

Supplementary Information [SI] for

Empathy and Helping: The Role of Affect in Response to Others' Suffering

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Notes: Data and analysis scripts are available at <https://github.com/cnlab/empathy>.

SI1. The Fantasy subscale of the Interpersonal Reactivity Index

Different facets of empathy were measured using the Interpersonal Reactivity Index ¹. The IRI consists of four subscales, including *Empathic Concern*, *Perspective Taking*, *Personal Distress*, and *Fantasy*. We reported results using the first three subscales in the main text based on their relevance to prosociality. In addition, here we report results for the Fantasy subscale that measures individual tendencies to identify with fictional characters. Fantasy scores were positively correlated with Empathic Concern ($r=0.298$, $p=0.010$), but not with Perspective Taking ($r=0.150$, $p=0.194$) or Personal Distress ($r=0.003$, $p=0.981$). A tendency to fantasize was not associated with the amount of help given to others in the past month ($b=-0.029$, $p=0.848$). In response to another's emotional narratives, the empathic tendency to fantasize was not associated with the positive affect ($b=0.209$, $p=0.107$) or negative affect ($b=-0.211$, $p=0.123$).

SI2. Seed story video and within-person consistency to different emotional narratives

We recruited one speaker (female, 24 years old) to create the seed story video to be later presented to the participants. The speaker filled out an online survey designed to help select emotional narratives from the past. The survey guided the speaker to recall and write about two emotional autobiographical events ("memorable stories that you will always remember") that she was willing to share with other participants in the study. The speaker wrote about each story and rated their valence, ranging from negative (-5) to positive (5). The research team used these scores to ensure that the seed story was sufficiently emotive, rated at or below/above -2 and 2 in terms of their valence. The speaker practiced narrating each of the stories. Next, she was given some time to evoke the emotional experiences she had during these events. When ready, the speaker started to tell the stories while video recording herself. Each of the two stories were narrated three times in a pseudo randomized order (i.e., avoided recounting the same story twice in a row). The final seed video (279 seconds) was chosen by the research team in consultation with the speaker as follows: First, researchers ensured that the emotional impact was sufficient for the speaker based on the valence rating. Second, of the two stories, the research team and the speaker picked one that was more relatable to general young adult populations than the other (e.g., a romantic relationship and early career decisions). Third, of the three versions of the chosen story, the researchers and the speaker picked the version that felt the most natural. The first recording of the first story was chosen unanimously as the final seed video. The transcription of the seed story is available upon request.

Participants' response to the seed video was used as a measure of individual differences in affective responses to suffering. To help establish that responses to others' suffering reported in the current study were mainly driven by individual traits as opposed to story-specific effects, we used a separate unpublished dataset (N=198) to examine within-person variability in participants' responses to different stories. Participants listened to randomly chosen two of four different seed stories (including the one presented in the current study) and provided verbal support in response. Each story was narrated by a female speaker and described a negative emotional life event. A separate group of participants (N=916) rated the quality of verbal support in terms of the degree to which it would help the speaker feel understood, warm, and better. Scores showed high internal consistency ($\alpha=0.91$) and were averaged to create a composite score that indexed the quality of interpersonal support given in response to hearing someone else's emotional life story. A likelihood ratio test comparing the model with random intercepts and slopes for the effect of seed story by participants to the model with only random intercepts for participants was not significant, $\chi^2(9)=5.306$, $p=0.807$. The lack of significant within-person variability suggested that the participants' responses were consistent within individuals, regardless of the specific story they listened to. While these results come from a different dataset, they support that people's responses to others' suffering tend to be consistent across a variety of narratives depicting the suffering of others.

SI3. Mood

We conducted additional analyses to test whether the relationships among different components of empathy (Empathic Concern, Perspective Taking, and Personal Distress) and affective response to another's suffering, reported in the main text, were unique to witnessing human suffering versus mood in general. Participants' baseline mood was assessed using the modified Differential Emotion Scale (mDES) ² before they listened to the speaker's emotional life stories. Baseline mood was not associated with any of the components of empathy tested here ($p>0.10$) (Fig.SI3). These results suggest that more empathic individuals (within the domains of Empathic Concern, Perspective Taking, and Personal Distress) may not be typically in a better or worse mood than those who are less empathic.

In addition, we found that those who were in a better mood at baseline also felt more positive in response to another's suffering ($b=0.303$, $p=0.011$). However, controlling for baseline positive mood, the relationships to positive affect in response to others' suffering remained significant for Empathic Concern ($b=0.435$, $p<0.001$) and Perspective Taking ($b=0.412$, $p<0.001$). The baseline negative mood was not associated with the degree to which people felt negative in response to another's suffering ($b=0.062$, $p=0.147$). Together, these results suggest that the affective experiences while witnessing others' suffering among empathic individuals are largely independent of their baseline mood.

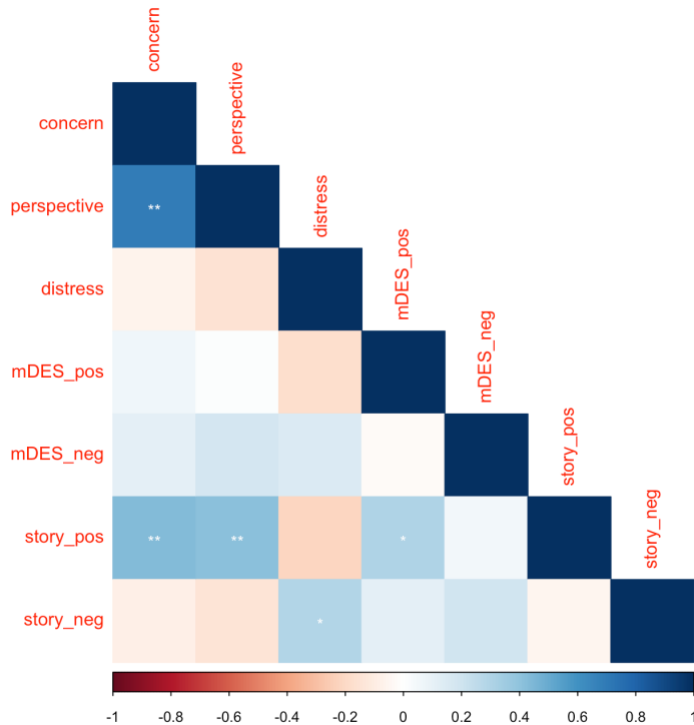


Fig.SI3. Bivariate correlations among empathy, compassion, and baseline positive and negative mood. Notes: Interpersonal Reactivity Index (IRI; Davis, 1980) subscales include concern = Empathic Concern, perspect = Perspective Taking, and distress = Personal Distress; mDES = modified Differential Emotion Scale (mDES) ²; mDES_neg = baseline negative mood; mDES_pos = baseline positive mood; story_neg = self-reported negative affect upon hearing someone else's emotional life story; story_pos = self-reported positive affect upon hearing someone else's emotional life story. * $p < .05$, ** $p < .001$.

SI4. Outliers

Two univariate outliers were detected, including one in the positive affect variable and the other in the negative affect variable. After winsorizing outliers to ± 3 standard deviations, all results remained consistent: Higher Empathic Concern ($b = 0.454$, $p < 0.001$) and Perspective Taking ($b = 0.409$, $p = 0.002$) were associated with the degrees to which participants felt more positive, but not negative (Empathic Concern: $b = -0.139$, $p = 0.310$; Perspective Taking: $b = -0.208$, $p = 0.138$) in response to another's suffering. By comparison, higher Personal Distress was associated with feeling less positive ($b = -0.274$, $p = 0.045$) and more negative ($b = 0.339$, $p = 0.017$) in response to others' suffering. We continued to observe a significant indirect effect of Empathic Concern ($a*b = 0.140$, BCa 95%CI [0.001, 0.312]) and Perspective Taking ($a*b = 0.128$, BCa 95%CI [0.009, 0.316]) on helping via positive affect. The indirect paths from Personal Distress to helping via positive affect ($a*b = -0.096$, BCa 95%CI [-0.282, 0.005]) and negative affect remained nonsignificant ($a*b = 0.043$, BCa 95%CI [-0.044, 0.227]).

We also assessed potential bivariate outliers using Mahalanobis distance and found no data that exceeded the threshold for $p > 0.95$ based on a chi-square distribution with 2 degrees of freedom.

SI5. Correction for multiple comparisons

All significant results reported in the main text were robust to False Discovery Rate (FDR) correction using the Benjamini-Hochberg method (FDR-adjusted p values for the association between Empathic Concern and helping (0.043), Empathic Concern and positive affect (0.002), Perspective Taking and positive affect (0.004), Personal Distress and positive affect (0.044) and Personal Distress and negative affect (0.028)). We applied an FDR correction instead of a Family-Wise Error Rate (FWER) correction (e.g., Bonferroni) because FDR controls the proportion of false positives in relation to the number of "discoveries" (i.e., rejections of the null hypothesis), whereas FWER addresses false positives by considering the total number of statistical tests performed.

SI References

1. Davis, M. H. Measuring individual differences in empathy: Evidence for a multidimensional approach. *J. Pers. Soc. Psychol.* 44, 113–126 (1983).
2. Cohn, M. A., Fredrickson, B. L., Brown, S. L., Mikels, J. A. & Conway, A. M. Happiness unpacked: positive emotions increase life satisfaction by building resilience. *Emotion* 9, 361–368 (2009).