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Compassion buffers the association between trauma exposure and PTSD symptom severity: Findings of a cross-sectional study

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Abstract

To advance intervention science dedicated to improve refugees' mental health, a better understanding of factors of risk and resilience involved in the etiology and maintenance of post-traumatic stress disorder (PTSD) is needed. In the present study, we tested whether empathy and compassion, two trainable aspects of social cognition related to health, would modulate risk for PTSD after war-related trauma. Fifty-six refugees and 42 migrants from Arabic-speaking countries reported on their trauma experiences, PTSD symptoms, and perceived trait empathy and compassion. They further completed the EmpaToM, a naturalistic computer task measuring behavioral empathy and compassion. Moderation analyses revealed that behavioral, but not self-reported compassion was a significant moderator of the trauma-PTSD link. Trauma was more strongly related to PTSD symptoms when individuals had low ($\beta = .59, t = 4.27, p < .001$) as compared to high levels of behavioral compassion. Neither self-reported nor behavioral empathy moderated the trauma-PTSD link ($\beta = .24, t = 1.57, p = .120$). Findings indicate that the ability to go beyond the sharing of others' suffering and generate the positive feeling of compassion may support

resilience in the context of trauma and subsequent development of PTSD. Hence, compassion may be a suitable target for prevention and intervention approaches reducing PTSD symptoms after trauma.

Keywords: trauma, post-traumatic stress disorder, compassion, empathy, resilience, refugees

By the end of 2022, there were 35.3 million refugees all around the world (UNHCR, 2023). Most refugees have experienced multiple traumas, including war, persecution, and threat to their life or the life of a family member (Jesuthasan et al., 2018). These traumatic experiences set refugees at increased risk of developing post-traumatic stress disorder (PTSD; Crepet et al., 2017; Steel et al., 2009). With the urgent aim to inform the development of preventive approaches, the present study sought to investigate factors of risk and resilience involved in the etiological pathway from trauma to psychopathology. To this end, we focused on empathy and compassion, two trainable aspects of social cognition related to health (Klimecki et al., 2013; Klimecki et al., 2014).

Seeing someone else suffer often elicits feelings of distress in oneself. This affect sharing, while being aware that one's emotion originated in someone else, has been termed "empathy" (de Vignemont & Singer, 2006; Eisenberg, 1990). Empathy can be accompanied by feelings of "compassion", a warm sense of care involving the wish for the other's well-being (Singer & Klimecki, 2014). Other than empathy, which is broadly understood as feeling *with* somebody else, compassion involves feeling *for* another person. In going beyond the excessive sharing of negative affect that is involved in the feeling of empathy, compassion is linked to positive affect and activation of brain networks implicated in affiliation and reward (Klimecki et al., 2013; Klimecki et al., 2014).

Previous research suggests that empathy and compassion may play critical and complementary roles in modulating risk for adverse health outcomes in the context of trauma (Cristea et al., 2014). On the one hand, high levels of compassion may facilitate refugees' coping when being directly exposed to stressors. This is supported by studies showing that the systematic training of compassion leads to reductions in acute stress reactivity (Engert et

al., 2017; Pace et al., 2009) and chronic stress load (Engert, 2023; Puhlmann et al., 2019; Puhlmann et al., 2021). On the other hand, refugees' trauma experiences often occur in a social context in which others are exposed to similar adverse experiences. Particularly when *witnessing* trauma, generating compassionate feelings for others despite one's own pain may mobilize resources to help and cope with trauma together. In contrast, persevering in empathic feelings may pose additional burden to mental health through inducing second-hand stress, which can bear physiological costs through the release of stress hormones (Buchanan et al., 2012; Engert et al., 2014). Taken together, it is conceivable that individuals with high levels of compassion process own traumatic experiences and those of others in more adaptive ways, leading to a reduced risk to develop PTSD. To date, there is limited evidence suggesting that compassion may buffer, whereas empathy may increase risk for adverse health outcomes after trauma. However, backing up this hypothesis, in one longitudinal study, community volunteers involved in relief work after an earthquake showed stronger decreases in depression and general distress over time if they scored low on personal distress (a self-report measure of empathy) and high on empathic concern (a self-report measure of compassion) before the relief work began (Cristea et al., 2014).

As refugees are at heightened risk to develop PTSD (Crepet et al., 2017; Steel et al., 2009), examining the roles of empathy and compassion as factors of risk and resilience, respectively, may lay the groundwork for refinement of effective interventions. Hence, we tested in the present study whether empathy and compassion would moderate the well-established link between trauma and PTSD. To obtain a sample with a broad range of traumatic experiences and PTSD symptoms, we recruited war refugees and migrants who came from Arabic-speaking countries. To counter the limitation that questionnaire measures of empathy and compassion are prone to self-report bias (Paulhus, 2007; Podsakoff et al., 2012), we employed the EmpaToM (Kanske et al., 2015), a well-validated computer-based paradigm yielding separate behavioral measures of state empathy and compassion. We hypothesized that higher levels of empathy would render an individual more vulnerable to develop PTSD symptoms following trauma exposure, whereas higher levels of compassion

were expected to exert a protective function. The moderating influences of empathy and compassion were compared against that of social support, a well-accepted protective factor against developing PTSD in the context of trauma (Ferrajão, 2015; Kirkpatrick & Heller, 2014; Schwartz & Shrira, 2019). As compassion appears to be particularly susceptible to training interventions (Klimecki et al., 2013; Klimecki et al., 2014; Singer & Engert, 2019), this aspect of social cognition holds great promise for the development of effective preventions against PTSD.

Methods

Procedure

Data was drawn from a larger study on empathic processes in individuals with war-related trauma exposure, which was approved by the Ethics Board of the medical faculty of Leipzig University, Germany (ethics number: 405/18-ek). Participants were recruited from 2019 – 2023 via flyers and screened for eligibility via phone. Eligible participants visited the lab for a first visit lasting 2.5 hours in which they provided informed consent, and completed the EmpaToM task (Kanske et al., 2015) as well as several self-report questionnaires. Participants returned for a second visit, during which they took part in an empathic stress test. Data collected during the second lab visit is not subject to the current manuscript. Participants received financial compensation for study participation.

Participants

Ninety-eight participants (21.4% female) took part in the study, comprising 56 refugees (11 females; $M_{\text{age}} = 29.1$ years, $SD = 4.8$ years) and 42 migrants (10 females; $M_{\text{age}} = 26.6$ years, $SD = 4.5$ years). Following definitions of UNHCR (2023) and Amnesty International (2023), individuals who had been *forced* to flee their home countries because of conflict or persecution were considered as refugees. We also included asylum seekers in our operationalization of the refugee group, who according to prevailing definitions had not yet been legally recognized as refugees and were still waiting on a decision on their asylum claim. In contrast, individuals who had *chosen* to leave their home to work, study, or join family in a new country were considered as migrants. Of note, the two groups were selected

given an initial plan to test whether individuals with war-related trauma (refugees) would differ in their empathic abilities from individuals without war-related (or other) trauma who have a similar cultural background (migrants).

Inclusion requirements for refugees and migrants were being aged between 20 to 40 years, coming from an Arabic-speaking country of origin, living in Germany for at least six months, speaking Arabic as native language and German at an intermediate (B1) level, and having no reading disability. Refugees were included if they had a war-related trauma (i.e., they had fled war, violence, conflict or persecution). Exclusion criteria for refugees were 1) exposure to any major non-war-related trauma (including maltreatment, severe accident, and natural disaster), 2) the presence of a diagnosed psychiatric disorder during the last two years except for PTSD and depression, and 3) the presence of severe depressive symptoms during the last four weeks as confirmed by scores ≥ 5 on the depression section of the Structured Clinical Interview for DSM-IV Personality Disorders (SCID; First et al., 1996). Migrants were included if they were never exposed to major trauma (including war-related trauma), and did not have a diagnosed psychiatric disorder within the past two years.

Measures

Behavioral Empathy and Compassion

The EmpaToM (Kanske et al., 2015) was employed as a behavioral measure of empathy and compassion. It consists of 48 short video sequences during which autobiographical narratives differing in emotional valence (negative vs. neutral) are presented. For the current study, German autobiographical narratives were presented as audio with Arabic subtitles. After each video, participants rated the valence of their current emotional state (negative to positive) to assess *empathy*, answering the question “*How do you feel?*”. Second, they rated the level of *compassion* felt for the person in the video based on the question “*How much compassion do you feel?*”. For each rating, participants had to move a sliding scale without numbers. For the analysis, responses in the ratings were coded from 0 (negative affect/no compassion) to 100 (positive affect/high compassion). Behavioral empathy was measured as the difference in valence ratings between emotionally negative

and neutral conditions. Behavioral compassion was measured as a mean of compassion ratings across all conditions (see Kanske et al., 2015). The EmpaTom further assesses participants' ability to make inferences about others' beliefs, thoughts, intentions or emotions—termed "*Theory of Mind*" (ToM; Frith & Frith, 2005; Singer & Klimecki, 2014). In detail, after each compassion rating, participants were presented a multiple-choice question that required either a ToM-inference (e.g., irony, false beliefs, and metaphors) or factual reasoning about the content of the previous video. ToM data was not subject to our main analysis, which explicitly focused on affective components of social cognition. Since ToM may nevertheless have an influence on the link between trauma and PTSD, an analysis of ToM data is presented in the Supplement. EmpaToM data was missing from one participant due to technical issues.

Self-reported Empathy and Compassion

Next to the behavioral EmpaTom data, we used the Interpersonal Reactivity Index (IRI; Davis, 1980) as a measure of self-reported empathy and compassion to compare our results with prior research (e.g., Cristea et al., 2014). The IRI was translated into Arabic by a native, bilingual speaker and then back translated by a second bilingual individual to ensure linguistic equivalence (Brislin, 1986). In line with previous studies (Cristea et al., 2014; von Harscher et al., 2018; Zhang et al., 2021), we used the personal distress scale to measure empathy, and the empathic concern scale to measure compassion. The personal distress scale identifies empathic self-oriented feelings such as discomfort. The empathic concern scale captures other-oriented feelings such as compassion or concern in distress. Each scale consists of seven items rated on a Likert scale from 1 ("does not describe me well") to 5 ("describes me very well") which are aggregated to a sum score. In the current study, Cronbach's alpha was relatively poor (.45 for empathic concern; .51 for personal distress).

Trauma

Trauma was measured with the trauma events section of the Harvard Trauma Questionnaire (HTQ; Mollica et al., 1992), in which participants indicated whether they had

experienced any of 42 traumatic events (e.g., oppression, imprisonment, combat exposure) before coming to Germany. Response options were “yes” and “no”, and trauma scores were calculated by a sum of “yes” responses. We employed the official Arabic version of the HTQ (“Iraqi Version”; Shoeb et al., 2007), which has shown good psychometric properties (Arnetz et al., 2014; Shoeb et al., 2007). In our study, the trauma events section of the HTQ demonstrated excellent reliability (Cronbach’s alpha = .92).

PTSD

PTSD symptom severity was measured using the trauma symptom section of the Arabic version of the HTQ (Mollica et al., 1992; Shoeb et al., 2007). Participants indicated on 45 items the degree to which they were distressed in the past week by trauma symptoms such as “feeling detached or withdrawn from people” or having “trouble sleeping” on a Likert scale ranging from 1 (“not at all”) to 4 (“extremely”). The current study makes use of only the first 16 items of the trauma symptom section, which correspond to symptoms of PTSD according to the DSM-IV. Higher mean scores indicated more severe PTSD symptoms. The HTQ manual recommends a cut-off score of 2.5 to identify clinically significant levels of PTSD (Mollica et al., 1992). Reliability was good (Cronbach’s alpha = .87).

Social support

Social support was measured with the Social Support Questionnaire-Short Form (SSQ6; Sarason et al., 1983, 1987), which was translated into Arabic by a native, bilingual speaker and then back translated by a second bilingual individual. Participants were presented with six situations (e.g., when in need of help or when feeling down). For each situation, they were asked to indicate the number of people in their lives who would support them, and their overall satisfaction with the support in prior experience of such situations, ranging from 1 (“very dissatisfied”) to 6 (“very satisfied”) on a Likert scale. Social support was operationalized as the mean satisfaction score. Reliability was good (Cronbach’s alpha = .86).

Data analysis

For descriptive purposes, we first compared refugees and migrants concerning

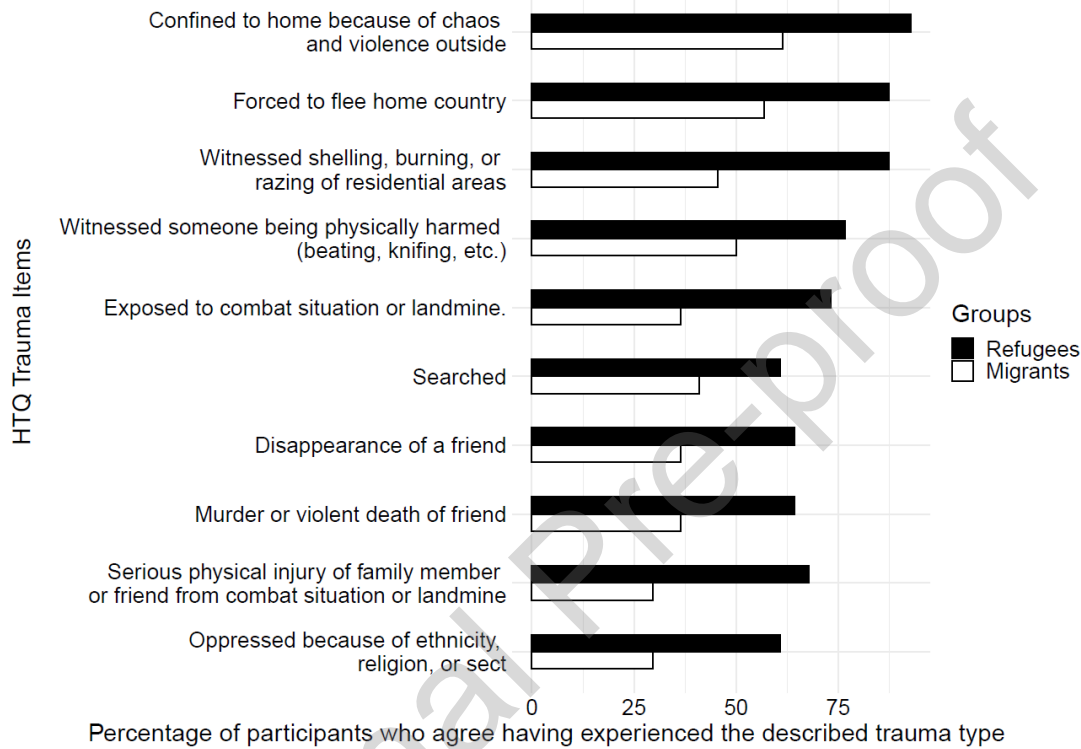
trauma exposure, PTSD symptoms, empathy, and compassion using t -tests. As opposed to recruitment plans, migrants reported considerable war-related traumatic experiences. Hence, we collapsed the groups of migrants and refugees for further analyses, retaining group membership as a covariate. In two separate hierarchical multiple regression analyses, we examined the predictive value of trauma exposure and the moderating roles of empathy and compassion to PTSD symptoms. In these analyses, we also controlled for the covariate sex given significant associations with predictor and outcome variables, and for social support as a well-established moderator of the trauma-PTSD link. Analyses were focused on (behavioral) EmpaTom rather than (self-report) IRI measures of empathy and compassion. This decision was made because the EmpaTom is a naturalistic task with high ecological validity (Hildebrandt et al., 2021). Its measures directly trace neural responses in empathy- and compassion-related brain regions (Kanske et al., 2015). Apart from that, reliability of the IRI subscales was generally low in our sample. Moreover, previous studies have revealed a lack of association between questionnaire and behavioral measures of empathy (Hildebrandt et al., 2021). An a priori power analysis using G*Power version 3.1.9.7 (Faul et al., 2007) revealed a required minimum of $N = 95$ participants to test our moderation hypotheses ($\alpha = .05$; 80% power for detecting small-to-medium effects of $f^2 = .085$). For informative purposes, exploratory moderation analyses including questionnaire-assessed empathy and compassion are reported in the Supplement. A significance level was set to 5%. All analyses were conducted in R (version 4.2.2; Team, 2022). The data set and analysis script are available on the Open Science Framework (<https://osf.io/rz9cq/>).

Results

Refugees were older than migrants, $t(96) = -2.58, p = .011$. Groups did not differ in terms of sex composition ($\chi^2 = .06, p = .80$). The majority of refugees and migrants came from Syria (78.6% and 69.0%, respectively; see Table S1 for details on country of origin for each group). Refugees ($M = 16.4, SD = 7.7$) reported having experienced more traumatic events than migrants ($M = 7.8, SD = 6.8; t(96) = -5.76, p < .001$). Yet, contrary to our initial recruitment plan, migrants also reported considerable trauma exposure (Figure 1). Refugees

($M = 1.87$, $SD = 0.47$) exhibited higher levels of PTSD symptoms than migrants ($M = 1.53$, $SD = 0.45$; $t(96) = -3.56$, $p < .001$). Six participants reported clinically significant levels of PTSD (defined as HTQ mean scores > 2.5), five of whom were refugees.

Figure 1. Trauma experiences by refugee and migrant status



Note. The ten most frequently affirmed trauma items are listed.

There were no significant differences in questionnaire (IRI) and behavioral (EmpaTom) measures of empathy and compassion between refugees and migrants (see Table 1). Table 2 presents bivariate Pearson correlations between all study variables.

Table 1. Group comparison of measures of empathy and compassion

	Refugees (<i>M</i> , <i>SD</i>)	Migrants (<i>M</i> , <i>SD</i>)	<i>t</i>	<i>p</i>
EmpaTom				
Empathy	32.34 (20.69)	29.96 (16.38)	-0.61	.545
Compassion	63.71 (12.46)	62.55 (12.15)	-0.46	.649
Interpersonal Reactivity Index				
Personal Distress	21.38 (4.00)	21.38 (4.65)	0.01	.995
Empathic Concern	28.71 (3.56)	27.98 (3.54)	-1.02	.311

Note. IRI subscales are ordered to indicate conceptual overlap with EmpaTom measures.

Table 2. Bivariate correlations between study variables

	Group ^b	Sex	Age	Trauma ^a	PTSD	Empathy	Compassion	IRI: PD	IRI: EC	Support	
Sex ^a	-.05										
Age	.25*										
Trauma	.51**										
PTSD	.34**										
Empathy	.06										
Compassion	.05										
IRI: PD	.00										
IRI: EC	.10										
Support	.06										
<i>M</i>			28.0	12.70	1.72	31.33	63.22	21.3	28.4	2.10	
<i>SD</i>			3	4.84	8.45	0.49	18.93	12.28	4.27	3.55	0.98

Note. EC = Empathic Concern; IRI = Interpersonal Reactivity Index; PD = Personal distress.

^a Sex coded as 0 = male, 1 = female.

^b Group coded as 0 = migrant, 1 = refugee.

* $p < .05$

** $p < .01$

*** $p < .001$

We conducted two multiple regression analyses to evaluate whether empathy and compassion would moderate the association between trauma exposure and PTSD symptoms, controlling for group and sex as covariates, and for social support as a well-established moderator of the relationship. Model statistics are shown in Table 3. Female sex and higher levels of trauma were main predictors (i.e., risk factors) of PTSD symptoms. Empathy was not a significant moderator of the trauma-PTSD link. By contrast, compassion, but not social support, was a significant moderator of the trauma-PTSD link. We probed this interaction by computing the simple slope of trauma predicting PTSD symptoms at low and high levels of compassion (i.e., recentered at ± 1 SD from mean). Results revealed that trauma was more strongly related to PTSD symptoms when individuals had low levels of compassion ($\beta = .59$, $t = 4.27$, $p < .001$) as compared to high levels of compassion ($\beta = .24$, $t = 1.57$, $p = .120$). The trauma by compassion interaction is depicted in Figure 2. The effect

size of the interaction effect was small ($f^2 = .04$). No significant interaction effects between trauma and empathy or trauma and compassion were observed based on the IRI measures (see Table S2). Further, no significant interaction effects between trauma and ToM were found (see Table S3).

Table 3. Multiple linear regression models

	β	SE	p	R^2	p	ΔR^2	Δp
Model 1: Empathy							
Step 1				.321	<.001***		
Group ^a	.133	.097	.172				
Sex ^b	.371	.106	<.001***				
Trauma	.030	.015	.045*				
Social support	.073	.091	.427				
Empathy	.002	.004	.589				
Step 2				.325	<.001***	.004	.289
Trauma x Social Support	.003	.006	.629				
Trauma x Empathy	<.001	<.001	.135				
Model 2: Compassion							
Step 1				.319	<.001***		
Group ^a	.159	.096	.102				
Sex ^b	.341	.106	.002**				
Trauma	.074	.030	.015*				
Social support	.063	.091	.491				
Compassion	.007	.007	.500				
Step 2				.338	<.001***	.019	.104
Trauma x Social Support	.004	.006	.496				
Trauma x Compassion	-.001	<.001	.040*				

Note. Regression parameters for all predictor variables are given for the full model (Step 2).

^aCoding of group: 0 = migrant, 1 = refugee.

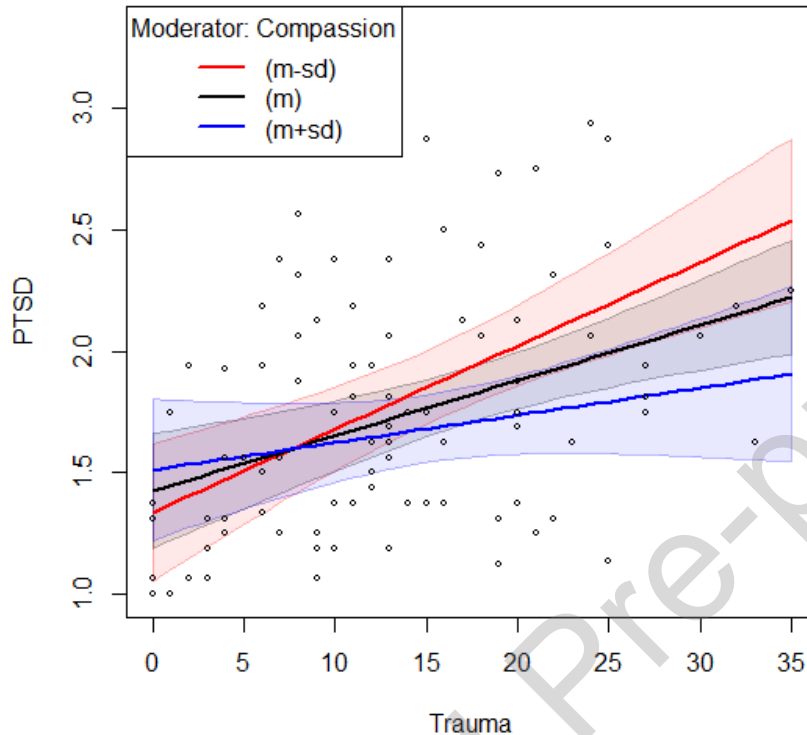
^bCoding of sex: 0 = male, 1 = female.

* $p < .05$

** $p < .01$

*** $p < .001$

Figure 2. The moderating impact of compassion on the relationship between trauma exposure and PTSD symptoms



Note. Simple slopes of trauma predicting PTSD symptoms are computed at low levels of compassion (red; recentered at -1 standard deviation from mean [m-sd]), mean levels of compassion (black; [m]), and high levels of compassion (blue; recentered at +1 standard deviation from mean [m+sd]).

Discussion

The present study aimed to uncover factors modulating risk for PTSD after trauma exposure. To this end, we examined levels of empathy and compassion, assessed in a behavioral task, in refugees and migrants from Arabic-speaking countries. We found that compassion exerted a protective function against developing PTSD symptoms after trauma. Although compassion was positively correlated with empathy, only compassion but not empathy moderated the trauma-PTSD link. The positive association between empathy and compassion could indicate that in order to generate feelings of concern for someone else, it is a prerequisite to feel with the other to a certain extent. Yet, it seems to be the ability to go beyond the sharing of others' suffering and generate the positive feeling of compassion that

is critical for resilience.

Our finding is consistent with the theoretical view of compassion as a resource, both generally in life (Bloom, 2017; Singer & Klimecki, 2014) and specifically after witnessing traumatic events (Trautmann et al., 2022). It also complements prior research showing a link of self-reported compassion with numerous positive health outcomes in non-traumatized adults (Lamothe et al., 2014; von Harscher et al., 2018) and catastrophe relief workers (Cristea et al., 2014). Importantly, in our sample, the moderating effect of behavioral compassion did not extend to self-reported compassion, and both measures did not correlate despite being conceptually related. Apart from confirming the observation that individuals' perceptions of their social abilities do not necessarily reflect their social behaviors elicited in more naturalistic tasks (see also Böckler et al., 2018), this shows that acute and situated compassionate *feelings* seem to be a more powerful buffer in the trauma-PTSD link than perceived trait compassion.

Compassion may exert its protective function through a range of associated mechanisms. In a review of compassion conceptualizations, Gu et al. (2017) have defined compassion as consisting of five elements: recognizing suffering, understanding the universality of human suffering, feeling moved by the suffering person and emotionally connecting with their distress, tolerating the uncomfortable feelings aroused, and acting/being motivated to act to alleviate suffering. While these mechanisms are mostly directed to others (rather than the self), it is well conceivable that the underlying readiness to perceive and accept the existence of suffering in life renders the individual stronger in accepting their own adverse experience. Much in line with this reasoning, previous research has linked compassion to better emotion regulation (Weng et al., 2013) and lower stress reactivity (Engert et al., 2017; Pace et al., 2009). Further, compassion for others typically goes hand-in-hand with self-compassion (Neff, 2003), which supports coping with stressful events through positive cognitive restructuring (Allen & Leary, 2010). In self-experienced hardship, it is hence possible that individuals with high levels of compassion are better able to cope with traumatic stress. In future studies, the relative importance of compassion and its

interrelations with other key mechanisms such as emotion regulation, stress reactivity, and self-compassion have to be tested. Compassion has further been proposed to facilitate the reception of social support (Cosley et al., 2010), which may be a pathway to improved recovery in the aftermath of trauma (Schwartz & Shrira, 2019). In addition to their own traumatic experiences, refugees often witness others' hardship. Specifically in this context, the ability to generate compassionate feelings for others despite one's own pain may prevent perseverance in empathic feelings inducing second-hand stress, and mobilize resources to help and cope with trauma together (Weisz & Cikara, 2021).

Our findings are in line with intervention studies demonstrating benefits of fostering compassion in healthy individuals (Engert et al., 2017, 2023; Pace et al., 2009; Weng et al., 2013) and in those who have experienced trauma (Hinton et al., 2013; Müller-Engelmann et al., 2019). In recent years, attempts have been made to adapt mindfulness-based interventions involving compassion practices to the needs of refugees: After a 9-week mindfulness-based, trauma-sensitive group intervention, Eritrean asylum-seekers residing in Israel demonstrated significantly reduced rates and symptom severity of PTSD, depression, anxiety, and multimorbidity (Aizik-Reebs et al., 2021). Yet, as the intervention contained several components (e.g., loving-kindness and self-compassion practices, attention training, psychoeducation), it is not clear which of them contributed most to the symptom reduction. In this specific study, potential mediators of therapeutic effects on PTSD outcomes included pre- to post-intervention change in self-criticism, self-compassion, and shame (Aizik-Reebs et al., 2022; Oren-Schwartz et al., 2022). Beyond usefulness in interventions, the findings of our study may further suggest that fostering compassion *preventively* in individuals with a high risk of trauma exposure could lower their risk to develop PTSD. Studies testing this hypothesis in individuals living in regions afflicted by war or natural disaster, aid workers, and military personnel are still outstanding.

Surprisingly, we found that beyond the role of compassion, perceived social support had no influence on the trauma-PTSD link. This may emphasize the importance of an individual's own feelings over the care and assistance of other people. Given the solid body

of evidence on the role of social support as a resilience factor in PTSD (Ferração, 2015; Kirkpatrick & Heller, 2014; Schwartz & Shrira, 2019), it is possible that methodological details (e.g., utilized questionnaire, refugee sample) drove the current null result.

We further observed that female sex was a main risk factor of PTSD symptoms. This is in line with several studies showing a greater risk of PTSD among female as compared to male participants after exposure to trauma (Farhood et al., 2018; Holbrook et al., 2002; Stein et al., 2000), with findings being robust against differences in trauma type (Christiansen & Elklit, 2012; Tolin & Foa, 2008). Also, a meta-analysis conducting sub-group analyses on trauma studies in which participants had experienced combat, war, or terrorism, confirmed a greater likelihood of PTSD among female as compared to male civilians (reporting an Odds Ratio of 1.33, 95% CI [1.16, 1.53]; Tolin & Foa, 2008). The reasons for the observed sex differences in vulnerability to PTSD are not fully understood. Yet, sex differences in the risk factors associated with PTSD such as neuroticism, peritraumatic fear, horror, and helplessness, as well as negative posttraumatic cognitions about self and the world may at least partially account for the higher prevalence of PTSD in females (Christiansen & Elklit, 2012; Christiansen & Hansen, 2015).

Correlational analyses revealed that PTSD symptom severity was positively associated with self-reported personal distress (a questionnaire measure of empathy), which reflects the tendency for self-directed negative emotional reactions to the suffering of others. In line with these findings, higher levels of personal distress were consistently observed in individuals with PTSD related to war trauma (Aragona et al., 2020), man-made or accidental trauma (Nietlisbach et al., 2010), childhood trauma (Parlar et al., 2014), and higher post-traumatic stress responses in disaster workers (Nagamine et al., 2018). Given the cross-sectional design of these studies, it is difficult to evaluate whether personal distress is heightened due to PTSD or whether it is a stable trait that modulates vulnerability to PTSD. Yet we did not find evidence for the latter in our moderation analyses focusing on empathy.

This study is not without limitations. First, our attempt to recruit a group of migrants without major traumatic experiences was not successful. While individuals categorized into

the migrant group negated any experiences of war-related or other major trauma during an initial telephone screening, their responses in the HTQ revealed considerable trauma exposure. We assume that the screening was not specific enough to capture traumatic experiences. Seeing traumatic events spelled out in detail in the HTQ likely triggered more accurate memory and helped to categorize prior experience as trauma. Although migrants reported significantly less trauma than refugees did, it is possible that trauma experience in both groups was sufficiently severe to affect measures of empathy and compassion, rendering it less likely to detect trauma-related group differences. Second, we cannot draw causal inferences given the cross-sectional design of our study. Third, despite its high ecological validity, the EmpaTom is still an experimental task with unknown generalizability to individuals' empathic processes in everyday life. Fourth, the relatively small sample size of our study yielded reduced statistical power to detect small effects and increased the likelihood for a Type II error, which might have occurred in the case of the null result obtained on social support. Fifth, given the restricted age range of 20-40 years, findings have limited generalizability to children, adolescents, and older adults. Sixth, reliability of self-reported empathy and compassion as assessed with the IRI was low. This may have been due to a lack of validation of these scales after translation into Arabic, which is a highly complex language with various dialects spoken across regions. Hence, our supplementary results showing no moderating role of self-reported empathy and compassion should be interpreted with caution. Seventh, we did not assess in which year our participants came to Germany, although the duration of time spent in the host country may have influenced the association between trauma and PTSD symptoms. Finally, we did not disentangle whether compassion exerts a protective function specifically in self-experienced hardship, or rather in the context of witnessing trauma, which remains an important endeavor for future studies.

To conclude, we found that higher levels of compassion shown in a naturalistic task buffered the association between trauma and PTSD among refugees and migrants from Arabic-speaking countries. Given that compassion is trainable (Trautwein et al., 2020), we suggest that fostering compassion in the aftermath of trauma, or preventively in individuals

with a high risk of trauma exposure, may lower the incidence or severity of PTSD. In a reverse approach, lower levels of compassion may serve to identify those most in need of support after trauma.

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Author contributions

CW: conceptualization, methodology, formal analysis, writing – original draft; MG: conceptualization, methodology, investigation, writing – review & editing; MN: conceptualization, writing – review and editing; AB: methodology, writing – review and editing; BO: investigation, writing – review and editing; VE: conceptualization, funding acquisition, methodology, supervision, writing – review & editing.

References

- Aizik-Reebs, A., Amir, I., Yuval, K., Hadash, Y., & Bernstein, A. (2022). Candidate mechanisms of action of mindfulness-based trauma recovery for refugees (MBTR-R): Self-compassion and self-criticism. *Journal of Consulting and Clinical Psychology, 90*(2), 107.
- Aizik-Reebs, A., Yuval, K., Hadash, Y., Gebreyohans Gebremariam, S., & Bernstein, A.

- (2021). Mindfulness-based trauma recovery for refugees (MBTR-R): Randomized waitlist-control evidence of efficacy and safety. *Clinical Psychological Science*, 9(6), 1164-1184.
- Allen, A. B., & Leary, M. R. (2010). Self-Compassion, Stress, and Coping. *Soc Personal Psychol Compass*, 4(2), 107-118. <https://doi.org/10.1111/j.1751-9004.2009.00246.x>
- Amnesty International. (2023, December 8). Refugees, asylum seekers, and migrants. <https://www.amnesty.org/en/what-we-do/refugees-asylum-seekers-and-migrants/>
- Aragona, M., Petta, A., Kiaris, F., Begotaraj, E., Lai, C., & Spitoni, G. (2020). The empathic migrant: empathy is preserved in African refugees with PTSD. *Dialogues in Philosophy, Mental & Neuro Sciences*, 13(2), 54-61.
- Arnetz, B. B., Broadbridge, C. L., Jamil, H., Lumley, M. A., Pole, N., Barkho, E., Fakhouri, M., Talia, Y. R., & Arnetz, J. E. (2014). Specific trauma subtypes improve the predictive validity of the Harvard Trauma Questionnaire in Iraqi refugees. *J Immigr Minor Health*, 16(6), 1055-1061. <https://doi.org/10.1007/s10903-014-9995-9>
- Bloom, P. (2017). *Against empathy: the case for rational compassion*. Random House.
- Böckler, A., Tusche, A., Schmidt, P., & Singer, T. (2018). Distinct mental trainings differentially affect altruistically motivated, norm motivated, and self-reported prosocial behaviour. *Sci Rep*, 8(1), 13560. <https://doi.org/10.1038/s41598-018-31813-8>
- Brislin, R. (1986). The wording and translation of research instruments. In W. Lonner & J. Berry (Eds.), *Field methods in cross-cultural research* (pp. 137-164). Sage Publications, Inc.
- Buchanan, T. W., Bagley, S. L., Stansfield, R. B., & Preston, S. D. (2012). The empathic, physiological resonance of stress. *Social neuroscience*, 7(2), 191-201.
- Christiansen, D. M., & Elklit, A. (2012). Sex differences in PTSD. In E. Ovuga (Ed.), *Post Traumatic Stress Disorders in a Global Context* (pp. 113-142). InTechOpen. <https://doi.org/10.5772/1281>
- Christiansen, D. M., & Hansen, M. (2015). Accounting for sex differences in PTSD: A multi-variable mediation model. *European journal of psychotraumatology*, 6(1), 26068.
- Cosley, B. J., McCoy, S. K., Saslow, L. R., & Epel, E. S. (2010). Is compassion for others stress buffering? Consequences of compassion and social support for physiological reactivity to stress. *Journal of experimental social psychology*, 46(5), 816-823.
- Crepet, A., Rita, F., Reid, A., Van den Boogaard, W., Deiana, P., Quaranta, G., Barbieri, A., Bongiorno, F., & Di Carlo, S. (2017). Mental health and trauma in asylum seekers landing in Sicily in 2015: a descriptive study of neglected invisible wounds. *Confl Health*, 11, 1. <https://doi.org/10.1186/s13031-017-0103-3>
- Cristea, I. A., Legge, E., Prospero, M., Guazzelli, M., David, D., & Gentili, C. (2014). Moderating effects of empathic concern and personal distress on the emotional

- reactions of disaster volunteers. *Disasters*, 38(4), 740-752.
<https://doi.org/10.1111/disa.12075>
- Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *JSAS Catalog of Selected Documents in Psychology*, 10(85).
- de Vignemont, F., & Singer, T. (2006). The empathic brain: how, when and why? *Trends Cogn Sci*, 10(10), 435-441. <https://doi.org/10.1016/j.tics.2006.08.008>
- Eisenberg, N. F., R. A. (1990). Empathy: Conceptualization, measurement, and relation to prosocial behavior. *Motivation and Emotion* 14(2), 131-149.
<https://doi.org/10.1007/BF00991640>
- Engert, V., Hoehne, K., & Singer, T. . (2023). Specific reduction in the cortisol awakening response after socio-affective mental training. *Mindfulness*, 14(3), 681-694.
- Engert, V., Kok, B. E., Papassotiriou, I., Chrousos, G. P., & Singer, T. (2017). Specific reduction in cortisol stress reactivity after social but not attention-based mental training. *Sci Adv*, 3(10), e1700495. <https://doi.org/10.1126/sciadv.1700495>
- 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.
- Farhood, L., Fares, S. & Hamady, C. (2018). PTSD and gender: could gender differences in war trauma types, symptom clusters and risk factors predict gender differences in PTSD prevalence?. *Arch Womens Ment Health*, 21, 725–733.
<https://doi.org/10.1007/s00737-018-0849-7>
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods*, 39(2), 175-191. <https://doi.org/10.3758/bf03193146>
- Ferrajão, P. C., & Oliveira, R. A. (2015). From self-integration in personal schemas of morally experiences to self-awareness of mental states: A qualitative study among a sample of Portuguese war veterans. *Traumatology*, 21(1), 22-31.
<https://doi.org/10.1037/trm0000019>
- First, M., Spitzer, R., Gibbon, M., & Williams, J. (1996). *Structured Clinical Interview for Axis I Disorders-Patient Edition*. Biometrics Research, New York State Psychiatric Institute.
- Frith, C., & Frith, U. (2005). Theory of mind. *Curr Biol*, 15(17), R644-646.
<https://doi.org/10.1016/j.cub.2005.08.041>
- Gu, J., Cavanagh, K., Baer, R., & Strauss, C. (2017). An empirical examination of the factor structure of compassion. *PLoS one*, 12(2), e0172471.
- Hildebrandt, M. K., Jauk, E., Lehmann, K., Maliske, L., & Kanske, P. (2021). Brain activation during social cognition predicts everyday perspective-taking: A combined fMRI and ecological momentary assessment study of the social brain. *Neuroimage*, 227,

117624. <https://doi.org/10.1016/j.neuroimage.2020.117624>
- Hinton, D. E., Ojserkis, R. A., Jalal, B., Peou, S., & Hofmann, S. G. (2013). Loving-kindness in the treatment of traumatized refugees and minority groups: A typology of mindfulness and the nodal network model of affect and affect regulation. *Journal of clinical psychology*, *69*(8), 817-828.
- Holbrook, T. L., Hoyt, D. B., Stein, M. B., & Sieber, W. J. (2002). Gender differences in long-term posttraumatic stress disorder outcomes after major trauma: women are at higher risk of adverse outcomes than men. *J Trauma*, *53*(5):882-8. doi: 10.1097/00005373-200211000-00012.
- Jesuthasan, J., Sonmez, E., Abels, I., Kurmeyer, C., Gutermann, J., Kimbel, R., Kruger, A., Niklewski, G., Richter, K., Stangier, U., Wollny, A., Zier, U., Oertelt-Prigione, S., Shouler-Ocak, M., & Female Refugee Study, I. (2018). Near-death experiences, attacks by family members, and absence of health care in their home countries affect the quality of life of refugee women in Germany: a multi-region, cross-sectional, gender-sensitive study. *BMC Med*, *16*(1), 15. <https://doi.org/10.1186/s12916-017-1003-5>
- Kanske, P., Böckler, A., Trautwein, F. M., & Singer, T. (2015). Dissecting the social brain: Introducing the EmpaToM to reveal distinct neural networks and brain-behavior relations for empathy and Theory of Mind. *Neuroimage*, *122*, 6-19. <https://doi.org/10.1016/j.neuroimage.2015.07.082>
- Kirkpatrick, H. A., & Heller, G. M. (2014). Post-traumatic stress disorder: theory and treatment update. *Int J Psychiatry Med*, *47*(4), 337-346. <https://doi.org/10.2190/PM.47.4.h>
- Klimecki, O. M., Leiberg, S., Lamm, C., & Singer, T. (2013). Functional neural plasticity and associated changes in positive affect after compassion training. *Cereb Cortex*, *23*(7), 1552-1561. <https://doi.org/10.1093/cercor/bhs142>
- Klimecki, O. M., Leiberg, S., Ricard, M., & Singer, T. (2014). Differential pattern of functional brain plasticity after compassion and empathy training. *Soc Cogn Affect Neurosci*, *9*(6), 873-879. <https://doi.org/10.1093/scan/nst060>
- Lamothe, M., Boujut, E., Zenasni, F., & Sultan, S. (2014). To be or not to be empathic: the combined role of empathic concern and perspective taking in understanding burnout in general practice. *BMC Fam Pract*, *15*, 15. <https://doi.org/10.1186/1471-2296-15-15>
- Mollica, R. F., Caspi-Yavin, Y., Bollini, P., Truong, T., Tor, S., & Lavelle, J. (1992). The Harvard Trauma Questionnaire. Validating a cross-cultural instrument for measuring torture, trauma, and posttraumatic stress disorder in Indochinese refugees. *J Nerv Ment Dis*, *180*(2), 111-116. <https://www.ncbi.nlm.nih.gov/pubmed/1737972>
- Müller-Engelmann, M., Schreiber, C., Kümmerle, S., Heidenreich, T., Stangier, U., & Steil, R.

- (2019). A trauma-adapted mindfulness and loving-kindness intervention for patients with PTSD after interpersonal violence: A multiple-baseline study. *Mindfulness*, *10*(6), 1105-1123.
- Nagamine, M., Shigemura, J., Fujiwara, T., Waki, F., Tanichi, M., Saito, T., Toda, H., Yoshino, A., & Shimizu, K. (2018). The relationship between dispositional empathy, psychological distress, and posttraumatic stress responses among Japanese uniformed disaster workers: a cross-sectional study. *BMC Psychiatry*, *18*(1), 328. <https://doi.org/10.1186/s12888-018-1915-4>
- Neff, K. (2003). The development and validation of a scale to measure self-compassion. *Self and identity*, *2*(3), 223-250.
- Nietlisbach, G., Maercker, A., Rossler, W., & Haker, H. (2010). Are empathic abilities impaired in posttraumatic stress disorder? *Psychol Rep*, *106*(3), 832-844. <https://doi.org/10.2466/pr0.106.3.832-844>
- Oren-Schwartz, R., Aizik-Reebs, A., Yuval, K., Hadash, Y., & Bernstein, A. (2023). Effect of mindfulness-based trauma recovery for refugees on shame and guilt in trauma recovery among African asylum-seekers. *Emotion*, *23*(3), 622.
- Pace, T. W., Negi, L. T., Adame, D. D., Cole, S. P., Sivilli, T. I., Brown, T. D., Issa, M. J., & Raison, C. L. (2009). Effect of compassion meditation on neuroendocrine, innate immune and behavioral responses to psychosocial stress. *Psychoneuroendocrinology*, *34*(1), 87–98. <https://doi.org/10.1016/j.psyneuen.2008.08.011>
- Parlar, M., Frewen, P., Nazarov, A., Oremus, C., MacQueen, G., Lanius, R., & McKinnon, M. C. (2014). Alterations in empathic responding among women with posttraumatic stress disorder associated with childhood trauma. *Brain Behav*, *4*(3), 381-389. <https://doi.org/10.1002/brb3.215>
- Paulhus, D. L., Vazire, S. (2007). The self-report method. In R. W. Robins, Fraley, R. C., Krueger, R. F. (Ed.), *Handbook of research methods in personality psychology* (pp. 224-239). Guilford.
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annu Rev Psychol*, *63*, 539-569. <https://doi.org/10.1146/annurev-psych-120710-100452>
- Puhlmann, L. M. C., Valk, S. L., Engert, V., Bernhardt, B. C., Lin, J., Epel, E. S., Vrticka, P., & Singer, T. (2019). Association of Short-term Change in Leukocyte Telomere Length With Cortical Thickness and Outcomes of Mental Training Among Healthy Adults: A Randomized Clinical Trial. *JAMA Netw Open*, *2*(9), e199687. <https://doi.org/10.1001/jamanetworkopen.2019.9687>
- Puhlmann, L. M. C., Vrticka, P., Linz, R., Stalder, T., Kirschbaum, C., Engert, V., & Singer, T.

- (2021). Contemplative Mental Training Reduces Hair Glucocorticoid Levels in a Randomized Clinical Trial. *Psychosom Med*, 83(8), 894-905.
<https://doi.org/10.1097/PSY.0000000000000970>
- Refugees, U. N. H. C. f. (2023). *Global Trends: Forced Displacement in 2022*.
- Sarason, B., Shearin, E., Pierce, G., & Sarason, I. (1987). Interrelations of social support measures: Theoretical and practical implications. *Journal of personality and social psychology*, 52(4), 813-832. <https://doi.org/10.1037/0022-3514.52.4.813>
- Sarason, I., Levine, H., Basham, R., & Sarason, B. (1983). Assessing social support: the social support questionnaire. *Journal of personality and social psychology*, 44(1), 127–139. <https://doi.org/10.1037/0022-3514.44.1.127>
- Schwartz, E., & Shrira, A. (2019). Social Connectedness Moderates the Relationship Between Warfare Exposure, PTSD Symptoms, and Health Among Older Adults. *Psychiatry*, 82(2), 158-172. <https://doi.org/10.1080/00332747.2018.1534521>
- Shoeb, M., Weinstein, H., & Mollica, R. (2007). The Harvard trauma questionnaire: adapting a cross-cultural instrument for measuring torture, trauma and posttraumatic stress disorder in Iraqi refugees. *Int J Soc Psychiatry*, 53(5), 447-463.
<https://doi.org/10.1177/0020764007078362>
- Singer, T., & Engert, V. (2019). It matters what you practice: differential training effects on subjective experience, behavior, brain and body in the ReSource Project. *Curr Opin Psychol*, 28, 151-158. <https://doi.org/10.1016/j.copsyc.2018.12.005>
- Singer, T., & Klimecki, O. M. (2014). Empathy and compassion. *Curr Biol*, 24(18), R875-R878. <https://doi.org/10.1016/j.cub.2014.06.054>
- Steel, Z., Chey, T., Silove, D., Marnane, C., Bryant, R. A., & van Ommeren, M. (2009). Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: a systematic review and meta-analysis. *JAMA*, 302(5), 537-549.
<https://doi.org/10.1001/jama.2009.1132>
- Stein, M. B., Walker, J. R., & Forde, D. R. (2000). Gender differences in susceptibility to posttraumatic stress disorder. *Behaviour research and therapy*, 38(6), 619-628.
- Team, R. C. (2022). *R: A language and environment for statistical computing*. In <https://www.R-project.org/>
- Tolin, D. F., & Foa, E. B. (2008). Sex differences in trauma and posttraumatic stress disorder: a quantitative review of 25 years of research. *Psychological Trauma: Theory, Research, Practice, and Policy*, S(1), 37–85. <https://doi.org/10.1037/1942-9681.S.1.37>
- Trautmann, S., Wittgens, C., Muehlhan, M., & Kanske, P. (2022). The Role of Socio-Affective and Socio-Cognitive Mechanisms in the Processing of Witnessed Traumatic Events.

- Front Psychiatry*, 13, 830218. <https://doi.org/10.3389/fpsy.2022.830218>
- Trautwein, F. M., Kanske, P., Bockler, A., & Singer, T. (2020). Differential benefits of mental training types for attention, compassion, and theory of mind. *Cognition*, 194, 104039. <https://doi.org/10.1016/j.cognition.2019.104039>
- United Nations High Commissioner for Refugees (UNHCR). (2023). Global Trends: Forced Displacement in 2022. Statistics and Demographics Section, UNHCR Global Data Service, Denmark.
- von Harscher, H., Desmarais, N., Dollinger, R., Grossman, S., & Aldana, S. (2018). The impact of empathy on burnout in medical students: new findings. *Psychology, Health & Medicine*, 23(3), 295-303. <https://doi.org/10.1080/13548506.2017.1374545>
- Weng, H. Y., Fox, A. S., Shackman, A. J., Stodola, D. E., Caldwell, J. Z., Olson, M. C., ... & Davidson, R. J. (2013). Compassion training alters altruism and neural responses to suffering. *Psychological science*, 24(7), 1171-1180.
- Weisz, E., & Cikara, M. (2021). Strategic regulation of empathy. *Trends in Cognitive Sciences*, 25(3), 213-227.
- Zhang, M., Wang, S., Wang, Z., Peng, X., Fei, W., Geng, Y., & Zhang, T. (2021). Associations of affective and cognitive empathy with depressive symptoms among a sample of Chinese college freshmen. *J Affect Disord*, 292, 652-659. <https://doi.org/10.1016/j.jad.2021.05.111>

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Highlights

- Behavioral compassion assessed with the EmpaTom moderated the trauma-PTSD link.
- Trauma was positively related to PTSD symptoms when individuals had low compassion.
- Trauma was not related to PTSD symptoms when individuals had high compassion.
- Neither self-reported nor behavioral empathy moderated the trauma-PTSD link.