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EMPATHY FOR THE PAIN OF OTHERS: SENSITIVITY TO THE INDIVIDUAL, NOT TO THE COLLECTIVE

By

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Empathy for the pain of others: Sensitivity to the individual, not to the collective

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Abstract

Groups of people in pain evoke our empathic reactions. Yet how does one empathize with a group? Here, we aim to identify psychological mechanisms that underlie empathic reactions to groups. We theorize that because empathy is an egocentric process routed through the self, people are strongly attuned to the impact on each individual, and less so to the number of individuals affected. In five pre-registered experiments, involving different types of stimuli and valences of the outcomes, we repeatedly find that participants' level of empathy depends on the pain experienced by each individual, but not on the number of individuals in the group. The experiments support our hypothesis and rule out alternative explanations such as limited numeric ability and strategic regulation of negative emotions, providing valuable insights into the phenomenon of scope insensitivity. The findings also bear implications for the ongoing debate on the role of empathy in public policy decisions.

Empathy for the pain of others: Sensitivity to the individual, not to the collective

As social observers, we witness events that impact the lives of groups of people. Some involve negative outcomes such as salary cuts, traffic congestion, natural disasters, and epidemics. Others involve positive social outcomes, such as bonus payments, infrastructure improvements, and better medicine. Our assessment of the magnitude of such social outcomes readily affects our emotional reactions and subsequent judgments, decisions, and actions. For example, our willingness to contribute money to help a group of people in need, or to partake in a civil protest, is dependent on our perception and assessment of the misery of many others.

One way in which we come to grasp the impact of negative and positive outcomes on others is through empathy, namely, our ability to "feel for" and understand the emotional states of others (Davis, 1983). Whereas past research has generally focused on empathy for a single individual, or contrasted empathy towards and individual with empathy towards groups, here we ask: how do we empathize with a group or collective of individuals? What aspects are we sensitive to? And how might these sensitivities affect our empathic reactions?

We build on findings on judgments and decisions in relation to collective outcomes, showing that empathy for groups is severely limited (Fischhoff et al., 1993; Kogut & Ritov, 2005; Slovic, 2007). We investigate people's empathic reactions to a group that experiences either negative outcomes (physical pain, loss of time, loss of money) or positive outcomes (obtaining a monetary bonus). We propose that, in considering a collective social outcome, people's empathy is attuned to the impact of the outcome on the individual, rather than on the group. Thus, people do not readily consider the number of individuals affected (Barneron et al., 2021). We test our hypothesis to explain people's insensitivity to the number of individuals affected, and also assess alternative accounts based on ideas such as limited numeric ability (Dickert et al., 2011; Kleber et al., 2013) or strategic regulation of negative emotions (Cameron & Payne, 2011).

Empathy for many others

Empathy is broadly defined as the ability to understand other people's thoughts and feelings (Batson et al., 1991). It encompasses the cognitive understanding of others' internal states (Epley et al., 2004; Eyal et al., 2018), as well as the affective sharing of their emotions (Davis, 1983). Behavioral lab studies on empathy have primarily focused on empathy for a single individual. Research has demonstrated, for example, that when empathizing with another person, one often takes on their emotional experience by unconsciously mimicking their facial expressions (Hess & Blairy, 2001; Oliver et al., 2018). Other studies have suggested that empathy motivates prosocial behavior toward a single person in need (Bartal et al., 2011; Batson et al., 1981; Choshen-Hillel et al., 2022; Decety et al., 2016). Studies of empathic neural reactions also typically focus on one's response to the pain of a single individual (e.g., Kanske et al., 2016; Shamay-Tsoory, 2011). These studies typically test participants' physiological reactions as they are being presented with pictures or short videos of another person in pain. Such studies find that some of the brain regions activated when a participant sees another person in pain are the ones activated when the participant herself experiences pain (Decety et al., 2010; Levy et al., 2016; Perry et al., 2010; Shamay-Tsoory et al., 2013; Singer et al., 2004; for a review see Fallon et al., 2020; Lamm et al., 2011).

Both behavioral and neuroimaging studies suggest that empathy involves the sharing of the affective experience of the other person and/or cognitively taking their perspective (Zaki & Ochsner, 2012). For example, one can simulate the pain of someone who has been burned in a fire, and perhaps even experience an uncomfortable visceral response. But, can one simulate the pain of, say, two, ten, or fifty people who have been burned? Both experience sharing and perspective taking are egocentric processes, anchored in the self, and simulating the experience of one other person (Epley et al., 2004; Keysers et al., 2010). The egocentric nature of empathy implies that one cannot take the perspectives and share the experiences of many at the same time.

Some studies have compared empathy for a single victim versus a group of victims. These studies suggest that a single victim attracts more empathy than a group of victims (Kogut & Ritov, 2005a), especially when the single victim is identified (Kogut & Ritov, 2005b). This phenomenon, known as the singularity effect, points to the special emotional response that a single victim evokes (Erlandsson et al., 2015; Moche et al., 2022; Small et al., 2007).

Here, we aim to identify psychological mechanisms that underlie empathic reactions to groups. We propose that the level of empathy increases with the *magnitude of pain* borne by each individual, but that it need not increase with the *number of people* suffering. We suggest that a mental procedure for aggregating feelings of empathy across individuals may not be readily available (for related theories, see Bloom, 2016; Slovic, 2007).

Some evidence for this claim arises from the studies of Barneron et al. (2021). In these studies, the participants were asked to evaluate the severity of harm caused to a group of individuals, based on information on the level of harm borne by each individual and the number of individuals who suffered the harm. Specifically, they found that participants' judgments of a financial fraud became harsher as the damage (per person) increased from $50 to $2,000. However, their judgments did not vary as the number of people affected increased from 50 to 2,000. Thus, in considering the damage caused to a group, people hardly considered the information on the number of people who were negatively affected, whereas they closely considered the extent of the harm caused to individual members. These results contradict what might be a normative expectation regarding the assessment of collective outcomes, namely, that the assessment of the overall pain or loss experienced by a group should consider both the amount of pain endured by each individual in the group and the number of people in the group. They hypothesized that this biased assessment of collective outcomes was driven by the mechanism of empathy.

In this work we extend these past findings and ideas. Our hypothesis concerns two relevant scopes for feeling empathy, the intensity of the positive or negative outcome experienced by the individual and the number of people experiencing this outcome. We suggest that people are attuned to the individual pain (or gain), but are insensitive to the number of individuals who are affected. The latter prediction is consistent with behavioral studies showing that people's compassion and prosocial behavior (which are both related to empathy; Batson, 2010; Lim & DeSteno, 2016) are relatively insensitive to the size of the group. Many past studies have elicited people's feelings of compassion and their willingness to contribute to social causes. In these studies, people's willingness to pay for social goods barely varied as the number of individuals benefiting increased, a phenomenon known as "scope insensitivity" (Baron, 1997; Baron & Greene, 1996; Fischhoff et al., 1993; Hsee & Rottenstreich, 2004; Kahneman et al., 1999; Slovic et al., 2020). In one study, for example, participants barely increased the value placed on saving endangered birds, as the number of birds to be saved increased from 2,000 to 200,000 (Boyle et al., 1994).

The term "psychic numbing" also suggests an impairment, whereby people display diminished sensitivity to the value of life as the number of victims increases (Dickert et al., 2015; Slovic, 2007; Small et al., 2007). Interestingly, several researchers have suggested that participants' willingness to donate to charity may even decrease as the number of victims increases (Cameron & Payne, 2011). They theorized that individuals are motivated to regulate their intense negative feelings that may arise from witnessing many people in pain so as to control the intensity of their feelings of compassion, and perhaps also to restrain the apparent need to offer help or a donation.

The present investigation goes beyond the previous findings by focusing on the idea that, although people are scope insensitive in relation to the number of victims, their empathic reactions are highly sensitive to other scopes that can be simulated or imagined (the loss/pain of a single individual). Note that the mechanisms suggested to explain scope insensitivity mainly focused on the number of victims, without considering the level of pain of each individual. Some previous studies have suggested that people with low numeric abilities are more susceptible to scope insensitivity and thus ignore the number of victims when offering help or a donation (Dickert et al., 2011). In their view, scope insensitivity arises due to people's reliance on an automatic ("emotional") system that fails to account for numerical information (Dickert et al., 2015). Other studies have suggested that people's empathic reactions to differing numbers of victims follow a concave value function, just like psychophysical sensitivity, thereby showing diminishing marginal returns (Slovic, 2007). In one demonstration of this account, interventions that saved the same number of lives were judged more positively as the number of lives that were at risk decreased (Fetherstonhaugh et al., 1997).

Our hypothesis suggests that the insensitivity to aggregate levels of pain or loss is grounded in the mechanism of empathy itself. Since empathy is routed through the self, it *is sensitive* to the level of pain endured by each individual, but cannot be sensitive to the number of individuals in the group. To test this idea, we use a varied set of negative outcomes, including monetary loss, physical pain, and time loss, as well as positive outcomes, such as obtaining a monetary bonus. Obtaining a consistent pattern of findings would allow us to offer a parsimonious explanation for the studied phenomena. Moreover, it would shed light also on the generality of previously proposed mechanisms, including numeric ability, psychophysical numbing, and strategic regulation of compassion (Cameron & Payne, 2011; Cameron et al., 2016).

The current studies

We tested our hypothesis in five pre-registered experiments. In each experiment, we presented participants with a scenario describing some social outcome experienced by a group of people. The outcomes were either negative (a monetary loss, physical pain, or time loss) or positive (a monetary bonus). In each study, we varied orthogonally two parameters of the outcome, namely, the number of individuals affected and the intensity of the outcome experienced by each individual. We elicited the participants' empathic reactions to the collective experience of the group affected. When the outcome for the group was negative, we asked the participants to evaluate (a) how much distress they thought the group felt overall, (b) their personal distress upon reading about the outcome for the group, and (c) their empathic concern for the group. In studies involving a positive outcome, the three items were rephrased accordingly.

In some of the studies, the level of individual pain and the group size were presented numerically, allowing us to compare the relative impact of the two scopes. In one study, we used a visual representation of pain, drawn from the social neuroscience literature on empathy. In another study we examined whether our hypothesized effects hold for positive outcomes. We hypothesized that regardless of the domain and types of presentation, people should be insensitive to group size, but sensitive to the intensity of the pain (or enjoyment) experienced by each individual in the group. Lastly, in a final study, we tested whether insensitivity to group size reflects actual preference or bias, by utilizing a within-participant design.

The data and code for all experiments are publicly available at https://osf.io/5d2e8/?view_only=be1a85665aaf4aa3b195f6ef27602549.

Experiment 1

In the first experiment, we test our hypothesis that empathy is sensitive to the level of loss suffered by each individual, but less so to the number of individuals suffering the loss. The study presented participants with a scenario describing a wage cut in a company. Two factors were varied orthogonally: the magnitude of the wage cut per employee and the number of employees who suffered the wage cut. We measured participants' empathic reactions to the wage cut. We hypothesized that the empathic reactions would be sensitive to the magnitude of the wage cut, but not to the number of employees who suffer it. The study was pre-registered at https://aspredicted.org/dt8i8.pdf.

Method

Participants. Four-hundred and three Amazon Mechanical-Turk employees who passed an initial attention check participated in the experiment for a compensation of $0.25. Forty-seven participants failed at least one comprehension question (see below) and were excluded from the analysis. The analyses were thus conducted on a sample of 356 participants (44.4% females; M_{age} = 40.26, SD_{age} = 12.96).

Procedure, materials, and design. Participants were randomly assigned to one of four experimental conditions in a 2 (wage cut: $10 vs. $200) X 2 (number of employees: 10 vs. 200) between-subjects design. The *N* per condition varied from 97 to 104. Participants read the following scenario:

> "Mr. Johns is the CEO of a company that employs a few thousand employees. Due to the economic crisis caused by the COVID-19 pandemic, the company is going through a difficult economic period. The company's usual monthly gains turned into slight losses. As the CEO, Johns faces an important decision. He can either wait a few more months and see if the situation improves, or he can cut some of the workers' monthly wages, to balance the losses.
> Johns knows that his employees are not earning much, only a few thousand dollars a month. They will probably have difficulties finding an alternative job during such times of record-setting unemployment rates.
> Johns considers introducing a wage cut, with the result that [10/200] employees would each lose [$10/$200] of their monthly salary.
> After much deliberation, Johns decides that it is too risky to wait, and cuts the workers' wages. Indeed, [10/200] employees each lose [$10/$200] monthly."

After reading the scenario, participants were asked to respond to three items designed to tap both cognitive empathy (understanding the other's pain) and emotional empathy (feelings of personal distress and concern), using 7-point Likert scales. Specifically, participants were asked (i) "In your opinion, how much distress, overall, was caused to the employees whose salaries were reduced?" (1 = no distress at all, 7 = extreme distress), (ii) "How much personal distress did ***you*** feel when reading about the employees whose salaries were reduced?" (1 = I did not feel personal distress at all, 7 = I felt a lot of personal distress), and (iii) "How much empathic concern did you feel when reading about the employees whose salaries were reduced?" (1 = I did not feel empathic concern at all, 7 = I felt a lot of empathic concern). The order of the items was randomized.

Finally, participants were presented with two multiple-choice questions testing their attention to the numerical information presented in the scenario. They had to select one alternative (out of four) indicating the size of the wage cut per employee, and then one alternative (out of four) indicating the number of employees who suffered the wage cut. Lastly, they were prompted to report their gender and age.

Results

As expected, the three items, empathic concern, personal distress, and overall distress caused were highly correlated, and were thus averaged for each participant to create an "empathy score" (α = .86).

The empathy scores were submitted to a linear regression analysis, with wage cut, number of employees, and their interaction as predictors. The two levels of the wage cut ($10 and $200) were coded 0 and 1, respectively. The two numbers of employees (10 and 200) were also coded 0 and 1, respectively. The level of the wage cut was a significant predictor of empathy. Empathy scores were higher when the wage cut was $200 ($M$ = 5.43, SD = 1.32) than when it was $10 ($M$ = 3.97, SD = 1.54), b = 1.45, β = 0.45, $t(353) = 9.51$, $p < .001$. Empathy scores did not vary as a function of number of employees. Participants indicated similar levels of empathy when either 10 (M = 4.78, SD = 1.73) or 200 employees suffered a wage cut (M = 4.59, SD = 1.58), b = -0.14, β = -0.04, $t < 1$. The wage cut X number of employees interaction term was not significant, b = 0.42, β = 0.11, $t(353) = 1.37$, p = .173 (Figure 1). A comparison of the standardized regression coefficients (β) yielded that the coefficient of individual loss (β = 0.45) was larger than that of group size (β = -0.04), $F(1, 353) = 56.22$, $p < .001$.

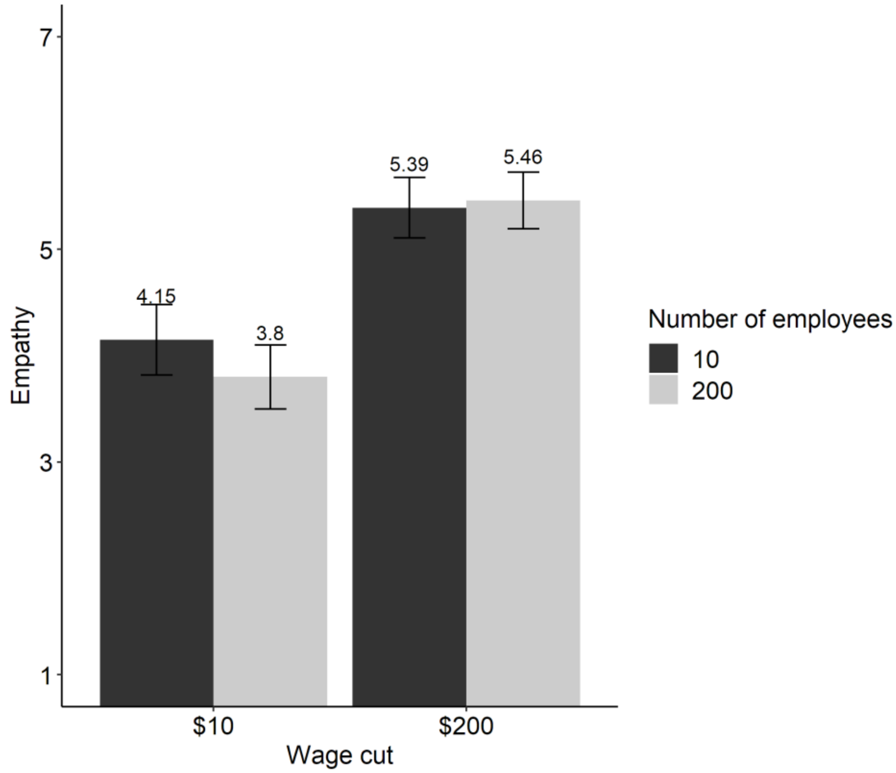

Figure 1. Empathy scores by condition in Experiment 1. Error bars denote a 95% CI.

Discussion

Experiment 1 provides initial support for the hypothesis that empathy for groups *is* sensitive to the level of the individual loss, but less so to the number of individuals who suffer the loss. In fact, we found no sensitivity to group size. Our participants differentiated between the values of 10 and 200, when these numbers referred to individual monetary losses, but not when they referred to group size. These results do not support the claim that the insensitivity to the number of individuals observed in our studies is due to the participants' limited numeric abilities (Dickert et al., 2011; Kleber et al., 2013). We next investigate whether these findings generalize to other prominent quantifiable dimensions of loss that are non-monetary, specifically time.

Experiment 2

In Experiment 2 we sought further support for our hypothesis using a non-monetary dimension: wasted time. Whereas time and money are different types of resources (which sometimes are even treated differently; e.g., Gino & Mogliner, 2014; Zauberman & Lynch, 2005), we expected that the pattern found for monetary loss would generalize also to time loss. Participants' empathy for individuals who suffered a time loss should show sensitivity to the duration of time wasted, but not to the number of individuals whose time was wasted. We used a scenario describing a group of students who were inconveniently delayed at the end of class, and varied the duration of the delay and the number of students who were delayed. Again, we expected empathic reactions to be sensitive to the duration of the delay, but not to the number of students who suffered the delay. The study was pre-registered at https://aspredicted.org/blind.php?x=tk6qi6.

Method

Participants. We recruited 333 Israeli students to an online experiment offering them participation in a raffle of three prizes of 100NIS (~$30) each. Twenty-four participants failed at least one comprehension question (see below), and were excluded from further analyses. Hence, all analyses were conducted on a sample of 309 participants (66.7% females; M_{age} = 27.68, SD_{age} = 5.36).

Procedure, materials, and design. Participants were randomly assigned to one of four conditions in a 2 (group size: 15 vs. 45) X 2 (length of delay: 3 vs. 9 minutes) between-subjects design. The *N* per condition varied from 83 to 84.

Participants read one of four versions of the following scenario:

> "Imagine an undergraduate class conducted online via Zoom. There are [15/45] students in this class. Toward the end of the class, a student asks the professor to go over an explanation he had already repeated several times before. The other students must wait for the student to finish presenting her questions, because a quiz has been scheduled to take place at the end of the lesson. The student's questions cause a delay of [3/9] minutes for [15/45] classmates."

After reading the scenario, participants were asked to respond (using a 7-point Likert scale) to three items, similar to the ones used to tap empathy in Experiment 1: (i) "In your opinion, how much discomfort, overall, was caused to the students in the class?" (1 = no discomfort at all, 7 = extreme discomfort), (ii) "How much discomfort did *you* feel in reading about the students who were held waiting?" (1 = I did not feel discomfort at all, 7 = I felt a lot of discomfort), and (iii) "How much empathic concern did you feel for the students who were kept waiting?" (1 = I did not feel empathic concern at all, 7 = I felt a lot of empathic concern). The order of the three items was randomized. Next, as in Experiment 1, the participants were presented with two multiple-choice questions that tested their attention to the two numerical parameters in the scenario (the length of the delay and the number of classmates who were delayed). Finally, participants were prompted to report their gender and age.

Results

As before, the three items, empathic concern, personal discomfort, and overall discomfort were correlated, and were thus averaged to create an "empathy score" for each participant (α = .67).

Participants' empathy scores were submitted to a linear regression analysis, with length of delay, size of class, and their interaction as predictors. The two levels of delay (3 and 9 minutes) were coded 0 and 1, respectively, and the two class sizes (15 and 45) were also coded 0 and 1, respectively.

Length of delay was a significant predictor of empathy. The empathy scores were higher when the delay was 9 minutes (*M* = 4.32, *SD* = 0.96) than when it was 3 minutes (*M* = 3.72, *SD* = 1.17), *b* = 0.10, β = 0.27, *t*(306) = 4.91, *p* < .001. The class size was not a significant predictor. Participants displayed similar levels of empathy when the number of students delayed was 15 (*M* = 4.10, *SD* = 1.11) as when it was 45 (*M* = 3.95, *SD* = 1.11), *b* = 0.00, β = -0.06, *t* = -1.16, *p* = .248. The length of delay X class size interaction term was not significant, *t <1* (Figure 2). A comparison of the standardized regression coefficients revealed that the coefficient of individual loss (β = 0.27) was larger than that of group size (β = -0.06), *F*(1, 306) = 25.44, *p* < .001.

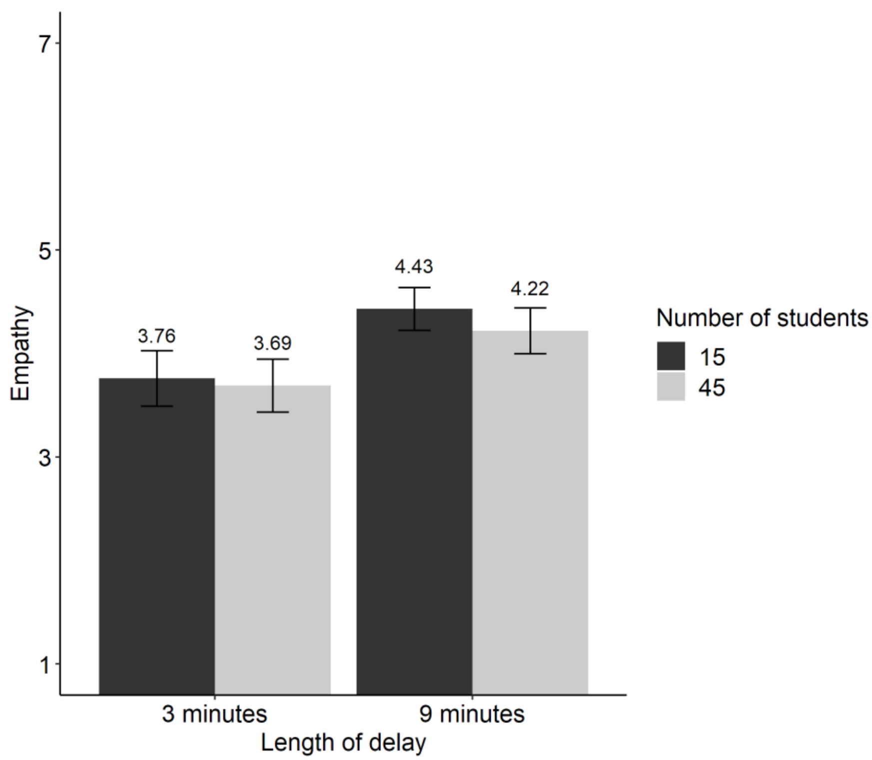

Figure 2. Empathy by condition in Experiment 2. Error bars denote a 95% CI.

Discussion

Experiment 2 provided additional support for our hypothesis. Our participants were sensitive to the length of the delay imposed on the classmates, but not to the number of classmates. Together with the results of Experiment 1, the findings show that people's empathic reactions are sensitive to the numerical information in one dimension, namely, the loss borne by each individual. They are, however, insensitive to the second dimension, group size. This is in contrast to the normative expectation that both dimensions should be considered in assessing the overall (negative) impact of the action on the collective.

Experiment 3

In Experiments 1 and 2 the losses were presented in numerical terms. In Experiment 3, we used visual images to represent pain. Such representations are common in real life, as well as in studies eliciting empathic reactions, where participants are shown pictures of body parts (e.g., a hand or foot) in painful situations and are asked to indicate their empathy for the person suffering the pain (e.g., Jackson et al., 2005; Lamm et al., 2010; Singer et al., 2004).

We created a set of photos showing hands of people in pain. The pain intensity was manipulated by either showing each hand being cut by a knife (great pain) or being stabbed by a needle (mild pain). The number of people in pain was manipulated by varying the number of hands in pain shown on the screen (see Figure 3). The number of hands was kept relatively small (two vs. six), so that group size could be readily assessed visually. We measured participants' empathic reactions. We expected that the effect of pain intensity on empathic reactions would be greater than that of number of people in pain.

The study was pre-registered at https://aspredicted.org/blind.php?x=8he46c.

Method

Participants. We recruited 401 British participants on Prolific who passed an initial attention check (2 + 2 = ?) for a fee of 0.35£. Seventy-nine participants failed at least one comprehension question (see below), and were excluded from further analyses. Hence, all analyses were conducted on a sample of 322 participants (34.2% females; M_{age} = 30.33, SD_{age} = 10.17).

Procedure, materials, and design. Participants were randomly assigned to one of four conditions in a 2 (number of hands: 2 vs. 6) X 2 (pain intensity, i.e., caused by a needle vs. a knife) between-subjects design. The *N* per condition varied from 99 to 102.

Participants were shown five stimuli, one at a time on a computer screen. Each stimulus included eight rectangular pictures of human hands and maple leaves in a mixed order (see examples in Figure 3). The maple leaves were added to ensure that the overall visual stimuli always contained similar amounts of information. The maple leaf pictures were generally analogous to the hands in overall configuration, size, color, and orientation. Between participants, we manipulated the number of hands shown, such that in each stimulus, there were either two hands and six maple leaves or six hands and two maple leaves. We also varied between participants the pain intensity, i.e., pain caused by either a knife or a needle. In a pre-test we confirmed that the knife was rated as substantially more painful than the needle.

Following the presentation of each stimulus, participants were asked to respond to three empathy-related questions (presented in random order), using a 9-point Likert scale: (i) “How much pain is caused, overall, to the people whose hands are shown in the pictures?” (1 = no pain at all, 9 = extreme pain), (ii) “How much empathic concern do you feel for the people whose hands are shown in the pictures?” (1 = I did not feel empathic concern at all, 9 = I felt a lot of empathic concern), and (iii) “How much personal distress did you feel when looking at the hands shown in the pictures?” The level of personal distress was measured using the Self-Assessment Manikin (SAM) arousal scale, a pictographic scale commonly used to assess emotional reactions (Bradely & Lang, 1994).

Finally, we presented two questions testing participants’ attention. In the first, the participants had to select (out of four options) the cause of pain they saw in the stimuli. In the second, they had to indicate the number of hands that appeared in the stimuli they saw. Lastly, participants were prompted to report their gender and age.

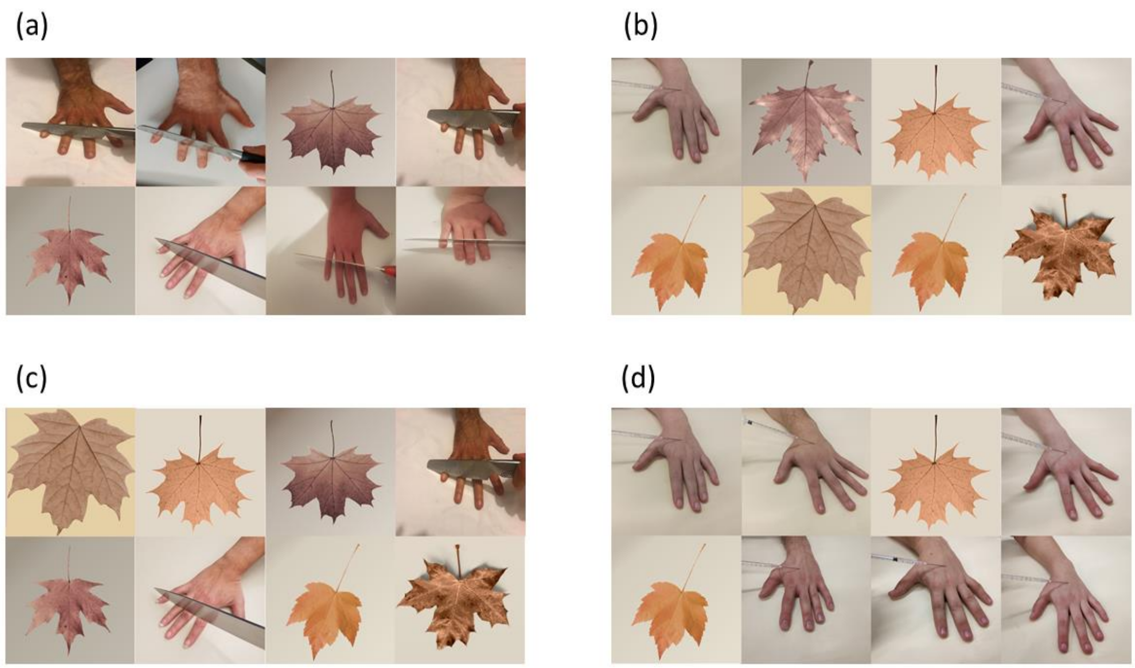

Figure 3. Sample stimuli used in Experiment 3. (a) Large number of people, high pain intensity (knife). (b) Small number of people, low pain intensity (needle). (c) Small number of people, high pain intensity (knife). (d) Large number of people, Low pain intensity (needle).

Results

As before, the three items measuring empathy were highly correlated, and were thus averaged to create an "empathy score" for each participant ($\alpha = .86$). For each participant, we averaged the empathy score across the five stimuli. These empathy scores were submitted to a linear regression analysis, with cause of pain and number of hands as predictors. The two levels of pain intensity (low and high) were coded 0 and 1, respectively. The two numbers of hands (2 and 6) were coded 0 and 1, respectively.

Pain intensity was a significant predictor of empathy. The empathy scores were higher when participants were presented with pictures of knives ($M = 5.63$, $SD = 1.83$) than with pictures of needles ($M = 4.53$, $SD = 1.65$), $b = 0.92$, $\beta = 0.25$, $t(319) = 4.70$, $p < .001$. The number of hands was not a significant predictor. Participants' levels of empathy did not differ as a function of whether the number of hands was two ($M = 4.89$, $SD = 1.73$) or six ($M = 5.19$, $SD = 1.90$), $b = 0.24$, $\beta = 0.07$, $t(319) = 1.22$, $p = .225$. The pain intensity X number of hands interaction term was not significant, $t < 1$ (see Figure 4). A comparison of the standardized regression coefficients yielded that the coefficient of pain intensity ($\beta = 0.25$) was larger than that of group size ($\beta = 0.07$), $F(1, 319) = 5.59$, $p = .019$.

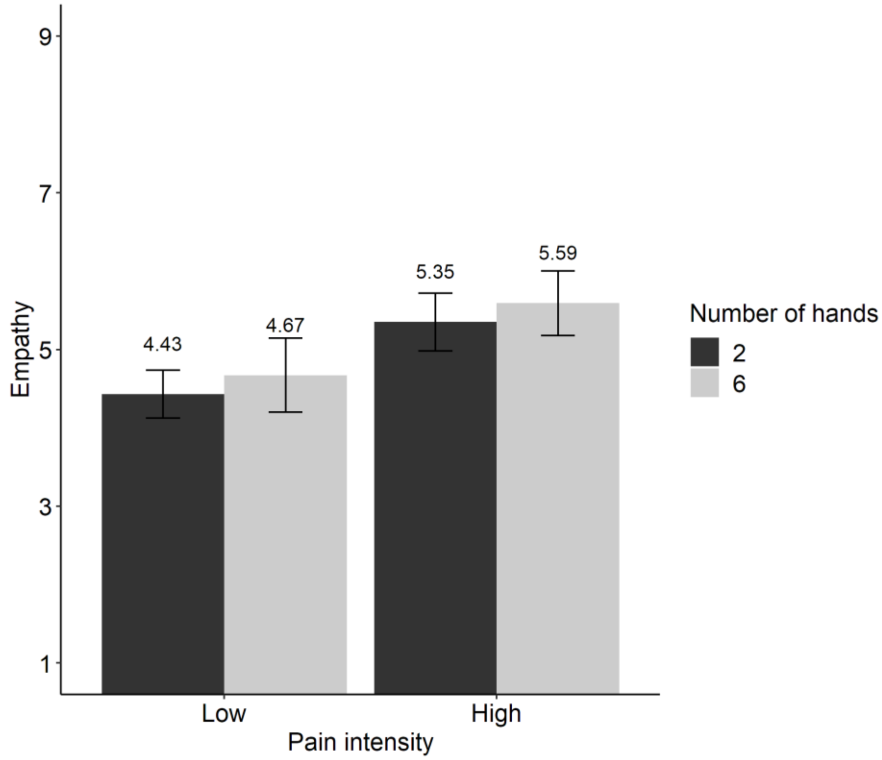

Figure 4. Empathy by condition in Experiment 3. Error bars denote a 95% CI.

Discussion

Our findings from Experiments 1 and 2, which involved monetary loss and time loss, were replicated in Experiment 3 in the domain of pain, involving a visual representation of pain. Importantly, Experiment 3 provided strong evidence against numeracy as the sole explanation for the observed insensitivity to the number of people in pain since the same pattern was obtained when the pain was presented in a qualitative rather than quantitative format. The empathic reaction was still more sensitive to the level of pain endured by each individual, but not to the number of people in the group.

Experiment 4

Experiments 1–3 reveal that empathy for groups is sensitive to the level of pain endured by each person in the group, and less so (or not at all) to the number of people in the group. Why is this the case? Cameron and Payne (2011) suggested that when faced with a humanitarian crisis or tragedy, people are motivated to attenuate their emotional response to the suffering of many people. They do so by discounting group size, so as to avoid feeling compelled to assist an overwhelming number of individuals. This view thus suggests that people disregard group size due to strategic (though not necessarily deliberate) emotion regulation, rather than due to the inherent nature of empathy. Specifically, this strategic motivational account implies that in the domain of positive outcomes, where the outcomes are not overwhelming, group size should not be discounted. According to our theory, however, empathy, which is routed through the self, should not be attuned to the number of people in the group, regardless of whether their experience is negative or positive. Therefore, we expected to see the same insensitivity to group size in positive outcomes as in negative outcomes.

Experiment 4 was designed to put these two competing hypotheses to the test. In particular, we now presented participants with a scenario describing a positive outcome for a group of people. We manipulated group size and individual gain, and elicited empathic reactions. According to our hypothesis – but not to the strategic motivational account – participants should be insensitive to group size.

The study was pre-registered at https://aspredicted.org/blind.php?x=nx2uc3.

Method

Participants. We recruited 415 British participants on Prolific who passed an initial attention check for a fee of 0.35£. Sixteen participants who failed at least one of the two comprehension questions (see below) were excluded from the analyses. Hence all further analyses were conducted on a sample of 399 participants (29.5% females; M_{age} = 36.82, SD_{age} = 12.78).

Procedure, materials, and design. As in Experiments 1–3, participants were assigned to one of four between-subjects conditions. The *N* per condition varied from 102 to 105. We manipulated the number of employees who received a bonus (50 vs. 1,000), and the magnitude of the bonus for each employee (50£ vs. 1,000£).

Participants read the following scenario:

> "Mr. Johns is the CEO of a company that employs a few thousand employees. In the last couple of months, the company has seen a substantial financial growth. The company's average monthly profits have significantly increased.
> As the CEO, Johns faces an important decision. He can either invest the profits in the company's expansion, or he can award bonuses to some employees.
> Johns knows that his employees are not earning much, only a few thousand pounds a month.
> Johns considers giving a [50£/1,000£] bonus to [50/1,000] employees.
> After much deliberation, Johns decides that it is most important to reward his employees and therefore he gives them the bonus.
> In the end, [50/1,000] employees each received a [50£/1,000£] bonus."

Participants were asked to rate their empathy on the following three items (adapted from the previous experiments): (i) "In your opinion, overall, how much happiness was experienced by the employees who received the bonus?" (1 = no happiness at all, 7 = extreme happiness), (ii) "How good did you feel when reading about the employees receiving a bonus?" (1 = I did not feel good at all, 7 = I felt extremely good), and (iii) "How happy did you feel for the employees receiving a bonus?" (1 = I did not feel happy for them at all, 7 = I felt extremely happy for them).

Finally, the participants were presented with two multiple-choice questions testing their attention to the two scenario parameters, namely, the bonus level and the number of employees who received a bonus. Lastly, they were prompted to provide information on gender and age.

Results

The three ratings of the employees' overall happiness, the rater's own good feelings, and personal happiness were highly correlated, and were thus averaged to create an "empathy score" for each participant (α = .86). The empathy scores were submitted to a linear regression analysis, with bonus size, number of employees, and their interaction as predictors. The two levels of bonus size (50£ vs. 1,000£) were coded 0 and 1, respectively. The two numbers of employees (50 vs. 1,000) were also coded 0 and 1, respectively.

Bonus size was a significant predictor of empathy. The empathy scores were higher when the individual bonus was 1,000£ (M = 5.99, SD = 0.94) than when it was 50£ (M = 5.30, SD = 1.21), b = 0.69, β = 0.30, $t(396)$ = 6.38, p < .001. The number of employees who received a bonus was not a significant predictor. The mean empathy scores were similar regardless of

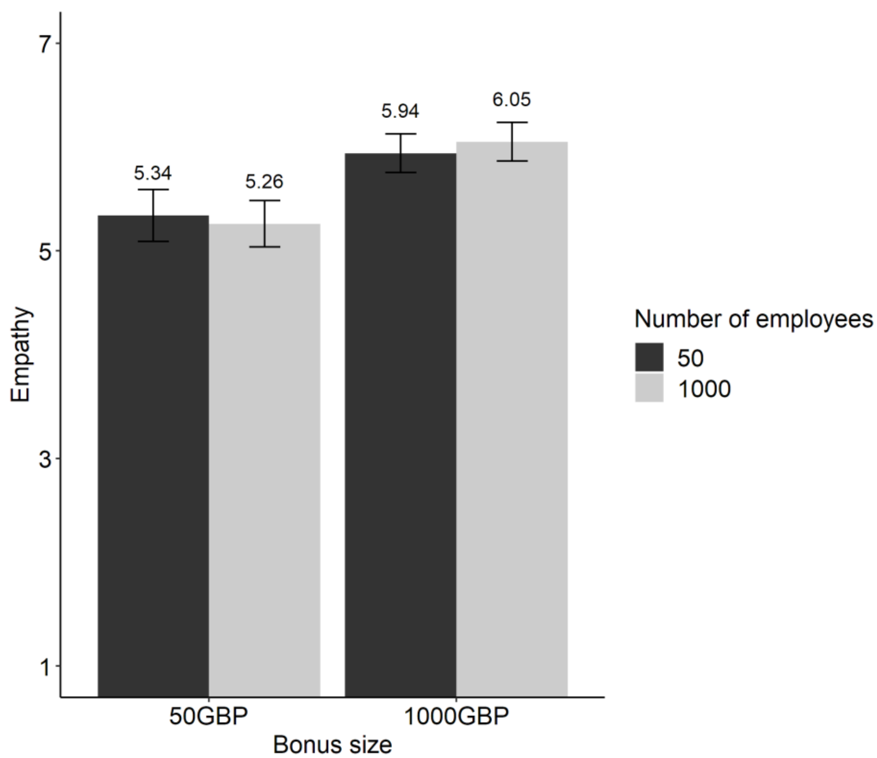

Figure 5. Empathy scores by condition in Experiment 4. Error bars denote a 95% CI.

whether the number was 50 (M = 5.64, SD = 1.16) or 1,000 (M = 5.65, SD = 1.11), b = 0.01, β = 0.01, $t < 1$. The interaction of bonus size and number of employees was not significant, $t < 1$ (see Figure 5). A comparison of the standardized regression coefficients yielded that the coefficient of bonus size (β = 0.30) was larger than that of the number of employees (β = 0.01), $F(1, 396)$ = 19.73, $p < .001$.

Discussion

Experiment 4 pitted our hypothesis against an alternative motivational account according to which people should not be insensitive to group size when the social outcomes are positive, and are not potentially threatening to the self (Cameron & Payne, 2011). Experiment 4 described individuals who experience a positive outcome (receiving a bonus). Nevertheless, as in the previous experiments that described a negative outcome (Experiments 1–3), the participants' empathic reactions were sensitive to the size of the individual bonus, but not to the number of people who received the bonus. These results lend further support to our theory that feelings of empathy, by their very nature, and regardless of the type of outcome, cannot be sensitive to the number of people in the group.

Experiment 5

Four experiments provided consistent evidence for the claim that empathy is sensitive to the magnitude of pain (or gain) experienced by each individual, and not to the number of people. Whereas this discrepancy clearly deviates from the normative prediction that group size should affect the overall group pain (gain), it is possible that our findings do not reflect an error. Instead, they may reflect the subjective preferences of observers who try to assess the magnitude of social outcomes in groups.

One way to study this possibility is by allowing observers to actively compare different group sizes and different magnitudes of pain. Such a within-subject design has been shown to reduce biases in charitable donation decisions, such as the singularity effect (Hsee et al., 2013) or scope insensitivity (Garinther et al., 2022). If people's insensitivity to group size reflects their true preferences, then it should be apparent even when they can compare groups of different sizes. However, we hypothesize that this is not the case, and that people's preferences would take group size into account. Hence, the insensitivity to the group size observed in Experiments 1–4 reflects a limitation of the empathic system. We hypothesized that allowing participants to compare all conditions in a within-subject design would reveal sensitivity both to individual pain levels and to the number of people in the group. The study was pre-registered at https://aspredicted.org/MBZ_T6M.

Method

Participants. We recruited 121 British participants on Prolific who passed an initial attention check for a fee of 0.70£. One participant failed the comprehension question (see below) and was excluded from the analyses. The analyses were thus conducted on 120 participants (53.3% females; M_{age} = 39.62, SD_{age} = 13.61).

Procedure, materials, and design. Participants read the following scenario:

> "Mr. Johns, Mr. Smith, Mr. Brown, and Mr. Philips are the CEOs of four medium-sized companies. Each of their companies employs a few thousand employees. All four companies are going through a difficult economic period in which their usual monthly gains turned into slight losses.
> The CEOs face an important decision. They can either wait a few more months and see if the situation improves, or they can cut some of the workers' monthly wages, to balance the losses.
> The CEOs know that their employees are not earning much as it is, only a couple of thousands of dollars a month, and will probably have difficulties finding alternative jobs. After much deliberation, all CEOs decide that it is too risky to wait, and introduce pay cuts in their companies.

Specifically,
In Mr. Johns' company, 200 employees each lose $200 of their monthly salary.
In Mr. Smith's company, 10 employees each lose $200 of their monthly salary.
In Mr. Brown's company, 200 employees each lose $10 of their monthly salary.
In Mr. Philips' company, 10 employees each lose $10 of their monthly salary."

Upon reading the scenario, participants were asked to consider the employees of each of the four companies (one at a time, in random order). They were asked to respond to the three questions from Experiment 1 for each group of employees, using a 7-point Likert scale. Specifically, participants were asked to answer for each group: (i) "In your opinion, how much distress, overall, was caused to the employees whose salaries were reduced?" (1 = no distress at all, 7 = extreme distress), (ii) "How much personal distress did ***you*** feel when reading about the employees whose salaries were reduced?" (1 = I did not feel personal distress at all, 7 = I felt a lot of personal distress), and (iii) "How much empathic concern did you feel when reading about the employees whose salaries were reduced?" (1 = I did not feel empathic concern at all, 7 = I felt a lot of empathic concern). The order of the three questions was randomized.

Finally, participants were presented with a multiple-choice question testing their attention to the information presented in the scenario (they had to indicate what happened to the employees in the scenario). Lastly, they were prompted to report their gender and age.

Results

As expected, the three items, empathic concern, personal distress, and overall distress caused, were highly correlated in all conditions, and were thus averaged for each participant to create an "empathy score" in each within-subject condition ($.80 < \alpha$'s $< .88$).

The empathy scores were submitted to a repeated measures ANOVA, with wage cut ($10 vs. $200) and number of employees (10 vs. 200) as within-subject factors. As predicted, the analysis revealed two main effects. Empathy scores were higher when the wage cut was $200 (*M*

= 5.73, *SE* = 0.11) than when it was $10 (*M* = 3.29, *SE* = 0.14), *F*(1,119) = 355.66, $p < .001$, η^2_p = .749. Similarly, empathy scores were higher when 200 employees suffered a wage cut (*M* = 4.60, *SE* = 0.11) than when 10 employees suffered a wage cut (*M* = 4.42, *SE* = 0.11), *F*(1,119) = 13.38, $p < .001$, η^2_p = .101. The wage cut X number of employees interaction was not significant, *F*(1,119) = 3.03, *p* = .084.

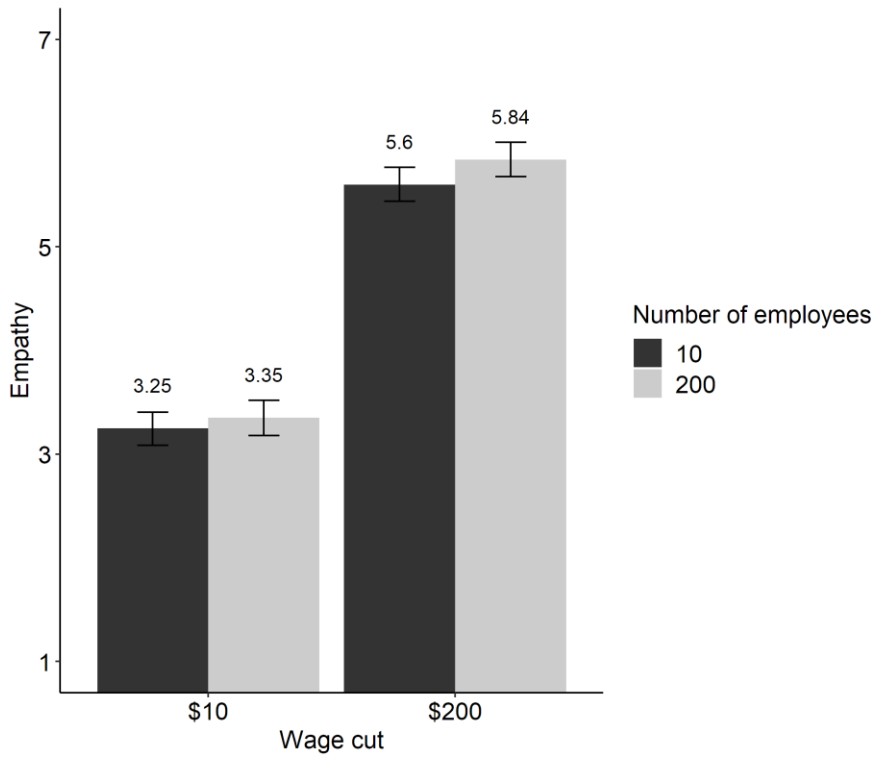

Figure 6. Empathy scores by condition in Experiment 5. Error bars denote a 95% CI**.**

Discussion

Experiment 5 tested people's empathic reactions in a within-subject design. We explored whether people would be sensitive to the magnitude of the pain inflicted upon each individual, as well as to the number of people in the group, when the comparison between the different conditions was readily available for them. Previous studies have shown that allowing people to compare groups of different sizes (in a within-subject design) nullifies the singularity effect and scope insensitivity (Garinther et al., 2022; Hsee et al., 2013). Yet the results of Experiment 5 suggest that, given the possibility to compare groups of different sizes, people do indeed consider not only the individual pain level, but also group size. That is, it seems that the insensitivity to the size of the group observed in Experiments 1–4 reflects a limitation of human empathy, not a human preference. We note that even in this within-subject design, the effect of the individual pain (η^2_p = .749) is larger than the effect of group size (η^2_p = .101), suggesting that even when given full information, people focus more on the individual pain than on the number of people experiencing it.

General Discussion

In everyday life, people often direct their empathic reactions to groups. Yet most research on empathy to date has focused on empathy for individuals. In five pre-registered experiments, we investigated people's empathy for groups. We found robust evidence that empathy is highly sensitive to the magnitude of the loss (or gain) caused to individual members in the group, and less so to the number of people in the group. This was found across various types of resources (time, money, and physical pain), valences (positive or negative), and different populations (students, online workers, across the US, UK, and Israel).

Insensitivity to the number of people in the group, known as scope insensitivity or psychic numbing, has been extensively documented (e.g., Baron, 1997; Baron & Greene, 1996; Boyle et al., 1994; Cameron & Payne, 2011; Dickert et al., 2015; Fischhoff et al., 1993; Hsee & Rottenstreich, 2004; Kahneman et al., 1999; Slovic et al., 2020; Small et al., 2007). Whereas much of past research has focused on the number of people in the group, this may not be the only parameter that should be taken into account when considering a social outcome. Clearly, the magnitude of the loss (or gain) of each individual in the group is also a crucial parameter.

However, most previous studies did not test people's sensitivity to both parameters conjointly (but see Barneron et al., 2021). The present work extends these past studies in significant ways. Here, we find differential sensitivity to group size and individual impact level.

Several other explanations of scope insensitivity build on biases in the processing of numeric information, such as inattention to numbers (e.g., Dickert et al., 2015) and the concavity of the value function (e.g., Fetherstonhaugh et al., 1997). Whereas these two explanations are valid and can account for the effect of insensitivity to the number of people in the group, our studies suggest that they may not tell the whole story. In Experiments 1, 2, and 4, we used the same numeric values to represent levels of pain caused to each individual and numbers of individuals in the group (e.g., in Experiment 1, either 10 or 200 employees suffered individual wage cuts of either $10 or $200). If people are inattentive to numbers, or assess magnitudes based on a concave function, the effects obtained when the numeric expressions represent the number of people in the group should be the same as when they represent the level of pain caused to each individual. Furthermore, in Experiment 3, participants were insensitive to the number of people in pain, although this information was presented in non-numeric terms. Taken together, our findings provide evidence that numeric deficiencies, be they inattention to large numbers, poor numeric abilities, or non-linear value functions, cannot account for the whole effect. Our results show that people's empathic reactions *can* be sensitive to numbers that represent magnitudes of individual pain, but not when they represent numbers of individuals who suffer the pain.

Other scholars have proposed that observers intentionally attenuate their empathic reactions to the suffering of large groups, since giving full attention to the misery of others could be overwhelming (Cameron & Payne, 2011; Cameron et al., 2016). Our results do not support this explanation as the sole account of insensitivity to group size. In Experiment 4, insensitivity to group size was documented, although the group members experienced positive outcomes, such as a bonus at the workplace. In such cases, it is unlikely that participants found their emotional responses to be overwhelming or unpleasant and intentionally attenuated them.

The data presented here on empathy for groups, as well as the results of Barneron et al. (2021) on decisions made at the expense of groups, best fit with our hypothesis regarding the dissociation between the two scopes of the occurrence. According to our explanation, because empathy is routed through the self, it simulates the experience of a single individual. Therefore, empathy cannot, by its very nature, be sensitive to the number of people in the group. It is however attuned to the magnitude of loss (or gain) experienced by a single individual in the group.

Our hypothesis has behavioral implications for altruistic behaviors that are often driven by empathy, such as donation giving (Batson et al., 1981; Decety et al., 2016; Ein-Gar & Levontin, 2013; Smith et al., 2020). Past findings on scope insensitivity in donation decisions (e.g., Boyle et al., 1994; Harel & Kogut, 2020; Kogut et al., 2015) can also be explained by the inherent inability to adjust the empathic reactions to the number of people experiencing pain.

Our findings pave the way for new research questions. In our experiments, the group members described in the scenarios all experienced the same individual loss (or gain). But, how might one's empathy for a group take shape when the individuals in the group experience different outcomes? Is the reaction directed to the average outcome, to a prototypical one, to the most extreme one, or to a randomly selected group member? A recent study suggests that people's estimations of the average emotional response of a crowd are affected by faces showing strong facial expressions (Goldenberg et al., 2021), suggesting that empathy for a group is particularly influenced by group members who exhibit extreme emotions. This finding suggests an important direction for future research on empathy for groups.

We also did not address here the effect of social identity on empathy for groups. People tend to see in-group members as more diverse and heterogeneous than out-group members (e.g., Taylor et al., 1978; Quattrone & Jones, 1980). Hence, it might be easier to account for the number of people in one's in-group. Additionally, in-group members tend to evoke stronger empathic responses (Brown et al., 2006; De Dreu et al., 2011; Han, 2018), which might also increase the saliency of their number in the group.

Decisional biases could be overcome by refocusing people's attention on the factors they should consider (Gordon-Hecker & Kogut, 2022). Thus, asking people to aggregate harm using multiplication might help them overcome their empathic limitation. As noted earlier, both aspects, the number of members in the group and the level of pain caused to each group member, should be normatively weighed in assessing the overall pain caused to a group. Moreover, we found (Experiment 5) that when given the opportunity to compare, people do weigh both factors, though the number of people in the group has a much weaker effect. Being aware of the bias, along with specific suggestions on how to aggregate empathy across group members, could enhance personal decisions, as well as public policy decisions, of the sort made by leaders, government agencies, businesses, and philanthropists.

Conclusion

Bill Gates, one of the world's most generous philanthropist, once said, "Melinda and I often find it very tough when you're seeing a few kids dying. But then there's millions like that. It should be a million times more emotional, but nobody can be a million times more sad" ("Inside Bill Gates' Brain," Netflix, S1:E2). Consistent with this observation, our experiments suggest that individuals do not have mental procedures for multiplying levels of empathy to reflect the size of the group that is the target of one's empathy.

In this study, we took a step forward in unveiling the mechanisms by which empathy for many others is formed and shaped. Understanding these mechanisms has theoretical and practical implications for various fields. It should help uncover the social-cognitive roots of previously documented decision-making phenomena, such as scope insensitivity and psychic numbing. These findings should also inform the ongoing debate on the role of empathy in domains such as fundraising and public policy decisions.

Bibliography

Aaker, J. L., Rudd, M., & Mogilner, C. (2011). If money does not make you happy, consider time. *Journal of Consumer Psychology*, *21*(2), 126-130.

Barneron, M., Choshen-Hillel, S., & Yaniv, I. (2021). Reaping a benefit at the expense of multiple others: How are the losses of others counted? *Organizational Behavior and Human Decision Processes*, *164*, 136-146.

Baron, J. (1997). Biases in the quantitative measurement of values for public decisions. *Psychological Bulletin*, *122*(1), 72-88.

Baron, J., & Greene, J. (1996). Determinants of insensitivity to quantity in valuation of public goods: Contribution, warm glow, budget constraints, availability, and prominence. *Journal of Experimental Psychology: Applied*, *2*(2), 107-125.

Bartal, I. B. A., Decety, J., & Mason, P. (2011). Empathy and pro-social behavior in rats. *Science, 334*(6061), 1427-1430.

Batson, C. D. (2010). Empathy-induced altruistic motivation. In M. Mikulincer & P. R. Shaver (Eds.), *Prosocial motives, emotions, and behavior: The better angels of our nature* (pp. 15-34). American Psychological Association.

Batson, C. D., Batson, J. G., Slingsby, J. K., Harrell, K. L., Peekna, H. M., & Todd, R. M. (1991). Empathic joy and the empathy-altruism hypothesis. *Journal of Personality and Social Psychology*, *61*(3), 413-426.

Bloom, P. (2016). *Against empathy: The case for rational compassion*. London: Penguin Random House.

Boyle, K. J., Desvousges, W. H., Johnson, F. R., Dunford, R. W., & Hudson, S. P. (1994). An investigation of part-whole biases in contingent valuation studies. *Journal of Environmental Economics and Management, 27,* 64-83.

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: the self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry*, *25*(1), 49-59.

Brown, L. M., Bradley, M. M., & Lang, P. J. (2006). Affective reactions to pictures of ingroup and outgroup members. *Biological psychology*, *71*(3), 303-311.

Cameron, C. D., & Payne, B. K. (2011). Escaping affect: how motivated emotion regulation creates insensitivity to mass suffering. *Journal of Personality and Social Psychology*, *100*(1), 1-15.

Cameron, C. D., Harris, L. T., & Payne, B. K. (2016). The emotional cost of humanity: Anticipated exhaustion motivates dehumanization of stigmatized targets. *Social Psychological and Personality Science*, *7*(2), 105-112.

Choshen-Hillel, S., Sadres, I., Gordon-Hecker, T., Genzer, S., Rechtman, D., Rekhtman, D., Caruso, E. M., Clements, K. L., Ohler, A., Gozal, D., Israel, S., Perry, A., & Gileles-Hillel, A. (2022). Physicians prescribe fewer analgesics during nightshifts than dayshifts. *Proceedings of the National Academy of Sciences*, *119*, e2200047119.

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, *44*(1), 113-126.

De Dreu, C. K., Greer, L. L., Van Kleef, G. A., Shalvi, S., & Handgraaf, M. J. (2011). Oxytocin promotes human ethnocentrism. *Proceedings of the National Academy of Sciences*, *108*(4), 1262-1266.

Decety, J., Bartal, I. B. A., Uzefovsky, F., & Knafo-Noam, A. (2016). Empathy as a driver of prosocial behaviour: highly conserved neurobehavioural mechanisms across species. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *371*(1686), 20150077.

Decety, J., Yang, C. Y., & Cheng, Y. (2010). Physicians down-regulate their pain empathy response: an event-related brain potential study. *Neuroimage*, *50*, 1676-1682.

Depow, G. J., Francis, Z., & Inzlicht, M. (2021). The experience of empathy in everyday life. *Psychological Science*, *32*(8), 1198-1213.

Dickert, S., Kleber, J., Peters, E., & Slovic, P. (2011). Numeracy as a precursor to pro-social behavior: The impact of numeracy and presentation format on the cognitive mechanisms underlying donation decisions. *Judgment and Decision Making*, *6*(7), 638-650.

Dickert, S., Västfjäll, D., Kleber, J., & Slovic, P. (2015). Scope insensitivity: The limits of intuitive valuation of human lives in public policy. *Journal of Applied Research in Memory and Cognition*, *4*(3), 248-255.

Ein-Gar, D., & Levontin, L. (2013). Giving from a distance: Putting the charitable organization at the center of the donation appeal. *Journal of Consumer Psychology*, *23*(2), 197-211.

Epley, N., Keysar, B., Van Boven, L., & Gilovich, T. (2004). Perspective taking as egocentric anchoring and adjustment. *Journal of Personality and Social Psychology*, *87*(3), 327-339.

Erlandsson, A., Björklund, F., & Bäckström, M. (2015). Emotional reactions, perceived impact and perceived responsibility mediate the identifiable victim effect, proportion dominance effect and in-group effect respectively. *Organizational Behavior and Human Decision Processes*, *127*, 1-14.

Eyal, T., Steffel, M., & Epley, N. (2018). Perspective mistaking: Accurately understanding the mind of another requires getting perspective, not taking perspective. *Journal of Personality and Social Psychology*, *114*(4), 547-571.

Fallon, N., Roberts, C., & Stancak, A. (2020). Shared and distinct functional networks for empathy and pain processing: a systematic review and meta-analysis of fMRI studies. *Social Cognitive and Affective Neuroscience*, *15*(7), 709-723.

Fetherstonhaugh, D., Slovic, P., Johnson, S., & Friedrich, J. (1997). Insensitivity to the value of human life: A study of psychophysical numbing. *Journal of Risk and Uncertainty*, *14*(3), 283-300.

Fischhoff, B., Quadrel, M. J., Kamlet, M., Loewenstein, G., Dawes, R., Fischbeck, P., ... & Stroh, P. (1993). Embedding effects: Stimulus representation and response mode. *Journal of Risk and Uncertainty, 6,* 211-234.

Garinther, A., Arrow, H., & Razavi, P. (2022). Victim number effects in charitable giving: Joint evaluations promote egalitarian decisions. *Personality and Social Psychology Bulletin*, *48*(1), 34-48.

Gino, F., & Mogilner, C. (2014). Time, money, and morality. *Psychological Science*, *25*(2), 414-421.

Goldenberg, A., Weisz, E., Sweeny, T. D., Cikara, M., & Gross, J. J. (2021). The crowd-emotion-amplification effect. *Psychological Science*, *32*(3), 437-450.

Gordon-Hecker, T., & Kogut, T. (2022). Think of what really matters: Structured analysis of personal criteria can save lives. *Social Psychological and Personality Science,* 19485506221141987.

Halevy, N., Kreps, T. A., Weisel, O., & Goldenberg, A. (2015). Morality in intergroup conflict. *Current Opinion in Psychology*, *6*, 10-14.

Han, S. (2018). Neurocognitive basis of racial ingroup bias in empathy. *Trends in Cognitive Sciences*, *22*(5), 400-421.

Harel, I., & Kogut, T. (2021). The Effect of the Number and Identification of Recipients on Organ-Donation Decisions. *Frontiers in Psychology*, *12*, 794422.

Hess, U., & Blairy, S. (2001). Facial mimicry and emotional contagion to dynamic emotional facial expressions and their influence on decoding accuracy. *International Journal of Psychophysiology*, *40*(2), 129-141.

Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: On the affective psychology of value. *Journal of Experimental Psychology: General*, *133*, 23-30.

Hsee, C. K., Zhang, J., Lu, Z. Y., & Xu, F. (2013). Unit asking: A method to boost donations and beyond. *Psychological Science, 24*(9), 1801-1808.

Israelashvili, J., & Perry, A. (2021). Nuancing Perspective. *Social Psychology, 52*, 238-249.

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.

Kahneman, D., Ritov, I., & Schkade, D. A. (1999). Economic preferences or attitude expressions? An analysis of dollar responses to public issues. *Journal of Risk and Uncertainty, 19*, 203-235.

Kanske, P., Böckler, A., Trautwein, F. M., Parianen Lesemann, F. H., & Singer, T. (2016). Are strong empathizers better mentalizers? Evidence for independence and interaction between the routes of social cognition. *Social Cognitive and Affective Neuroscience*, *11*, 1383-1392.

Keysers, C., Kaas, J. H., & Gazzola, V. (2010). Somatosensation in social perception. *Nature Reviews Neuroscience*, *11*(6), 417-428.

Kleber, J., Dickert, S., Peters, E., & Florack, A. (2013). Same numbers, different meanings: How numeracy influences the importance of numbers for pro-social behavior. *Journal of Experimental Social Psychology*, *49*(4), 699-705.

Kogut, T., & Ritov, I. (2005a). The singularity effect of identified victims in separate and joint evaluations. *Organizational Behavior and Human Decision Processes*, *97*(2), 106-116.

Kogut, T., & Ritov, I. (2005b). The “identified victim” effect: An identified group, or just a single individual? *Journal of Behavioral Decision Making*, *18*(3), 157-167.

Kogut, T., Slovic, P., & Västfjäll, D. (2015). Scope insensitivity in helping decisions: Is it a matter of culture and values?. *Journal of Experimental Psychology: General*, *144*(6), 1042-1052.

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*(3), 2492-2502.

Lamm, C., Meltzoff, A. N., & Decety, J. (2010). How do we empathize with someone who is not like us? A functional magnetic resonance imaging study. *Journal of Cognitive Neuroscience*, *22*(2), 362-376.

Levy, J., Goldstein, A., Influs, M., Masalha, S., Zagoory-Sharon, O., & Feldman, R. (2016). Adolescents growing up amidst intractable conflict attenuate brain response to pain of outgroup. *Proceedings of the National Academy of Sciences*, *113*, 13696-13701.

Lim, D., & DeSteno, D. (2016). Suffering and compassion: The links among adverse life experiences, empathy, compassion, and prosocial behavior. *Emotion*, *16*(2), 175-182.

Moche, H., Gordon-Hecker, T., Kogut, T., & Västfjäll, D. (2022). Thinking, good and bad? Deliberative thinking and the singularity effect in charitable giving. *Judgment and Decision Making*, *17*(1), 14-30.

Morelli, S. A., Lieberman, M. D., & Zaki, J. (2015). The emerging study of positive empathy. *Social and Personality Psychology Compass*, *9*(2), 57-68.

Oliver, L. D., Vieira, J. B., Neufeld, R. W., Dziobek, I., & Mitchell, D. G. (2018). Greater involvement of action simulation mechanisms in emotional vs cognitive empathy. *Social Cognitive and Affective Neuroscience*, *13*(4), 367-380.

Perry. A., Bentin, S. Bartal, I. B., Lamm, C., & Decety, J. (2010). “Feeling” the pain of those who are different from us: Modulation of EEG in the mu/alpha range. *Cognitive, Affective and Behavioral Neuroscience, 10*, 493-504.

Quattrone, G. A., & Jones, E. E. (1980). The perception of variability within in-groups and out-groups: Implications for the law of small numbers. *Journal of Personality and Social Psychology*, *38*(1), 141-152.

Shamay-Tsoory, S. G. (2011). The neural bases for empathy. *The Neuroscientist*, *17*(1), 18-24.

Shamay-Tsoory, S. G., Abu-Akel, A., Palgi, S., Sulieman, R., Fischer-Shofty, M., Levkovitz, Y., & Decety, J. (2013). Giving peace a chance: Oxytocin increases empathy to pain in the context of the Israeli–Palestinian conflict. *Psychoneuroendocrinology*, *38*, 3139-3144.

Singer, T., Seymour, B., O'doherty, J., Kaube, H., Dolan, R. J., & Frith, C. D. (2004). Empathy for pain involves the affective but not sensory components of pain. *Science*, *303*(5661), 1157-1162.

Slovic, P. (2007). If I look at the mass, I will never act: Psychic numbing and genocide. *Judgment and Decision Making*, *2*, 79-95.

Slovic, P., Mertz, C. K., Markowitz, D. M., Quist, A., & Västfjäll, D. (2020). Virtuous violence from the war room to death row. *Proceedings of the National Academy of Sciences*, *117*(34), 20474-20482.

Small, D. A., Loewenstein, G., & Slovic, P. (2007). Sympathy and callousness: The impact of deliberative thought on donations to identifiable and statistical victims. *Organizational Behavior and Human Decision Processes*, *102*(2), 143-153.

Smith, K. E., Norman, G. J., & Decety, J. (2020). Medical students' empathy positively predicts charitable donation behavior. *The Journal of Positive Psychology*, *15*(6), 734-742.

Taylor, S. E., Fiske, S. T., Etcoff, N. L., & Ruderman, A. J. (1978). Categorical and contextual bases of person memory and stereotyping. *Journal of Personality and Social Psychology*, *36*(7), 778-793.

Telle, N. T., & Pfister, H. R. (2016). Positive empathy and prosocial behavior: A neglected link. *Emotion Review*, *8*(2), 154-163.

Weisz, E., & Zaki, J. (2018). Motivated empathy: a social neuroscience perspective. *Current Opinion in Psychology*, *24*, 67-71.

Zaki, J., & Ochsner, K. N. (2012). The neuroscience of empathy: Progress, pitfalls and promise. *Nature Neuroscience, 15*, 675-680.

Zauberman, G., & Lynch Jr, J. G. (2005). Resource slack and propensity to discount delayed investments of time versus money. *Journal of Experimental Psychology: General*, *134*(1), 23-37.

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