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Deployment-related PTSD symptomatology and social functioning: Probing the mediating roles of emotion regulation and mentalization in an outpatient veteran sample

Petrus G.J. Janssen [a,b,*], Sabine Stoltz [a], Antonius H.N. Cillessen [a], Elisa van Ee [a,b]

[a] Behavioural Science Institute, Radboud University, Nijmegen, The Netherlands
[b] Psychotraumacentrum Zuid Nederland, Reinier van Arkel, 's-Hertogenbosch, The Netherlands

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ABSTRACT

Deployment-related posttraumatic stress disorder (PTSD) impacts social functioning in families. Therefore, it is important to examine the factors that contribute to social functioning in families that are confronted with deployment-related PTSD. The goal of this study was to assess the association between PTSD symptom severity and social functioning using self-report questionnaires in an outpatient veteran sample and to test the mediating roles of emotion regulation (Study 1, $N = 100$) and mentalization (Study 2, $N = 38$). Study 1 demonstrated that emotion regulation problems fully mediated PTSD associated family dysfunctioning. Study 2 did not demonstrate a mediation role of mentalization, but also did not demonstrate an association between PTSD and social dysfunctioning. Maladaptive mentalization was associated with poor child adjustment. Critically, a between-study comparison revealed that PTSD symptom severity was significantly higher in Study 1 than in Study 2. Overall, our findings suggest that social dysfunctioning may only appear when a given *severity threshold* of PTSD is reached, in which emotion regulation might be a key clinical factor. Maladaptive mentalization may be critical for post-deployment child adjustment. Future research should further examine social functioning in samples with different PTSD severity profiles and include the role of mentalization. Longitudinal data are needed to gain further insight into the causal relationships among the factors considered and the etiological pathways that lead to developing social dysfunction over time.

1. Introduction

Military deployment and deployment-related posttraumatic stress disorder (PTSD) symptomatology can negatively impact social functioning in veteran families (Creech et al., 2014; Erbes et al., 2011; Khaylis et al., 2011). Gaining insight in social functioning in families dealing with PTSD is critical and may provide clinical targets for intervention. The goal of the current study was to examine the association between PTSD and social functioning in veteran families in an outpatient veteran sample and to examine the potential mediating roles of veterans' deficits in emotion regulation and mentalization.

1.1. Association between PTSD and social functioning in veteran families

Accumulating evidence has indicated that deployment-related PTSD symptomatology – characterized by combat-related intrusive thoughts or flashbacks, avoidance behavior, negative alterations in mood and cognitions, and hyperarousal (American Psychiatric Association, 2013) – may impact intra-familial relations (for a review, see Creech and Misca, 2017). This converges with accounts that emphasize the link between PTSD and impaired interpersonal functioning, including the cognitive-behavioral interpersonal theory of PTSD (C-BIT; Dekel and Monson, 2010) and the cascade model of intra-familial symptom transmission (Snyder et al., 2016).

The C-BIT model states that core PTSD symptoms may negatively affect intimate relationship quality and also parent-child functioning (Creech and Misca, 2017). For example, veterans' behavioral avoidance can be linked to withdrawal from family activities (e.g., dining, child playing), thereby reducing intra-familial relationship satisfaction (Dekel and Monson, 2010). Conversely, family members may facilitate veterans' PTSD symptoms such as avoidance by changing their own behavior, such as avoiding conversations about topics that may trigger

* Corresponding author. Thomas van Aquinostraat 4, 6525 GD Nijmegen, The Netherlands.
E-mail address: peter.janssen2@ru.nl (P.G.J. Janssen).

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trauma-related memories.

In their cascade model, Snyder et al. (2016) argued that deployment "provides a key initiating context for symptom cascades across family members" (p. 4). They found empirical support for their model in a sample of 183 veteran families in which parents' PTSD symptoms and child internalizing and externalizing symptoms were reciprocally linked. These findings suggest that deployment-related PTSD and family functioning are reciprocally related.

Thus, both theory and empirical evidence indicate that PTSD symptoms are associated with social problems in veteran families. Examining the factors that underly this association is important to further understand and target PTSD related social difficulties in families and in turn improve social functioning.

1.2. Mediating role of emotion regulation and mentalization

Emotion regulation is defined as the ability to monitor, evaluate, and modify emotional reactions (Sheppes et al., 2015; Thompson, 1994). Deficits in emotion regulation are hypothesized to negatively affect post-deployment social functioning. Research has shown that emotion regulation can be distorted following war and can be a key factor in the development of PTSD and post-deployment social problems (Kashdan et al., 2009; Seligowski et al., 2015). For example, Zhang et al. (2020) followed deployed fathers for two years and found that fathers' emotion dysregulation at baseline predicted coercive parenting at 1-year follow-up, in which the latter was accompanied by emotional and behavioral problems in children at 2-year follow-up. These findings converge with findings that observed inadequate emotion regulation strategies, such as the tendency to avoid unwanted thoughts or feelings (i.e., experiential avoidance; Hayes et al., 1996), were linked to less family engagement and more couple adjustment problems (e.g., Brockman et al., 2016; Reddy et al., 2011). Thus, social dysfunctioning in veteran families has shown to be associated with veterans' emotion regulation difficulties.

Another factor hypothesized to negatively impact post-deployment social functioning is a compromised ability to *mentalize* (Adolphs et al., 2001; Green et al., 2008). Mentalization refers to the ability to perceive, infer, and understand mental states of oneself and others (Green et al., 2008). It is one aspect of social cognition, or the ability to understand and effectively act in social situations (Green et al., 2008; Janssen et al., 2022). Ample evidence has indicated that combat veterans experience difficulties in mentalizing (e.g., Janssen et al., 2022; Poljac et al., 2011; Nazarov et al., 2014). Mazza et al. (2012) described impairments in mentalization in a deployed group of PTSD diagnosed individuals. They performed worse than healthy participants on a task in which they were asked to describe what another person might feel in certain emotional contexts. Specifically, mentalizing deficits may be explained by present PTSD symptomatology: symptoms central to PTSD – such as emotional numbness and avoidance – may interfere with the adequate processing and integration of social information (Lavoie et al., 2014; Mazza et al., 2012).

1.3. The current study

Thus, previous research suggests that both emotion regulation and mentalization difficulties in veterans could result from deployment-related PTSD and subsequently predict social problems. Therefore, the goal of this study was to examine the association between PTSD and social (dys)functioning in veteran families, and whether this association was mediated by emotion regulation (Study 1) and mentalization (Study 2).

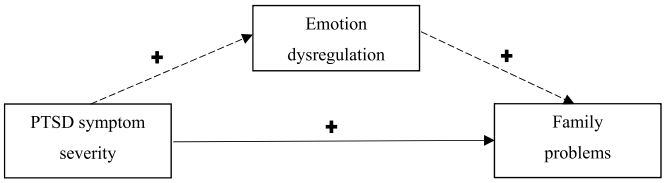

Fig. 1. Simple mediation model of the hypothesized mediating or indirect effect of emotion dysregulation (Model 1).
Note. As illustrated, PTSD symptom severity was expected to be positively associated with family problems (bold line). This direct relation was hypothesized to be mediated by a deficit in emotion regulation (top path; dotted lines).

Data were collected in an outpatient veteran sample. Social problems were measured with a broad-based family functioning measure. In Study 1, we examined the association between PTSD symptoms and family difficulties and the mediating role of emotion regulation (see Fig. 1, Model 1). In Study 2, we examined the mediating role of maladaptive mentalization on family functioning as well as child functioning. Two aspects of mentalization were measured with the Reflective Functioning Questionnaire (RFQ). The RFQ measures the ability to develop models of the mind of self and others and specifically the degree of certainty about mental states in which higher levels of uncertainty (i.e., a lack of knowledge about mental states) and lower levels of certainty (i.e., how convinced an individual is that their view corresponds with reality) are indicative for maladaptive mentalization (Fonagy et al., 2016). We examined the associations between PTSD symptoms with family functioning (Fig. 2, Model 2a) and child functioning (Fig. 2, Model 2b), and whether these associations were mediated by maladaptive mentalization (i.e., more uncertain and less certain mentalization).

Overall, we expected that higher levels of PTSD symptoms would be associated with social difficulties in both studies and that this association was mediated by emotion regulation difficulties (Study 1) and maladaptive mentalization (Study 2).

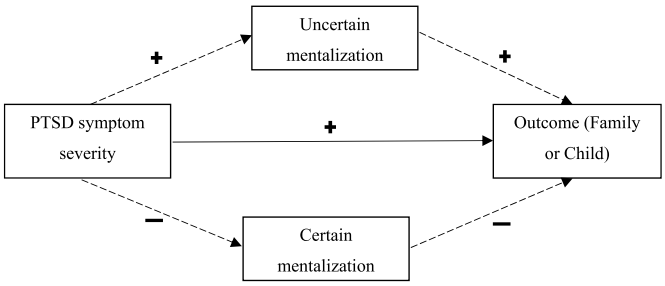

Fig. 2. Mediation models of the hypothesized mediating or indirect effects of uncertain and certain mentalization pertaining family problems (Model 2a) and child maladjustment (Model 2b).
Note. PTSD symptom severity was expected to be directly positively associated with family or child problems. This direct association was hypothesized to be mediated by a higher level of uncertain mentalization and a lower level of certain mentalization. Two identical models were run: one with family problems as the outcome and one with child problems as the outcome.

2. Study 1

2.1. Method

2.1.1. Participants

Participants were outpatient veterans referred for treatment to a specialized psychotrauma centre in the Netherlands between 2016 and 2021, having at least one child aged 18 year or below under their parental supervision at a minimum of one day per week, including step and foster children. Patients filled in the questionnaires at the start of their treatment. The initial data file included 114 patients. Of these, 14 were excluded as their measurement was incomplete (e.g., missing data, one or more questionnaires were not filled in). The final sample consisted of 100 patients (M_{age} = 41.69 years, SD_{age} = 6.95; 93% male; 97% Dutch), predominantly living/cohabiting with an intimate partner (74%). The mean number of children aged 18 years or younger was 1.66 (*SD* = 0.83); the average age of the children was 10.02 years (*SD* = 8.99).

2.1.2. Measures

Family Functioning. The Systematic Clinical Outcome and Routine Evaluation (SCORE-15; Stratton et al., 2014) is a 15-item self-report measure of family functioning. Participants rated how much each item described their family on a 5-point scale (1 = very well, 5 = not at all). An example item is: "In our family, we can trust each other". The SCORE-15 demonstrated good internal consistency in Study 1 (α = 0.88) and Study 2 (α = 0.87).

PTSD Symptom Severity. The PTSD Checklist-5 (PCL-5; Blevins et al., 2015) is a 20-item self-report measure of PTSD symptom severity. Participants rated to what degree symptoms were disrupting in the past month on a 5-point scale (1 = not at all, 5 = extremely). An example item is: "Do you have bad dreams about the traumatic experiences?". The PCL-5 demonstrated excellent internal consistency in Study 1 (α = 0.91) and Study 2 (α = 0.96).

Emotion Dysregulation. The Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer, 2004) is a 36-item self-report measure of emotion dysregulation. Participants rated how much each item applied to them on a 5-point scale (1 = almost never, 5 = almost always). An example item is: "When I am upset, I can't control my behavior". The DERS demonstrated excellent internal consistency in the current sample (α = 0.90).

2.1.3. Procedure

Patients filled in the questionnaires digitally via the routine outcome measurement (ROM) as a standard part of their first treatment appointment. They were instructed that the ROM data would be used to track their treatment progress and might be used anonymously for research – none of the participants objected. As the ROM data is already standardly administered for treatment purposes and as data is analyzed as part of a larger aggregated dataset, no informed consent was required, as approved by the Institutional Ethical Review Board (CWO/2104) of the treatment facility and in line with the policy of the Dutch Medical Ethical Committee. An independent researcher extracted a SPSS data file with the questionnaire data from the ROM database. Another independent researcher performed the analyses.

2.1.4. Analytical strategy

Statistical analyses were run with SPSS 25.0. First, one-sample Kolmogorov-Smirnov (K–S) tests were run to assess whether variables were normally distributed and outliers were removed (i.e., absolute *z*-values larger than ± 3.00; Tabachnick et al., 2007). Descriptive statistics (*M* and *SD*) of the indices were calculated. Second, Pearson correlations were computed and confirmed by non-parametric Spearman correlations when variables were not normally distributed. Based on Cohen (2013), correlations were interpreted as small (0.10), moderate (0.30), or large (0.50). Third, to test the mediating role of emotion dysregulation, Model 1 (Fig. 1) was tested using Hayes' PROCESS macros (Hayes, 2018). A bootstrap model with 5000 samples was used to compute the indirect effect of emotion regulation with a 95% confidence interval (CI).

Table 1
Patient, family and questionnaire outcomes in study 1 and 2.

Outcome	Study 1 (n = 100)	Study 2 (n = 38)
	%	%
Male	93	100
Dutch nationality	97	94.7
Cohabiting with intimate partner	74	86.8
	M (*SD*)	*M* (*SD*)
Age veteran	41.69 (6.95)	41.97 (5.41)
Number of children under 18	1.66 (0.83)	1.94 (0.81)
Age of children under 18	10.02 (8.99)	10.56 (8.2)
PTSD symptom severity*	52.11 (12.65)	43.84 (18.94)
Family dysfunctioning	2.46 (0.64)	2.46 (0.58)
Emotion dysregulation	115.94 (22.69)	–
Uncertain mentalization	–	1.33 (0.74)
Certain mentalization	–	0.62 (0.69)
Poor child adjustment	–	27.32 (5.79)

Note. *A significant between-study difference was observed pertaining this outcome.

2.2. Results

2.2.1. Descriptive statistics

Patient, family, and questionnaire data are shown in Table 1. Variables were normally distributed (K–S tests, p's > .05). No outliers were detected. Correlations between study variables can be found in Appendix Table 1.

2.2.2. Mediation analysis

As shown in Fig. 3, PTSD symptom severity predicted emotion dysregulation, β = 0.61, t (97) = 7.59, p < .001, and emotion dysregulation predicted family problems, β = 0.28, t (96) = 2.31, p = .02. PTSD symptom severity predicted family problems, β = 0.21, t (97) = 2.11, p = .04, when entered without emotion dysregulation in the regression model. The indirect effect of PTSD symptom severity via emotion dysregulation was significant, as the CI did not overlap with zero (β = 0.17, lower limit = 0.01, upper limit = .36). The direct effect of PTSD symptom severity on family problems was no longer significant when taking emotion dysregulation into account, β = 0.002, t (97) = 0.30, p = .76, meaning that the association between PTSD symptom severity and family problems was fully mediated by emotion dysregulation.

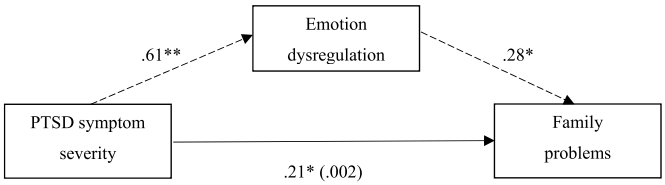

Fig. 3. Simple mediation model of the indirect effect of emotion regulation pertaining the association between PTSD symptom severity and family problems (Model 1).
Note. Standardized regression coefficients for the relationship between PTSD symptom severity and family dysfunctioning (bold line) as mediatio through emotion dysregulation (top path; dotted lines). The coefficient between PTSD symptom severity and family problems, when taking emotion regulation into account, is noted in parentheses. *p < .05; **p < .01.

3. Study 2

3.1. Method

3.1.1. Participants

The sample and eligibility criteria were similar to Study 1. The participants of Study 2 were proactively approached. 38 patients were included (M_{age} = 41.97 years, SD_{age} = 5.41; 100% male, 95% Dutch) and were predominantly living/cohabiting with an intimate partner (86.8%). The average number of children aged 18 years or younger was 1.94 (SD = 0.81); their average age was 10.56 years (SD = 8.20).

3.1.2. Measures

The measures of PTSD symptom severity and family functioning were the same as for Study 1.

Mentalization. The RFQ is an 8-item self-report measure of reflective functioning as an operationalization of mentalization (Fonagy et al., 2016) and has two subscales: uncertainty (RFQu) and certainty (RFQc) about mental states. Items were rated on a 7-point scale (1 = strongly disagree, 7 = strongly agree). Example items of the RFQu and RFQc are, respectively: "Sometimes I do things without really knowing why" and "People's thoughts are a mystery to me". Items were recoded such that higher RFQu and lower RFQc scores indicate maladaptive mentalizing. Both subscales demonstrated good internal consistency (RFQu, α = 0.71; RFQc, α = 0.73).

Child Functioning. The parent version of the Strengths and Difficulties Questionnaire (SDQ; Goodman and Goodman, 2009) is a 25-item self-report measure to assess emotional and behavioral problems of children aged 4 to 17. Items were rated on a 3-point scale (0 = not true, 2 = certainly true). An example item is: "My child often has temper tantrums or hot tempers". The SDQ demonstrated good internal consistency (α = 0.74).

3.1.3. Procedure

The study procedure was approved by the Institutional Ethical Review Board (CWO/2104) of the treatment facility and the Medical Ethical Committee of the University of Utrecht, the Netherlands (number 17/829). Patients received written study information after their first treatment appointment. After a week, they were contacted by phone to clarify the study procedure and to determine whether they had at least one child aged 18 years or younger under their parental supervision at least one day per week. If the veteran decided to participate, they filled in an informed consent. Questionnaires were filled in online.

3.1.4. Analytical strategy

The analytical strategy was identical to Study 1. To test the mediation role of uncertain and certain mentalization, Model 2a and 2b (Fig. 2) were tested using Hayes' PROCESS macros (Hayes, 2018). RFQc was not normally distributed (K–S test, $p < .001$). The individual pathways involving RFQc were confirmed non-parametrically.

3.2. Results

3.2.1. Descriptive statistics

Patient, family, and questionnaire data for Studies 1 and 2 are shown in Table 1. Study differences for all variables were assessed. The PTSD symptom severity level was significantly higher in Study 1 (M = 52.11, SD = 12.65) than in Study 2 (M = 43.84, SD = 18.94), t (136) = −2.410, p = .02. There were no other study differences. No outliers were detected. Correlations between study variables are shown in Appendix Table 1.

3.2.2. Mediation analyses

Two mediation analyses were run to examine the mediating role of uncertain and certain mentalization in the association between PTSD symptom severity and family problems (Model 2a, see Fig. 4, panel A) and child maladjustment (Model 2b, see Fig. 4, panel B). As models only differed in the outcome variable (family vs. child functioning), pathways concerning PTSD symptom severity, uncertain mentalization, and certain mentalization were identical in both models. In both models, higher PTSD symptom severity levels predicted more uncertain mentalization, β = −0.374, t (6) = 2.42, p = .02. PTSD symptom severity did not predict certain mentalization ($p > .05$). In both models, neither PTSD symptom severity nor uncertain or certain mentalization predicted family dysfunctioning or child maladjustment (p's > .05). Indirect effects of uncertain and certain mentalization were still tested as they could still be probed in the absence of significant direct pathways (Hayes, 2018). No indirect effect was found, indicating no mediation effects in both models, as evidenced by non-significant indirect effects of uncertain and certain mentalization on family problems (respectively, lower limit = −0.05, upper limit = .12 and lower limit = −0.01, upper limit .01) and child maladjustment (respectively, lower limit = −0.02, upper limit = .11 and lower limit −0.09, upper limit .05).

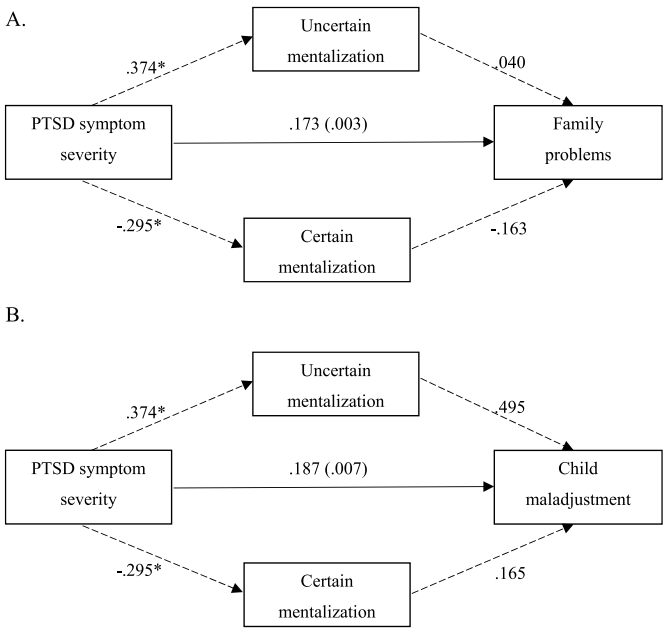

Fig. 4. Parallel mediation model of the indirect effects of uncertain and certain mentalization pertaining family problems (Model 2a) and poor child adjustment (Model 2b).
Note. Standardized regression coefficients for the relationship between PTSD symptom severity and family dysfunctioning (panel A: bold line) and poor child adjustment (panel B: bold line). Standardized regression coefficients for the hypothesized mediation paths through uncertain and certain mentalization (respectively top and bottom dotted line paths in both panel A and B). The coefficient between PTSD symptom severity and family problems (panel A) and poor child adjustment (panel B), when taking uncertain and certain mentalization into account, are noted in parentheses.
*$p < .05$; **$p < .01$.

4. Discussion

The goal of the current study was to examine the association between deployment-related PTSD and social functioning in families, and the mediating roles of emotion regulation (Study 1) and mentalization (Study 2) in this association. In Study 1, the association between PTSD and family problems was indeed fully mediated by emotion regulation problems. However, in Study 2 there was no association between PTSD and social functioning and no mediation by mentalization. Instead, individual (PTSD symptoms, mentalization) and social (family and child functioning) processes were mostly distinctively interrelated; only maladaptive mentalization (i.e., uncertain mentalization) was

associated with poor child adjustment. The absence of PTSD related social difficulties in Study 2 contrasts with the findings of Study 1. A potential critical difference between the studies could be that the average PTSD symptom severity level was significantly higher in Study 1 than in Study 2.

The *severity threshold* of PTSD symptomatology may thus have been be a key factor in our findings and may be important to understand relational functioning in veteran families. The role of the severity threshold of PTSD symptoms and the study differences in PTSD related social functioning may be understood when considering existing accounts of PTSD and social functioning, such as the C-BIT (Dekel and Monson, 2010) and the cascade model (Snyder et al., 2016). These accounts consider elevated PTSD symptoms as a key contributor for social problems. This may explain why PTSD associated social difficulties were only found in Study 1, in which the average PTSD severity level was significantly higher than in Study 2. Ample evidence has indicated that social functioning may deteriorate above a certain level of PTSD symptomatology (e.g., Creech and Misca, 2017; Samper et al., 2004). Our findings extend previous work by suggesting that social problems may only appear when a given PTSD severity threshold is reached. This implies that the PTSD severity level is a critical factor for the timing of clinical (systemic) interventions. Future research should further explore which PTSD threshold levels exactly are linked to social functioning in veteran families.

As anticipated, Study 1 demonstrated that PTSD related family dysfunctioning was mediated by emotion regulation problems. This is consistent with research that has shown that emotion regulation can be impaired following war and may contribute to the development of PTSD and post-deployment social deficits (e.g., Kashdan et al., 2009; Zhang et al., 2020). Indeed, prior studies among veterans have shown that impaired emotion regulation capacities, such as the tendency to avoid and suppress emotional experiences (i.e., experiential avoidance), were related to less family involvement and more interpersonal problems (Brockman et al., 2016; Reddy et al., 2011). Our findings point out that emotion regulation deficits may be an important clinical factor in targeting PTSD and related social problems. Further addressing the associations among PTSD, emotion regulation, and social functioning in veteran families is thus of clinical importance.

Contrasting our anticipation, Study 2 did not demonstrate a mediating role of mentalization underlying PTSD related social difficulties at either the family or the child level. This is not in line with previous research that has shown an association between PTSD related mentalization deficits and social dysfunctioning (e.g., Janssen et al., 2022; Lavoie et al., 2014; Poljac et al., 2011).

One explanation for the absent mediating role of mentalization is that Study 2 did not demonstrate PTSD related social difficulties in the first place. Multiple studies across a range of PTSD diagnosed samples have shown mentalization deficits related to PTSD (for a review, see Janssen et al., 2022). It can be expected that these deficits further contribute to the social problems already associated with higher PTSD severity levels (e.g., Creech and Misca, 2017) and poor mentalization capacities (e.g., Fonagy et al., 2007; Gergely and Unoka, 2008). Follow up research should determine the potential mediating role of mentalization, particularly in families with more severe forms of PTSD related social problems.

An alternative explanation for the absent mediating role of mentalization could be that mentalization impairments might be particularly related to more specific social processes. Accordingly, in Study 2 maladaptive mentalization was linked to child maladjustment, consistent with research that has shown that poor mentalization might particularly hinder parents to bond with their children, thereby reducing children's well-being (Fonagy et al., 2007). Stressful contexts, such as war deployment, have shown to impair the ability to mentalize; the capacity to think about others' thoughts and feelings is inhibited when functioning under enduring distress (Luyten and Fonagy, 2015). Thus, maladaptive mentalization might be especially critical for child adjustment. It would be interesting to further examine to role of mentalization and related social processes (e.g., couple attachment, overall family functioning), especially when more severe forms of PTSD and social disruption are present. As Fonagy and Allison (2012) noted, family systems include various dyads (e.g., veteran-child, veteran-partner). Impaired mentalization may initially negatively affect functioning in specific dyadic interactions, gradually affecting overall intra-familial functioning. Future research should examine the role of mentalization in families with more severe degrees of PTSD-related social disruption, and examine different aspects of social functioning (e.g., child adjustment, couple attachment, family system functioning).

A methodological explanation for the lack of mediation in Study 2 could be that the sample was too small, yielding insufficient statistical power to detect mediation. Based on Fritz and MacKinnon (2007), identifying true effects would require a sample size between at least 34 and 78 participants for correlational patterns with a moderate to large size of effect. Others suggest that resampling by bootstrapping circumvents problems with power and can be applied to small samples (e.g., Hayes and Scharkow, 2013; Shrout and Bolger, 2002). Nevertheless, prospective studies should incorporate larger sample sizes when probing PTSD associated family dysfunction and the mediating role of mentalization.

4.1. Limitations

This study had some limitations. First, some potentially confounding effects could not be excluded. Co-occurring psychiatric conditions may have negatively impacted the outcomes of interest. For example, social functioning may be negatively affected by the presence of post-deployment depressive symptomatology (Bonde et al., 2016) and high-risk behaviors, such as alcohol use and aggression (Brown et al., 2012). These and other possible confounding factors could not be controlled for and may have led to different results between our two studies. Future research should take such factors into account.

Second, our study did not include outcome data from veterans' family members. This is important, because perceptions of PTSD related social problems may differ between family members. Prospective research should include the perspective of multiple family members.

Third, the present results were based on cross-sectional data and analyses. Previous work suggests that deployment related PTSD negatively impacts mentalization and emotion regulation processes, which then contribute to subsequent social difficulties in veteran families. In order to test this in detail, longitudinal data are needed to further determine the direction of causality between these variables and to assess and understand the etiological pathways for developing family dysfunction over time.

Fourth, this study focused on mentalizing, as this cognitive form of empathy has been shown to be impaired in PTSD diagnosed individuals (for a review, see Janssen et al., 2022). Given that studies have also indicated associations between PTSD with affective empathy (i.e., the ability to share feelings of others; Parlar et al., 2014; Warrier et al., 2018), future studies should examine whether affective empathy mediates PTSD associated social difficulties.

5. Conclusion

In spite of these limitations, this study yielded three main findings of clinical importance. First, social functioning in families was negatively affected by deployment-related PTSD symptomology as a function of reported symptom severity. This means that social problems may only appear when a given severity threshold of PTSD symptomatology is reached. Second, our findings underscore the importance of emotion regulation problems as a key factor in PTSD related social problems. Third, we found no evidence for mentalization as a mediator in a sample demonstrating no PTSD related social problems, yet future research should examine the mediating role of mentalization in larger samples

with different PTSD severity profiles. The current study did point out that a reduced ability to create mental models of others' behavior was linked to poor child adjustment, emphasizing that deficits in mentalization capacities may be critical for post-deployment child maladjustment.

CRediT authorship contribution statement

Petrus G.J. Janssen: Investigation, Methodology, Formal Analysis, Writing – Original Draft, Writing – Review & Editing. Sabine Stoltz: Writing – Review & Editing. Toon Cillessen: Writing – Review & Editing, Supervision. Elisa van Ee: Writing – Review & Editing, Supervision, Conceptualization.

Declaration of competing interest

None.

Acknowledgements

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Appendix

Table 1
Correlations Between the Study Variables in Study 1 and Study 2

Variable	1	2	3	4	5	6	7	8
Study 1								
1. PTSD symptom severity								
2. Family dysfunctioning	.21*							
3. Emotion dysregulation	.61**	.31*						
Study 2								
4. PTSD symptom severity								
5. Family dysfunctioning				.172				
6. Uncertain mentalization				.374*	.210			
7. Certain mentalization				−.326*	−.165	−.803**		
8. Child dysfunctioning				.175	.395*	.341*	−.303	

Note. Abbreviations: PTSD = posttraumatic stress disorder.
Non-parametric Spearman correlations are shown for all correlation pairs involving certain mentalization, as this variable was not normally distributed.
*$p < .05$; **$p < .01$.

References

Adolphs, R., Sears, L., Piven, J., 2001. Abnormal processing of social information from faces in autism. J. Cognit. Neurosci. 13 (2), 232–240. https://doi.org/10.1162/089892901564289.

American Psychiatric Association, 2013. Diagnostic and Statistical Manual of Mental Disorders: DSM-5, fifth ed. Washington DC.

Blevins, C.A., Weathers, F.W., Davis, M.T., Witte, T.K., Domino, J.L., 2015. The posttraumatic stress disorder checklist for DSM-5 (PCL-5): development and initial psychometric evaluation. J. Trauma Stress 28 (6), 489–498. https://doi.org/10.1002/jts.22059.

Bonde, J.P., Utzon-Frank, N., Bertelsen, M., Borritz, M., Eller, N.H., Nordentoft, M., Olesen, K., Rod, N.H., Rugulies, R., 2016. Risk of depressive disorder following disasters and military deployment: systematic review with meta-analysis. Br. J. Psychiatr. 208 (4), 330–336. https://doi.org/10.1192/bjp.bp.114.157859.

Brockman, C., Snyder, J., Gewirtz, A., Gird, S.R., Quattlebaum, J., Schmidt, N., Pauldine, M.R., Elish, K., Schrepferman, L., Hayes, C., Zettle, R., DeGarmo, D., 2016. Relationship of service members' deployment trauma, PTSD symptoms, and experiential avoidance to post-deployment family reengagement. J. Fam. Psychol. 30 (1), 52. https://doi.org/10.1037/fam0000152.

Brown, J.M., Williams, J., Bray, R.M., Hourani, L., 2012. Post-deployment alcohol use, aggression, and post-traumatic stress disorder. Mil. Med. 177 (10), 1184–1190. https://doi.org/10.7205/milmed-d-11-00119.

Cohen, J., 2013. Statistical Power Analysis for the Behavioral Sciences. Routledge Press.

Creech, S.K., Misca, G., 2017. Parenting with PTSD: a review of research on the influence of PTSD on parent-child functioning in military and veteran families. Front. Psychol. 8, 1101. https://doi.org/10.3389/fpsyg.2017.01101.

Creech, S.K., Hadley, W., Borsari, B., 2014. The impact of military deployment and reintegration on children and parenting: a systematic review. Prof. Psychol. Res. Pract. 45 (6), 452. https://doi.org/10.1037/a0035055.

Dekel, R., Monson, C.M., 2010. Military-related post-traumatic stress disorder and family relations: current knowledge and future directions. Aggress. Violent Behav. 15 (4), 303–309. https://doi.org/10.1016/j.avb.2010.03.001.

Erbes, C.R., Meis, L.A., Polusny, M.A., Compton, J.S., 2011. Couple adjustment and posttraumatic stress disorder symptoms in National Guard veterans of the Iraq war. J. Fam. Psychol. 25 (4), 479. https://doi.org/10.1037/a0024007.

Fonagy, P., Allison, E., 2012. What is mentalization? The concept and its foundations in developmental research. In: Midgley, N., Vrouva, I. (Eds.), Minding the Child. Routledge Press, pp. 11–34.

Fonagy, P., Gergely, G., Target, M., 2007. The parent-infant dyad and the construction of the subjective self. JCPP (J. Child Psychol. Psychiatry) 48 (3-4), 288–328. https://doi.org/10.1111/j.1469-7610.2007.01727.x.

Fonagy, P., Luyten, P., Moulton-Perkins, A., Lee, Y.W., Warren, F., Howard, S., Ghinai, P. F., Lowyck, B., 2016. Development and validation of a self-report measure of mentalizing: the reflective functioning questionnaire. PLoS One 11 (7), e0158678. https://doi.org/10.1371/journal.pone.0158678.

Fritz, M.S., MacKinnon, D.P., 2007. Required sample size to detect the mediated effect. Psychol. Sci. 18 (3), 233–239. https://doi.org/10.1111/j.1467-9280.2007.01882.x.

Gergely, G., Unoka, Z., 2008. Attachment and Mentalization in Humans: the Development of the Affective Self. Routledge Press.

Goodman, A., Goodman, R., 2009. Strengths and Difficulties Questionnaire as a dimensional measure of child mental health. J. Am. Acad. Child Adolesc. Psychiatry 48, 400–403. https://doi.org/10.1097/CHI.0b013e3181985068.

Gratz, K.L., Roemer, L., 2004. Multidimensional assessment of emotion regulation and dysregulation: development, factor structure, and initial validation of the difficulties in emotion regulation scale. J. Psychopathol. Behav. Assess. 26, 41–54. https://doi.org/10.1023/B:JOBA.0000007455.08539.94.

Green, M.F., Penn, D.L., Bentall, R., Carpenter, W.T., Gaebel, W., Gur, R.C., Kring, A.N., Park, S., Silverstein, S.M., Heinssen, R., 2008. Social cognition in schizophrenia: an NIMH workshop on definitions, assessment, and research opportunities. Schizophr. Bull. 34 (6), 1211–1220. https://doi.org/10.1093/schbul/sbm145.

Hayes, A.F., 2018. Introduction to Mediation, Moderation, and Conditional Process Analysis, second ed. Guilford Press.

Hayes, A.F., Scharkow, M., 2013. The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: does method really matter? Psychol. Sci. 24 (10), 1918–1927. https://doi.org/10.1177/0956797613480187.

Hayes, S.C., Wilson, K.G., Gifford, E.V., Follette, V.M., Strosahl, K., 1996. Experiential avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. J. Consult. Clin. Psychol. 64 (6), 1152. https://doi.org/10.1037/0022-006X.64.6.1152.

Janssen, P.G.J, van Est, L.A., Hilbink, M., Gubbels, L., Egger, J., Cillessen, A.H.N., Van Ee, E., 2022. Social cognitive performance in posttraumatic stress disorder: a meta-analysis. J. Affect. Disord. 297, 35–44. https://doi.org/10.1016/j.jad.2021.09.082.

Kashdan, T.B., Morina, N., Priebe, S., 2009. Post-traumatic stress disorder, social anxiety disorder, and depression in survivors of the Kosovo War: experiential avoidance as a contributor to distress and quality of life. J. Anxiety Disord. 23 (2), 185–196. https://doi.org/10.1016/j.jbtep.2004.04.011.

Khaylis, A., Polusny, M.A., Erbes, C.R., Gewirtz, A., Rath, M., 2011. Posttraumatic stress, family adjustment, and treatment preferences among National Guard soldiers deployed to OEF/OIF. Mil. Med. 176, 126–131. https://doi.org/10.7205/MILMED-D-10-00094.

Lavoie, M.A., Battaglia, M., Achim, A.M., 2014. A meta-analysis and scoping review of social cognition performance in social phobia, posttraumatic stress disorder and other anxiety disorders. J. Anxiety Disord. 28 (2), 169–177. https://doi.org/10.1016/j.janxdis.2013.09.005.

Luyten, P., Fonagy, P., 2015. The neurobiology of mentalizing. Person. Dis.: Theory, Res., and Treatm. 6 (4), 366. https://doi.org/10.1037/per0000117.

Mazza, M., Giusti, L., Albanese, A., Mariano, M., Pino, M.C., Roncone, R., 2012. Social cognition disorders in military police officers affected by posttraumatic stress disorder after the attack of An-Nasiriyah in Iraq 2006. Psychiatr. Res. 198 (2), 248–252. https://doi.org/10.1016/j.psychres.2011.11.027.

Nazarov, A., Frewen, P., Parlar, M., Oremus, C., MacQueen, G., McKinnon, M., Lanius, R., 2014. Theory of mind performance in women with posttraumatic stress disorder related to childhood abuse. Acta Psychiatr. Scand. 129 (3), 193–201. https://doi.org/10.1111/acps.12142.

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 and Behav 4 (3), 381–389. https://doi.org/10.1002/brb3.215.

Poljac, E., Montagne, B., De Haan, E.H., 2011. Reduced recognition of fear and sadness in post-traumatic stress disorder. Cortex 47 (8), 974–980. https://doi:10.1016/j.cortex.2010.10.002.

Reddy, M.K., Meis, L.A., Erbes, C.R., Polusny, M.A., Compton, J.S., 2011. Associations among experiential avoidance, couple adjustment, and interpersonal aggression in returning Iraqi war veterans and their partners. J. Consult. Clin. Psychol. 79 (4), 515. https://doi.org/10.1037/a0023929.

Samper, R.E., Taft, C.T., King, D.W., King, L.A., 2004. Posttraumatic stress disorder symptoms and parenting satisfaction among a national sample of male Vietnam veterans. J. Trauma Stress 17 (4), 311–315. https://doi.org/10.1023/B:JOTS.0000038479.30903.

Seligowski, A.V., Lee, D.J., Bardeen, J.R., Orcutt, H.K., 2015. Emotion regulation and posttraumatic stress symptoms: a meta-analysis. Cognit. Behav. Ther. 44 (2), 87–102. https://doi.org/10.1080/16506073.2014.980753.

Sheppes, G., Suri, G., Gross, J.J., 2015. Emotion regulation and psychopathology. Annu. Rev. Clin. Psychol. 11, 379–405. https://doi.org/10.1146/annurev-clinpsy-032814-112739.

Shrout, P.E., Bolger, N., 2002. Mediation in experimental and nonexperimental studies: new procedures and recommendations. Psychol. Med. 7 (4), 422–445. https://doi.org/10.1037/1082-989x.7.4.422.

Snyder, J., Gewirtz, A., Schrepferman, L., Gird, S.R., Quattlebaum, J., Pauldine, M.R., Elish, K., Zamir, O., Hayes, C., 2016. Parent-child relationship quality and family transmission of parent posttraumatic stress disorder symptoms and child externalizing and internalizing symptoms following fathers' exposure to combat trauma. Dev. Psychopathol. 28 (4), 947–969. https://doi.org/10.1017/S095457941600064X.

Stratton, P., Lask, J., Bland, J., Nowotny, E., Evans, C., Singh, R., Janes, E., Peppiatt, A., 2014. Detecting therapeutic improvement early in therapy: validation of the SCORE-15 index of family functioning and change. J. Fam. Ther. 36 (1), 3–19. https://doi.org/10.1111/1467-6427.12022.

Tabachnick, B.G., Fidell, L.S., Ullman, J.B., 2007. Using Multivariate Statistics, fifth ed. Pearson.

Thompson, R.A., 1994. Emotion Regulation: A Theme in Search of Definition. Monographs of the Society for Research in Child Development. Wiley-Blackwell, pp. 25–52.

Warrier, V., Toro, R., Chakrabarti, B., Børglum, A.D., Grove, J., Hinds, D.A., , the 23andMe Research Team, Hinds, D.A., Bourgeron, T., Baron-Cohen, S., 2018. Genome-wide analyses of self-reported empathy: correlations with autism, schizophrenia, and anorexia nervosa. Transl. Psychiatry 8 (1), 1–10. https://doi.org/10.1038/s41398-017-0082-6.

Zhang, J., Palmer, A., Zhang, N., Gewirtz, A.H., 2020. Coercive parenting mediates the relationship between military fathers' emotion regulation and children's adjustment. J. Abnorm. Child Psychol. 1–13. https://doi.org/10.1007/s10802-020-00625-8.