

## Risk Factors for Post-traumatic Stress Disorder: The Role of Previous Traumas, Peri-traumatic Response, Social Support and Body-image

Lene Bjerre, Sarah Dokkedahl and Ask Elklit\*

Danish National Center for Psychotraumatology, University of Southern Denmark, Campusvej 55, 5230 Odense M, Denmark

\*Corresponding author: Ask Elklit, Danish National Center for Psychotraumatology, University of Southern Denmark, Campusvej 55, 5230 Odense M, Denmark, Tel: +4565504975; E-mail: aelklit@health.sdu.dk

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### Abstract

**Objective:** In a non-clinical adolescent sample, the present study investigated the predictive and the mediating effects of several rudimentary risk factors for post-traumatic stress. The study had three objectives: 1) to identify predictors of posttraumatic stress, 2) to explore the mediating effect of diverse psychosocial factors on posttraumatic stress, and 3) to explore the mediating effect of body-image on posttraumatic stress across trauma types.

**Method:** A Danish national probability sample of 1083 high school students aged 15-20 were administered a questionnaire survey that included traumatic events, psychosocial variables and the Harvard Trauma Questionnaire. The current study holds the strength of a relatively large sample size and being based on a nationally representative sample, thus preventing population biased results. Data analysis has been conducted in SPSS version 22.

**Results:** Number of traumas, peritraumatic response, loneliness, body-image and parental support predicted 26% of the variance in post-traumatic stress disorder severity. Trauma exposure was related to posttraumatic stress via intermediate factors; the number of traumas, peritraumatic response and body-image mediated development of the disorder. Body-image acted as a mediator of post-traumatic stress only with respect to certain types of trauma, with post-traumatic stress developing via body-image in physical and non-interpersonal trauma survivors, but not in survivors of sexual traumas.

**Conclusion:** Previous traumas, peritraumatic response and body-image were found to impact the development of posttraumatic stress. The present study additionally indicated that risk factors may influence the development of posttraumatic stress disorder in different ways, following certain types of events. This underlines the importance of considering the type of trauma in combination with other potential risk factors such as body-image. Future research is needed to further investigate factors which may mediate the development of posttraumatic stress disorder, especially about different trauma types.

**Keywords:** Risk factors; Stress disorder; Post-traumatic; Body image; Loneliness adolescents; Support

effect of each of these four risk factors on PTSD, and moreover, to examine the effect of self-perceptions according to the type of trauma.

### Introduction

Post-traumatic stress disorder (PTSD) is known to cause substantial distress and disruption to social functioning. With a lifetime prevalence of around 9% in adolescent populations [1], the disorder constitutes a significant public health problem [2]. In a recent meta-analysis of children and adolescents aged 6-18 years it was concluded that only a limited number of risk factors, such as age and gender, have systematically been investigated in adolescents. This analysis also found that studies on risk factors which have previously been identified as important in adult populations had rarely been replicated with adolescent populations. Of the 64 studies reviewed in the meta-analysis only four investigated social support, while three investigated peritraumatic fear, two examined negative self-perceptions and eight considered previous traumas. Trickey et al. [3] thus highlighted the need for further investigation of these four risk factors in adolescent samples, to develop a more reliable risk profile for PTSD in this population. Therefore, the objective of this study is to examine the

### Peritraumatic response (A2)

Studies have indicated that the subjective interpretation of threat and peritraumatic affect is likely to be linked to the onset of PTSD [3,4]. Brewin et al. [5] investigated the impact of intense peritraumatic responses in 138 victims of violent assault in a longitudinal study. This study concluded that intense feelings of fear, helplessness and horror were strong predictors of PTSD.

Previously, the presence of intense fear, horror or helplessness during the traumatic event was a criterion (A2) for fulfilling the PTSD diagnosis according to DSM-IV [6]. However, in the recently released version of DSM-5 [7] the criterion has been removed. Thorough research has shown that even though peritraumatic responses were associated with higher PTSD severity, a proportion of individuals, who experienced trauma, moved on to develop PTSD without meeting the A2 criterion [8]. Thus, the peritraumatic response can be conceptualized as a risk factor rather than as a criterion for the PTSD diagnosis [9].

## Social support

In a meta-analysis based on 77 articles, Brewin et al. [5] examined 14 separate risk factors for PTSD. Lack of post trauma social support emerged as the strongest predictor of PTSD severity across the studies ( $r=0.40$ ). Moreover, in a subsequent meta-analysis of 68 articles by Ozer et al. [10], social support ( $r=0.28$ ) was the strongest predictor, followed by peritraumatic response ( $r=0.26$ ). Studies suggest that support received from close relations, is of greatest importance in adolescents [3]. A cross-sectional study by Lauterbach and Koch [11] found that parental emotional availability and engagement were strongly related to trauma exposure and the development of PTSD.

## Body-image

Cognitive models of trauma response have proposed that the development of PTSD is dependent on the individual's ability to effectively cope with and incorporate the trauma experiences in accordance with existing perceptions of oneself [12]. It has therefore been suggested that maladaptive perceptions of oneself may arise when the trauma violates existing assumptions about the individual as a person who is worth loving [13]. It has further been argued that negative self-perceptions may prevent the individual from coping effectively and regulating affective responses during and after exposure which in turn will increase the risk of PTSD and vice versa [12].

## Mediating effect of body-image across trauma types

It has been suggested that some risk factors act differently depending on the type of trauma [14]. Empirical evidence indicates that interpersonal traumas, both sexual and physical, cause severe damage to victims' bodies and consequently to the way in which they relate to their bodies more than non-interpersonal traumas [14,15]. This suggests that body-image may mediate the development of PTSD in individuals exposed to interpersonal traumas, but not in survivors of non-interpersonal traumas. Few studies have investigated this assumption, with inconsistent results [16].

## Aims of the present study

The present study aimed to explore the influence of these four risk factors on PTSD, particularly body-image, across different trauma types, in a nationally representative sample of 1083 Danish adolescents. The study had three specific objectives:

- 1) To examine the predictive effects on PTSD of the risk factors; parental support, peritraumatic response, number of traumas and body-image, along with additional factors assumed to impact PTSD based on the existing literature.
- 2) To explore the mediating effects of the variables; support from parents, body-image, peritraumatic response and number of traumas on the relationship between exposure to traumatic events and PTSD.
- 3) To explore the mediating effect of body-image on the relationship between interpersonal traumas (physical and sexual) and PTSD and on the relationship between non-interpersonal traumas and PTSD.

Based on previous research, it was expected that the proposed risk factors would have a substantial predictive effect on PTSD, and that they would mediate the relationship between exposure and PTSD to some extent. Moreover, it was expected that body-image would mediate the development of PTSD in survivors of interpersonal traumas, but not in survivors of non-interpersonal traumas.

## Method

The data in the present study were drawn from a larger dataset collected from a questionnaire survey with a nationally representative sample of 1083 high school students. This was conducted by the Center of Youth Studies and Religious Education in cooperation with the Danish National Center of Psychotraumatology, University of Southern Denmark. The questionnaire contained 258 items and assessed social activities and academic life, as well as trauma history and symptomatology.

## Participants

1083 students aged 15 to 20 years ( $M=17.1$ ;  $SD=1.0$ ) from twenty-two Danish high schools participated in the study. The sample was geographically stratified by 5 regions and adjusted proportionate to the Danish population. The gender distribution was 695 females (64.4%) and 384 males (35.6%). The students were fairly distributed with 38.1% in the first grade, 32.7% in the second and 28.7% in the third.

## Procedures

In securing a sample allocation proportionate to the Danish population, several high schools, corresponding to the number of students in each of five stratified areas, were randomly selected, approached and introduced to the study. Twenty-Two Danish high schools accepted to participate and 21-78 students per school took part. The questionnaire was introduced by the teacher and completed in class during regular school hours. This was then submitted electronically on the students' own laptops. Instructions made clear that participation was entirely anonymous and voluntary. All the students present at school gave consent.

## Demographic instruments

The survey contained several demographic items including gender, age, living with parents, parents' level of education, and place of residence. Questions concerning religious beliefs, being in a relationship, having friends, free-time activities such as sport, attending parties, creative activities, charity work and use of TV/computers were also included. Additionally, the questionnaire contained a list of 20 questions about traumatic life events. The events were measured by respondents' indications of whether a given event had been experienced (yes/no). The events were selected based on clinical experience and existing literature [1]. The list included both directly experienced life-threatening events consistent with the diagnostic criterion A1 in DSM-IV and negative life events (Table 1).

## Instruments for assessing risk factors

Three questions concerning distress experienced during the event were included to estimate peritraumatic responses of intense fear, helplessness, or horror, which constitute the A2 criterion for PTSD in DSM-IV. The mean inter-item correlation was 0.30. This falls within the optimal range of 0.20 to 0.40 [17].

To achieve a simple measurement of perceived guidance and support from parents, 9 items rated on a five-point Likert scale were entered in a factor analysis which yielded two scales; support from parents (six items); and practical help from parents (three items). Cronbach's  $\alpha$  were 0.57 and 0.52 for the two scales, respectively. To assess the respondents' body-image and body-satisfaction a scale was constructed using two items concerning body-satisfaction and

perception of weight: “Are you satisfied with your body?” (1=no, 4=yes) and “Do you think you weigh too much?” (1=too much, 4=satisfied). Items were rated on a 4-point Likert scale, Cronbach’s  $\alpha$  was 0.64.

Trauma events	%
Serious illness	35.4
Unexpected loss of a loved one	28.7
Traffic Accident	19.1
Robbery or theft	16.6
Witnessed other people injured or killed	14.2
Physical assault	13.9
Other serious accident	10.3
Near-drowning	9.5
Great shock when hearing about a loved one in a life-threatening situation	7.9
Fire	7.8
Other self-reported traumas	6.6
Attempted suicide	6.6
Threatened with weapons	6.4
Came close to being injured or killed	5.9
Physical abuse	3.7
Severe childhood neglect	3.7
Rape or attempted rape	2.3
Sexual abuse	1.5
Abortion or lost infant	1.4
War or torture	0.7

**Table 1:** Frequencies of trauma events in Danish high school students (n=1083).

### Psychological measures

The questionnaire contained single items related to intrapsychological conditions such as feelings of stress and loneliness (“do you feel stressed/lonely”) measured by a 3-point Likert scale. PTSD symptomatology was assessed using the Harvard Trauma Questionnaire (HTQ), which is based on DSM-IV diagnostic criteria [6], Mollica et al. [18] have tested the scale reliable and it has been standardized in Danish. In the present study, the Cronbach’s  $\alpha$  was 0.92 for the total PTSD scale [19].

### Statistical analysis

All analyses were conducted in SPSS version 22. Additionally, PROCESS the regression-based path analysis macro for SPSS [20] was employed to establish mediation.

## Results

### PTSD

Seventy-eight percent (females 78% & males 77%) of the students had experienced at least one traumatic event and 48% reported non-interpersonal traumas. The rate for current PTSD in the total sample was estimated at 7.7% and a sub-clinical level of PTSD was found in 9.2% of the sample. There was a significant gender difference in the rate of PTSD 4.54;  $p < 0.05$ ) with females being almost twice as likely to meet the criteria for the PTSD diagnosis.

### Risk factors

The relationship between PTSD and proposed risk factors were examined. A one-way ANOVA between HTQ total score and the demographic variables of gender, age, parents’ education, residence and living with parents showed that only gender ( $F=24.81$ ,  $p < 0.0001$ ) was significantly associated with PTSD severity. Pearson’s correlations showed a positive association between number of events and PTSD ( $r=0.28$ ;  $p < 0.0001$ ). Similarly, the peritraumatic response (A2) was positively associated with PTSD ( $r=0.27$ ;  $p < 0.0001$ ). Body-image ( $r=-0.19$ ;  $p < 0.0001$ ), loneliness ( $r=-0.29$ ;  $p < 0.0001$ ) and stress ( $r=0.19$ ;  $p < 0.0001$ ) were negatively and significantly associated with PTSD. Support from parents ( $r=-0.09$ ;  $p < 0.05$ ), having friends ( $r=-0.15$ ;  $p < 0.0001$ ) and attending parties ( $r=-0.14$ ;  $p < 0.0001$ ) were also significantly associated with PTSD.

### Factor analysis for support from parents

Initially, to create a single measure of support from parents, a principal component analysis (PCA) with orthogonal varimax rotation was conducted for 9 items concerning perceived parental support and guidance. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis with  $KMO=0.82$ . Bartlett’s test of sphericity ( $\chi^2_{36}=2745.41$ ,  $p < 0.001$ ) indicated that correlations between the items were sufficiently large for the PCA. The communalities were also all above 0.3, further confirming that each item shared some common variance with other items. Given these overall indicators the factor analysis was deemed to be suitable with all 9 items. A scree plot and a component matrix identified two factors with eigenvalues above 1. The two factors were retained for the final analysis, thus composing two simple scales which in combination explained 53.67% of the variance. The items that clustered together suggested that factor 1 represented social support from parents and factor 2 represented practical help from parents. The internal consistency was measured by Cronbach’s  $\alpha$  showing a relatively low reliability for both scales (0.57 & 0.52, respectively).

### Regression analyses

Several simple linear regression analyses were carried out followed by a hierarchical regression analysis. The simple linear regression analyses were carried out with the HTQ total score as the dependent variable. A hierarchical multiple regression analysis was conducted with the HTQ total score as the dependent variable, while the significant variables identified in the simple linear regression analyses were entered as the independent variables (Table 2). The aim of this analysis was to examine how much of the variation in the HTQ total score these variables could explain. Variables were entered systematically in four blocks based on literature review and the assumption that more fundamental and stable variables are than

others. The first step contained sociodemographic variables ( $F_{2,520}=35.397$ ,  $R^2=0.12$ ,  $p<0.0005$ ), the second related to peritraumatic response ( $F_{3,519}=34.873.246$ ,  $R^2=0.17$ ,  $p<0.0005$ ) and the third included intra-psychological factors ( $F_{6,516}=24.847$ ,  $R^2=0.25$ ,  $p<0.0005$ ). The fourth and final step contained the psychosocial factors

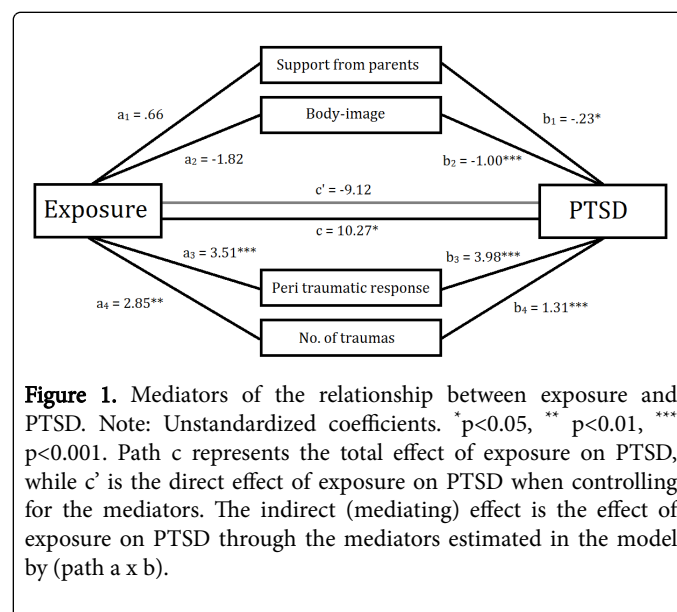
( $F_{13,509}=13.523$ ,  $R^2=0.26$ ,  $p<0.0005$ ). The only independent variables to be significant at this level were number of traumas, peritraumatic response (A2), body-image, loneliness, and support from parents. This final model explained 26% of the variance in the HTQ total score.

	Step 1		Step 2		Step 3		Step 4	
	B	p	B	P	B	p	B	P
Gender	0.22	0.0005	0.17	0.0005	0.1	0.018	0.06	0.17
No. of traumas	31	0.0005	0.29	0.0005	0.25	0.0005	0.23	0.0005
A2			0.23	0.0005	0.22	0.0005	0.22	0.0005
Loneliness					-0.18	0.0005	-0.15	0.001
Stress					-0.04	0.293	-0.04	0.3
Body-image					0.12	0.014	0.11	0.01
Creative/charity							-0.07	0.08
TV/computer							0.08	0.06
Friendships							0.03	0.41
Attending parties							-0.07	0.07
Sport							0.05	0.3
Practical help							0.08	0.06
Support from parents							-0.1	0.03

**Table 2:** Hierarchical multiple regression analysis with the HTQ total score as dependent variable.

### Mediation analysis of exposure on PTSD

By conducting mediation analysis using the SPSS script PROCESS the effect of exposure on PTSD through four mediators; support from parents, body-image, the peritraumatic response (A2) and number of traumas, was examined. A multiple mediation model was carried out for the relationship between exposure and PTSD and all four mediators (Figure 1). As can be seen in Figure 1 and Table 3, the effect of exposure on the mediators (a) was statistically significant for peritraumatic response and the number of traumas, while the effect of the proposed mediators on PTSD (b) were all significant. The total effect (c) of exposure on PTSD was positive and significant ( $b_i=10.27$ ,  $SE=5.23$ ,  $p<0.05$ ) with no mediators in the model. However, when the mediators were included in the model the direct effect ( $c'$ ) was reduced and became non-significant ( $b_i=-9.12$ ,  $SE=5.15$ ,  $p<0.08$ ), indicating complete mediation in the model. The indirect effects (ab) of exposure on PTSD through each mediator are shown in Table 3. The bias-corrected bootstrap confidence intervals for the indirect effects of peritraumatic response, body-image and number of traumas did not include zero and were thus significant. The confidence intervals for support from parents did contain zero showing no significant indirect effect on the relationship between exposure and PTSD. However, the confidence interval for the total indirect effect of all mediators did not contain zero (CI: 14.89 – 23.13) which indicated mediation for the full model and suggested that exposure did not influence PTSD independently of its mediators ( $c'=-9.12$ ,  $p=0.08$ ).



**Figure 1.** Mediators of the relationship between exposure and PTSD. Note: Unstandardized coefficients. \* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$ . Path c represents the total effect of exposure on PTSD, while  $c'$  is the direct effect of exposure on PTSD when controlling for the mediators. The indirect (mediating) effect is the effect of exposure on PTSD through the mediators estimated in the model by (path a x b).

These results suggest that the effects of exposure on PTSD may be mediated by paths involving body-image, peritraumatic response and number of traumas, but not by support from parents.

### Mediation of trauma type on PTSD

A second mediation analysis aimed to clarify the mediating effect of body-image on the relationship between trauma types (non-interpersonal and sexual & physical interpersonal traumas) and PTSD. Separate models were constituted for the three trauma types. Figure 2 displays the model for the mediated relationship between physical traumas and PTSD (models for non-interpersonal and sexual traumas are not shown). As illustrated in Figure 2, respondents who experienced a physical trauma were significantly more likely to have a negative view of their bodies, compared to respondents who did not ( $a=-.50^*$ ), and those who had a negative view of their body were more

likely to develop PTSD, compared to those who did not ( $b=-.88^{***}$ ). The total effect of physical traumas on PTSD ( $c$ ) was positive and significant ( $bi=6.11$ ,  $SE=1.10$ ,  $p<0.001$ ) with no mediator in the model. When the mediator was controlled for, the direct effect ( $c'$ ) turned lower but remained significant ( $bi=5.67$ ,  $SE=1.09$ ,  $p<0.001$ ) indicating partial mediation. Additionally, the indirect effect ( $ab=-0.44$ ) based on 1000 bootstrap samples was entirely above zero (CI: 0.07 - 0.98) further indicating that the effect of exposure to physical traumas on PTSD was dependent on body-image to some extent. Thus, the perception of one's own body made some contribution to the relationship between physical traumas and PTSD.

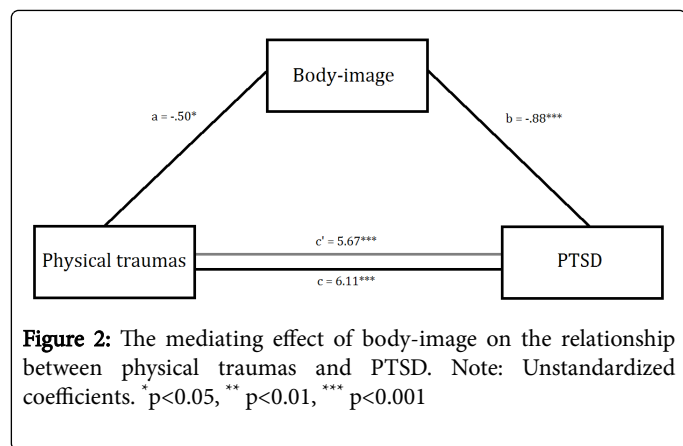
Mediator	c	c'	a	b	ab	Lower (CI95%)	Upper (CI95%)
Support	10.28 (5.24)	10.44* (5.23)	0.66 (1.84)	-0.23* (0.11)	-0.16 (0.52)	-1.64	0.50
Body-image	10.28* (5.34)	8.37 (5.11)	-1.82 (1.03)	-1.00*** (0.19)	1.70 (0.48)	1.07	2.75
Peritrauma	10.34* (5.28)	-4.05 (5.50)	3.51*** (0.34)	3.98*** (0.56)	14.38(2.23)	9.93	17.57
No. of Events	10.35* (5.28)	6.23 (5.12)	2.85** (1.01)	1.32*** (0.19)	3.71 (0.62)	2.58	4.98
All	10.27* (5.24)	-9.12 (5.15)	-	-	19.40(2.11)	14.89	23.13

Note: Unstandardized coefficients. CI=confidence interval (bias-corrected).

<sup>a</sup>Differences in c values are due to variation in n. CI values in bold indicate mediation.

\*p <0.05, \*\*p <0.01, \*\*\*p <0.001

**Table 3:** Coefficients for the multiple mediation model of exposure and PTSD.



**Figure 2:** The mediating effect of body-image on the relationship between physical traumas and PTSD. Note: Unstandardized coefficients. \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 4 reveals further statistically significant associations between paths in all three models. The only path not showing significant associations was the path from sexual traumas to body-image indicating that respondents who experienced sexual traumas did not differ in their view of own body, compared to others. However, respondents who experienced a non-interpersonal trauma were more likely to have a positive view of their body, than respondents who did not ( $a=0.12^*$ ).

As was the case for physical traumas the total effects ( $c$ ) were significant for both non-interpersonal traumas ( $bi=1.07$ ,  $SE=0.27$ ,  $p<0.001$ ) and sexual traumas ( $bi=8.43$ ,  $SE=1.59$ ,  $p<0.001$ ).

Trauma Type	c	c'	a	b	ab	Lower (CI 95%)	Upper (CI 95%)
Non-interpersonal	1.07*** (0.27)	1.19*** (0.26)	0.12* (0.05)	-1.05*** (0.20)	0.12 (0.06)	-0.25	-0.16
Physical traumas	6.11*** (1.10)	5.67*** (1.09)	-0.11	-0.88*** (0.20)	-0.44 (0.21)	0.07	0.98
Sexual traumas	8.43*** (1.59)	8.09*** (1.57)	-0.36 (0.32)	-0.92*** (0.20)	-0.34 (0.23)	-0.02	1.18

Note: Unstandardized coefficients. CI=confidence interval (bias-corrected).

<sup>a</sup>Differences in b values are due to variation in n. CI values in bold indicate mediation.

\*p <0.05, \*\*p <0.01, \*\*\*p <0.001

**Table 4:** Coefficients for the mediation models of trauma types and PTSD.



When the mediator was included in the models, the direct effects remained almost unchanged and significant in both models (non-interpersonal traumas:  $bi=1.17$ ,  $SE=0.26$ ,  $p<0.001$  & sexual traumas:  $bi=8.09$ ,  $SE=1.57$ ,  $p<0.001$ ). Additionally, as shown in Table 4 the CI did contain zero in the model with sexual traumas indicating no mediation. However, the CI did not include zero for the non-interpersonal traumas which indicated partial mediation in this model.

## Discussion

In a non-clinical adolescent sample the present study investigated the predictive and the mediating effects of several rudimentary risk factors. As well as this, the mediating effect of body-image was examined across trauma types. In line with previous findings [21], the present study showed that seventy-eight percent (females 78% and males 77%) of the students had experienced at least one traumatic event. Ten percent reported interpersonal traumas, while 48% reported non-interpersonal traumas. There was a gender difference with more males than females reporting non-interpersonal traumas. This was not surprising as previous research has shown that males engage in more out-of-home activities or risk behaviors, while females more often report at-home or interpersonal traumas [22,23]. The study found that 7.7% of the total sample displayed PTSD symptoms while a sub-clinical level of PTSD was reached by 9.2%. This was in accordance with previous research in adolescents [1].

## Predictability of PTSD

The first aim of the study was to estimate the predictive capacity of several risk factors. A hierarchical regression methodology revealed that number of traumas, peritraumatic response, loneliness, body-image and social support from parents in combination explained 26% of the variance in PTSD severity (Table 2). Number of traumas and peritraumatic response were the strongest predictors, while loneliness and body-image were moderate factors in explaining PTSD. This was in accordance with previous findings among children [24,25]. Social support from parents also played a significant, but small role in explaining PTSD. This is also in line with other studies. However, most of these previous studies have found social support to be a strong predictor of PTSD [2,10]. It is possible that the weak predictability of parental support on PTSD found in this study, may be explained by the type of assessed support. The present study investigated advice and guidance from parents in matters not related to the trauma, whereas other studies have focused on more emotional support, social reactions and support in relation to the trauma [10,26]. Additionally, the social support scale in this study had a low to fair internal consistency which also should be considered when interpreting the results.

Contradictory to the findings in other studies [27,28], gender did not predict PTSD at the final step of the regression model, when social support was considered. Furthermore, support of the predictive effect of the factors; age, parents' educational level, living with parents, place of residence, having a boy/girlfriend, having friends, being religious, doing sport and practical help from parents was not found when other factors were accounted for.

The results of the regression analysis were generally consistent with previous findings in child and adolescent populations showing pretraumatic and peritraumatic factors, except for gender, as strongly predictive [3]. However, the present study did not support findings from adult populations indicating that the posttraumatic factor social support was the strongest predictor [5].

## Mediation of exposure on PTSD

The second aim of the study was to explain how or why exposure was related to PTSD by investigating the mediating effects of four variables on the relationship between exposure and PTSD. Results of the multiple mediation analysis showed that without influence of any mediators' traumatic exposure was significantly associated with PTSD severity. However, when the mediators were included in the model, the direct path between exposure and PTSD was no longer significant. This indicated that development of PTSD operated through the risk factors, and that development of PTSD was dependent on intermediate factors rather than directly on exposure. The factors which significantly mediated the development of PTSD were number of traumas, peritraumatic response and body-image.

The mediating effect of number of experienced traumatic events on the relationship between exposure and PTSD indicated that the degree to which adolescents had been exposed to previous traumas increased the likelihood of subsequent PTSD. This supports the consensus that a history of previous traumas has considerable impact on the likelihood of onset of PTSD [5,29,30].

The results further indicated that peritraumatic response mediated the development of PTSD, suggesting that PTSD developed via peritraumatic responses rather than solely from exposure. This was in accordance with previous studies which have found strong associations between peritraumatic response and subsequent PTSD [3-5].

Body-image also had a mediating effect on the relationship between exposure and PTSD, which indicated that adolescents' perception of their bodies played a role in the development of PTSD. Negative body-image was, however, not significantly associated with trauma exposure, but there was a negative association between body-image and PTSD. This indicated that trauma-exposed adolescents were not more likely to have a negative view of their bodies, but adolescents who had a negative view of their body were more likely to display PTSD symptoms compared to adolescents having a less negative view of their body. This was largely in line with previous studies based on older participants, and it supported the hypothesis that a negative perception of self and physical appearance may constitute a risk factor for developing PTSD [5,31,32].

The only examined variable that did not have a mediating effect on the relationship between exposure and PTSD was parental support. Lack of parental support was not associated with exposure, but was, however, significantly associated with higher PTSD severity. Thus, results indicated that even though parental support did not function as a mediator between exposure and PTSD, adolescents who reported lack of parental support displayed higher levels of PTSD compared to others. This is somewhat in line with findings in previous research showing that low support was associated with increased PTSD symptoms [25,33-35].

From the first mediation analysis, it could be concluded that the development from exposure to PTSD was dependent on intermediate factors such as previous traumas, peritraumatic response and body-image. This finding contributes to a growing body of research demonstrating that various factors influence the development of PTSD; this finding is also in line with current perspectives in the field of psychotraumatology, which emphasize the role of multi causality and the impact of various risk factors [36].

## Mediation of trauma type on PTSD

The third aim of the present study was to explore whether body-image mediated the relationship between exposure and PTSD for some trauma types, but for not others. Based on previous research body-image was expected to mediate the effect of interpersonal, but not non-interpersonal traumas on PTSD. The study found that body-image did effect the development of PTSD differently dependent on trauma type, however, the expectations were not fully met.

The results showed that body-image mediated the effect of physical traumas on PTSD, indicating that following physical traumas, the development of PTSD was dependent on the adolescents' perception of their bodies. This was in line with the expectations of the study. The model showed that body-image was negatively associated with both physical traumas and PTSD, suggesting that adolescents exposed to physical traumas were more likely to have a negative body-image, and adolescents displaying a negative body-image were more likely to have PTSD symptoms.

Sexual traumas were, contrary to expectations, not mediated by body-image, indicating that appraisals of one's own body did not influence the development of PTSD following sexual traumas. Hence, the results showed that sexual traumas were not significantly associated with body-image, indicating that adolescents exposed to sexual traumas did not differ in their perception of own body compared to others, although a negative body-image was significantly associated with greater PTSD severity.

Results showed that the effects on PTSD of the two interpersonal trauma categories, physical and sexual traumas, were not similarly mediated by body-image. An explanation of the observed lack of mediational effect in sexual traumas may be that sexual traumas are more likely to interact with the perception of more internal characteristics such as self-efficacy and sense of being worth loving, as has been suggested in previous studies<sup>31</sup>. Physical traumas on the other hand, may be more likely to be associated with perception of physical appearance, as they obviously contain a physical element and may have led to external injury. However, contrary to the findings in this study, a clinical study of abused women has indicated that sexual traumas, and not physical traumas, were associated with reporting body-image disturbances [15]. Thus, future research should investigate this more thoroughly to reach a better understanding of the effect of negative body-image on PTSD following sexual and physical traumas.

In the present study body-image was not expected to mediate the development of PTSD following non-interpersonal traumas. Nevertheless, results revealed that body-image did mediate the relationship between non-interpersonal trauma exposure and PTSD, suggesting that perception of own body did impact the development of PTSD in survivors of non-interpersonal traumas. However, the mediation analysis showed an inverse relationship as body-image was positively associated with exposure and negatively associated with PTSD. This indicated that adolescents who were exposed to non-interpersonal traumas, were more likely to hold a positive view of their bodies, compared to unexposed adolescents, whereas individuals with a negative body-image were more likely to display PTSD symptoms, compared to others with a more positive body-image.

The link between exposure and positive body-image was particularly surprising as experiencing trauma is generally not assumed to be connected to positive effects [22]. The non-interpersonal traumas in this study were in many ways comparable to risk behaviors, which may provide some explanation of why exposure

to non-interpersonal traumas was linked to a positive view of body. First, it has been suggested that adolescents who are less satisfied with themselves may be more withdrawn and less likely to experience peer pressure or to engage in risk behaviors [32,37]. A second explanation may be that performing risk behaviors may lead to admiration and recognition by the peer group which in turn increases self-esteem [32,37]. Finally, drawing on previous research we know that particularly males may over-report certain events or risk behaviors and satisfaction with own body, consistent with pressures to conform to masculine ideals [38,39]. Thus, reporting biases may explain the link between exposure and positive body-image.

From the second mediation model, it could be concluded that body-image influenced PTSD differently dependent on trauma type. PTSD only developed via body-image in survivors of physical and non-interpersonal, but not sexual traumas. Nevertheless, there was a link between negative body-image and high risk of PTSD, regardless of trauma type, indicating that exposed adolescents, who had a negative body-image, were more likely to display PTSD symptoms, compared to exposed adolescents with more positive body-images. This generally supports the existing research on the effects of negative self-perceptions on PTSD [3]. It was found that exposure to physical, but not sexual traumas, was linked to a negative body-image, whereas exposure to non-interpersonal traumas was associated with a positive body-image. This provides further evidence for the theory that that severity of trauma alone may not be accountable for the difference in predictability of PTSD across traumas. Intermediating risk factors such as body-image may also play a role following certain traumas. Thus, the results highlight the importance of considering multi causality and the interactions between trauma types and risk factors, including body-image. Finally, the results emphasize the importance of considering negative cognitions about the self in therapeutic intervention.

## Limitations

Some response bias may have been produced due to self-reporting. However, the survey was based on recognition of events, which compared to free recall, is less distressing when reporting upsetting events [40]. Information about time of trauma exposure or about whether an event had occurred more than once, was not obtained. The study measured PTSD symptomatology according to DSM-IV [6] despite the release of a new conceptualization of the diagnosis in DSM-5 [7]. This on the other hand, allowed for consistent comparisons of results with earlier research in PTSD. Finally, the cross-sectional design did not allow for assumptions of casual relationships. Hence it was not possible to determine whether the proposed risk factors were present before the trauma or whether they occurred post-trauma as an outcome of PTSD. Future research can benefit from prospective and longitudinal designs to investigate the causality of risk factors.

The current study holds the strength of a relatively large sample size and being based on a nationally representative sample, thus preventing population biased results.

## Clinical relevance and implications for future research

The present study adds to current understanding of factors that influence the development of PTSD. The results may aid health personnel in designing prevention and treatment programs for PTSD taking relevant risk factors into account. In the present study previous traumas, peritraumatic response and body-image were found to

impact the development of PTSD. Such factors, among others, could potentially be assessed following exposure to traumatic events. This could allow screening for those most vulnerable to developing PTSD and targeting of treatment efforts accordingly.

The present study additionally indicated that risk factors may influence the development of PTSD in different ways, following certain types of events. This underlines the importance of considering the type of trauma in combination with other potential risk factors such as body-image. Future research is needed to further investigate factors which may mediate the development of PTSD, especially about different trauma types. This has potential to provide a basis for screening persons at risk of PTSD in relation to interaction between trauma types and various relevant risk factors.

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