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Adverse Childhood Experiences and Somatic Symptoms in Adulthood: A Moderated Mediation Effects of Disturbed Self-Organization and Resilient Coping

Metka Kuhar[1] and Gaja Zager Kocjan[2]
[1] Faculty of Social Sciences, University of Ljubljana
[2] Faculty of Arts, University of Ljubljana

Objective: Early life adversity is associated with somatic symptoms (SS) in adulthood, but the psychological mechanisms involved need to be further investigated. The aim of this study was to investigate whether disturbances in self-organization (DSO), consisting of affective dysregulation, negative self-concept, and disturbances in relationships, mediate the relationship between exposure to adverse childhood experiences (ACEs) and SS in adulthood. In addition, we investigated whether resilient coping buffers the direct and indirect effect of ACEs on SS. ***Method:*** The study sample comprised 4,847 Slovenian adults aged 18 to 75 years and was broadly representative of the general population. ***Results:*** Results of the mediation analysis showed that DSO had a notable, significant mediating effect on the relationship between ACEs and SS, with the indirect effect ($a \times b = .386$, $p < .001$) accounting for 53.3% of the total effect. A moderated mediation analysis revealed a significant interaction between ACEs and resilient coping in predicting DSO ($B = -.074$, $p = .020$), suggesting that resilient coping moderated the indirect effect of ACEs on SS. The flexible use of coping strategies to solve problems in stressful circumstances reduced the negative effect of ACEs on DSO, and hence the frequency of SS in adults with a history of ACEs. ***Conclusions:*** Health care professionals should be aware of the role that DSO may have in maintaining or exacerbating SS in victims of early trauma. Strengthening the individual's capacities for resilient coping can alleviate the negative effects of early trauma on psychological functioning and health in later life.

Clinical Impact Statement

Adverse childhood experiences (ACEs) contribute to somatic symptoms (SS) in adults through increased disturbances in self-organization (DSO), consisting of affective dysregulation, negative self-concept, and disturbances in relationships, which together with posttraumatic stress disorder (PTSD) symptoms form the concept of complex PTSD (cPTSD). Resilient coping mitigates the negative effect of ACEs on the frequency of adult SS via DSO. Clinicians should be aware that DSO may contribute to medically unexplained physical health complaints. Early diagnostics of ACEs and subsequent potential DSO symptoms, along with interventions aimed at strengthening resilient coping capacities, can alleviate SS in victims of early life adversity.

Keywords: adverse childhood experiences, somatic symptoms, disturbances in self-organization, resilient coping, moderated mediation

Over the past two decades, evidence regarding the profound, long-lasting, even lifelong harmful effects of childhood adversity on different aspects of health, psychosocial functioning, and quality of life has accumulated significantly (e.g., Clemens et al., 2018; Felitti et al., 1998). Somatic symptoms (SS), that is, physical complaints for which no physical cause could be found, such as tension headaches, gastrointestinal disturbances, and abdominal, back, or pelvic pain (Herman, 1992), have been pointed out among the multifaceted sequelae of complex traumatization, particularly trauma that occurs early in life (Herman, 1992; van der Kolk et al., 1996). Remarkable efforts were invested to understand risks, psychological and physiological mechanisms of SS (e.g., Beutel et al., 2020; Brown, 2006; Fischer et al., 2014; Rief & Barsky, 2005; Roelofs & Spinhoven, 2007). There is strong empirical evidence of the association between posttraumatic stress disorder (PTSD) symptoms (reexperiencing, avoidance, and hyperarousal) especially following nondevelopmental trauma such as war and terrorist attack, and SS, in particular chronic pain as the most commonly studied SS (e.g., Bugge et al., 2017; Otis et al., 2003; Wachen et al., 2013). However, still more attention needs to be

Metka Kuhar https://orcid.org/0000-0001-8311-1272
Gaja Zager Kocjan https://orcid.org/0000-0002-1934-2831

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Correspondence concerning this article should be addressed to Metka Kuhar, Faculty of Social Sciences, University of Ljubljana, Kardeljeva pl. 5, Ljubljana, Slovenia. Email: metka.kuhar@fdv.uni-lj.si

devoted to unveiling the underlying psychological mechanisms of the association between childhood adversity and SS (McFarlane, 2010; Rueness et al., 2019).

In the current study, we aim to extend scarce previous work that explored PTSD as an underlying mechanism of the complex relationship between exposure to childhood trauma and SS in adulthood (Rueness et al., 2019), using a large heterogeneous sample of Slovene adults. We examine a mediating role of disturbances in self-organization (DSO), consisting of affective dysregulation, negative self-concept, and disturbances in relationships. DSO symptoms, together with three clusters of PTSD symptoms, form the concept of complex posttraumatic stress disorder (cPTSD), for which growing empirical evidence shows conceptual distinctiveness and clinical usefulness (e.g., Cloitre et al., 2020; Hyland et al., 2017; Karatzias & Levendosky, 2019) and which has been included in the 11th revision of *International Classification of Diseases (ICD-11;* WHO, 2018). *ICD-11* defines cPTSD as a distinct stress-related disorder consistently with earlier conceptualizations (Herman, 1992; van der Kolk et al., 1996) that point out interpersonal nature of serious and repetitive traumatization. So far, the role of DSO (or cPTSD) in the development of SS has not been empirically examined. Additionally, we investigate resilient coping as a potential moderator of the effects of childhood adversity on SS in adulthood and DSO symptoms following early trauma.

Somatic Symptoms Following Early Life Adversity

SS, labeled also medically unexplained symptoms, functional symptoms, and so forth (Marks & Hunter, 2015), are common among children and adults (e.g., Egger et al., 1998; Hinz et al., 2017). They have been related to reduced subjective health and quality of life (Creed et al., 2012), and to increased utilization of health care services and greater health costs (Katon & Walker, 1998; Leadley et al., 2012). Known risk factors for the frequency and/or severity of SS include sociodemographic characteristics, such as female sex, higher age, lower social and economic status, unemployment, and disruption of partnership, as well as psychosocial characteristics including perceived lack of social support, loneliness, trait neuroticism, and others (e.g., Beutel et al., 2020; Creed et al., 2012; Denovan et al., 2019). There is ample research evidence on medical illnesses and mental health disorders, especially mood and anxiety disorders, coexisting with SS (Beutel et al., 2020; Creed et al., 2012). Also, a significant relationship between childhood adversity and SS in childhood, adolescence, and adulthood has been consistently demonstrated by a growing body of research (e.g., Beutel et al., 2020; Briere et al., 2008; Creed et al., 2012; Kaier et al., 2015; Rueness et al., 2019).

Explanations for the association of childhood adversity with SS accentuate heightened stress reactivity on a biological and psychological level resulting in chronic stress (Fischer et al., 2014; Schnurr & Jankowski, 1999; Schulz & Vögele, 2015) and increased allostatic load (Gupta, 2013; McFarlane, 2010). Especially profound and enduring neurobiological consequences have been found for the experiences of abuse, neglect, and other early adverse experiences (e.g., Agorastos et al., 2019; Herzog & Schmahl, 2018; Loman & Gunnar, 2010). Altered interoceptive processes (i.e., perception of bodily sensations) have been hypothesized as a mediator between dysregulated stress axes and SS (Schulz & Vögele, 2015), and they were also associated with acute stress (Schaan et al., 2019). Schulz and Vögele (2015) suggest that early life stress affects interoception by altering the intensity of the internal cues as well as their perception and interpretation. Thus, trauma affects the strength of signals from the body to the brain and/or the brain's reactions to those signals, the likelihood of stored memory representations, as well as the ability to detect or/and tolerate these cues, which in turn compromises accurate interpretation of sensations, further leading to SS. From a psychological viewpoint, misperceptions of bodily sensations have been explained by attentional bias (hypervigilance and alertness) to unpleasant bodily sensations (Schmidt et al., 1994), amplified stress following these perceptions (Carleton et al., 2014), and perceived external and internal threats to the integrity of the body (Köteles & Witthöft, 2017). In addition, existing research indicates an intimate association between SS and a reduced ability to identify and describe one's own emotions, accompanied by an expression of psychological distress via bodily sensations (i.e., alexithymia; Komaki, 2014; Nakao & Takeuchi, 2018).

In this study, we operationalize early life adversity with ACEs, a well-established theoretical and empirical construct measuring typical forms of early and often chronic potentially traumatic experiences (Felitti et al., 1998). ACEs specifically have been shown to be associated with SS, though the research evidence has been relatively scarce so far (Anda et al., 2010; Brown et al., 2018; Kaier et al., 2015). Based on the existing findings and the above theoretical reasoning we posit that ACEs predict increased amount of SS in adulthood (H1).

Early Life Adversity and Disturbances in Self-Organization

Early life adversity interrupts the development of a stable sense of self and of others. Physical and emotional pain or neglect, often inflicted by caregivers, can lead to a sense that one is fundamentally flawed and that others cannot be relied upon. Disturbed sense of self and relational functioning persist into adult life. Shame as a negative appraisal of self as bad, deficient or inadequate was demonstrated to play an intermediary role between childhood trauma, especially child maltreatment and somatic symptoms (Kealy et al., 2018). Insecure early relational experiences contribute also to impaired affective processing (e.g., Mikulincer et al., 2003; Nemeroff, 2016; Schore, 2003). ACEs have been shown to lead to a higher level of PTSD (e.g., Lee et al., 2020; Schalinski et al., 2016); however, early traumatization can also lead to additional symptoms (Herman, 1992; van der Kolk et al., 1996). A currently limited evidence suggests that ACEs are associated with more cPTSD symptoms, involving a pattern of PTSD symptoms along with life-impairing DSO (Frewen et al., 2019). In our study we hypothesize that ACEs predict more DSO in adulthood (H2). We base this expectation on scarce existing research evidence indicating a significant relationship between ACEs and impaired emotional regulation (McLaughlin et al., 2015), lower self-esteem (AlShawi & Lafta, 2014), and lower relationship adjustment (Briere et al., 2010), all elements of DSO.

Furthermore, we expect that DSO lead to increased amounts of SS (H3). Impaired ability to regulate emotions, disturbed sense of self, and disturbed relationships following early life adversity should manifest as SS due to increased chronic stress and possibly

associated deficient interoception (Schulz & Vögele, 2015)—both being especially strongly related with self-awareness, emotion processing, and social cognition (Löffler et al., 2018). What is more, this expectation can be implied from ample research evidence revealing a significant association between insecure attachment and SS. Attachment pattern represents a matrix for future relationships, and has a particular impact on psychological functions such as emotional regulation and self-perception (e.g., Lin et al., 2020; Meredith et al., 2008; Wearden et al., 2005).

While we have exposed literature suggesting that PTSD may represent one important pathway through which early life adversity affects later SS, there is a knowledge gap as to whether DSO could also play a significant mediating role in this relationship. This hypothesis can be substantiated by previously described mechanisms of the effects of early life adversity on the development of a stable sense of self and of others, and on chronic stress and impaired interoception, further leading to increased SS. Therefore, we expect that ACEs predict increased amount of SS in adults both directly (H1) and indirectly through increased DSO (H4).

Resilience as a Protective Factor

There has been a marked tendency in contemporary trauma-related research (and also in the clinical practice) to expand focus from negative effects of adversities to include also the buffering effects of resilience, that is, a capacity for positive adaptation following life adversities (e.g., Hamby et al., 2018; Ross et al., 2020). Resilience theories focus on strengths that individuals possess internally, such as efficacy beliefs, coping strategies, personality characteristics, and externally, such as family and community support, which contribute to more favorable outcomes for individuals exposed to adversities (Simeon et al., 2007; Southwick et al., 2014). Although there is evidence of resilience stability (Genet & Siemer, 2011; Hu et al., 2015), recent studies emphasize that resilience can be cultivated (Iacoviello & Charney, 2014; Smith et al., 2018).

Existing research demonstrated that resilience in adulthood buffers the association between retrospectively reported childhood trauma and adult SS due to more adaptive coping with stressors and better reach to social support (Beutel et al., 2020; Fischer et al., 2014), although childhood resilience and social support might as well represent a protective factor against childhood trauma (Meng et al., 2018). Therefore, we assume that resilient coping in adults, that is, coping with stress in a highly adaptive manner (Sinclair & Wallston, 2004), moderates the effect of ACEs on SS in adulthood, such that more resilient coping compared to less resilient coping weakens this association (H5). Additionally, we postulate that resilient coping in adults moderates the indirect effect of ACEs on SS in adulthood via DSO, such that more resilient coping compared to less resilient coping weakens this association (H6).

Figure 1 presents our conceptual model portraying the hypothesized associations between ACEs, SS in adulthood, DSO, and resilient coping. We tested the model on a large sample of Slovenian adults with demographic characteristics close to those of the general population. Although a former Yugoslav republic, Slovenia used to be the "westernmost" country of the Eastern European, communist bloc, gaining independence in 1991 and joining the European Union (EU) in 2004. In terms of demographic, family and child rearing trends, Slovenia is considered to be more modernized than the Eastern and Southern Europe and quite similar to those in Western countries (e.g., Švab et al., 2012).

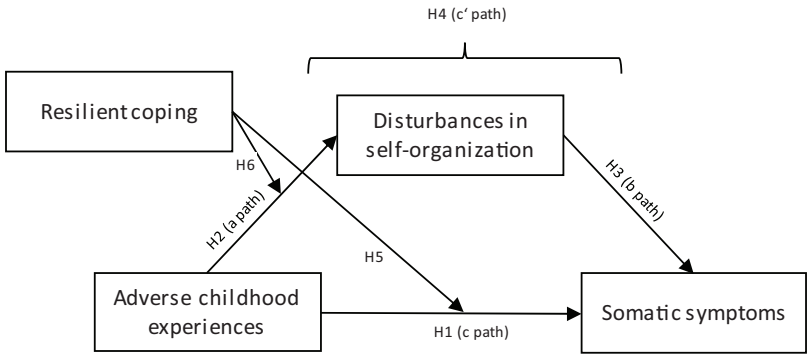
Method

Participants and Procedure

Participants were recruited from an online survey panel of a Slovene research agency using nonprobability quota sampling based on the demographic features of the population of Slovenia aged between 18 and 75 years. The panel consists of people who have given their informed consent in advance to participate in online surveys and receive a small compensation for their participation. We conducted a Computer Assisted Web Interview survey that was fully completed by 4,940 panelists. The data were weighted by gender, age, education, and statistical regions to reduce possible bias and ensure an accurate reflection of the

Figure 1

The Hypothesized Moderated Mediation Model With ACEs Predicting SS in Adults Directly and Indirectly through Increased DSO, and Resilient Coping Moderating the Direct and Indirect Associations Between ACEs and SS



population. Weighting was performed via iterative proportional fitting which aligns survey respondents to population benchmarks, with the demographic benchmarks taken from the SiStat Data Portal (Statistical Office of the Republic of Slovenia (SURS), 2018). In the weighted study sample, women accounted for 49.1% and 50.9% of the participants were male. The mean participant age was 46.7 years (*SD* = 15.3 years). Regarding their education, 43.9% of participants achieved less than a high school, 31.0% attained high school, and 25.0% had a postsecondary education or graduate degree. Participants also provided a self-assessment of their household's material living conditions, with 40.3% reporting below average material living conditions, 45.1% reporting average material living conditions, and 14.7% reporting above average material living conditions. The study was approved by the National Medical Ethics Committee, Ministry of Health (0120–236/2019/4).

Measures

Adverse Childhood Experiences

Items measuring the ACEs were designed based on the Felitti et al.'s (1998) study, the Behavioral Risk Factor Surveillance System (CDC, 2019), and the ACE International Questionnaire (WHO, 2016). Ten ACE categories were measured: five categories concerned child maltreatment (physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect) and five categories were related to household dysfunctions (domestic violence among adult household members, their mental illness, substance abuse, incarceration, and parental separation/child abandonment/parental death). Each ACE category was measured using two to five items including all content categories from sources. The items on child maltreatment required responses on a frequency scale (*never*, *once*, *a few times*, *often*, *very often*). The answers to the household dysfunction items were dichotomous (*yes and no*). If a participant indicated that he or she had experienced the adverse situation at least *a few times* (child maltreatment) or that one of the items for an individual ACE had been present by the time he or she was 18 (household dysfunctions), a point was earned for that ACE. In the case of sexual abuse, a point was given also for the answer *once* at any of the corresponding items. The total ACE score could range between 0 and 10. In the present study, Cronbach's alpha for the ACE score was .75. Cronbach's alpha for a similar adapted version of the ACE scale used by Murphy et al. (2014) was .88.

Resilience

The Brief Resilient Coping Scale (Sinclair & Wallston, 2004) was used to measure one's tendency to effectively use coping strategies in flexible, committed ways to actively solve problems despite stressful circumstances. The scale is composed of four items (e.g., I look for creative ways to alter difficult situations.) that are assessed on a 5-point scale ranging from 1 = *does not describe me at all* to 5 = *describes me very well*. The answers to all items were added up to obtain an overall BRCS score, with possible values ranging from 4 to 20. The authors report good convergent validity of the scale and sufficient stability and internal consistency with Cronbach's alpha reliability coefficients ranging from .64 to .76 (for two samples and multiple measurement points). In our sample, Cronbach's alpha coefficient was .80.

Disturbances in Self-Organization

The disturbances in self-organization were measured using sixteen DSO symptom indicators from the International Trauma Questionnaire—ITQ (Cloitre et al., 2018; Shevlin et al., 2018). Nine items measure affective dysregulation (hyperactivation and hypoactivation experiences; e.g., I react intensely to things that do not seem to affect other people so much.), four items measure negative self-concept (e.g., I feel like a failure.), and three items measure disturbed relationships (e.g., I feel distant or cut off from people.). The items are answered using a 5-point scale ranging from 1= *not at all* to 5 = *extremely*. The answers to all items were added up to obtain an overall DSO score, with possible values between 16 and 80. ITQ demonstrated good construct validity in previous research (e.g., Hyland et al., 2017). Shevlin et al. (2018) report high internal consistency of the sixteen DSO items, with Cronbach's alpha of .94. In our sample, Cronbach's alpha estimate was .93.

Somatic Symptoms

The somatic symptoms scale was constructed based on symptoms most commonly found in various SS measurement instruments (Zijlema et al., 2013), which provided initial support for its content validity. The scale consists of the following seven symptoms: headache, stomach ache, backache, chest pain, trouble sleeping, dizziness, feeling tired or low energy. Respondents were asked about how often in the last 6 months they had suffered from the listed complaints in the absence of known physical reasons, and they choose their answer on a 5-point scale ranging from 1 = *rarely or never* to 5 = *about every day*. Principal component analysis revealed a clear unidimensional structure of the scale with the single component explaining 47.4% of the total item variance. The total score was calculated by summing the answers to all of the items, resulting in possible scores ranging from 7 to 35. Cronbach's alpha for the total score was .81.

Data Analysis

Preliminary analyses included a review of descriptive statistics and Pearson correlations between the main variables. Correlation coefficients up to .30 were interpreted as low, between .30 and .50 as medium, and those above .50 as large (Cohen, 1988). Correlations with participants' age were also examined, and independent samples *t*-tests were used to investigate differences between men and women in the main variables. To estimate the effect size for the *t*-tests, Cohen's *d* values were calculated, with values up to .50 indicating a small effect, between .50 and .80 a medium effect, and those above .80 a large effect (Cohen, 1988).

To evaluate the hypothesized moderated mediation model, a path analysis was performed in Mplus Version 8.4 (Muthén & Muthén, 1998–2019) using a maximum likelihood estimator (ML). First, a simple mediation model was tested where the ACE score was modeled as an exogenous variable with both direct and indirect effects on adult SS, while DSO were modeled as a mediating variable. Then, a moderated mediation model was tested, in which resilient coping was added as a moderator of the direct and indirect effects of the ACE score on the SS (see Figure 1), and the conditional direct and indirect effects at various levels of the moderator were examined (i.e., -1 *SD*, *M*, $+1$ *SD*). In both models,

Table 1
Descriptive Statistics, Reliability Coefficients, and Correlations Between ACEs, Resilient Coping, DSO, and Frequency of SS in Adulthood

	ACE score	Resilient coping (BRCS)	Disturbances in self-organization (DSO)	Somatic symptoms (SS)
Males				
M	2.14	14.31	33.19	13.94
SD	2.01	2.89	11.18	4.80
Females				
M	2.61	14.23	36.24	16.31
SD	2.35	2.92	12.02	5.38
Total sample				
M	2.37	14.27	34.69	15.10
SD	2.20	2.91	11.70	5.23
α	.75	.80	.93	.81
Age	.02	.15***	−.20***	−.10***
ACE		−.04*	.35***	.32***
BRCS			−.31***	−.19***
DSO				.54***

* $p < .05$. *** $p < .001$.

the effect of participants' sex and age on endogenous variables (i.e., DSO and SS) was statistically controlled. The direct, indirect, and conditional direct and indirect effects were tested, and the bootstrap estimation procedure with 10,000 bootstrap samples was used to obtain 95% confidence intervals, with confidence intervals not containing zero considered to indicate significant effects. Bootstrapping simulates new samples to determine the distribution of estimates from repeated measurements, based on which confidence intervals can be constructed to answer the question of the extent of bias in the estimator (e.g., Kulesa et al., 2015). A particular advantage of bootstrapping is that it avoids the problems due to the nonnormal sampling distribution of indirect effects (MacKinnon et al., 2004).

Results

Descriptive Statistics and Correlations

Descriptive statistics, Cronbach's alpha reliability coefficients, and correlations between all the variables are presented in Table 1. Measures of all variables displayed adequate internal consistency. A very low yet significant negative correlation was observed between the ACE score in resilient coping, suggesting slightly lower resilient coping among participants who experienced more ACEs, and vice versa. The ACE score had a medium positive correlation with DSO and the frequency of SS in adulthood. Conversely, resilient coping had a medium negative correlation with DSO and a low negative correlation with the frequency of SS, lending initial support for our hypotheses. Also, in line with expectations, a large positive correlation was obtained between DSO and the frequency of SS.

While no significant association was observed between the number of ACEs and age of participants, age had a low positive correlation with resilient coping, such that older participants reported slightly more resilient coping compared with younger participants. On the other hand, age had low negative correlations with DSO and SS, suggesting that with the increasing age of participants, the reported frequency of SS in adulthood slightly decreased and so did the amount of DSO (see Table 1). Participants' sex had no effect on their resilient coping, $t(4,937) = .93$, $p = .350$; $d = .03$, but a small effect on the number of ACEs, $t(4,757.3) = -7.45$, $p < .000$; $d = -.21$, the level of DSO, $t(4,880.1) = -9.24$, $p < .000$; $d = -.26$, and the frequency of SS in adulthood, $t(4,832.1) = -16.30$, $p < .000$; $d = -.46$, with women reporting more ACEs, more DSO, and more SS compared with men.[1] The effect of participants' age and sex was statistically controlled in the following mediation and moderated mediation analyses.

Mediation Analysis

Results of the simple mediation analysis testing the indirect effect of the ACE score on the frequency of SS via DSO are provided in Table 2. In line with the expectations, the ACE score had a significant intensifying effect on the frequency of SS (H1; c path) as well as on DSO (H2; a path), which further predicted increased frequency of SS (H3; b path). Both direct and indirect effects of the ACE score on SS were positive and significant (H4; c' path), indicating a partial mediation of DSO in the model. The indirect effect accounted for 53.3% of the total effect. The model explained 17.5% of the variance in DSO, and 33.4% of the variance in SS.

Moderated Mediation Analysis

To test whether the direct and the indirect effects of the ACE score on the frequency of SS are moderated by resilient coping, a moderated mediation analysis was conducted, and the results are presented in Table 3. In accordance with our prediction (H6), resilient coping moderated the indirect effect of the ACE score on SS, as shown by the significant interaction effect

[1] The assumption of equality of variances was violated for the comparison of the ACE scores (Levene's $F = 111.15$, $p < .001$), DSO (Levene's $F = 13.28$, $p < .001$), and SS in adulthood (Levene's $F = 46.15$, $p < .001$) between male and female participants. In these cases, degrees of freedom were adjusted to correct for unequal variances.

Table 2
Summary of the Mediation Analysis and Bootstrap Results for Direct and Indirect Effects of the ACE Score on SS

	Mediator variable: Disturbances in self-organization (DSO)				Dependent variable: Somatic symptoms (SS)			
	B(β)	*SE*	*p*	95% CI for *B*	*B*(β)	*SE*	*p*	95% CI for *B*
Control variables								
Sex	2.226 (.095)	.358	<.001	[1.518, 2.927]	1.571 (.150)	.149	<.001	[1.290, 1.866]
Age	−.159 (−.207)	.012	<.001	[−.183, −.134]	−.003(−.010)	.005	.507	[−.013, .007]
Predictors								
ACE score	1.843 (.346)	.088	<.001	[1.668, 2.012]	.338 (.142)	.041	<.001	[.258, .418]
Disturbances in self-organization					.210 (.469)	.008	<.001	[.193, .225]
R^2	.175				.334			
Direct effect: ACE score → SS					.338 (.142)	.024	<.001	[.258, .418]
Indirect effect: ACE score → DSO → SS					.386 (.162)	.024	<.001	[.341, .435]

Note. *B* = unstandardized regression coefficients; β = standardized regression coefficients; CI = confidence interval based on 10,000 bootstrapped samples.

between the ACE score and resilient coping on the mediator variable, that is, DSO. To assist the interpretation, we plotted this relationship at three levels of resilient coping: one standard deviation below the mean, the mean, and one standard deviation above the mean of resilient coping (see Figure 2). Consistent with our prediction, the figure demonstrates that the ACE score was more predictive of DSO at lower (steeper line) compared with higher levels of resilient coping. The conditional indirect effects (via DSO) of the ACE score on the frequency of SS (lower part of Table 3) were significant but decreased in magnitude along three increasing levels of resilient coping ($M \pm 1$ *SD*).

Contrary to our expectations (H5), the interaction effect between the ACE score and resilient coping on the frequency of SS was insignificant, suggesting that resilient coping did not moderate the direct effect of the ACE score on SS. The conditional direct effects (lower part of Table 3) were significant and of similar magnitude at all three levels of resilient coping ($M \pm 1$ *SD*). With the inclusion of resilient coping in the model, the variance explained in DSO increased to 24.9%, while with 33.6% the amount of the variance explained in the frequency of SS remained largely the same as in the previous model.

Discussion

In the current study, we examined the association between retrospective reports of ACEs and the development of a range of SS in adults, with a particular focus on the role that DSO and resilient coping may have in this relationship. There is much evidence of the higher occurrence of SS in adulthood, especially chronic pain, in people with a history of early life adversity. Altered stress reactivity and increased chronic stress were postulated as possible

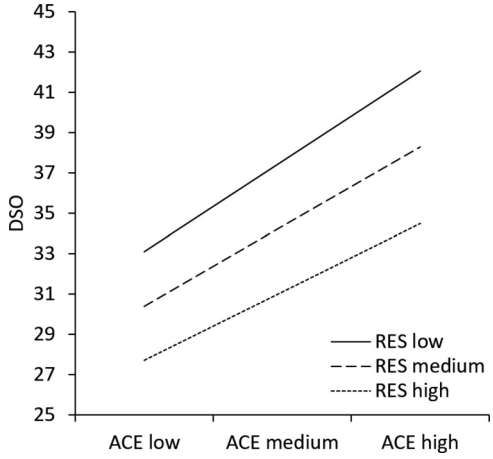
Table 3
Summary of the Moderated Mediation Analysis and Bootstrap Results With Conditional Direct and Indirect Effects of the ACE Score on the Frequency of SS at Different Levels of Resilient Coping ($M \pm 1$ SD)

	Mediator variable: Disturbances in self-organization				Dependent variable: Somatic symptoms			
	B(β)	*SE*	*p*	95% CI for *B*	*B*(β)	*SE*	*p*	95% CI for *B*
Control variables								
Sex	2.159 (.092)	.342	<.001	[1.487, 2.825]	1.581 (.151)	.149	<.001	[1.299, 1.878]
Age	−.129 (−.168)	.012	<.001	[−.152, −.104]	−.002 (−.007)	.005	.651	[−.012, .008]
Predictors								
ACE score	2.842 (.534)	.468	<.001	[1.904, 3.757]	.544 (.228)	.203	.007	[.158, .946]
Disturbances in self-organization					.203 (.454)	.009	<.001	[.185, .220]
Resilient coping	−.908 (−.226)	.097	<.001	[−1.099, −.721]	−.046 (−.026)	.038	.224	[−.119, .029]
ACE score × Resilient coping	−.074 (−.206)	.032	.020	[−.136, −.012]	−.014 (−.086)	.013	.301	[−.119, .012]
R^2	.249				.336			
Conditional direct effects of the ACE score								
−1 *SD*					.387 (.162)	.062	<.001	[.268, .510]
M					.346 (.145)	.042	<.001	[.266, .429]
+1 *SD*					.306 (.129)	.052	<.001	[.206, .408]
Conditional indirect effects of the ACE score								
−1 *SD*					.406 (.171)	.032	<.001	[.344, .471]
M					.363 (.152)	.023	<.001	[.318, .411]
+1 *SD*					.319 (.134)	.027	<.001	[.267, .374]

Note. *B* = unstandardized regression coefficients; β = standardized regression coefficients; CI = confidence interval based on 10,000 bootstrapped samples.

Figure 2

Disturbances in Self-Organization (DSO) as a Function of ACEs and Resilient Coping (RES). ACE Score was More Predictive of DSO at Lower Compared With Higher Levels of Resilient Coping



explanations for this relationship (e.g., for a meta-analytic review, see Davis et al., 2005). The effects of maladaptive and chronically dysregulated stress response are expected to be particularly profound and lasting, because ACEs are postulated to influence basic biological processes in a sensitive period of child development (Cross et al., 2017; Nemeroff, 2016). In line with our H1 and previous studies (Anda et al., 2010; Brown et al., 2018; Kaier et al., 2015), we confirmed that ACEs predict an increased frequency of SS in adulthood.

According to the existing research evidence (e.g., Cloitre et al., 2018, 2020; van der Kolk et al., 1996), adverse experiences in childhood, especially if multiple, are associated with later PTSD. We proposed they may be also associated with symptoms, characterized as DSO: affect dysregulation, damage to one's sense of self, and relational impairment. We confirmed our H2 that a higher number of ACEs would predict more DSO, which is a new research evidence in the field of psychological trauma—so far, ACEs have only been associated with PTSD (e.g., Lee et al., 2020; Schalinski et al., 2016). Furthermore, in line with H3, more DSO was proved to predict increased frequency of SS in adulthood. This finding, too, extends the quite numerous previous studies on the association between PTSD and SS in adults (e.g., Bugge et al., 2017; Gupta, 2013), which has been explained by the effect of the pathophysiological stress response directly on the physical level and also by intertwined psychological mechanisms, such as attentional bias to unpleasant bodily sensation and unfavorable interpretation causing further stress (Kearney et al., 2010).

Furthermore, we found that DSO partially mediated the relationship between exposure to ACEs and the frequency of SS in adulthood (H4). To our knowledge, this is the first study examining the mediating role of DSO between early life adversity and SS in adulthood. Rueness et al. (2019) showed in their study the mediating role of PTSD in the relationship between (all types) of child abuse and neglect, and SS. The mediating effect on later SS has been similarly shown for PTSD following nondevelopmental trauma (Bugge et al., 2017; Wachen et al., 2013). Existing research evidence has also shown the mediating role of other mental health disorders, especially mood and anxiety disorders in the ACEs-SS (specifically pain) associations (Kascakova et al., 2020; Sachs-Ericsson, 2017).

The mediating effect of DSO could be explained by how ACEs affect the altered capacity for self-regulation and this effect continues on the SS due to altered physiological and psychological responses to stressors (Fischer et al., 2014; Schulz & Vögele, 2015) and increased allostatic load (Danese & McEwen, 2012). Our results are also in line with previous findings that insecure early relational experiences impair development and organization of neurobiological systems which modulate physiological and affective processing (Fonagy & Target, 2005), further leading to impaired sense of self and relational functioning (Mikulincer et al., 2003; Schore, 2003) and more SS (Lin et al., 2020; Meredith et al., 2008).

What is more, recently there has been growing research interest in the role of disturbed interoception (the perception and interpretation of bodily signals) in SS related with early life adversity (Harshaw, 2015; Schaan et al., 2019; Schulz & Vögele, 2015). Interoception, impaired by early life stress might underlie the intertwined emotion, self, and other processing (Löffler et al., 2018), leading to more emotional dysregulation (e.g., Craig, 2015), and worse psychosocial functioning in adulthood (Arnold et al., 2019; Löffler et al., 2018; Murphy et al., 2017). Negative self- and other cognitions, and hyper- or hypoactivated emotions and moods, and their behavioral correlates are exactly the characteristics of DSO.

Moreover, in our study, the correlation between exposure to adversity in early life and resilient coping in adulthood was significant but trivial, suggesting that resilient coping is affected by many factors, including biological, psychological, and social factors (Southwick et al., 2014). Resilient coping means a more efficient response to stressors, thereby alleviating the maladaptive effects of heightened psychological distress (Fischer et al., 2014; Iacoviello & Charney, 2014). Our analysis did not confirm that more resilient coping would moderate the direct effect of ACEs on the frequency of SS in adulthood (H5), suggesting that ACEs directly predict adult SS regardless of individuals' level of resilient coping. However, resilient coping expectedly moderated the indirect effect of ACEs on the frequency of adult SS via more DSO (H6). In other words, high levels of resilient coping attenuated the relationships between ACEs, DSO, and adult SS through a link between ACEs and DSO. The flexible use of coping strategies to actively solve problems in stressful circumstances reduced the negative effect of ACEs on emotion regulation, self-esteem, and relationship adjustment (i.e., decreased DSO), and hence the frequency of SS in adults with a history of ACEs. This finding is consistent with previous research evidence on lower vulnerability to stressors throughout the life span in people with more resilient coping (Beutel et al., 2020; Fischer et al., 2014), and advances our understanding of the interactive underlying mechanisms between early life adversities and later DSO and SS. Negative consequences of early adversities can be reduced by building individual capacity for resilient coping. Various intervention strategies could be used to achieve this goal; some have shown promising results in earlier research (e.g., Smith et al., 2018).

Study Limitations and Future Directions

The present results should be interpreted in the light of several limitations. Because an online research panel was used to collect

data, only people using the Internet could participate. Therefore, a possible self-selection of participants, especially among older adults, could occur. All data in this study, including data on early life adversities, were collected through self-reports, but retrospective assessments of ACEs are prone to recall bias, such as overreporting of adverse events in people with poor current health status (Fergusson et al., 2000). To improve the quality of the findings, future studies could include data from medical records, behavioral measurements, or reports from significant others. While a large and heterogeneous nonclinical sample represents a significant advantage of this study, studies focusing on symptomatic samples, such as individuals with psychiatric diagnoses for which a known comorbidity with SS exists (Beutel et al., 2020; Creed et al., 2012), could provide further insight into the relationship between early life adversities and SS.

Although DSO are an interesting construct conceptually relevant in the study of SS per itself, previous studies have rarely investigated DSO in isolation from PTSD. The two constructs are indeed intertwined in the concept of cPTSD (Cloitre et al., 2018), and future research on the mechanisms underlying the development of SS would benefit from their joint investigation. Furthermore, in recent research the importance of additional early adverse experiences, such as exposure to peer or community violence, that are not covered among the traditional ten ACEs, has been raised (Finkelhor et al., 2009). Their association with SS could be examined in future studies. In this study, duration and severity of ACEs were not measured (Schalinski et al., 2016). However, such data could offer a deeper insight into how ACEs contribute to maladaptive outcomes later in life. Future research endeavors should also seek to empirically examine the role of interoception in the development of maladaptive outcomes following early life adversity. While interoception has previously been linked with SS (Fischer et al., 2014; Schulz & Vögele, 2015), studies investigating impaired interoception in the context of adverse experiences are still needed. Studies of the effects of individual ACEs on the development of SS later in life would also make a valuable contribution to this area.

Last but not least, it should be pointed out that our data support the specific causal model, which we assumed, but of course we can also find alternative models and explanations, for example childhood resilience and social support might represent a protective factor against childhood trauma (Meng et al., 2018).

Practice Implications and Conclusions

Our findings suggest implications for clinical practice. In treating patients with physical complaints of unknown etiology clinicians should take into consideration the presence of childhood trauma and potential cPTSD which is still a relatively new diagnosis. Education on this common medical presentation should be designed and delivered to medical students and qualified doctors (e.g., Yon et al., 2017) and clinicians' evaluation and treatment options should be developed (e.g., Edwards et al., 2010). In addition, strengthening resilience was shown to attenuate SS (Smith et al., 2018), and this is also consistent with the results of this study, in which resilience mitigated the indirect negative effect of ACEs on SS in adults via DSO.

Overall, our findings confirmed that DSO and resilient coping represent important underlying mechanisms explaining how ACEs contribute to SS in adults. Health care professionals should be aware of the role that early life adversity and cPTSD symptoms, especially DSO, following childhood adversity can play in maintaining or exacerbating physical health problems in adulthood. Timely diagnostics and treatment interventions, with a particular focus on strengthening the individual's resilience, are needed to alleviate the negative effects of early life adversities on the individual's psychological functioning and health later in life.

References

Agorastos, A., Pervanidou, P., Chrousos, G. P., & Baker, D. G. (2019). Developmental trajectories of early life stress and trauma: A narrative review on neurobiological aspects beyond stress system dysregulation. *Frontiers in Psychiatry*, *10*, 118. https://doi.org/10.3389/fpsyt.2019.00118

AlShawi, A. F., & Lafta, R. K. (2014). Relation between childhood experiences and adults' self-esteem: A sample from Baghdad. *Qatar Medical Journal*, *2014*(2), 82–91. https://doi.org/10.5339/qmj.2014.14

Anda, R., Tietjen, G., Schulman, E., Felitti, V., & Croft, J. (2010). Adverse childhood experiences and frequent headaches in adults. *Headache*, *50*(9), 1473–1481. https://doi.org/10.1111/j.1526-4610.2010.01756.x

Arnold, A. J., Winkielman, P., & Dobkins, K. (2019). Interoception and social connection. *Frontiers in Psychology*, *10*, 2589. https://doi.org/10.3389/fpsyg.2019.02589

Beutel, M. E., Klein, E. M., Henning, M., Werner, A., & Brähler, E. (2020). Somatic symptoms in the German general population from 1975 to 2013. *Nature*, *10*, 1595. https://doi.org/10.1038/s41598-020-58602-6

Briere, J., Hodges, M., & Godbout, N. (2010). Traumatic stress, affect dysregulation, and dysfunctional avoidance: A structural equation model. *Journal of Traumatic Stress*, *23*(6), 767–774. https://doi.org/10.1002/jts.20578

Briere, J., Kaltman, S., & Green, B. L. (2008). Accumulated childhood trauma and symptom complexity. *Journal of Traumatic Stress*, *21*(2), 223–226. https://doi.org/10.1002/jts.20317

Brown, R. C., Plener, P. L., Braehler, E., Fegert, J. M., & Huber-Lang, M. (2018). Associations of adverse childhood experiences and bullying on physical pain in the general population of Germany. *Journal of Pain Research*, *11*, 3099–3108. https://doi.org/10.2147/JPR.S169135

Brown, R. J. (2006). Medically unexplained symptoms: A new model. *Psychiatry*, *5*(2), 43–47. https://doi.org/10.1383/psyt.2006.5.2.43

Bugge, I., Dyb, G., Stensland, S. O., Ekeberg, Ø., Wentzel-Larsen, T., & Diseth, T. H. (2017). Physical injury and somatic complaints: The mediating role of posttraumatic stress symptoms in young survivors of a terror attack. *Journal of Traumatic Stress*, *30*(3), 229–236. https://doi.org/10.1002/jts.22191

Carleton, R. N., Duranceau, S., Freeston, M. H., Boelen, P. A., McCabe, R. E., & Antony, M. M. (2014). But it might be a heart attack: Intolerance of uncertainty and panic disorder symptoms. *Journal of Anxiety Disorders*, *28*(5), 463–470. https://doi.org/10.1016/j.janxdis.2014.04.006

Centers for Disease Control and Prevention (CDC). (2019). *Behavioral Risk Factor Surveillance System Survey Questionnaire*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Clemens, V., Huber-Lang, M., Plener, P. L., Brähler, E., Brown, R. C., & Fegert, J. M. (2018). Association of child maltreatment subtypes and long-term physical health in a German representative sample. *European Journal of Psychotraumatology*, *9*(1), 1510278. https://doi.org/10.1080/20008198.2018.1510278

Cloitre, M., Brewin, C. R., Bisson, J. I., Hyland, P., Karatzias, T., Lueger-Schuster, B., Maercker, A., Roberts, N. P., & Shevlin, M. (2020). Evidence for the coherence and integrity of the complex PTSD (CPTSD) diagnosis: Response to Achterhof et al. (2019) and Ford (2020). *European*

Journal of Psychotraumatology, *11*(1), 1739873. https://doi.org/10.1080/20008198.2020.1739873

Cloitre, M., Shevlin, M., Brewin, C. R., Bisson, J. I., Roberts, N. P., Maercker, A., Karatzias, T., & Hyland, P. (2018). The International Trauma Questionnaire: Development of a self-report measure of ICD-11 PTSD and complex PTSD. *Acta Psychiatrica Scandinavica*, *138*(6), 536–546. https://doi.org/10.1111/acps.12956

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum.

Craig, A. D. (2015). *How do you feel? An interoceptive moment with your neurobiological self*. Princeton University Press.

Creed, F. H., Davies, I., Jackson, J., Littlewood, A., Chew-Graham, C., Tomenson, B., Macfarlane, G., Barsky, A., Katon, W., & McBeth, J. (2012). The epidemiology of multiple somatic symptoms. *Journal of Psycho-somatic Research*, *72*(4), 311–317. https://doi.org/10.1016/j.jpsychores.2012.01.009

Cross, D., Fani, N., Powers, A., & Bradley, B. (2017). Neurobiological development in the context of childhood trauma. *Clinical Psychology: Science and Practice*, *24*(2), 111–124. https://doi.org/10.1111/cpsp.12198

Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & Behavior*, *106*(1), 29–39. https://doi.org/10.1016/j.physbeh.2011.08.019

Davis, D. A., Luecken, L. C., & Zautra, A. J. (2005). Are reports of childhood abuse related to the experience of chronic pain in adulthood? A meta-analytic review of the literature. *The Clinical Journal of Pain*, *21*(5), 398–405. https://doi.org/10.1097/01.ajp.0000149795.08746.31

Denovan, A., Dagnall, N., & Lofthouse, G. (2019). Neuroticism and somatic complaints: Concomitant effects of rumination and worry. *Behavioural and Cognitive Psychotherapy*, *47*(4), 431–445. https://doi.org/10.1017/S1352465818000619

Edwards, T. M., Stern, A., Clarke, D. D., Ivbijaro, G., & Kasney, L. M. (2010). The treatment of patients with medically unexplained symptoms in primary care: A review of the literature. *Mental Health in Family Medicine*, *7*(4), 209–221. https://doi.org/10.1046/j.1525-1497.2003.20815.x

Egger, H. L., Angold, A., & Costello, E. J. (1998). Headaches and psychopathology in children and adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, *37*(9), 951–958. https://doi.org/10.1097/00004583-199809000-00015

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, *14*(4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8

Fergusson, D. M., Horwood, L. J., & Woodward, L. (2000). The stability of child abuse reports: A longitudinal study of the reporting behaviour of young adults. *Psychological Medicine*, *30*(3), 529–544. https://doi.org/10.1017/S0033291799002111

Finkelhor, D., Turner, H. A., Ormrod, R. K., & Hamby, S. L. (2009). Violence, crime, and exposure in a national sample of children and youth. *Pediatrics*, *124*(5), 1411–1423. https://doi.org/10.1542/peds.2009-0467

Fischer, S., Lemmer, G., Gollwitzer, M., & Nater, U. M. (2014). Stress and resilience in functional somatic syndromes—A structural equation modeling approach. *PLoS ONE*, *9*(11), e111214. https://doi.org/10.1371/journal.pone.0111214

Fonagy, P., & Target, M. (2005). Bridging the transmission gap: An end to an important mystery of attachment research? *Attachment & Human Development*, *7*(3), 333–343. https://doi.org/10.1080/14616730500269278

Frewen, P., Zhu, J., & Lanius, R. (2019). Lifetime traumatic stressors and adverse childhood experiences uniquely predict concurrent PTSD, complex PTSD, and dissociative subtype of PTSD symptoms whereas recent adult non-traumatic stressors do not: Results from an online survey study. *European Journal of Psychotraumatology*, *10*(1), 1606625. https://doi.org/10.1080/20008198.2019.1606625

Genet, J. J., & Siemer, M. (2011). Flexible control in processing affective and non-affective material predicts individual differences in trait resilience. *Cognition and Emotion*, *25*(2), 380–388. https://doi.org/10.1080/02699931.2010.491647

Gupta, M. A. (2013). Review of somatic symptoms in post-traumatic stress disorder. *International Review of Psychiatry*, *25*(1), 86–99. https://doi.org/10.3109/09540261.2012.736367

Hamby, S., Grych, J., & Banyard, V. (2018). Resilience portfolios and poly-strengths: Identifying protective factors associated with thriving after adversity. *Psychology of Violence*, *8*(2), 172–183. https://doi.org/10.1037/vio0000135

Harshaw, C. (2015). Interoceptive dysfunction: toward an integrated framework for understanding somatic and affective disturbance in depression. *Psychological Bulletin*, *141*(2), 311–363. https://doi.org/10.1037/a0038101

Herman, J. L. (1992). Complex PTSD: A syndrome in survivors of prolonged and repeated trauma. *Journal of Traumatic Stress*, *5*(3), 377–391. https://doi.org/10.1002/jts.2490050305

Herzog, J., & Schmahl, C. (2018). Adverse childhood experiences and the consequences on neurobiological, psychosocial, and somatic conditions across the lifespan. *Frontiers in Psychiatry*, *9*, 420. https://doi.org/10.3389/fpsyt.2018.00420

Hinz, A., Ernst, J., Glaesmer, H., Brähler, E., Rauscher, F. G., Petrowski, K., & Kocalevent, R.-D. (2017). Frequency of somatic symptoms in the general population: Normative values for the Patient Health Questionnaire-15 (PHQ-15). *Journal of Psychosomatic Research*, *96*, 27–31. https://doi.org/10.1016/j.jpsychores.2016.12.017

Hu, T., Zhang, D., & Wang, J. (2015). A meta-analysis of the trait resilience and mental health. *Personality and Individual Differences*, *76*, 18–27. https://doi.org/10.1016/j.paid.2014.11.039

Hyland, P., Shevlin, M., Elklit, A., Murphy, J., Vallières, F., Garvert, D. W., & Cloitre, M. (2017). An assessment of the construct validity of the ICD-11 proposal for complex posttraumatic stress disorder. *Psychological Trauma: Theory, Research, Practice, and Policy*, *9*(1), 1–9. https://doi.org/10.1037/tra0000114

Iacoviello, B. M., & Charney, D. S. (2014). Psychosocial facets of resilience: Implications for preventing posttrauma psychopathology, treating trauma survivors, and enhancing community resilience. *European Journal of Psychotraumatology*, *5*(1), 23970. https://doi.org/10.3402/ejpt.v5.23970

Kaier, E., DeMarni Cromer, L., Davis, J. L., & Strunk, K. (2015). The relationship between ACEs and subsequent health complaints in elite athletes. *Journal of Child & Adolescent Trauma*, *8*(2), 83–92. https://doi.org/10.1007/s40653-015-0041-4

Karatzias, T., & Levendosky, A. A. (2019). Introduction to the special section on complex posttraumatic stress disorder (CPTSD): The evolution of a disorder. *Journal of Traumatic Stress*, *32*(6), 817–821. https://doi.org/10.1002/jts.22476

Kascakova, N., Furstova, J., Hasto, J., Madarasova Geckova, A., & Tavel, P. (2020). The unholy trinity: Childhood trauma, adulthood anxiety, and long-term pain. *International Journal of Environmental Research and Public Health*, *17*(2), 414. https://doi.org/10.3390/ijerph17020414

Katon, W. J., & Walker, E. A. (1998). Medically unexplained symptoms in primary care. *The Journal of Clinical Psychiatry*, *59*(Suppl. 20), 15–21. https://doi.org/10.1192/apt.bp.106.003335

Kealy, D., Rice, M. S., Ogrodniczuk, J. S., & Spidel, A. (2018). Childhood trauma and somatic symptoms among psychiatric outpatients: Investigating the role of shame and guilt. *Psychiatry Research*, *268*, 169–174. https://doi.org/10.1016/j.psychres.2018.06.072

Kearney, C. A., Wechsler, A., Kaur, H., & Lemos-Miller, A. (2010). Posttraumatic stress disorder in maltreated youth: A review of contemporary research and thought. *Clinical Child and Family Psychology Review*, *13*(1), 46–76. https://doi.org/10.1007/s10567-009-0061-4

Komaki, G. (2014). Alexithymia and somatic symptoms. In K. B. Koh (Ed.), *Somatization and psychosomatic symptoms* (pp. 41–49). Springer. https://doi.org/10.1007/978-1-4614-7119-6_4

Köteles, F., & Witthöft, M. (2017). Somatosensory amplification—An old construct from a new perspective. *Journal of Psychosomatic Research*, *101*, 1–9. https://doi.org/10.1016/j.jpsychores.2017.07.011

Kulesa, A., Krzywinski, M., Blainey, P., & Altman, N. (2015). Points of significance: Sampling distributions and the bootstrap. *Nature Methods*, *12*(6), 477–478. https://doi.org/10.1038/nmeth.3414

Leadley, R. M., Armstrong, N., Lee, Y. C., Allen, A., & Kleijnen, J. (2012). Chronic diseases in the European Union: The prevalence and health cost implications of chronic pain. *Journal of Pain & Palliative Care Pharmacotherapy*, *26*(4), 310–325. https://doi.org/10.3109/15360288.2012.736933

Lee, H., Kim, Y., & Terry, J. (2020). Adverse childhood experiences (ACEs) on mental disorders in young adulthood: Latent classes and community violence exposure. *Preventive Medicine*, *134*, 106039. https://doi.org/10.1016/j.ypmed.2020.106039

Lin, H.-C., Yang, Y., Elliott, L., & Green, E. (2020). Individual differences in attachment anxiety shape the association between adverse childhood experiences and adult somatic symptoms. *Child Abuse & Neglect*, *101*, 104325. https://doi.org/10.1016/j.chiabu.2019.104325

Löffler, A., Foell, J., & Bekrater-Bodmann, R. (2018). Interoception and its interaction with self, other, and emotion processing: Implications for the understanding of psychosocial deficits in borderline personality disorder. *Current Psychiatry Reports*, *20*(4), 28. https://doi.org/10.1007/s11920-018-0890-2

Loman, M. M., & Gunnar, M. R. (2010). Early experience and the development of stress reactivity and regulation in children. *Neuroscience and Biobehavioral Reviews*, *34*(6), 867–876. https://doi.org/10.1016/j.neubiorev.2009.05.007

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*, *39*(1), 99–128. https://doi.org/10.1207/s15327906mbr3901_4

Marks, E. M., & Hunter, M. S. (2015). Medically Unexplained Symptoms: An acceptable term? *British Journal of Pain*, *9*(2), 109–114. https://doi.org/10.1177/2049463714535372

McFarlane, A. (2010). The long-term costs of traumatic stress: Intertwined physical and psychological consequences. *World Psychiatry*, *9*(1), 3–10. https://doi.org/10.1002/j.2051-5545.2010.tb00254.x

McLaughlin, K. A., Peverill, M., Gold, A. L., Alves, S., & Sheridan, M. A. (2015). Child maltreatment and neural systems underlying emotion regulation. *Journal of the American Academy of Child & Adolescent Psychiatry*, *54*(9), 753–762. https://doi.org/10.1016/j.jaac.2015.06.010

Meng, X., Fleury, M.-J., Xiang, Y.-T., Li, M., & D'Arcy, C. (2018). Resilience and protective factors among people with a history of child maltreatment: A systematic review. *Social Psychiatry and Psychiatric Epidemiology*, *53*(5), 453–447. https://doi.org/10.1007/s00127-018-1485-2

Meredith, P., Ownsworth, T., & Strong, J. (2008). A review of the evidence linking adult attachment theory and chronic pain: Presenting a conceptual model. *Clinical Psychology Review*, *28*(3), 407–429. https://doi.org/10.1016/j.cpr.2007.07.009

Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment related strategies. *Motivation and Emotion*, *27*(2), 77–102. https://doi.org/10.1023/A:1024515519160

Murphy, A., Steele, M., Dube, S. R., Bate, J., Bonuck, K., Meissner, P., Goldman, H., & Steele, H. (2014). Adverse Childhood Experiences (ACEs) Questionnaire and Adult Attachment Interview (AAI): Implications for parent child relationships. *Child Abuse & Neglect*, *38*(2), 224–233. https://doi.org/10.1016/j.chiabu.2013.09.004

Murphy, J., Brewer, R., Catmur, C., & Bird, G. (2017). Interoception and psychopathology: A developmental neuroscience perspective. *Developmental Cognitive Neuroscience*, *23*, 45–56. https://doi.org/10.1016/j.dcn.2016.12.006

Muthén, L. K., & Muthén, B. O. (1998–2018). *Mplus user's guide* (8th ed.).

Nakao, M., & Takeuchi, T. (2018). Alexithymia and somatosensory amplification link perceived psychosocial stress and somatic symptoms in outpatients with psychosomatic illness. *Journal of Clinical Medicine*, *7*(5), 112. https://doi.org/10.3390/jcm7050112

Nemeroff, C. B. (2016). Paradise lost: The neurobiological and clinical consequences of child abuse and neglect. *Neuron*, *89*(5), 892–909. https://doi.org/10.1016/j.neuron.2016.01.019

Otis, J. D., Keane, T. M., & Kerns, R. (2003). An examination of the relationship between chronic pain and post-traumatic stress disorder. *Journal of Rehabilitation Research and Development*, *40*(5), 397–405. https://doi.org/10.1682/JRRD.2003.09.0397

Rief, W., & Barsky, A. J. (2005). Psychobiological perspectives on somatoform disorders. *Psychoneuroendocrinology*, *30*(10), 996–1002. https://doi.org/10.1016/j.psyneuen.2005.03.018

Roelofs, K., & Spinhoven, P. (2007). Trauma and medically unexplained symptoms towards an integration of cognitive and neuro-biological accounts. *Clinical Psychology Review*, *27*(7), 798–820. https://doi.org/10.1016/j.cpr.2007.07.004

Ross, N., Gilbert, R., Torres, S., Dugas, K., Jefferies, P., McDonald, S., Savage, S., & Ungar, M. (2020). Adverse childhood experiences: Assessing the impact on physical and psychosocial health in adulthood and the mitigating role of resilience. *Child Abuse & Neglect: The International Journal*, *103*, 104440. https://doi.org/10.1016/j.chiabu.2020.104440

Rueness, J., Myhre, M. C., Strøm, I. F., Wentzel-Larsen, T., Dyb, G., & Thoresen, S. (2019). The mediating role of posttraumatic stress reactions in the relationship between child abuse and physical health complaints in adolescence and young adulthood. *European Journal of Psychotraumatology*, *10*(1), 1608719. https://doi.org/10.1080/20008198.2019.1608719

Sachs-Ericsson, N. J., Sheffler, J. L., Stanley, I. H., Piazza, J. R., & Preacher, K. J. (2017). When emotional pain becomes physical: Adverse childhood experiences, pain, and the role of mood and anxiety disorders. *Journal of Clinical Psychology*, *73*(10), 1403–1428. https://doi.org/10.1002/jclp.22444

Schaan, V. K., Schulz, A., Rubel, J. A., Bernstein, M., Domes, G., Schächinger, H., & Vögele, C. (2019). Childhood trauma affects stress-related interoceptive accuracy. *Frontiers in Psychiatry*, *10*, 750. https://doi.org/10.3389/fpsyt.2019.00750

Schalinski, I., Teicher, M. H., Nischk, D., Hinderer, E., Müller, O., & Rockstroh, B. (2016). Type and timing of adverse childhood experiences differentially affect severity of PTSD, dissociative and depressive symptoms in adult inpatients. *BMC Psychiatry*, *16*, 295. https://doi.org/10.1186/s12888-016-1004-5

Schmidt, A. J. M., Wolfs-Takens, D. J., Oosterlaan, J., & van den Hout, M. A. (1994). Psychological mechanisms in hypochandriasis: Attention-induced physical symptoms without sensory stimulation. *Psychotherapy and Psychosomatics*, *61*(1–2), 117–120. https://doi.org/10.1159/000288876

Schnurr, P. P., & Jankowski, M. K. (1999). Physical health and post-traumatic stress disorder: Review and synthesis. *Seminars in Clinical Neuropsychiatry*, *4*(4), 295–304.

Schore, A. N. (2003). *Affect dysregulation and disorders of the self*. Norton.

Schulz, A., & Vögele, C. (2015). Interoception and stress. *Frontiers in Psychology*, *6*, 993. https://doi.org/10.3389/fpsyg.2015.00993

Shevlin, M., Hyland, P., Roberts, N. P., Bisson, J. I., Brewin, C. R., & Cloitre, M. (2018). A psychometric assessment of Disturbances in Self-Organization symptom indicators for ICD-11 Complex PTSD using the International Trauma Questionnaire. *European Journal of Psychotraumatology*, *9*(1), 1419749. https://doi.org/10.1080/20008198.2017.1419749

Simeon, D., Yehuda, R., Cunill, R., Knutelska, M., Putnam, F. W., & Smith, L. M. (2007). Factors associated with resilience in healthy adults. *Psychoneuroendocrinology*, *32*(8–10), 1149–1152. https://doi.org/10.1016/j.psyneuen.2007.08.005

Sinclair, V. G., & Wallston, K. A. (2004). The development and psychometric evaluation of the Brief Resilient Coping Scale. *Assessment*, *11*(1), 94–101. https://doi.org/10.1177/1073191103258144

Smith, B., Shatté, A., Perlman, A., Siers, M., & Lynch, W. D. (2018). Improvements in resilience, stress, and somatic symptoms following online resilience training: A dose-response effect. *Journal of Occupational and Environmental Medicine*, *60*(1), 1–5. https://doi.org/10.1097/JOM.0000000000001142

Southwick, S. M., Bonanno, G. A., Masten, A. S., Panter-Brick, C., & Yehuda, R. (2014). Resilience definitions, theory, and challenges: Interdisciplinary perspectives. *European Journal of Psychotraumatology*, *5*(1), 25338. https://doi.org/10.3402/ejpt.v5.25338

Statistical Office of the Republic of Slovenia (SURS). (2018). SI-STAT Data Portal. SURS. https://pxweb.stat.si/SiStat/sl

Švab, A., Rener, T., & Kuhar, M. (2012). Behind and beyond Hajnal's line: Families and family life in Slovenia. *Journal of Comparative Family Studies*, *43*(3), 419–437. https://doi.org/10.3138/jcfs.43.3.419

van der Kolk, B., Pelcovitz, D., Roth, S., Mandel, F., McFarlane, A., & Herman, J. (1996). Dissociation, somatization, and affect dysregulation. *American Journal of Psychiatry*, *153*(7, Festschrift Supplement), 83–93. https://doi.org/10.1176/ajp.153.7.83

Wachen, J. S., Shipherd, J. C., Suvak, M., Vogt, D., King, L. A., & King, D. W. (2013). Posttraumatic stress symptomatology as a mediator of the relationship between warzone exposure and physical health symptoms in men and women. *Journal of Traumatic Stress*, *26*(3), 319–328. https://doi.org/10.1002/jts.21818

Wearden, A. J., Lamberton, N., Crook, N., & Walsh, V. (2005). Adult attachment, alexithymia, and symptom reporting. An extension to the four category model of attachment. *Journal of Psychosomatic Research*, *58*(3), 279–288. https://doi.org/10.1016/s0022-3999(02)00635-9 https://doi.org/10.1016/j.jpsychores.2004.09.010

World Health Organization. (2016). *Adverse Childhood Experiences International Questionnaire (ACE-IQ)*. http://www.who.int/violence_injury_prevention/violence/activities/adverse_childhood_experiences/en/

World Health Organization. (2018). *ICD-11: International classification of diseases 11th revision*. http://www.who.int/classifications/icd/revision/en

Yon, K., Habermann, S., Rosenthal, J., Walters, K. R., Nettleton, S., Warner, A., Lamahewa, K., & Buszewicz, M. (2017). Improving teaching about medically unexplained symptoms for newly qualified doctors in the U.K.: Findings from a questionnaire survey and expert workshop. *BMJ Open*, *7*(4), e014720. https://doi.org/10.1136/bmjopen-2016-014720

Zijlema, W. L., Stolk, R. P., Löwe, B., Rief, W., White, P. D., & Rosmalen, J. G. M. (2013). How to assess common somatic symptoms in large-scale studies: A systematic review of questionnaires. *Journal of Psychosomatic Research*, *74*(6), 459–468. https://doi.org/10.1016/j.jpsychores.2013.03.093

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