American Psychological Association

Journal of Experimental Psychology: General

ISSN: 0096-3445

2020, Vol. 149, No. 7, 1398–1416
http://dx.doi.org/10.1037/xge0000718

Profiles in Empathy: Different Empathic Responses to Emotional and Physical Suffering

Jennifer E. Stellar
University of Toronto

Craig L. Anderson
University of California, San Francisco

Arasteh Gatchpazian
University of Toronto

Empathy often occurs when individuals witness another suffer. Researchers who study empathy have tried to identify reliable behavioral outcomes, affective responses, and physiological changes associated with its experience. However to date, these markers of empathy have remained elusive. We propose that failing to take into account the features of the suffering that elicited the empathy has contributed to this problem. We hypothesized that emotional and physical suffering generate diverging profiles of empathy with different behavioral, affective, and physiological markers. We first examined how observer's rated 75 different types of suffering. Ratings produced 2 independent clusters—primarily emotional and primarily physical, which classified 80% of suffering events (Study 1). Next we measured behavioral, affective, and physiological markers of empathy for emotional and physical suffering. In a 2-step exploratory (Study 2a) and confirmatory (Study 2b; preregistered) process, participants generated open-ended behavioral responses to suffering scenarios, which were coded, classified into thematic categories, and presented to new participants. We found that emotional suffering elicited more comforting and interpersonal emotion regulation behaviors in others, whereas physical suffering elicited more emergency mobilization behaviors. In Study 3, participants viewed pictures of suffering. Self-reports and coded expressions of compassion were stronger for emotional suffering; anxiety and distress were stronger for physical suffering. In Study 4, participants watched videos of suffering. Emotional and physical suffering elicited increased parasympathetic and sympathetic activation, though coactivation was greater for physical suffering. This work generates a more nuanced and comprehensive understanding of empathy, which addresses current debates and reconciles inconsistencies in its conceptualization.

Keywords: empathy, suffering, emotion, autonomic physiology

Supplemental materials: http://dx.doi.org/10.1037/xge0000718.supp

Empathy is defined as the ability to understand and share another person's thoughts and feelings (Preston & De Waal, 2002; Wispé, 1986; Zaki, 2014). As a prototypical response to another's suffering, researchers who study empathy have tried to identify the behavioral outcomes, affective responses, and physiological changes associated with its experience. However to date, these markers of empathy have been elusive. Meta-analyses reveal weak predictive validity for behavioral outcomes (e.g., Eisenberg & Miller, 1987), studies conflict on whether affective responses like anxiety are part of empathy or an obstacle to it (e.g., Singer & Klimecki, 2014), and other studies have documented inconsistent patterns of physiological activation (e.g., Hein, Lamm, Brodbeck, & Singer, 2011; Stellar, Cohen, Oveis, & Keltner, 2015). We propose that one reason for these discrepant findings may be the failure to account for how observers perceive the suffering that elicited the empathy, specifically whether the suffering is construed as primarily emotional (e.g., grief) versus physical (e.g., breaking a finger).

In the present research we examined the capacity for physical and emotional suffering to generate diverging profiles of empathy, associated with different behavioral, affective, and physiological markers. We hypothesized that empathic responses, when initially encountering suffering construed as primarily *physical* in nature, would be characterized by emergency mobilization behaviors,

This article was published Online First December 5, 2019.

Jennifer E. Stellar, Department of Psychology, University of Toronto; Craig L. Anderson, Department of Psychiatry, University of California, San Francisco; Arasteh Gatchpazian, Department of Psychology, University of Toronto.

Craig L. Anderson is now at the Department of Marketing, Washington University, St. Louis.

This data has previously been presented as a poster at the Society for Personality and Social Psychology (San Antonio) in 2018 in as a flash talk at the Society for Affective Science (Boston) in 2019. All materials, syntax, and data are publically available on Open Science Framework: https://osf.io/tdmc5/?view_only=a28955f26e9346a799e27448f267c4e8. We thank Erika Carlson, Amie Gordon, Brett Ford, and Matthew Feinberg for their insightful advice and suggestions on this article.

Correspondence concerning this article should be addressed to Jennifer E. Stellar, Department of Psychology, University of Toronto, Mississauga, ON L5L 1C6, Canada. E-mail: jennifer.stellar@utoronto.ca

anxious affective responses, and domination of the sympathetic branch of the autonomic nervous system. On the other hand, we hypothesized that empathic responses, when initially encountering suffering construed as primarily *emotional* in nature, would be characterized by comforting and interpersonal emotion regulation behaviors, compassionate affective responses, and domination of the parasympathetic branch of the autonomic nervous system. Across five studies we tested these claims in an effort to bring clarity to the conceptualization and measurement of empathy and to reconcile inconsistent findings on empathic responses to suffering.

The Importance of Differentiating Between Physical and Emotional Suffering for Empathy

Theoretical examinations of empathy in response to suffering have traditionally failed to consider the features of suffering, treating it as monolithic. However, suffering can take diverse forms. One way in which suffering can vary is whether it is primarily emotional or physical in nature. Suffering is often considered primarily emotional when the mind is in pain, which can result from social causes (e.g., rejection), nonsocial causes (e.g., losing one's job), or even ambiguous causes (e.g., depression). On the other hand, suffering is often considered primarily physical when the body is in pain, often due to injury, infection, or illness. Although distinctions between emotional and physical pain may be less salient to the individual who is experiencing the suffering (Eisenberger, Lieberman, & Williams, 2003; MacDonald & Leary, 2005), we propose that observers should be particularly sensitive to differences between the two.

Differentiating between whether another person's suffering is primarily emotional or physical would be especially important to observers because it necessitates different behavioral responses. For example, the initial response to a person who has just been dumped by their long-time partner versus a person who has just burned their hand on the stove should be quite different, though both recruit what would be considered empathic systems. We predict that this distinction between physical and emotional suffering should generate divergent behavioral intentions even in the absence of the ability to take action (e.g., watching a video of a person being injured) or other qualities of the situation such as its unpredictability or uncertainty. Past work finds that failure to respond in a context appropriate manner to another's suffering predicts poorer outcomes for the sufferer (Eisenberg et al., 1989) and is considered a marker of disrupted functioning on the part of the observer (e.g., insecure attachment style or anxiety disorder; Mikulincer & Shaver, 2005; Nietlisbach, Maercker, Rössler, & Haker, 2010). Therefore, identifying the type of suffering would be important for observers to respond appropriately and get the sufferer the kind of help they need.

Support for the claim that observers distinguish between emotional and physical suffering can be found in a few studies that focus on the neural correlates of empathy. For instance, when participants read narratives of suffering, the amount of perceived emotional versus physical pain correlated with neural activity in different brain regions (emotional suffering: precuneus, posterior cingulate, and medial prefrontal cortex; physical suffering: bilateral frontal gyri, left extrastriate region, and left extrastriate body area; Bruneau, Dufour, & Saxe, 2013). Further, manipulating suffering with narratives depicting primarily social pain or physical pain generated divergent activation in the posteromedial cortices compared with a control and this activation peaked over a different time course (Immordino-Yang, McColl, Damasio, & Damasio, 2009). From this work, scholars have suggested that physical suffering activates the shared neural pain network, whereas emotional suffering activates brain regions associated with theory of mind (Bruneau, Jacoby, & Saxe, 2015; Bruneau, Pluta, & Saxe, 2012). The differences between neural signatures of empathy for emotional and physical suffering are so pronounced that these two types of suffering have been used to generate distinct functional localizers to identify brain regions of activation within fMRI studies (Jacoby, Bruneau, Koster-Hale, & Saxe, 2016). These studies show promise for our aim of identifying divergent behavioral, affective, and physiological markers of empathy in response to emotional versus physical suffering. In addition, we extend this work to examine empathic responses to suffering witnessed in real time (i.e., pictures and videos of people emotionally or physically suffering).

This handful of findings stands in contrast to the majority of empirical investigations of empathy that typically fail to take into account the type of suffering. This tendency is exacerbated by differential reliance on emotional versus physical suffering when evoking empathy across diverse subfields of psychology. For instance, most studies within neuroscience induce empathy using stimuli that represent primarily physical forms of suffering, including pictures of limbs in painful positions (e.g., Danziger, Faillenot, & Peyron, 2009; Fan & Han, 2008; Jackson, Meltzoff, & Decety, 2005), facial expressions and experiences of pain (e.g., Botvinick et al., 2005; Budell, Jackson, & Rainville, 2010; Lamm, Batson, & Decety, 2007; Loggia, Mogil, & Bushnell, 2008; Saarela et al., 2007), needles penetrating hands and feet (e.g., Avenanti, Bueti, Galati, & Aglioti, 2005; Morrison, Lloyd, Di Pellegrino, & Roberts, 2004; Xu, Zuo, Wang, & Han, 2009), or pictures of people in physically challenging situations (e.g., amid a natural disaster; Mathur, Harada, Lipke, & Chiao, 2010). This focus on physical suffering likely arose out of early work that delineated a clear neural network for pain allowing empathy for this kind of suffering to be more easily assessed in the brain (Singer & Klimecki, 2014). Not surprisingly, recent meta-analyses of empathy focus on empathy for pain, comparing it with all other negative states collapsed together (e.g., anger, fear, sadness; Lamm, Decety, & Singer, 2011; Timmers et al., 2018).

Studies of altruism also typically use physically painful stimuli such as witnessing another person receive electric shocks or place their hand in extremely hot or cold water (Batson, O'Quin, Fultz, Vanderplas, & Isen, 1983; Hein et al., 2011; Krebs, 1975; Singer et al., 2006). This paradigm often explores whether empathy motivates individuals to take the place of the other person who is suffering, which necessitates the use of physical, rather than emotional, suffering. Across these two disciplines empathy emerges as an experience marked by heightened feelings of personal distress, unpleasantness, and sympathy (Fan & Han, 2008; Lamm et al., 2007; Loggia et al., 2008), expressions of vicarious pain (Lamm, Porges, Cacioppo, & Decety, 2008), and increased autonomic arousal (heart rate acceleration and/or increase skin-conductance responses; Hein et al., 2011; Vaughan & Lanzetta, 1981), which encourages overt helping behavior (Batson et al., 1983; Hein et al., 2011).

In contrast, affective science, developmental, and clinical psychology have predominantly examined empathy in response to emotional suffering. Common paradigms to induce empathy include scenarios, pictures, and videos in which individuals suffer from adjusting back to life after negative experiences (Eisenberg et al., 1996), losing their home or being homeless (Batson et al., 1997; Cialdini, Brown, Lewis, Luce, & Neuberg, 1997), being separated from parents (Anastassiou-Hadjicharalambous & Warden, 2007), living with mental illness (Lebowitz & Ahn, 2014), or simply visual expressions of sadness (Harrison, Wilson, & Critchley, 2007). Within these disciplines empathy emerges as an experience marked by heightened compassion, sympathy, warmth, tenderness, and sadness (Anastassiou-Hadjicharalambous et al., 2007; Batson et al., 1997; Lebowitz & Ahn, 2014), expressions of sadness and sympathy (Anastassiou-Hadjicharalambous et al., 2007; Eisenberg et al., 1989), and reduced autonomic arousal (heart rate deceleration and greater respiratory sinus arrhythmia; Eisenberg et al., 1989; Stellar et al., 2015), which encourages a variety of behaviors ranging from sharing, comforting, and volunteering to helping (Eisenberg & Miller, 1987).

Therefore, despite observer's strong motivation to differentiate emotional from physical suffering, the majority of studies of empathy have not taken this distinction into account. This issue is compounded by greater reliance on primarily emotional or physical suffering within different disciplines, which we suggest has generated diverging portraits of the experience of empathy. Though some common characteristics emerge across fields (e.g., sympathy/compassion), the numerous differences in empathic responding have impeded the ability to identify reliable behavioral, affective, and physiological markers of empathy.

Markers of Empathy: Debates and Inconsistencies

In addition to discipline-specific tendencies to rely more heavily on primarily physical versus emotional suffering when eliciting empathy, debates and inconsistencies about behavioral outcomes, affective responses, and physiological activity during empathy itself further complicate the search for reliable markers of its experience. For each marker—behavioral, affective, and physiological—we highlight these debates and inconsistencies and identify how taking into account the type of suffering may help addresses them.

With respect to behavioral outcomes of empathy, the empathy-altruism hypothesis proposes that empathy is critical to promoting prosocial action (e.g., Batson, Duncan, Ackerman, Buckley, & Birch, 1981). However large-scale meta-analyses have found empathy to be unreliably associated (Underwood & Moore, 1982) or associated to a low-to-moderate degree with prosociality (Eisenberg & Miller, 1987). We suggest that accounting for the type of suffering may reveal specific, context-appropriate prosocial behaviors that would more consistently be associated with empathy for either physical or emotional suffering. In addition, in these meta-analyses the suffering is often emotional, while the empathic behaviors may represent more prototypical responses to physical suffering, potentially reducing the strength of the relationship between empathy and behavioral outcomes.

With respect to affective responses, empathic concern is considered a hallmark of empathy (Batson, Fultz, & Schoenrade, 1987). Empathic concern includes emotions like compassion, sympathy, softhearted, warmth/tenderness, and moved, which are frequently experienced in response to suffering (e.g., Stellar & Keltner, 2014; Stellar, Manzo, Kraus, & Keltner, 2012). The role of emotions like anxiety and personal distress during empathy, however, is still debated. Personal distress is argued to lead to self-focused cognitions and avoidance motivations (Eisenberg et al., 1988, 1989; Singer & Klimecki, 2014) and is considered a marker of a selfish motivation for altruism that is often contrasted with genuine empathy (e.g., Batson et al., 1987). However, distress and anxiety are common in response to physical suffering. Foundational studies by Batson, O'Quin, Fultz, Vanderplas, and Isen (1983), note that personal distress is elicited to roughly the same degree ($M = 3.99$ out of 7) as empathy ($M = 4.03$ out of 7) and moderately correlated with empathy ($r = .38$) when witnessing another person receive painful shocks. In addition, instructions to empathize while watching a target physically suffer generates vicarious pain expressions (muscle movements of orbicularis oculi muscle) in observers (Lamm et al., 2008). Finally, trait empathy consistently correlated with vicarious anxiety in response to others' suffering (Shu, Hassell, Weber, Ochsner, & Mobbs, 2017). We propose that claims about whether anxiety and distress are part of or hinder empathy may depend on the type of suffering.

With respect to physiological patterns of activity associated with empathy for another's suffering, inconsistent and potentially incompatible findings exist. Some studies find empathy generates activation of the sympathetic system (e.g., heart rate acceleration; skin conductance; Hein et al., 2011; Krebs, 1975; Vaughan & Lanzetta, 1981), whereas others find it generates activation of the parasympathetic system (e.g., heart rate deceleration, increased respiratory sinus arrhythmia; Craig & Wood, 1969; Eisenberg et al., 1989; Stellar et al., 2015; van Hulle et al., 2013). Further complexity is added by instances in which an oscillation between these two systems (Lamm et al., 2008; Vaughan & Lanzetta, 1981) or coactivation of both systems (Englis, Vaughan, & Lanzetta, 1982) has been documented. These systems may be sensitive to and differentially activated by physical versus emotional suffering. In sum, these debates and inconsistencies with respect to the behavioral, affective, and physiological markers of empathy highlight the need for a more nuanced perspective on empathy that accounts for the features of the suffering itself.

Identifying Behavioral, Affective, and Physiological Markers of Empathy for Physical Versus Emotional Suffering

In generating hypotheses about markers of empathic responding we employ a social functionalist approach, which suggests that emotions and physiology promote adaptive and functional behavioral responses (e.g., Fischer & Manstead, 2008; Keltner & Haidt, 1999; Niedenthal & Brauer, 2012). However, the context is critical in shaping what behavioral responses are adaptive and functional when feeling empathy (Barrett, 2012). In this case we consider the context to be whether the observer construes another's suffering to be primarily emotional versus physical. When feeling empathy for someone who is suffering emotionally, it is likely that observers' initial behavioral responses will be aimed at reducing the sufferer's emotional pain. Therefore, we hypothesized that observers who witness another suffering emotionally would be inclined to engage in comforting and interpersonal emotion regulation behaviors,

ranging from providing a comforting touch (e.g., a hug) and expressing sympathy/condolences to engaging in distraction (e.g., offering to take the person to do something fun) and displaying optimism (e.g., injecting humor), that reduce negative affect. On the other hand, when feeling empathy for someone who is suffering physically, observers' initial behavioral responses will likely be aimed at reducing the sufferer's physical pain. Therefore, we hypothesized that observers who witness another suffering physically would display a repertoire of urgent emergency mobilization behaviors to provide aid to the sufferer—rushing over to bandage a wound or cut, recruit others (i.e., doctors) to help, and/or stay with them while help arrives.

In light of these divergent behavioral responses to primarily physical versus emotional suffering, we can make claims about the affective responses that undergird them. Compassion related states like sympathy, warmth, and tenderness would promote comforting and interpersonal regulation behaviors in response to witnessing emotional suffering. These emotions would likely activate caretaking or nurturance behaviors on the part of the observer. On the other hand, anxiety-related states like distress, discomfort, and alertness likely prepare an individual to mobilize to help the sufferer in response to witnessing physical suffering. It may be expected that these affective responses would push an observer away from the sufferer, but we believe as long as the observer does not perceive any direct threat to themselves, these emotions would prepare them to engage in approach-related emergency helping behavior.

Like emotions, autonomic physiological changes also prepare the body for behavior by guiding metabolic processes (Cacioppo, Tassinary, & Berntson, 2007). We propose that parasympathetic activation, which is generally associated with relaxation processes in the body during rest and digestion, would support comforting and caretaking responses to the emotional suffering of others. Past work suggests that parasympathetic activation occurs during affiliative moments, supporting positive social behaviors (Porges, 2001, 2007). We chose to measure respiratory sinus arrhythmia (RSA), a noninvasive index of vagal activation, as our marker of parasympathetic activation. Recent research suggests that the vagus nerve may be relevant for facilitating caretaking behavior (Stellar & Keltner, 2017) and finds that RSA increases in response to emotional suffering and correlates with compassion (Stellar et al., 2015). Alternately, we propose that sympathetic activation, which is generally associated with a *fight or flight* response to stressful situations, would support mobilization in response to the physical suffering of others to provide aid (Cacioppo et al., 2007). This system primes action, especially in response to challenges or threats in one's environment (Tomaka, Blascovich, Kibler, & Ernst, 1997). We chose to measure skin conductance (SCL) as our marker of sympathetic activation because previous research has identified increases in SCL in response to physical suffering (Hein et al., 2011). Therefore, we hypothesized that physical suffering would elicit increased sympathetic activation, whereas emotional suffering would elicit increased parasympathetic activation.

In sum, we predicted divergent profiles of empathy defined by different behavioral outcomes, affective responses, and physiological changes in response to physical and emotional suffering (see Table 1). To further tease apart these two profiles of empathy, we also predicted that different affective and physiological responses should be more strongly associated with empathy depending on the type of suffering. More specifically, compassion and parasympathetic activation would be more strongly correlated with reported empathy for emotional suffering, whereas anxiety and sympathetic activation would be more strongly correlated with reported empathy for physical suffering.

Present Research

To test our hypotheses we conducted five studies. We first aimed to establish whether participants' ratings of suffering events would generate two independent and distinct groups—primarily emotional versus primarily physical suffering. Participants rated how emotional and physical 75 suffering events were (Study 1), and then we analyzed the data using cluster analysis. In Studies 2–4 we focused on measuring the behavioral, affective, and physiological responses associated with empathy for these two types of suffering. We first aimed to identify whether empathy for emotional versus physical suffering evoked divergent behavioral intentions in observers (Study 2). In a two-step exploratory (Study 2a) and confirmatory (Study 2b; preregistered) process, participants generated open-ended behavioral responses to suffering scenarios, which were coded, classified into thematic categories, and presented to new participants. In Study 3, we assessed affective responses to another's physical and emotional suffering. Participants reported on their emotions and coders rated participants' emotion expressions while they viewed a series of pictures depicting physical and emotional suffering. In Study 4, we assessed physiological changes when witnessing another's physical and emotional suffering. Participants watched videos of emotional and physical suffering while we recorded their sympathetic (skin conductance) and parasympathetic (RSA) activity. In Studies 3 and 4, we collected participants' self-reports of their empathy.

In an effort to aid in the transparency and replicability of this work we have made all the syntax, data, and materials available online on Open Science Framework (https://osf.io/tdmc5/?view_only=a28955f26e9346a799e27448f267c4e8). In addition, we preregistered our confirmatory study (Study 2b) on Open

Table 1
Proposed Initial Empathic Responses to Primarily Emotional Versus Physical Suffering

	Initial empathic response	
Marker	Emotional suffering	Physical suffering
Behavioral	Comforting, soothing, caretaking, and interpersonal emotion regulation	Providing urgent and immediate emergency aid
Affective	Compassion, sympathy, warmth, tenderness, soft-heartedness, moved	Distress, anxiety, unease nervousness, alertness
Physiological	Parasympathetic activation (increased respiratory sinus arrhythmia)	Sympathetic activation (increased skin conductance)

Science Framework. The other studies were collected before preregistration was considered a best practice within science. All studies received Institutional Review Board approval.

Study 1

We first aimed to establish whether people's ratings of suffering events would generate two independent and distinct groups of suffering—primarily emotional versus primarily physical. To achieve this aim we had participants rate 75 suffering events on the how much they included physical versus emotional suffering. Our main statistical approach was a cluster analysis, a multivariate technique that allowed us to identify whether different groups of suffering emerge that are primarily physical or emotional. This method has been used in a variety of contexts within affective science such as exploring whether autonomic responses form different clusters during the experience of different emotions (Stephens, Christie, & Friedman, 2010), identifying whether different emotion self-report clusters emerge for different emotion induction videos (Gross & Levenson, 1995), and making the case that emotion expressions are not culturally universal (Jack, Garrod, Yu, Caldara, & Schyns, 2012). This analysis identifies whether relatively homogenous groups exist that are more similar to each other than they are to other groups (Hair, Anderson, & Tatham, 1995). We allowed the data to generate the number clusters and then confirmed them in a second analytic step. Support for our hypothesis would be found if two independent clusters emerged: one that was primarily emotional and one that was primarily physical. Our hypothesis would not be supported if one cluster emerged or clusters characterized by different patterns, such as one that was low on both physical and emotional suffering and another with high on both emotional and physical suffering, emerged.

To augment these analyses, we also examined whether the extent to which the events were rated as representing "emotional" would correlate with the extent to which they were rated as representing "physical" suffering. We predicted that they would be negatively correlated with one another, such that the more a suffering event was construed as physical the less it would be construed as emotional, and vice versa, rather than being uncorrelated or positively correlated.

Method

Participants. Forty-five undergraduates (17 males, 28 females) from a large West Coast university took part in this study for credit. The ethnicities that made up the participant sample were as follows: 22% European American, 58% Asian American, 9% Latin American, 4% Middle Eastern, and 7% other ethnicities. Because our primary hypothesis test was a cluster analysis of the events, it was unclear how to identify sufficient power for our sample size for participants. However there are suggestions about the number of items (suffering events) to use (Dolnicar, 2002). The most conservative analyses suggested a minimum of 40 types of suffering events to have sufficient power to detect the theorized number of clusters. We collected 75 types of suffering instead of 40 because we also wanted our list to represent the most common forms of suffering.

Procedure. Participants came to the laboratory in groups of two to five and took part in an experiment that was unrelated to this study.[1] After participants completed that study they were shown a randomized list of 75 suffering events (e.g., *poverty, death of a loved one, getting beat up, getting a cut*; see Supplemental Table S1 for entire list). Participants rated each suffering event on the extent to which it involved emotional suffering ranging from 1 (*none*), 2 (*a little*), 3 (*somewhat*), 4 (*very much*), 5 (*extremely*). Then again for the extent to which it involved physical suffering or pain, ranging from 1 (*none*), 2 (*a little*), 3 (*somewhat*), 4 (*very much*), 5 (*extremely*).[2]

In generating our list of suffering events we had two goals. First, to represent types of suffering used in the research on empathy. Second, to create a comprehensive list that included common forms of suffering. To create the list of suffering events, six research assistants blind to the hypotheses of the study, collected articles that measured empathy across a range of subfields within psychology from social, clinical, developmental, and cognitive psychology to affective science and neuroscience (for included articles see Supplemental Table S2). Research assistants recorded the type of suffering used to elicit empathy (e.g., finger bent in an unnatural way as if broken) to create an initial list. Then the research assistants and experimenter generated additional events to fill in missing types of suffering to create a more comprehensive list that represented common forms of suffering. In addition, some variations of suffering were combined (e.g., breaking an arm and breaking a leg became breaking a bone). The resulting list included 75 types of suffering instances. Although this list was not intended to include every possible suffering event, it was intended to be represent the majority of types of suffering people encounter from minor to severe.

Results and Discussion

For each suffering event, all participant's ratings were aggregated for the emotional suffering rating and again for the physical suffering rating, resulting in one score of emotional suffering and one score of physical suffering for each of the 75 types of suffering (see Supplemental Table S3 for aggregated ratings of each item). Our primary analysis was a two-stage cluster analysis. In the first stage we used a hierarchical cluster analysis in which we included the ratings of physical and emotional suffering for each event. This type of analysis does not require an a priori decision about the number of expected clusters, but rather allows the clusters to emerge based on the data. We used Ward's method, which calculates the sum of squared distances within clusters and then aggregates the clusters to identify the minimum increase in the overall sum of squares. We used established guidelines for selecting the number of clusters, which identify the stage immediately preceding a large increase in the agglomeration coefficient (Hair et al., 1995). The agglomeration schedule and the dendrograms (see Supplemental Table S4 and Figure S1) revealed a sharp increase in

[1] All materials for the unrelated study for this and all other studies are available at our OSF site.

[2] They rated these words a third time for negativity.

the within group sum of squares with the emergence of a third cluster, suggesting three relatively independent clusters.[3]

We then conducted a k-means cluster analysis in which we defined three clusters, based on our previous results from the hierarchical cluster analysis. This analysis classifies the 75 types of suffering into our three clusters. Table 2 presents the means of these clusters' on ratings of emotional and physical suffering and Figure 1 visually depicts them as clusters. These analyses revealed a cluster that was primarily categorized as emotional (e.g., death of a loved one, depression, being the victim of prejudice), a cluster that was primarily categorized as physical (e.g., falling off a bicycle, getting shocked, jamming one's finger in a door) and a cluster that was a roughly equal blend of the two, which may also represent extreme suffering because it received high scores on both (e.g., chronic hunger, rape, child abuse; see Supplemental Table S3 for which cluster each type of suffering was classified under). Eighty percent of the suffering events in this sample fell under either the primarily emotional or primarily physical suffering clusters, suggesting a majority of the suffering events we presented were classified as primarily emotional or physical.[4] In addition, we found that ratings of emotional and physical suffering were negatively correlated, $r(75) = -.41$, $p < .001$, reinforcing the notion of two distinct types of suffering.

These results supported Hypothesis 1, which predicted that a majority of suffering events would be construed as primarily physical or primarily emotional suffering. However, caution should be applied in generalizing to all forms of suffering as this list of 75 events did not represent the entire population of suffering events. In addition, interestingly a notable minority of cases (20%) represented a blend of both. These findings conflict with a previous study that showed a positive correlation between physical pain and emotional suffering across a variety of suffering scenarios (Bruneau et al., 2013). However, Bruneau et al. (2013) scenarios intentionally included mild emotional and physical suffering as well as scenarios in which the emotional or physical suffering was eliminated or lessened. The inclusion of these scenarios likely increased the positive correlation, because ratings more strongly reflected absolute variations in levels of suffering potentially minimizing the difference between the type of suffering. Next we proceeded to our primary aim of identifying whether suffering that is primarily emotional versus physical evokes different behavioral, emotional, and physiological empathic responses in observers and use these events to generate suffering stimuli that will allow us to cleanly differentiate empathic responses to these two types of suffering.

Study 2

In Study 1 we found evidence for the claim that a majority of suffering events are rated as primarily physical or primarily emotional. The aim of this study was to investigate whether these distinct forms of suffering generate divergent empathic responses in others. In Study 2, we focused on empathic responding at the behavioral level. We hypothesized that that responses to physical suffering would be characterized by emergency mobilization behaviors, whereas responses to emotional suffering would be characterized by comforting and interpersonal emotion regulation behaviors.

To test this hypothesis we conducted two studies. The first stage was data-driven and exploratory (Study 2a). We asked participants to report their first three responses when encountering individuals

Table 2
Suffering Clusters

Cluster feature	Primarily emotional suffering	Primarily physical suffering	Both
Number of events	36	24	15
Mean (*SD*) emotional rating	4.23 (.43)	1.97 (.33)	3.97 (.60)
Mean (*SD*) physical rating	1.97 (.44)	3.55 (.42)	4.24 (.40)

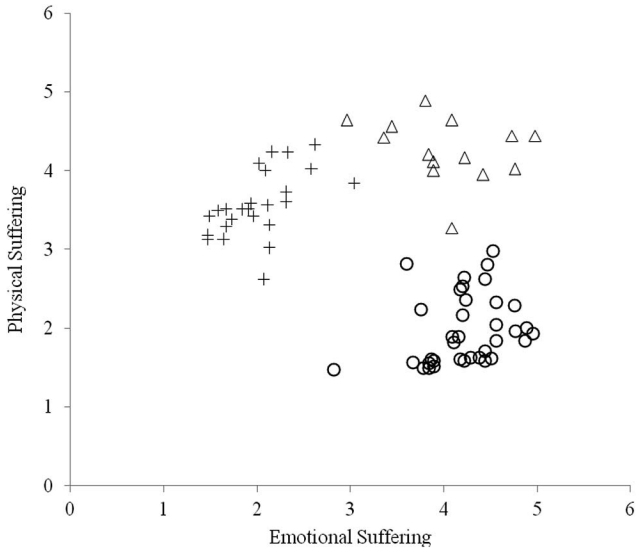

Figure 1. Three clusters of types of suffering (crosses represent primarily physical suffering, circles represent primarily emotional suffering, and triangles represent a roughly equal blend of the two) emerged in Study 1.

[3] Identifying the number of clusters is somewhat subjective. A case could be made for defining these data with two clusters (primarily physical or primarily emotional) rather than three, but we chose to focus on greater granularity, classifying them into three groups.

[4] To ensure our list of suffering events was truly comprehensive and included the most common types of suffering we conducted an additional study in which participants ($n = 101$) listed up to 10 suffering events. This approach resulted in 859 responses. The majority of these responses (688 responses or 80%) fit within our existing 75 types of suffering events. Thirty-one responses (3%) did not fit with these categories, but were vague (e.g., accident), did not make sense (e.g., rocks), or were uncommon (only listed by one participant; e.g., gaining weight). The remaining 140 (16%) fit within 14 new categories. Additionally, 16 of the original suffering events from Study 1 were uncommon in this new sample (i.e., not listed more than once) and were dropped from the subsequent analyses. The 14 new types of suffering were presented to a new set of participants ($n = 54$) who rated them using the same method as Study 1 (see Supplemental Table S5). The means of these new events were then added to the original events from Study 1 and the 16 uncommon events were removed. We conducted the same a cluster analyses described in Study 1. The pattern of results remained the same. Three clusters emerged (see Supplemental Tables S6 and S7 and Supplemental Figure S2 for details). The majority of these suffering events were classified as primarily physical or primarily emotional, with a minority of events (25%) representing a blend of both. These results give us confidence that our findings in Study 1 reflect how most types of suffering are construed.

who were suffering. We used four hypothetical scenarios of suffering based on Study 1 (two depicting physical suffering and two depicting emotional suffering). The behaviors that participants reported in response to the hypothetical scenarios were grouped into thematic categories. In the second stage we conducted a preregistered confirmatory study (Study 2b). We presented the thematic categories generated from Study 2a to novel participants after they read five emotional suffering and five physical suffering scenarios and asked them which behaviors they would engage in for each scenario.

Study 2a

Method

Participants. One-hundred and twenty-six undergraduates (29 males, 95 females, two declined to state) from a large West Coast university took part in this study for credit. The ethnicities that made up the participant sample were as follows: 1% African American, 43% Asian American, 35% European American, 10% Latin American, 5% Middle Eastern, and 6% other ethnicities. Because we could not predict the frequency of behaviors we would find in each category or the number of categories that would emerge, it was difficult to identify an appropriate sample size. Therefore we collected 12 behavioral responses from each participant and set a goal of approximately 100 people in our sample for a total of 1,200 responses to categorize.

Procedure. Participants came to the laboratory and took part in this study along with another unrelated study. They filled out demographic information about themselves and were then presented with four scenarios that depicted either primarily physical or primarily emotional suffering.[5] In the emotional suffering scenarios participants were informed that the target's romantic partner had just dumped them or they had just found out that their grandparent had passed away. In the two physical suffering scenarios they were told the target had just fallen off their bike and got a big scrape on their arm or just jammed their finger in a door and it was likely broken (see scenarios in online supplemental materials).

These scenarios were generated around events from Study 1 that were rated as primarily physical or primarily emotional in nature. They were selected because they showed clear differentiation between emotional and physical suffering making them ideal to examine potential differences in empathic responding. Based on Study 1, the events used to depict emotional suffering had higher ratings on emotional ($M = 4.38$, $SD = .69$) than physical suffering ($M = 1.71$, $SD = .18$). The events used to depict physical suffering had higher ratings physical ($M = 3.21$, $SD = .11$) than emotional suffering ($M = 1.66$, $SD = .02$). The emotional events did have a higher mean rating of negativity ($M = 4.23$, $SD = .71$) than the physical suffering events ($M = 2.51$, $SD = .10$) from 1 (*none at all*) to 5 (*extremely*), an issue we rectify in Study 2b.

In each scenario participants were asked to imagine seeing a friend from class as the target. We chose not to use a stranger because we did not want participants to refrain from listing certain behaviors because they would be uncomfortable expressing them with someone they did not know. For each scenario participants were asked to list the first three things they would say or do in response to this situation in a phrase or short sentence.

Coding open-ended responses. The experimenter read a majority of the open-ended responses and used these responses to create broader thematic groups under which future responses could be categorized. Eleven thematic groups were created: *elaboration and information-seeking, sympathizing, optimism, distraction, identification, staying with person, verbalizing support, providing comforting touch, recruiting others, expressing urgency, and helping* (see Table 3 for descriptions of each category).

During a training session these categories were explained to seven coders, blind to the hypotheses of the study. The coders practiced classifying a small subset of participant's responses into the aforementioned categories. Coders were then assigned to code the remaining participant's responses for one or two of the scenarios. As a result, there were four groups of coders; within each scenario the same three coders coded every participant's responses.

If a statement did not fit within a thematic category its absence was noted with a "0" and if it did fit within a thematic category its presence was noted with a "1." Because participants wrote three responses for each scenario, for each thematic category the score could range from 0 (none of their three statements fit within that category), to 3 (all three statements fit in that category). A single response could be categorized within more than one thematic category (for example, I would help the person [*helping*] and then give them a hug [*comforting touch*]). Out of the total of 1,512 responses generated by participants across all stories, only 10 responses could not be categorized within any one of the 11 established thematic categories by the majority of coders, suggesting these thematic categories captured almost all of the behaviors participants listed.

Next we calculated the intraclass correlation coefficients (ICC) for the coders for each category for each scenario. Within each scenario some thematic categories had very few observations, (e.g., comforting touch was only coded as occurring three times out of 252 possible times across the physical suffering scenarios). In these cases there was not enough variance to calculate an ICC (see Supplemental Table S8 for frequency of responses and average ICC coefficient for each of the 11 thematic categories for the physical and emotional suffering scenarios). This occurred five times out of the 22 in which an ICC was calculated (11 thematic categories for emotional suffering and again for physical suffering). The mean ICC across the categories that could be calculated with two-way random absolute agreement was .86 (range: .61–.99). One measure showed lower reliability, *identification,* within the physical suffering scenarios (ICC = .31). Within each story the coders' scores were averaged to create a final score for each category.

Scores were then summed across the two physical suffering scenarios and also across the two emotional suffering scenarios. As a result, participants could have a score anywhere between zero to six for each category, which represented how many times out of six possible times a response fit within a thematic category because up to six statements across the two stories could be classified in that category.

[5] An additional scenario that was a blend of both emotional and physical suffering from Study 1 was also used, but it was not analyzed.

Table 3
Participant's Reported Empathic Responses

Thematic category	Components
Elaboration and information-seeking	Asking about the event
	Seeking more information about the event
	Trying to ascertain if the person was alright
	Wanting to talk to the person about the event
	Stating they would listen to the sufferer talk about event
	Attempts to discern how severe problem was
Sympathizing	Stating that they would say sorry
	Offering sympathy
Optimism	Being encouraging
	Injecting humor
Distraction	Taking actions that were stated as intending to distract person from their suffering
	Taking person to do something fun, calming, relaxing, comforting
Comforting touch	Giving person a hug, pat on the back, holding their hand
Identification	Saying something to suggest participant identified with how sufferer was feeling
Staying with person	Saying they would sit with sufferer
	Saying they would remain with sufferer
Verbalizing support	Stating that they would support person if they need them
Recruiting others	Trying to get others to help
	Taking person somewhere to get help
Helping	Stating they would help
	Stating they would ask how to help
	Listing specific actions to ameliorate the suffering
Expressing urgency	Saying they would run
	Saying they would move quickly

Results

The coded responses were non-normally distributed and therefore we conducted a Wilcoxon's test to examine whether participants differentially listed responses from each category when reading the emotional versus physical suffering scenarios. The first three columns in Table 4 shows that when responding to emotional suffering participants generated significantly more statements categorized as *comforting touch*, *expressing sympathy*, *showing optimism*, *distracting the sufferer*, *staying with them*, and *identifying with their suffering*. In contrast, when responding to physical suffering, participants generated more statements categorized as *helping*, *recruiting others*, *verbalizing support*, and *expressed urgency*. *Elaboration and information seeking* was a common response and equally likely in response to emotional and physical suffering. A Bonferroni correction for multiple tests altered the threshold of significance value to $p < .005$. This did not change our pattern of results except for *verbalizing support* just missed this threshold at $p = .006$.

Study 2b (Preregistered)

Method

Participants. Ninety-two people (58 males, 34 females) from Mechanical Turk took part in this study for compensation. The ethnicities that made up the participant sample were as follows: 16% African American, 8% Asian American, 63% European American, 5% Latin American, and 8% other ethnicities. The average age was 34.16 ($SD = 11.25$). A sample size of 90 was the minimum that would allow us to detect small to medium sized effects (Cohen's $d = 0.3$–0.4) using a paired sample t test with 80% power at $p = .05$. This study was preregistered on OSF.

Procedure. Participants took part in this study on their own computers. After filling out demographic information they were shown 10 scenarios designed to represent primarily physical or primarily emotional suffering based on the ratings of events from Study 1. Five scenarios depicted emotional suffering and five scenarios depicted physical suffering (see online supplemental materials for scenarios). The emotional suffering scenarios included seeing a person who was just fired from their job, who had failed a very important test, who was dumped by a long-term partner, whose pet just passed away, and who was dealing with the difficulties of caring for an elderly parent. The physical suffering scenarios included seeing a person cut their foot, get a scrape from falling off their bike, get a painful electric shock from a live wire, jam their finger in a door dislocating it, and break their leg playing soccer.

We generated these scenarios based on events from Study 1 that participants had construed as primarily emotional versus physical suffering, but were roughly equivalent on negativity. The mean physical and emotional suffering of the emotional scenario group was 1.56 ($SD = .05$) and 4.01 ($SD = .23$), respectively; the mean physical and emotional suffering of the physical scenario group was 3.78 ($SD = .53$) and 1.98 ($SD = .31$), respectively, on a scale from 1 (*none at all*) to 5 (*extremely*). The negativity rating of the events that comprised the emotional suffering scenarios was 3.81 ($SD = 17$) and the physical suffering scenarios was 3.11 ($SD = .57$), which used the same anchors.

Participants were then shown the 10 thematic categories in randomized order from Study 2a and asked to select three of these behaviors, which they would be most likely to engage in after each scenario. We could not translate sense of urgency from Study 2a into a meaningful thematic category in Study 2b, therefore that category was omitted here. Participants were asked to select three

Table 4
Behavioral Empathic Responses to Emotional and Physical Suffering Scenarios

Categories	Study 2a			Study 2b		
	Physical suffering	Emotional suffering	Significance test (Wilcoxon)	Physical suffering	Emotional suffering	Significance test (*t*-test)
Helping	**2.17 (.87)**	.41 (.58)	$z = 9.72, p < .001, r = .86$	**3.14 (1.59)**	1.46 (1.20)	$t(91) = 7.47, p < .001, d = .78$
Recruiting others	**1.20 (.59)**	.01 (.08)	$z = 9.75, p < .001, r = .86$	**3.40 (1.66)**	.57 (.96)	$t(91) = 11.70, p < .001, d = 1.23$
Expressing sympathy	.04 (.17)	**.96 (.80)**	$z = 8.37, p < .001, r = .74$	.67 (.98)	**2.24 (1.42)**	$t(91) = 7.67, p < .001, d = .81$
Comforting touch	.01 (.07)	**1.12 (.90)**	$z = 8.27, p < .001, r = .73$	.58 (.90)	**1.74 (1.47)**	$t(91) = 6.54, p < .001, d = .70$
Optimism	.21 (.42)	**.72 (.83)**	$z = 5.67, p < .001, r = .50$	1.00 (1.11)	**1.88 (1.33)**	$t(91) = 5.16, p < .001, d = .54$
Distraction	.10 (.37)	**.42 (.65)**	$z = 4.88, p < .001, r = .43$	.83 (1.12)	**1.21 (1.11)**	$t(91) = 2.40, p = .02, d = .25$
Identification	.05 (.13)	**.26 (.46)**	$z = 4.92, p < .001, r = .43$	.78 (1.05)	**1.42 (1.21)**	$t(91) = 3.91, p < .001, d = .41$
Elaboration/Information seeking	1.65 (.89)	1.62 (1.02)	$z = .31, p = .75, r = .03$	**2.21 (1.71)**	1.60 (1.35)	$t(91) = 2.79, p = .007, d = .29$
Stay with person	.01 (.10)	**.32 (.53)**	$z = 5.60, p < .001, r = .49$	**1.62 (1.55)**	.98 (1.20)	$t(91) = 2.89, p = .005, d = .30$
Verbalizing support	**.23 (.39)**	.11 (.29)	$z = 2.76, p = .006, r = .24$	.71 (.96)	**1.76 (1.41)**	$t(91) = 6.22, p < .001, d = .66$
Expressing urgency	**.52 (.52)**	0 (0)	$z = 7.54, p < .001, r = .66$			

Note. For the first three columns, means (*SD*) represent number of times response fell within a category (out of a possible six times) for Study 2a. For the second three columns, means (*SD*) represent number of times that response was selected (out of 10) for Study 2b. For Study 2a effect sizes were calculated as r ($Z/\sqrt{N}$), for Study 2b they represent a Cohen's *d*. Means that were significantly greater in one condition are bolded in that condition.

responses from these 10 choices after each story. Therefore each response was either selected (1) or not selected (0). The categories were defined for participants as follows (italicized words were not included): (a) *elaboration/information seeking*: getting more information (e.g., ask if person is all right, talk to the person about what happened, find out how severe the event is, ask for more details, listen to them talk about event); (b) *expressing sympathy*: say you're sorry about what happened and/or offer your sympathies; (c) *optimism*: be encouraging, positive, or optimistic about future and/or try to inject some humor into the situation to make the person laugh; (d) *distraction*: try to distract the person and/or offer to take them to do something fun, calming, relaxing, or comforting; (e) *comforting touch*: give person a hug, pat them on the back, and/or hold their hand; (f) *identification*: say something to suggest you identify with how the person is feeling; (g) *stay with person*: sit or stay with the person; (h) *verbalizing support*: say you are there to support the person; (i) *recruiting others:* take the person somewhere they can get help and/or go get others who can help; (j) *helping:* help them and/or ask how you can help. The order of presentation of these behaviors was randomized.

Results

For each response, we summed across the five emotional scenarios to obtain how many times that response was selected; we did the same for the five physical scenarios. As a result each variable was between 0 (*not selected in any of five scenarios*), to 5 (*selected in every scenario*) for emotional and physical suffering. The data was normally distributed so we conducted paired *t* tests to examine whether our condition differences identified in Study 2a also emerged in Study 2b. The majority of our effects replicated with a few differences. The last three columns of Table 4 reveal that when participants witnessed physical suffering they more often selected *recruiting others, helping, stay with person*, and *elaboration/information seeking* responses. On the other hand, when they encountered emotional suffering they more often selected *verbalizing support, expressing sympathy, comforting touch, optimism, distraction,* and *identification* responses.

Discussion

The results from Studies 2a and 2b support the claim that emotional and physical suffering elicit divergent initial empathic behavioral intentions in others. Across both studies *helping* and *recruiting others* to help or taking the person somewhere to get help were more prevalent when encountering physical suffering. In contrast, comforting and interpersonal emotion regulation behaviors including *expressing sympathy*, *identifying with the person*, *providing comforting touch*, *expressing optimism*, and *engaging in distraction* were more prevalent when encountering emotional suffering. *Seeking more information about the event*, *staying with the person*, and *verbalizing support* were not consistently selected in response to one kind of suffering over another. These differences support the notion of the importance of context-appropriate prosocial responses that fit the needs of the sufferer. It is important to note that these data come from five scenarios of emotional and five scenarios of physical suffering, therefore caution should be taken as these scenarios do not represent the full population of suffering events individual encounter.

Study 3

Study 2 demonstrated that physical and emotional suffering scenarios do give rise to a number of divergent behavioral intentions in observers that represent context-appropriate empathic responses. In keeping with a social functionalist approach, emotions support behavioral responses and prepare individuals for context-appropriate adaptive action (e.g., Keltner & Haidt, 1999). Therefore in Study 3, we investigated empathic affective responses. We used pictures, piloted to depict either physical or emotional suffering based on the types of suffering from Study 1, and assessed participant's self-reported and expressed emotions. Coding emotion expressions allowed us to circumvent some of the biases inherent in self-reporting emotions and replicate reported emotion effects through another channel.

We predicted that divergent empathic behaviors in response to another's physical and emotional suffering would be grounded in different affective responses. Based on the comforting and interpersonal emotion regulation behaviors identified in Study 2, we hypothesized that emotional suffering would elicit compassion and related states like warmth, tenderness, sadness in others. On the other hand, based on the emergency mobilization behaviors identified in Study 2, we hypothesized that physical suffering would elicit anxiety, and related states like distress, alertness, and nervousness in others.

In addition, we collected reports of participant's empathy. This allowed us to ensure our inductions were eliciting high levels of empathy. It also allowed us to explore how our focal emotions for each type of suffering predicted reported empathy. We hypothesized that compassion and sadness in response to emotional suffering and anxiety in response to physical suffering would most strongly correlate with reports of empathy. Conducting these analyses would allow us to further support our claim that different affective responses underlie empathy in response to these two types of suffering.

Method

Participants. Eighty-three undergraduates (18 males, 65 females) from a large West Coast university took part in this study for credit. The ethnicities that made up the participant sample were: 4% African American, 45% Asian American, 25% European American, 16% Latin American, 6% Middle Eastern, and 5% other ethnicities. We aimed to obtain a sample size that would allow us to find a medium sized effect (Cohen's $d = .3$) in a repeated-measures design at 80% power at $p = .05$, which represented the smallest effect size we found in Study 2b.

Procedure. Participants came into the lab individually and were seated in a laboratory room alone in front of a computer. First they filled out a series of personality surveys on the computer. Then, in a repeated-measures design, they watched two 2-min long series of pictures that were piloted to depict either emotional or physical suffering. The sets of pictures were presented in random order. A video recorder, mounted on the opposite wall of the room recorded a video of the participants face and torso while they watched these two sets of pictures. In between the sets of slides participants filled out demographic information, which was also intended to reduce any carryover effect from one set of slides to the next.

Each set of slides contained 15 pictures that were displayed in succession for 8 s before automatically moving forward to the next picture. At the end of the set of pictures participants were asked to report how much they felt 16 different emotions. Emotions intended to assess compassion for the sufferer included compassion/sympathy, warmth/tenderness, softhearted, and moved (emotional suffering pictures: $\alpha = .80$; physical suffering pictures: $\alpha = .80$) based on past measures of empathic concern (Batson et al., 1987). Emotions intended to measure sadness included sad and upset (emotional suffering pictures: $r = .63$, physical suffering pictures: $r = .57$). Emotions intended to gauge anxiety and distress included anxious, nervous, uncomfortable/uneasy, and alert (emotional suffering pictures: $\alpha = .81$, physical suffering pictures: $\alpha = .87$). We separated compassion and sadness, given the theoretical differences between the two, which we did not want to obscure by combining them (Goetz, Keltner, & Simon-Thomas, 2010). Participants were also asked to rate how much empathy they felt as a single item. Additional emotions intended to hide our focal emotions included annoyed/irritated, contempt/disdain, inspired, angry, disgust, and afraid/scared. All ratings were made on a scale in which participants indicated feeling an emotion or state from 1 (*not at all*) to 10 (*as much as I've ever felt*).

All pictures were piloted online using Mechanical Turk. Participants in this pilot study ($n = 45$) rated each of the 30 pictures on how much physical suffering and emotional suffering they perceived in the picture ranging from 1 (*not at all*), 2 (*slightly*), 3 (*somewhat*), 4 (*very much*). For each picture participant's scores were aggregated, then the 15 pictures intended to show emotional suffering versus physical suffering were aggregated (see Supplemental Table S9 for individual means and standard deviations for each picture). The emotional suffering pictures were rated significantly higher on emotional suffering ($M = 3.63$, $SD = .32$) than physical suffering ($M = 2.09$, $SD = .49$), $t(44) = 18.30$, $p < .001$. The physical suffering pictures were rated significantly higher on physical suffering ($M = 3.46$, $SD = .37$) than emotional suffering ($M = 2.15$, $SD = .48$), $t(44) = 15.66$, $p < .001$. In addition, the emotional suffering ratings were higher for the emotional suffering pictures than the physical suffering pictures, $t(44) = 19.32$, $p < .001$, and the physical suffering ratings were higher for the physical suffering pictures than the emotional suffering pictures, $t(44) = 15.32$, $p < .001$. These results suggest the pictures were effectively able to disentangle primarily emotional from primarily physical suffering.

Coding expressed emotion. Four research assistants were trained to code facial expressions of compassion and anxiety using both descriptions and example photographs. Descriptions of facial expressions were adapted from Eisenberg et al. (1989), in which compassion and anxiety were described by specific components of expression. Compassion was described as including furrowing of the brows in and upward accompanied by either an open mouth or a frown expression. Anxiety was described as tightening of the lips combined with a brow that was lowered and pulled down. In addition, wincing, pulling back, and tightening of the mouth to expose the teeth (a common expression of pain) were also included within the anxiety definition. Pictures of these expressions were also provided to the coders. Vocalizations associated with compassion such as *awwww* and those of anxiety, such as a sharp audible intake of breath were also modeled for coders (Cordaro, Keltner, Tshering, Wangchuk, & Flynn, 2016). Body posture such

as leaning in was described as a cue of compassion, whereas leaning back was described as a signal of anxiety.

Coders were told to use all these cues when making two separate ratings of each participant after each video presentation: (a) *How much do you think they felt compassion and sympathy?* and (b) *How much do you think they felt anxiety and distress?* ranging from 0 (*not at all*), 1 (*a little*), 2 (*moderately*), and 3 (*very strongly*). Coders, blind to which set of pictures participants were viewing, watched participants for the entire 2-min presentation of the slide show with the sound on before making their ratings. Eight videos could not be coded because the participant was wearing a hat or the room was too dark. Therefore, no codes were entered for these participants, leaving a total sample of 75 participants.

Each coder rated all videos. Interrater reliabilities using absolute agreement were as follows: emotional suffering clips coded compassion ICC = .86 and coded anxiety ICC = .60; physical suffering clips: coded compassion ICC = .56 and coded anxiety ICC = .87. Interestingly, focal emotions within each set of pictures (compassion during emotional suffering and anxiety during physical suffering) showed higher reliabilities than nonfocal emotions.

Results and Discussion

Self-reported emotions. Paired sample t tests revealed that participants reported more compassion-related, $t(81) = 5.63$, $p < .001$, $d = .51$, and sadness-related emotions, $t(81) = 5.07$, $p < .001$, $d = .46$, in response to seeing others suffer emotionally compared to physically (see Figure 2; panel A). On the other hand, participants reported more anxiety-related emotions, $t(81) = 3.15$, $p = .002$, $d = .26$, in response to seeing others suffer physically compared with emotionally. In addition, in response to emotional suffering, participants reported less anxiety than compassion, $t(82) = 5.08$, $p < .001$, $d = .51$, and sadness, $t(82) = 5.57$, $p < .001$, $d = .54$, but equal levels of compassion and sadness, $t(82) = .64$, $p = .53$, $d = .08$. In response to physical suffering, participants reported more anxiety than compassion, $t(81) = 2.37$, $p = .02$, $d = .24$, and sadness, $t(81) = 2.18$, $p \leq .03$, $d = .18$, and again equal levels of compassion and sadness, $t(81) = .46$, $p = .64$, $d = .04$.

Coded emotions. Next we tested whether expressions of emotion, rated by trained coders, would replicate these self-reported affective differences. Figure 3 demonstrates that participants showed stronger expressions of compassion during emotional than physical suffering $t(72) = 5.05$, $p < .001$, $d = .69$. The reverse was found for expressed anxiety; participants showed stronger expressions of anxiety during physical than emotional suffering, $t(72) = 6.70$, $p < .001$, $d = .89$. In addition, participants expressed more compassion than anxiety in response to the emotional suffering pictures, $t(73) = 3.42$, $p = .001$, $d = .43$, and more anxiety than compassion in response to the physical suffering pictures, $t(74) = 8.37$, $p < .001$, $d = 1.18$.

Empathy. Self-reports of empathy were high in both conditions, suggesting our emotional and physical suffering stimuli can each be considered an empathy induction (see Figure 2, panel A). However, empathy was higher for emotional than physical suffering, $t(81) = 2.65$, $p = .01$, $d = .17$. We next examined how self-reported and coded expressions of emotions were associated with reports of empathy. When conducting these correlations we controlled for self-reports of the other emotions (e.g., controlled for sadness and anxiety when relating compassion to empathy) to identify the unique relationship of each emotion with empathy. Within the emotional suffering condition, reported compassion was correlated with empathy, $r(79) = .53$, $p < .001$, but reported anxiety, $r(78) = .14$, $p = .20$, and sadness, $r(78) = .08$, $p = .50$, were not. The correlation between empathy and compassion was significantly greater than the correlation between empathy and anxiety, $Z = 2.99$, $p = .003$. We conducted the same analyses for expressions of emotion. Neither compassion, $r(71) = -.11$, $p = .37$, nor vicarious distress, $r(71) = .16$, $p = .18$, were correlated with empathy, when controlling for expressions of the other emotion.

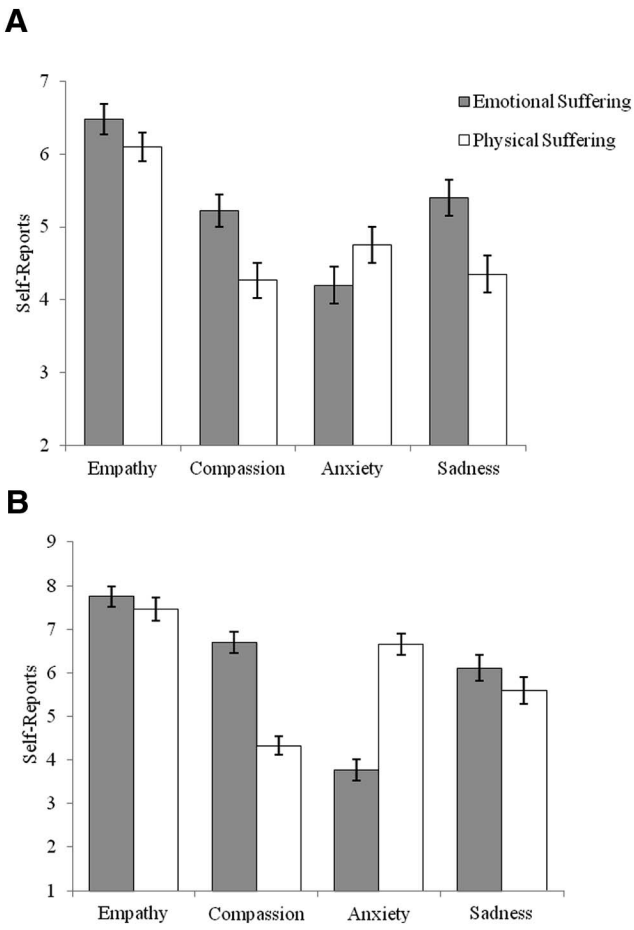

Figure 2. Self-reported emotions after witnessing emotional or physical suffering in (A) Study 3 and (B) Study 4.

Within the physical suffering condition, compassion, $r(78) = .46$, $p < .001$, and anxiety, $r(78) = .32$, $p = .004$, were both significantly correlated with reported empathy, but sadness was not, $r(78) = -.04$, $p = .75$. The correlation between empathy and compassion was not significantly different from the correlation between empathy and anxiety, $Z = 0.99$, $p = .32$. Expressions of anxiety, $r(72) = .20$, $p = .09$, were marginally correlated with empathy, but expressions of compassion were not, $r(72) = -.17$, $p = .14$.

In sum, emotional suffering elicited greater compassion and sadness, whereas physical suffering elicited greater anxiety. These

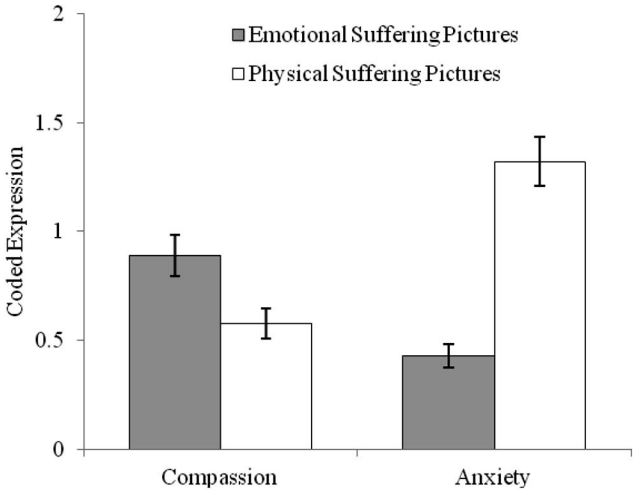

Figure 3. Coded emotions of participants while they viewed physical versus emotional suffering pictures.

effects were consistent across self-reports and expressions. Although reported empathy was high in both conditions, only reported compassion correlated with reports of empathy in the emotional suffering condition. On the other hand, reported anxiety correlated strongly, and to the same degree as compassion, to empathy in response to physical suffering. Surprisingly, empathy did not consistently correlate with expressions of the focal emotions, only anxiety correlated with empathy during physical suffering, and this was a marginal effect. It may be that expressions were more muted in the context of watching pictures alone, and that expressions would be more strongly correlated with reported empathy in a more social interaction that allowed for a wider range and stronger emotion expression. These results suggest a different balance of affective responses when feeling empathy for another's emotional versus physical suffering. Although expressions of emotion may be less subject to demand characteristics than self-reports, participants were told that we would be video recording the experiment. Therefore, we turn to a less conscious and controllable marker of empathy in our next study—autonomic physiological responding.

Study 4

In Study 4 we explored physiological responses when encountering emotional and physical suffering. Physiological activation prepares the body for action in the same fashion as emotions; therefore our hypotheses about divergent affective responding from Study 3 should extend to physiological responding. Participants viewed neutral video clips followed by clips of people experiencing emotional versus physical suffering while we measured their physiological responses. In response to emotional suffering, we expected greater parasympathetic activation in observers, which would be associated with compassion and support soothing and caretaking behavior. We assessed RSA as our primary measure of parasympathetic activation. In response to physical suffering, we expected greater sympathetic activation, which would be associated with anxiety and promote mobilization to provide emergency aid. We assessed skin conductance as our primary measure of sympathetic activation.

We collected participants' ratings of their emotional responses after the clip was over in an effort to replicate our findings from Study 3. We again predicted greater compassion and sadness in response to the emotional suffering film clip and greater anxiety in response to the physical suffering clip. We also investigated how physiological measures and reported emotion correlated with reported empathy in response to each type of suffering, to further tease apart these potential markers of divergent forms of empathy.

Method

Participants. Seventy-three undergraduates (19 males, 54 females) from a large West Coast university took part in this study for credit. The ethnicities that made up the participant sample were: 7% African American, 40% Asian American, 29% European American, 15% Latin American, 6% Middle Eastern, and 4% other ethnicities. As in Study 3, we aimed for a sample size that would allow us to find medium sized effects (Cohen's $d = .3$) at 80% power at $p = .05$.

Before analyzing the data, participants were removed based on notes from the experimenter during the session. Four participants were removed for skipping through a video or moving forward before the video was over and three participants were removed for miscellaneous reasons (they were very sick, they fell asleep during the experiment, or they came to the experiment extremely upset). As a result, a final sample of 65 participants was used for the analyses.

Procedure. Participants arrived in the lab individually and participated in two separate and unrelated studies. Participants were connected to the MP 150 data acquisition and analysis systems (Biopac Systems, Inc., Goleta, CA) to collect physiological signals. First, the experimenter applied sensors to participants' skin in a Lead II configuration to gather electrocardiogram (ECG) signals. Second, a belt was placed on the torso to assess respiration frequency. Third, two additional sensors were placed on the palmar surface of the left hand to measure SCL. Participants spent the first 15 min completing personality and attitude measures, which allowed them to adjust to wearing the sensors and being in the laboratory. They then watched two videos that were unrelated to this study.

After this period, participants watched two sets of videos intended to elicit empathy. In each set the first video was a neutral video. The neutral video was immediately followed by a video depicting suffering. The two videos were selected because they typified emotional and physical suffering and related back to concepts that mapped onto these two types of suffering in Study 1. Between each set of videos there was a 15-min recovery period in which participants filled out demographic and other background information. The order in which the two suffering videos were presented was randomized.

The emotional suffering video showed a compilation of parents discussing their children who had cancer and difficulties of watching their children go through this difficult time. We selected this topic because caring for someone who is ill was rated higher on emotional suffering ($M = 4.22$, $SD = .90$) and lower on physical suffering ($M = 1.58$, $SD = .97$) in Study 1. In addition, this video has previously been used to examine compassion in response to

suffering (Stellar et al., 2015). A matching physical suffering video was then created. The video of physical suffering used the same compilation format, but instead showed sports clips from ice skating to soccer in which athletes were injured. The videos were matched on time and number of subjects who were the focus of the video. This topic was selected because broken bones and other injuries, were rated as higher on physical suffering ($M = 4.24$, $SD = .68$) and lower on emotional suffering ($M = 2.16$, $SD = 1.02$) in Study 1.

Piloting of the videos in a novel sample of participants ($n = 93$, after removing eight people who did not watch the entire video) revealed that the emotional suffering video elicited higher reports of emotional ($M = 4.75$, $SD = 0.53$) than physical suffering ($M = 2.89$, $SD = 1.22$), $t(43) = 9.11$, $p < .001$, $d = 1.38$, and the physical suffering video elicited higher reports of physical ($M = 4.82$, $SD = 0.44$) than emotional suffering ($M = 4.08$, $SD = 0.95$), $t(48) = 5.40$, $p < .001$, $d = .78$. In addition, emotional suffering was rated as higher for the emotional suffering video than the physical suffering video, $t(91) = 4.22$, $p < .001$, $d = .87$ and physical suffering was greater in the physical suffering video than the emotional suffering video, $t(91) = 9.90$, $p < .001$, $d = 2.10$.

After each suffering induction, participants reported on 17 different emotional states, indicating how much they felt each from 1 (*not at all*) to 10 (*as much as I've ever felt*). Some emotions intended to assess compassion-related states (compassion/sympathy, warmth/tenderness, softhearted, moved; emotional suffering: $\alpha = .86$, physical suffering: $\alpha = .68$), sadness (sad, upset; emotional suffering: $\alpha = .79$, physical suffering: $\alpha = .63$), anxiety-related states (anxious, nervous, uncomfortable/uneasy, alert; emotional suffering: $\alpha = .76$, physical suffering: $\alpha = .82$), and additional emotions intended to obscure our focal emotions (annoyed/irritated, contempt/disdain, inspired, angry, disgust, afraid/scared, joy). In addition, participants were asked to rate how much empathy they felt using the same anchors. Finally, participants watched another video for the other study and filled out some measures in response to that video and were debriefed and released.

Physiological measures.

Respiratory sinus arrhythmia (RSA). RSA was calculated from the ECG and respiration (RESP) channels. ECG recordings were sampled at 1 kHz and gathered over the 2 min of each video presentation. Artifacts in the signal (e.g., due to coughing, sneezing or movement) were corrected manually to less than 5% of all data files. We set a threshold for artifacts such that if participants required imputing more than 5 R-spikes during any given video presentation, they were not included in the analysis. RESP signals were filtered with a low-pass filter of 1 Hz and high-pass filter of .05 Hz. Respiration rate was then assessed by transforming the data through the Biopac data acquisition program to breaths per minute. We aggregated respiration rate to create averages over the 2-min video inductions, which were included as covariates in our analyses.

RSA was then calculated using the analysis package in Biopac, which scans the ECG channel for the interbeat intervals to identify how they vary when individuals are inhaling versus exhaling. We took an average the RSA signal for the entire 2 min of each video. RSA signals were normally distributed and therefore we did not log transform them, which is a common practice when analyzing RSA. Three participants did not generate a viable signal for the entire study (one did not produce a signal for the physical suffering condition only and one for the emotional suffering condition only).

Skin conductance level (SCL). We averaged continuous measures of SCL signals over the entire 2 min of each video. Three participants did not generate a viable signal for SCL for the entire study, one did not produce a viable signal only for the physical suffering condition and two only for the emotional suffering condition.

Results and Discussion

Autonomic physiological responses. We conducted a repeated measures ANOVA with time (baseline and video), condition (suffering: emotional and physical), as well as the interaction between the two, predicting each physiological measure. For RSA, we also controlled for changes in respiration between baseline and video for each video. We found a main effect of time, $F(1, 57) = 16.00$, $p < .001$, $\eta^2 = .22$, such that RSA increased from baseline to video, but no main effect of condition, $F(1, 57) = .37$, $p = .54$, $\eta^2 = .006$. This was qualified by a significant interaction, $F(1, 57) = 7.42$, $p = .009$, $\eta^2 = .12$ (see Figure 4, top panel). Planned comparisons revealed that although RSA increased from baseline to the video during the emotional suffering condition, $F(1, 59) = 4.52$, $p = .04$, $\eta^2 = .07$, it did so more strongly for the physical suffering condition, $F(1, 60) = 19.81$, $p < .001$, $\eta^2 = .25$. In addition, although baseline RSA was the same in both conditions, $F(1, 60) = .04$, $p = .85$, $\eta^2 = .001$, unexpectedly, physical

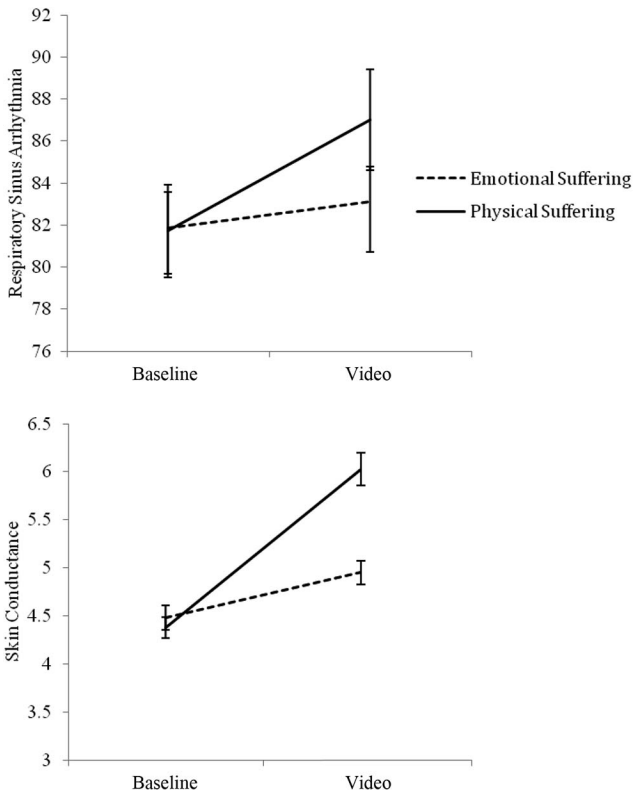

Figure 4. Respiratory sinus arrhythmia (RSA; top) and skin conductance (SCL; bottom) in response to emotional and physical suffering.

suffering elicited greater RSA than emotional suffering, $F(1, 59) = 13.92$, $p < .001$, $\eta^2 = .19$.

For SCL, we found a main effect of time, $F(1, 58) = 55.55$, $p < .001$, $\eta^2 = .49$, such that SCL increased from baseline to video. We also found a main effect of condition, $F(1, 58) = 8.42$, $p = .005$, $\eta^2 = .13$, such that people in the physical suffering condition showed higher SCL across the two time points than those in the emotional suffering condition. These effects were qualified by a significant interaction, $F(1, 58) = 41.13$, $p < .001$, $\eta^2 = .42$ (see Figure 4, bottom panel). Planned comparisons revealed that SCL increased from baseline to the video during the emotional suffering condition, $F(1, 59) = 10.58$, $p < .001$, $\eta^2 = .15$, but it did so more strongly during the physical suffering condition, $F(1, 61) = 72.08$, $p < .001$, $\eta^2 = .54$. In addition, although baseline SCL was the same in both conditions, $F(1, 59) = .90$, $p = .35$, $\eta^2 = .02$, physical suffering elicited greater SCL than emotional suffering, $F(1, 60) = 24.12$, $p < .001$, $\eta^2 = .29$.[6]

We also conducted exploratory analyses of the temporal trajectory of these two measures during the emotional and physical suffering videos by examining whether RSA and SCL showed different patterns of change within each video (see Supplemental Figure S2 and Supplemental Table S10). Because RSA depends on breathing, which is slow, the smallest temporal segment recommended to analyze RSA is 1 min (Berntson, Cacioppo, & Quigley, 1993). For SCL we used shorter 30-s segments. For RSA, a repeated measures ANOVA with time (first and second minute) and condition (suffering: emotional and physical), controlling for changes in respiration, revealed a marginal interaction between time and condition, $F(1, 59) = 2.91$, $p = .09$, $\eta^2 = .05$, such that RSA marginally increased during the video between the first and second minute only in response to physical suffering, $F(1, 61) = 3.57$, $p = .06$, $\eta^2 = .06$. For SCL, there was a significant interaction between time (four 30-s segments) and condition (suffering: emotional or physical suffering), $F(1, 59) = 9.38$, $p < .001$, $\eta^2 = .32$, such that SCL continued to increase only for the physical suffering video between the first and second 30-s segments. This increase happened early, between the first and second 30-s segments, $F(1, 62) = 24.12$, $p < .001$, $\eta^2 = .28$. These findings offer some initial support for a different time course of physiological responding for these two types of suffering such that for physical suffering physiological changes show a rapid, sharp, upward trajectory compared with emotional suffering, which showed smaller sustained increases.

Self-reported emotions. Figure 2 (panel B) demonstrates a replication of the findings from Study 3. Participants reported more compassion, $t(65) = 10.55$, $p < .001$, $d = 1.31$ and sadness, $t(65) = 2.19$, $p = .03$, $d = .27$, in response to emotional than physical suffering, whereas they reported more anxiety, $t(65) = 13.09$, $p < .001$, $d = 1.62$, in response to physical than emotional suffering.[7]

Empathy. Participants reported roughly equally high levels of empathy in response to the video depicting emotional suffering compared with the video depicting physical suffering, $t(65) = 1.46$, $p = .15$, $d = .18$ (see Figure 2, panel B). In addition, we examined whether self-reported emotions and physiological measures, RSA and SCL, were associated with empathy in each condition.

Within the emotional suffering condition, we examined the correlation between reported empathy and self-reports of compassion, anxiety, and sadness. When conducting our correlations, we again controlled for self-reports of the other emotions to identify the unique relationship of each emotion with empathy. In the emotional suffering condition, self-reported compassion was again correlated with empathy, $r(62) = .56$, $p < .001$, as was sadness, $r(62) = .28$, $p = .03$, but anxiety was not, $r(62) = .04$, $p = .77$. The correlation between empathy and compassion was significantly greater than the correlation between empathy and anxiety, $Z = 3.27$, $p = .001$. We then conducted another correlation with each physiology measure (RSA or SCL) during the video, controlling for baseline measure for that variable (respiration rate during the video was also included as covariate in the RSA analyses). RSA was a significantly correlated with empathy, $r(57) = .30$, $p = .02$, but SCL was not, $r(62) = .11$, $p = .43$.

In the physical suffering condition, empathy was again significantly correlated with anxiety, $r(62) = .31$, $p = .01$, though also with sadness, $r(62) = .27$, $p = .03$, and marginally with self-reported compassion, $r(62) = .24$, $p = .06$. The correlation between empathy and compassion was not significantly different from the correlation between empathy and anxiety, $Z = 0.23$, $p = .82$. We then conducted another correlation with each physiology measure (RSA or SCL) during the video, controlling for baseline measure for that variable (respiration rate during the video was also included as covariate in the RSA analyses). Neither RSA, $r(58) = .07$, $p = .61$, nor SCL, $r(62) = -.02$, $p = .91$, were correlated with empathy.

In sum, there was coactivation of the sympathetic and parasympathetic systems, with increases in RSA and SCL for observers watching others suffer, though greater increases in response to physical than emotional suffering. These results did not confirm our hypothesis of parasympathetically dominated activation in response to emotional suffering and sympathetically dominated activation in response to physical suffering. They suggested different, though not divergent, patterns of physiological activity in response to emotional and physical suffering. Differences were quantitative rather than qualitative. One reason for this outcome may relate to the fact that the physical suffering video was perceived to contain a fair amount of emotional suffering, though physical suffering was still greater. The higher presence of emotional suffering could have diminished the divergence in physiological responding. In addition, more pronounced divergence in physiological responses may occur when prosocial behavior is a relevant or possible option. In our studies, participants passively watched videos of targets they could not actually interact with.

[6] After conducting our analyses, we adapted Schiller et al.'s (2010) criterion for removing SCR non-responders for our measure of SCL. We removed those who showed changes in SCL between −.1 and .1 for both suffering inductions, suggesting no marked response to either induction. This criterion identified four people who we then removed from our analyses. Removing these nonresponders did not change the pattern of our findings.

[7] We explored the associations between the empathic concern and personal distress subscales of the interpersonal reactivity index (IRI; Davis, 1983), and our measures of emotion and autonomic physiology for Studies 3 and 4 (see Supplemental Table S11 for correlations). Empathic concern and personal distress predicted somewhat divergent patterns with relative consistency across studies. Empathic concern generally correlated with reported and expressed compassion, but not anxiety, for both emotional and physical suffering. Personal distress primarily correlated with *reported* anxiety, but not compassion, for both emotional and physical suffering.

This format for displaying suffering allowed for greater control of the stimuli, but removed the capacity for actual prosocial behavior.

It is also important to note that we only measured two physiological signals of autonomic activity. Additional measures may help differentiate responses to emotional versus physical suffering. For example, skin conductance changes occur through cholinergic pathways, whereas cardiac changes (e.g., preejection period) occur through adrenergic pathways so the two can differ even though they are both part of the sympathetic branch of the autonomic nervous system (McCorry, 2007). Cardiac measures have been associated with challenge and threat that may more specifically characterize responses to witnessing physical suffering (Blascovich, Mendes, Hunter, & Salomon, 1999) than skin conductance. In addition, cortisol and oxytocin may distinguish between responses to emotional and physical suffering. Cortisol increases have been documented during empathic stress (Engert, Plessow, Miller, Kirschbaum, & Singer, 2014), whereas oxytocin increases have been documented during empathy for emotional suffering and is associated with affiliative caretaking responses (Barraza & Zak, 2009).

Self-reports of emotions replicated findings from Study 3, in which reported compassion and sadness were greater when witnessing primarily emotional suffering, but reported anxiety was greater when witnessing primarily physical suffering. Although reported empathy was equivalently high in both conditions, different correlates of empathy did emerge in each condition. In the emotional suffering condition, reported compassion, sadness, and RSA, were uniquely correlated with reported empathy. These findings suggest increases in RSA may be more strongly tied to the psychological experience of empathy in response to emotional suffering. On the other hand, in the physical suffering condition, reported anxiety, compassion, and sadness, but not physiological changes, were correlated with reported empathy. In this condition compassion and anxiety were correlated to the same degree with empathy. Interestingly, unlike Study 3, sadness was independently correlated with empathy in both the emotional and physical suffering conditions. This may reflect that the higher correlations of sadness with anxiety and compassion in Study 3, which left less unique variance to correlate with empathy, though it is unclear why the two were more correlated in Study 3.

General Discussion

The literature offers conflicting findings on empathic responses to suffering, which we argued are partly due to the conflation of two distinct types of suffering. Therefore, we sought to distinguish between empathic responses to the emotional and physical suffering of others. The affective, behavioral, and to some degree physiological markers of empathy suggest two profiles of empathic responding. Empathy in response to emotional suffering was characterized by intentions to soothe, comfort, and care for the sufferer as well as regulate the sufferer's emotions (Study 2), feelings of compassion and sadness (Study 3), and coactivation of the parasympathetic and sympathetic systems (Study 4). In contrast, empathy in response to physical suffering was characterized by emergency mobilization behavioral (Study 2), anxiety and distress (Study 3), and greater coactivation of both branches of the autonomic nervous system (Study 4). In addition, reported compassion and parasympathetic activation (RSA) were correlated with empathy in response to emotional suffering, whereas anxiety (along with compassion) correlated with empathy in response to physical suffering. These results highlight the importance of context when trying to identify reliable and consistent behavioral, affective, and physiological responses (Barrett, 2012), which depend on its social functions within in that particular context (Keltner & Haidt, 1999).

Our results shed light on current debates about empathy. At the behavioral level, it suggests that measuring empathic responses to emotional suffering may be best served by the inclusion of more context-appropriate behavioral measures. For instance, observing physical contact, how much time participants spend writing supportive letters, or the use of interpersonal regulation strategies like distraction to another's emotional suffering, may reveal stronger relationships between empathy and behavior.

At the affective level, our findings are in line with a growing body of research suggesting that distress and anxiety are part of empathic responding. Our results were in keeping with previous research that has demonstrated that trait empathy predicts vicarious anxiety in response to witnessing others in physically threatening contexts (Shu et al., 2017; see Supplement Table S11 for analyses of trait empathy). Interestingly, exploratory analyses also revealed that the subcomponents of trait empathy, personal distress, and empathic concern, uniquely correlated with affective experiences of anxiety and compassion, respectively, during experiences of empathy, which further supports the notion that these are important, but distinct types of empathic responding. Anxiety appears to be particularly central to empathic responses to physical suffering and a marker of preparation for costly or altruistic helping behavior. Along with anxiety, compassion was also elicited to a moderate degree and still correlated with empathy in response to physical suffering. Therefore, our results do not suggest that compassion is not experienced when seeing others physically suffer, but rather that anxiety begins to play a larger role in the experience of empathy. The prominence of compassion may also be partially due to the colloquial interchangeability of compassion and empathy, which can inflate reports of compassion and correlations with empathy in response to physical suffering.

At the physiological level, our studies suggest the importance of including both parasympathetic and sympathetic autonomic measures in order to ensure false characterizations of empathy as promoting only sympathetic or parasympathetic activation are not made. These findings raise the question of what this coactivation might represent. Perhaps, given the intense nature of witnessing another suffer, these physiological responses represent an extended orienting period as individuals focus their attention on the sufferer. Past work has shown that orienting responses are associated with increased skin conductance and decreased heart rate (an indicator of parasympathetic activation; Bradley, 2009). This orienting toward the sufferer would then generate divergent affective and behavioral responses depending on the nature of the suffering. Future work should test how these two systems engage with better temporal resolution to gain more insights into how physiological response unfold over time in response to the suffering of others.

At a broader level, these findings have important implications for how researchers study empathy across different subfields of psychology. When creating inductions of empathy or collecting data about experiences of empathy, researchers should collect participants' ratings of whether the stimuli represent more physical versus emotional suffering or a blend of both. In some cases

researchers may prefer to specifically target empathic responses to one type of suffering depending on their behavioral, emotional, or physiological outcomes of interest. In addition, subfields that have traditionally relied more heavily on one type of suffering when eliciting empathy should actively increase empirical work on the other type of suffering in order to generate a more comprehensive conceptualization of empathy within each subfield. This trend has already begun with a handful of studies in neuroscience focusing on empathy for emotional pain such as rejection (e.g., Bruneau et al., 2012; Masten, Morelli, & Eisenberger, 2011; Rameson, Morelli, & Lieberman, 2012). Finally, in an effort to reduce cross-subfield differences in conceptualizations of empathy, the type of suffering should be explicitly discussed in order to identify whether differences or inconsistencies result from the type of stimuli.

Differentiating empathic responses to emotional and physical raises novel questions about empathy. For instance, how did empathy evolve? It is possible that responses to physical or emotional suffering emerged at different evolutionary time points (Bruneau et al., 2013). Empathic responses to emotional suffering may represent exaptation or co-opting of systems developed to respond to other's physical pain. It is interesting that the greatest similarity in our markers of empathy occurred at the most biological level of analysis—autonomic physiological responding. Within the life span, one can also ask whether empathy emerges for physical suffering before emotional suffering. Empathy for emotional suffering requires a deeper understanding of the internal state of another and shows more variability in the number of common behavioral responses. Therefore, it may be possible that children respond to physical suffering with empathy earlier, and only later learn how to respond to emotional suffering. Finally, this approach may offer a fruitful method for developmental researchers looking at autism or clinical psychologists examining psychopathy, to identify whether deficits in empathy occur for both types of suffering or only one. Though these questions are beyond the scope of this article, they offer an opportunity to better understand the emergence of and deficits in empathy.

There are important limitations to the following studies. None of the studies included face-to-face interactions in which one person was physically or emotionally suffering. Although presenting pictures or video stimuli allowed for stricter control in the presentation of suffering, it is also less ecologically valid and naturalistic. Future work should extend the current paradigms to live interactions. In line with this limitation, Study 2, which assessed behavioral responses to suffering were hypothetical. It is quite possible that people may act in ways that are inconsistent with how they report they would act in our scenarios. In addition, although we attempted to reduce demand characteristics by measuring emotion expressions and physiological changes, which are a more genuine indicator of one's internal states, our self-report measures may reflect social desirability biases. These responses may shift when the sufferer is a close person such as romantic partners or family member. Future work should explore whether distinctions between emotional and physical suffering hold for close relationships.

In many cases it is difficult to fully disentangle emotional and physical suffering. For instance, sport's injuries, which were the topic of the videos in Study 4, also result in the loss of a meaningful goal—future chances to compete, which might explain why reports of emotion suffering were higher than we expected for this condition. However, it is likely that the emotional implications of physical suffering are more fully appreciated by observers later than the immediate physical consequences. Here, we focused on the initial response to suffering (in the first few minutes), but it is likely that physical suffering could take on more emotional qualities as time passes and that as a result empathic responses more consistent with empathy for emotional suffering would emerge. Further, some types of suffering represent a roughly equal blend of both emotional and physical in nature. Study 1 revealed the existence of this smaller group of more extreme suffering (e.g., chronic hunger, rape, or child abuse). It is a limitation of our work that we did not document markers to this type of suffering and future research should examine it in the context of empathic responding. Three competing predictions stem from the current findings about empathic responding to this type of suffering. First, empathic responses may look like either emotional or physical suffering empathic responses. It is possible that, for instance, emotional suffering features would dominate leading to empathic responses that look similar to those we identified for primarily emotional suffering. Second, empathic responses may themselves blend the qualities we identified toward both emotional and physical suffering (e.g., for emotions, high anxiety and high compassion and sadness). Third, individual differences may moderate whether an observer focuses on the emotional or physical suffering cues, guiding them to empathically respond in way that is either consistent with emotional or physical suffering.

In conclusion, as an ultrasocial species, humans display a uniquely deep concern for the well-being of others. Here, we contribute to the growing work on empathy by suggesting that experiences of empathy reflect the type of suffering encountered, which can differ depending on whether the suffering is construed as primarily emotional or physical. This work has implications for how we conceptualize empathy across and within disciplines of psychology and offers intriguing future directions for those who wish to study the development of healthy empathic responding.

Context of the Research

The main idea for this article originated when Jennifer E. Stellar was reviewing physiological patterns of activation during empathy across multiple literatures. Physiological patterns of activity where inconsistent and it appeared that the type of suffering would help explain some of this variability in physiological responding. This work fits within Stellar's broader research interest in prosocial emotions, especially compassion, and her background in psychophysiology. The authors intend to examine future directions such as whether deficits in empathy for emotional suffering are associated with, or independent of, deficits in empathy for physical suffering. In addition she is interested in exploring how individuals respond to suffering that blends physical and emotional qualities and what individual differences may moderate how individual empathize in these situations.

References

Anastassiou-Hadjicharalambous, X., & Warden, D. (2007). Convergence between physiological, facial and verbal self-report measures of affective empathy in children. *Infant and Child Development, 16,* 237–254. http://dx.doi.org/10.1002/icd.464

Avenanti, A., Bueti, D., Galati, G., & Aglioti, S. M. (2005). Transcranial magnetic stimulation highlights the sensorimotor side of empathy for pain. *Nature Neuroscience, 8,* 955–960. http://dx.doi.org/10.1038/nn1481

Barraza, J. A., & Zak, P. J. (2009). Empathy toward strangers triggers oxytocin release and subsequent generosity. *Annals of the New York Academy of Sciences, 1167,* 182–189. http://dx.doi.org/10.1111/j.1749-6632.2009.04504.x

Barrett, L. F. (2012). Emotions are real. *Emotion, 12,* 413–429. http://dx.doi.org/10.1037/a0027555

Batson, C. D., Duncan, B. D., Ackerman, P., Buckley, T., & Birch, K. (1981). Is empathic emotion a source of altruistic motivation? *Journal of Personality and Social Psychology, 40,* 290–302. http://dx.doi.org/10.1037/0022-3514.40.2.290

Batson, C. D., Fultz, J., & Schoenrade, P. A. (1987). Distress and empathy: Two qualitatively distinct vicarious emotions with different motivational consequences. *Journal of Personality, 55,* 19–39. http://dx.doi.org/10.1111/j.1467-6494.1987.tb00426.x

Batson, C. D., O'Quin, K., Fultz, J., Vanderplas, M., & Isen, A. M. (1983). Influence of self-reported distress and empathy on egoistic versus altruistic motivation to help. *Journal of Personality and Social Psychology, 45,* 706–718. http://dx.doi.org/10.1037/0022-3514.45.3.706

Batson, C. D., Polycarpou, M. P., Harmon-Jones, E., Imhoff, H. J., Mitchener, E. C., Bednar, L. L., . . . Highberger, L. (1997). Empathy and attitudes: Can feeling for a member of a stigmatized group improve feelings toward the group? *Journal of Personality and Social Psychology, 72,* 105–118. http://dx.doi.org/10.1037/0022-3514.72.1.105

Berntson, G. G., Cacioppo, J. T., & Quigley, K. S. (1993). Respiratory sinus arrhythmia: Autonomic origins, physiological mechanisms, and psychophysiological implications. *Psychophysiology, 30,* 183–196.

Blascovich, J., Mendes, W. B., Hunter, S. B., & Salomon, K. (1999). Social "facilitation" as challenge and threat. *Journal of Personality and Social Psychology, 77,* 68–77. http://dx.doi.org/10.1037/0022-3514.77.1.68

Botvinick, M., Jha, A. P., Bylsma, L. M., Fabian, S. A., Solomon, P. E., & Prkachin, K. M. (2005). Viewing facial expressions of pain engages cortical areas involved in the direct experience of pain. *NeuroImage, 25,* 312–319. http://dx.doi.org/10.1016/j.neuroimage.2004.11.043

Bradley, M. M. (2009). Natural selective attention: Orienting and emotion. *Psychophysiology, 46,* 1–11. http://dx.doi.org/10.1111/j.1469-8986.2008.00702.x

Bruneau, E., Dufour, N., & Saxe, R. (2013). How we know it hurts: Item analysis of written narratives reveals distinct neural responses to others' physical pain and emotional suffering. *PLoS ONE, 8,* e63085. http://dx.doi.org/10.1371/journal.pone.0063085

Bruneau, E. G., Jacoby, N., & Saxe, R. (2015). Empathic control through coordinated interaction of amygdala, theory of mind and extended pain matrix brain regions. *NeuroImage, 114,* 105–119. http://dx.doi.org/10.1016/j.neuroimage.2015.04.034

Bruneau, E. G., Pluta, A., & Saxe, R. (2012). Distinct roles of the 'shared pain' and 'theory of mind' networks in processing others' emotional suffering. *Neuropsychologia, 50,* 219–231. http://dx.doi.org/10.1016/j.neuropsychologia.2011.11.008

Budell, L., Jackson, P., & Rainville, P. (2010). Brain responses to facial expressions of pain: Emotional or motor mirroring? *NeuroImage, 53,* 355–363. http://dx.doi.org/10.1016/j.neuroimage.2010.05.037

Cacioppo, J. T., Tassinary, L. G., & Berntson, G. (Eds.). (2007). *Handbook of psychophysiology*. Chicago, IL: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511546396

Cialdini, R. B., Brown, S. L., Lewis, B. P., Luce, C., & Neuberg, S. L. (1997). Reinterpreting the empathy-altruism relationship: When one into one equals oneness. *Journal of Personality and Social Psychology, 73,* 481–494. http://dx.doi.org/10.1037/0022-3514.73.3.481

Cordaro, D. T., Keltner, D., Tshering, S., Wangchuk, D., & Flynn, L. M. (2016). The voice conveys emotion in ten globalized cultures and one remote village in Bhutan. *Emotion, 16,* 117–128. http://dx.doi.org/10.1037/emo0000100

Craig, K. D., & Wood, K. (1969). Physiological differentiation of direct and vicarious affective arousal. *Canadian Journal of Behavioural Science/Revue Canadienne Des Sciences Du Comportement, 1,* 98–105.

Danziger, N., Faillenot, I., & Peyron, R. (2009). Can we share a pain we never felt? Neural correlates of empathy in patients with congenital insensitivity to pain. *Neuron, 61,* 203–212. http://dx.doi.org/10.1016/j.neuron.2008.11.023

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology, 44,* 113–126. http://dx.doi.org/10.1037/0022-3514.44.1.113

Dolnicar, S. (2002). A review of unquestioned standards in using cluster analysis for data-driven market segmentation. *Proceedings of the Australian and New Zealand Marketing Academy Conference 2002*. Melbourne: Deakin University. Retrieved from http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1286&context=commpapers

Eisenberg, N., Fabes, R. A., Miller, P. A., Fultz, J., Shell, R., Mathy, R. M., & Reno, R. R. (1989). Relation of sympathy and personal distress to prosocial behavior: A multimethod study. *Journal of Personality and Social Psychology, 57,* 55–66. http://dx.doi.org/10.1037/0022-3514.57.1.55

Eisenberg, N., Fabes, R. A., Murphy, B., Karbon, M., Smith, M., & Maszk, P. (1996). The relations of children's dispositional empathy-related responding to their emotionality, regulation, and social functioning. *Developmental Psychology, 32,* 195–209. http://dx.doi.org/10.1037/0012-1649.32.2.195

Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin, 101,* 91–119. http://dx.doi.org/10.1037/0033-2909.101.1.91

Eisenberg, N., Schaller, M., Fabes, R. A., Bustamante, D., Mathy, R. M., Shell, R., & Rhodes, K. (1988). Differentiation of personal distress and sympathy in children and adults. *Developmental Psychology, 24,* 766–775.

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does rejection hurt? An fMRI study of social exclusion. *Science, 302,* 290–292. http://dx.doi.org/10.1126/science.1089134

Engert, V., Plessow, F., Miller, R., Kirschbaum, C., & Singer, T. (2014). Cortisol increase in empathic stress is modulated by emotional closeness and observation modality. *Psychoneuroendocrinology, 45,* 192–201. http://dx.doi.org/10.1016/j.psyneuen.2014.04.005

Englis, B. G., Vaughan, K. B., & Lanzetta, J. T. (1982). Conditioning of counter-empathetic emotional responses. *Journal of Experimental Social Psychology, 18,* 375–391. http://dx.doi.org/10.1016/0022-1031(82)90060-9

Fan, Y., & Han, S. (2008). Temporal dynamic of neural mechanisms involved in empathy for pain: An event-related brain potential study. *Neuropsychologia, 46,* 160–173. http://dx.doi.org/10.1016/j.neuropsychologia.2007.07.023

Fischer, A. H., & Manstead, A. S. R. (2008). Social functions of emotion. In M. Lewis, J. Haviland, & L. Feldman Barrett (Eds.), *Handbook of emotion* (3rd ed., pp. 456–469). New York, NY: Guilford Press.

Goetz, J. L., Keltner, D., & Simon-Thomas, E. (2010). Compassion: An evolutionary analysis and empirical review. *Psychological Bulletin, 136,* 351–374. http://dx.doi.org/10.1037/a0018807

Gross, J. J., & Levenson, R. W. (1995). Emotion elicitation using films. *Cognition and Emotion, 9,* 87–108. http://dx.doi.org/10.1080/02699939508408966

Hair, J. F., Anderson, R. E., & Tatham, R. L. (1995). *Multivariate data analysis with readings* (4th ed.). Englewood Cliffs, NJ: Prentice Hall.

Harrison, N. A., Wilson, C. E., & Critchley, H. D. (2007). Processing of observed pupil size modulates perception of sadness and predicts em-

pathy. *Emotion, 7,* 724–729. http://dx.doi.org/10.1037/1528-3542.7.4.724

Hein, G., Lamm, C., Brodbeck, C., & Singer, T. (2011). Skin conductance response to the pain of others predicts later costly helping. *PLoS ONE, 6,* e22759. http://dx.doi.org/10.1371/journal.pone.0022759

Immordino-Yang, M. H., McColl, A., Damasio, H., & Damasio, A. (2009). Neural correlates of admiration and compassion. *Proceedings of the National Academy of Sciences of the United States of America, 106,* 8021–8026. http://dx.doi.org/10.1073/pnas.0810363106

Jack, R. E., Garrod, O. G., Yu, H., Caldara, R., & Schyns, P. G. (2012). Facial expressions of emotion are not culturally universal. *Proceedings of the National Academy of Sciences of the United States of America, 109,* 7241–7244. http://dx.doi.org/10.1073/pnas.1200155109

Jackson, P. L., Meltzoff, A. N., & Decety, J. (2005). How do we perceive the pain of others? A window into the neural processes involved in empathy. *NeuroImage, 24,* 771–779. http://dx.doi.org/10.1016/j.neuroimage.2004.09.006

Jacoby, N., Bruneau, E., Koster-Hale, J., & Saxe, R. (2016). Localizing pain matrix and theory of mind networks with both verbal and non-verbal stimuli. *NeuroImage, 126,* 39–48. http://dx.doi.org/10.1016/j.neuroimage.2015.11.025

Keltner, D., & Haidt, J. (1999). Social functions of emotions at four levels of analysis. *Cognition and Emotion, 13,* 505–521. http://dx.doi.org/10.1080/026999399379168

Krebs, D. (1975). Empathy and altruism. *Journal of Personality and Social Psychology, 32,* 1134–1146. http://dx.doi.org/10.1037/0022-3514.32.6.1134

Lamm, C., Batson, C. D., & Decety, J. (2007). The neural substrate of human empathy: Effects of perspective-taking and cognitive appraisal. *Journal of Cognitive Neuroscience, 19,* 42–58. http://dx.doi.org/10.1162/jocn.2007.19.1.42

Lamm, C., Decety, J., & Singer, T. (2011). Meta-analytic evidence for common and distinct neural networks associated with directly experienced pain and empathy for pain. *NeuroImage, 54,* 2492–2502. http://dx.doi.org/10.1016/j.neuroimage.2010.10.014

Lamm, C., Porges, E. C., Cacioppo, J. T., & Decety, J. (2008). Perspective taking is associated with specific facial responses during empathy for pain. *Brain Research, 1227,* 153–161. http://dx.doi.org/10.1016/j.brainres.2008.06.066

Lebowitz, M. S., & Ahn, W. K. (2014). Effects of biological explanations for mental disorders on clinicians' empathy. *Proceedings of the National Academy of Sciences of the United States of America, 111,* 17786–17790. http://dx.doi.org/10.1073/pnas.1414058111

Loggia, M. L., Mogil, J. S., & Bushnell, M. C. (2008). Empathy hurts: Compassion for another increases both sensory and affective components of pain perception. *Pain, 136,* 168–176. http://dx.doi.org/10.1016/j.pain.2007.07.017

Macdonald, G., & Leary, M. R. (2005). Why does social exclusion hurt? The relationship between social and physical pain. *Psychological Bulletin, 131,* 202–223. http://dx.doi.org/10.1037/0033-2909.131.2.202

Masten, C. L., Morelli, S. A., & Eisenberger, N. I. (2011). An fMRI investigation of empathy for 'social pain' and subsequent prosocial behavior. *NeuroImage, 55,* 381–388. http://dx.doi.org/10.1016/j.neuroimage.2010.11.060

Mathur, V. A., Harada, T., Lipke, T., & Chiao, J. Y. (2010). Neural basis of extraordinary empathy and altruistic motivation. *NeuroImage, 51,* 1468–1475. http://dx.doi.org/10.1016/j.neuroimage.2010.03.025

McCorry, L. K. (2007). Physiology of the autonomic nervous system. *American Journal of Pharmaceutical Education, 71,* 78. http://dx.doi.org/10.5688/aj710478

Mikulincer, M., & Shaver, P. R. (2005). Attachment security, compassion, and altruism. *Current Directions in Psychological Science, 14,* 34–38. http://dx.doi.org/10.1111/j.0963-7214.2005.00330.x

Morrison, I., Lloyd, D., di Pellegrino, G., & Roberts, N. (2004). Vicarious responses to pain in anterior cingulate cortex: Is empathy a multisensory issue? *Cognitive, Affective & Behavioral Neuroscience, 4,* 270–278. http://dx.doi.org/10.3758/CABN.4.2.270

Niedenthal, P. M., & Brauer, M. (2012). Social functionality of human emotion. *Annual Review of Psychology, 63,* 259–285. http://dx.doi.org/10.1146/annurev.psych.121208.131605

Nietlisbach, G., Maercker, A., Rössler, W., & Haker, H. (2010). Are empathic abilities impaired in posttraumatic stress disorder? *Psychological Reports, 106,* 832–844. http://dx.doi.org/10.2466/pr0.106.3.832-844

Porges, S. W. (2001). The polyvagal theory: Phylogenetic substrates of a social nervous system. *International Journal of Psychophysiology, 42,* 123–146. http://dx.doi.org/10.1016/S0167-8760(01)00162-3

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology, 74,* 116–143. http://dx.doi.org/10.1016/j.biopsycho.2006.06.009

Preston, S. D., & De Waal, F. B. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences, 25,* 1–20.

Rameson, L. T., Morelli, S. A., & Lieberman, M. D. (2012). The neural correlates of empathy: Experience, automaticity, and prosocial behavior. *Journal of Cognitive Neuroscience, 24,* 235–245. http://dx.doi.org/10.1162/jocn_a_00130

Saarela, M. V., Hlushchuk, Y., Williams, A. C. D. C., Schürmann, M., Kalso, E., & Hari, R. (2007). The compassionate brain: Humans detect intensity of pain from another's face. *Cerebral Cortex, 17,* 230–237. http://dx.doi.org/10.1093/cercor/bhj141

Schiller, D., Monfils, M. H., Raio, C. M., Johnson, D. C., Ledoux, J. E., & Phelps, E. A. (2010). Preventing the return of fear in humans using reconsolidation update mechanisms. *Nature, 463,* 49–53. http://dx.doi.org/10.1038/nature08637

Shu, J., Hassell, S., Weber, J., Ochsner, K. N., & Mobbs, D. (2017). The role of empathy in experiencing vicarious anxiety. *Journal of Experimental Psychology: General, 146,* 1164–1188. http://dx.doi.org/10.1037/xge0000335

Singer, T., & Klimecki, O. M. (2014). Empathy and compassion. *Current Biology, 24,* R875–R878. http://dx.doi.org/10.1016/j.cub.2014.06.054

Singer, T., Seymour, B., O'Doherty, J. P., Stephan, K. E., Dolan, R. J., & Frith, C. D. (2006). Empathic neural responses are modulated by the perceived fairness of others. *Nature, 439,* 466–469. http://dx.doi.org/10.1038/nature04271

Stellar, J. E., Cohen, A., Oveis, C., & Keltner, D. (2015). Affective and physiological responses to the suffering of others: Compassion and vagal activity. *Journal of Personality and Social Psychology, 108,* 572–585. http://dx.doi.org/10.1037/pspi0000010

Stellar, J. E., & Keltner, D. (2014). Compassion. In M. Tugade, L. Shiota, & L. Kirby (Eds.), *Handbook of positive emotion*. New York, NY: Guilford Press.

Stellar, J. E., & Keltner, D. (2017). Compassion in the autonomic nervous system: The role of the vagus nerve. In P. Gilbert (Ed.), *Compassion: Concepts, research and applications* (pp. 120–134). New York, NY: Routledge. http://dx.doi.org/10.4324/9781315564296-7

Stellar, J. E., Manzo, V. M., Kraus, M. W., & Keltner, D. (2012). Compassion and class: Socioeconomic factors predict compassionate responding. *Emotion, 12,* 449–459. http://dx.doi.org/10.1037/a0026508

Stephens, C. L., Christie, I. C., & Friedman, B. H. (2010). Autonomic specificity of basic emotions: Evidence from pattern classification and cluster analysis. *Biological Psychology, 84,* 463–473. http://dx.doi.org/10.1016/j.biopsycho.2010.03.014

Timmers, I., Park, A. L., Fischer, M. D., Kronman, C. A., Heathcote, L. C., Hernandez, J. M., & Simons, L. E. (2018). Is empathy for pain unique in its neural correlates? A meta-analysis of neuroimaging studies of empathy. *Frontiers in Behavioral Neuroscience, 12,* 289. http://dx.doi.org/10.3389/fnbeh.2018.00289

Tomaka, J., Blascovich, J., Kibler, J., & Ernst, J. M. (1997). Cognitive and physiological antecedents of threat and challenge appraisal. *Journal of Personality and Social Psychology, 73,* 63–72. http://dx.doi.org/10.1037/0022-3514.73.1.63

Underwood, B., & Moore, B. (1982). Perspective-taking and altruism. *Psychological Bulletin, 91,* 143–173. http://dx.doi.org/10.1037/0033-2909.91.1.143

Van Hulle, C., Zahn-Waxler, C., Robinson, J. L., Rhee, S. H., Hastings, P. D., & Knafo, A. (2013). Autonomic correlates of children's concern and disregard for others. *Social Neuroscience, 8,* 275–290. http://dx.doi.org/10.1080/17470919.2013.791342

Vaughan, K. B., & Lanzetta, J. T. (1981). The effect of modification of expressive displays on vicarious emotional arousal. *Journal of Experimental Social Psychology, 17,* 16–30. http://dx.doi.org/10.1016/0022-1031(81)90003-2

Wispé, L. (1986). The distinction between sympathy and empathy: To call forth a concept, a word is needed. *Journal of Personality and Social Psychology, 50,* 314–321. http://dx.doi.org/10.1037/0022-3514.50.2.314

Xu, X., Zuo, X., Wang, X., & Han, S. (2009). Do you feel my pain? Racial group membership modulates empathic neural responses. *The Journal of Neuroscience, 29,* 8525–8529. http://dx.doi.org/10.1523/JNEUROSCI.2418-09.2009

Zaki, J. (2014). Empathy: A motivated account. *Psychological Bulletin, 140,* 1608–1647. http://dx.doi.org/10.1037/a0037679

Received December 14, 2018
Revision received October 1, 2019
Accepted October 14, 2019 ■