1016/j.psyneuen.2018.10.014
- Zebrowitz, L., Kikuchi, M., & Fellous, J. (2007). Are effects of emotion expression on trait impressions mediated by babyfacedness? Evidence from connectionist modeling. *Personality and Social Psychology Bulletin*, *33*(5), 648-662. doi: 10.1177/0146167206297399

Zhu, N., Hawk, S., & Chang, L. (2019). Unpredictable and competitive cues affect prosocial behaviors and judgments. *Personality and Individual Differences, 138*, 203-211. doi: 10.1016/j.paid.2018.10.006

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ABSTRACT

ECOLOGICAL HARSHNESS AND THE COST OF FEAR EXPRESSION

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Fear expression is thought to elicit solely prosocial responses from others. However, no research has yet examined the possibility that fear may also elicit harmful, opportunistic responses, despite sound theoretical grounds to expect this motivation in some. The current work sought to address this gap by examining the impact of childhood exposure to ecological harshness – a factor known to influence prosocial behavior – on the relationship between fear expression and prosocially or opportunistic responding. I predicted that perceivers from harsh environments would behave more opportunistically and less prosocially toward fearful people, and that fearful people would express less fear toward an observer from a harsh versus benign ecology. Results revealed that although fear elicited opportunistic responses in some cases (Study 1 and 2), behavior toward fearful people was not moderated by ecology. Additionally, fearful people expressed less fear in the presence of harsh versus benign observers.