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The Body Keeps the Score: Childhood Adversity and Somatic Symptoms in Adulthood

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Abstract

Current study is an extension of HowNutsAreTheDutch national crowdsourcing study. In this study, childhood adversity was found to be positively associated to occurrence of somatic symptoms in adulthood. Current study found that sexual abuse was associated to general symptoms, cardiopulmonary symptoms and musculoskeletal symptoms, whereas emotional abuse was associated to gastrointestinal problems and general symptoms. Physical abuse, physical neglect and emotional neglect was not associated to experiencing somatic symptoms. Childhood adversity was measured with self-report retrospective questionnaire (CTQ-SF) and somatic symptoms were measured with both Patient Health Questionnaire (PHQ-15) and ecological momentary assessments of somatic discomfort rate over 1 month course. The current study used two different non-clinical sample in total for the EMA and PHQ-15. Possible implications for clinicians and policymakers as well as future directions were discussed.

Childhood adversity and trauma refers to a broad range of negative experiences that can potentially harm the children physically and mentally and bring detrimental consequences over the long and short term (Butchart et al., 2006). Childhood adversity is a globally present issue that can have tremendous impact in the long-term throughout the life (UNICEF, 2019). Prevalence of childhood trauma in the world was demonstrated by Benjet et al. (2005) in 29 types of traumatic events. According to the findings in a sample containing 24 countries with large number of participants, 7.9 % percent of the children experience being beaten up by their caregiver. According to World Mental Health (WMH) surveys, 1.6% of the participants experienced sexual abuse, 4.4% experienced neglect and 8% experienced physical abuse (Kessler et al., 2010).

In the Netherlands, one study estimated that 2.6%- 3.7% of the children experience maltreatment. From 2005 to 2017, there was an overall increase in the prevalence of childhood adversity. These adversities include sexual, physical and emotional abuse as well as emotional and

physical neglect. Emotional neglect steps forward with the frequency over 1000 people. Prevalence estimates are as follows respectively for sexual, physical, emotional abuse and the last two values for emotional and physical neglect: 0.08%, 0.29%, 0.38%, 0.97% and 1.87%. Study shows that sexual abuse has the lowest rate, which was in accord with the findings of Kessler et al. (2010). Whereas physical neglect has the highest rate with 1.87%. 46% of the reported families includes child maltreatment in the context of domestic violence. (van Berkel et al., 2020). These findings may suggest that it is a challenge to obtain the accurate number and measure childhood adversity precisely. Family Survey of Dutch population conducted in 2018 indicates that around 19% of the people experienced physical maltreatment between the frequency of sometimes and often. Around 17% report emotional maltreatment. In this study, it was also found that some of the abuses co-occur. Prevalence of cases reporting having more than 1 ACE is 25.8% (Bussemakers, et al., 2019). ACE is used to express all kinds of abuse occurred under the age of 18. Some of the major ones are defined as physical, sexual, emotional abuse, as well as psychological and physical neglect (UNICEF, 2019).

ACE score provides remarkable information about how severe a childhood trauma was by questioning which and whether it was more than 1 type of childhood trauma occurred before age of 18 years. ACE measures the cumulative exposure to adverse childhood experiences and each condition was counted as 1. A national study conducted in U.S shows that over 40% of the people experienced 1-3 ACEs, 12.7% experienced 4-6 ACEs and 2.6% experienced more than 7 ACEs (Gilbert et al., 2015). ACE includes abuse, neglect and household dysfunction. The current study will be focusing on the first two categories. Abuse and neglect contains sexual, physical, emotional abuse and physical and emotional neglect.

Childhood trauma may lead to significant problems in many areas of physical health throughout the life. According to UNICEF (2019), higher number of ACEs are associated to

neurological symptoms as well as to respiratory, gastrointestinal and cardiovascular problems. According to Gilbert et al. (2010), experiencing at least one ACE increases the odds of asthma than 0 ACE, and the odds gradually increase as the ACE score increases. Moreover, coronary heart disease is more likely to occur when the ACE score is higher than 7 compared to ACE score of 0. Interestingly, disability (health problem requiring certain equipment) has been the most predicted outcome among other diseases and especially having more than 3 ACE creates large differences in terms of the number of physical conditions comparing to 0 ACE (Gilbert et al., 2010).

There is an increasing evidence that experience of maltreatment in childhood is an important determinant of developing chronic diseases in adulthood (Sonu et al., 2019). Psychosomatic symptoms are characterized by pain, chronic illnesses and unexplained somatic symptoms that are caused by psychological disturbances and more specifically stress (Arai et al., 2011). Mock and Arai (2011), found that there was a significant relationship between childhood trauma and adult mental health; as well as between adult mental health and experiencing adult chronic illnesses. Thus, the study suggest that childhood abuse can lead to poor mental health; and poor mental health may predict poor adult physical health. Childhood trauma is linked with broad range of illnesses such as cardiovascular and autoimmune diseases (Harvard Health, 2021). An interview conducted with 60 women with somatization disorder demonstrated that 31 of them had been molested in their childhood. (Morrison, 1989). Maltreatment in childhood was also linked to endocrinological defeats such obesity and type II diabetes (Danese & Tan, 2014).

A study conducted in New Zealand showed that childhood physical abuse was significantly associated with more chronic pain and fatigue. (Romans et al., 2002). Another study found that for women, physical or sexual abuse was associated to feeling tired, experiencing trouble in sleeping, chest pain, constipation, nightmares, stomach pain, shortness of breath and stomach pain (McCauley et al., 1997). Goodwin and Stein (2004) found that childhood physical abuse increases

the risk of lung diseases, peptic ulcer and arthritic disorders. According to Goodwin et al. (2003), frequent physical abuse was associated to increased likelihood of stomach problems, migraine and ulcer. Another study found that frequent physical and psychological violence was associated to chronic conditions such as asthma, thyroid, diabetes, etc. (Greenfield & Marks, 2009). Further, childhood trauma was associated with increased risk of being hospitalized for autoimmune diseases (Dube et al., 2009). Overall, physical abuse can predict several poor physical health outcomes.

According to a meta-analytic review, sexual abuse was associated to higher musculoskeletal pain, obesity and gastrointestinal problems (Irish et al., 2010). Lampe et al. (2000) showed that sexual victimization before age of 15 is associated with later chronic pelvis pain. Childhood sexual abuse was significantly associated to increased risk of cardiac diseases; and childhood neglect was linked with increased risk of autoimmune diseases and diabetes. Romans et al. (2002) found that childhood sexual abuse was linked to chronic fatigue, headache/migraine, asthma, diabetes and cardiovascular diseases. Similarly, Talbot et al. (2009) found that sexual abuse in childhood predicts cumulative medical illness burden, worse physical function and higher bodily pain in patients over 50 years of age. Cumulative medical illness burden consists of cardiac, vascular, respiratory, gastrointestinal, etc. Afifi et al. (2016), showed that childhood sexual abuse was associated to back problems, high blood pressure, cancer, chronic fatigue in adulthood. Overall, sexual abuse may be increasing the risk of several medical conditions that can decrease the quality of life.

Kascakova et al. (2020), showed that emotional abuse, emotional neglect and physical neglect was associated with long-term pain in both clinical and non-clinical population. Further, emotional abuse was associated to increased odds of reporting asthma symptoms (Strathearn, 2020). Research suggests that childhood neglect may lead to untreated medical conditions and untreated obesity. Moreover, childhood abuse and neglect was associated to infections and

cardiorespiratory diseases (Leeb et al., 2011). Widom et al. (2012) found that childhood neglect was linked to increased risk of poorer lung functioning, diabetes and poorer vision and oral health. Research also suggest that emotional abuse may increase the risk of irritable bowel syndrome (IRB) (Sansone & Sansone, 2015).

There are pathways that are connecting childhood trauma to experiencing psychosomatic problems in adulthood. Kendall-Tackett (2002), posited four pathways of how childhood adversity can lead to poorer physical health outcomes, including (1) behavioral reasons such as substance abuse, smoking, and eating disorders; (2) social factors such as poor relationships and homelessness; (3) cognitive pathways like unhealthy thinking styles, attitude toward others and (4) emotional reasons such as internalized problems, depression and PTSD. These are considered to be health harming behaviors and actions to contribute to a low well-being.

As an example for the first pathway, survivors of childhood abuse are more likely to have more than 50 intercourse partners. This the case especially for adults who have experienced sexual abuse and neglect in childhood (UNICEF, 2019). Sexual behavior is associated to engaging in risky sexual activities which can result in having STDs and increase the chance of eight-fold of struggling with HIV.

As an example to the second pathway, sexual abuse was also found to be leading to less seek of social support which in turn increasing the negative health outcomes (Ericsson et al., 2009). (Ferguson et al., 1997; UNICEF, 2019). Likewise, children who experiences poor quality rearing are more likely to engage in health harming behavior (1). An example explained by Brown et al. (2010) for harmful habits is that ACE and lung cancer can be partially explained by regular smoking (1). Further, experiencing family traumas was associated with being a current smoker.

As an example to pathway 3 and 4, experiencing trouble in sleeping can also be a bridge between trauma and physical illnesses. Lack of sleep can lead to depression, chronic illnesses

(National Sleep Foundation, 2000). Further, Poon and Knight (2011) showed that emotional abuse and physical abuse; as well as parental neglect predicts sleep disturbances in adulthood via emotional distress and current relationship status with family and friends, which correspond to pathway 4 and 2 respectively. This was consistent with the findings of Mock and Arai (2011), who suggested that mental health is a significant predictor of physical health caused by childhood trauma. A study conducted in Netherlands showed that there was a direct relationship between childhood trauma and adult chronic physical disorders. In addition, there was an indirect association between childhood trauma and physical disorders via lifetime mood, anxiety and substance use disorders (Noteboom et al., 2021). Waldinger et al. (2006) found that insecure attachment mediates the relationship between childhood trauma and adult somatization. This mediating factor was more explicit comparing to other mediators mentioned below since experiencing violence or and abuse from a parent disrupts the relationship fundamentally. Further, they found that for women, fearful attachment fully mediates the link between two concepts.

Another subcategory of mediators explaining the relationship was described as biological stress systems. Kuzminskaite et al. (2020), found that there is a significant relationship between childhood trauma and high levels of cortisol, cumulative HPA axis markers (HPA dysregulation) and inflammation. The activation of stress system is considered to be normal and healthy across acute stress. However, when the stress system is over-stimulated for prolonged periods, cortisol starts to damage the tissues and creates a whole-body effect (Biodesign Wellness, 2019). Childhood abuse is also found be significantly predicting the adult inflammation, which in turn increases the risk for chronic diseases such as diabetes, metabolic syndrome, cancer, etc. (Baumeister et al., 2015; Zhong & Shi, 2019). Likewise, persistent low level of inflammation may also be predicting age-related diseases. (Hostinar et al., 2017). Childhood abuse can also impair immune functioning and influence having autoimmune diseases as an outcome (Ericsson et al., 2009).

HowNutsAreTheDutch (HoeGeklsNL) is a national crowdsourcing study that has been conducted on a large Dutch population. The main study was interested in investigating mental strengths and symptoms in multiple domains such as childhood trauma, psychotic symptoms, well-being, somatic symptoms, etc., as well as their interaction. Moreover, there was a diary study which is collecting information for 90 days about every domain with one question for each and it was a longitudinal addition to the rest of the cross-sectional study (van der Krieke et al., 2015).

HND is the first study for looking at the effect of childhood abuse on psychosomatic symptoms via measuring it with daily recordings of subjective somatic experiences, which was named as ecological momentary assessments. Research show that using ecological momentary assessments (EMA) has several benefits among currently used methods. EMA provides an accurate information about the symptoms, since, in theory, the measurement time is close to the time of experience. EMA enables to gather information over a certain period per individuals and provide more detailed measurements of what is being investigated. EMA reduces the dependence on retrospective memory and decrease the inaccurate measurement of the mood, affect, symptoms, etc. (Moskowitz & Young, 2006). EMA points out to the fact that mood, symptoms or behaviors can fluctuate and narrowing down these differences to one answer may not reflect the true experience, which traditional methods often fail to cover (Li et al., 2009).

My current study has 3 main research interests. I have investigated whether;

1. There is a relationship between experiencing childhood trauma and occurrence of psychosomatic symptoms in adulthood.

2. There is a relationship between childhood trauma and diary recordings (EMA) of somatic symptoms over 30 days.

3. There is a meaningful relationship between particular types of childhood adversity and particular clusters of psychosomatic symptoms.

Method

Participants

Total participants included 15004 people in total from Belgium, Netherlands and other countries. 0.9% of the participants includes people from Belgium, 98.4% people from Netherlands and 0.7% from other countries. 67.6% of the sample consisted of females and 32.4% consisted of males. The age at entry of the cross-sectional part ranged between 18 and 90 years (M= 43.83, SD= 14.76).

405 participants were included based on the first and third research question. Relationship between childhood adversity and psychosomatic symptoms in the cross-sectional study was investigated. Participants who completed both CTQ-SF (questionnaire that measures childhood trauma in short form) and PHQ (questionnaire that measures bodily symptoms) were the eligible group to be investigated. Moreover, PHQ has 4 different versions based on in which time period it assesses the somatic symptoms (past 24 h, 1 week, 2 weeks, 4 weeks or 3 months). To obtain interpretable results, we choose only one version of the questionnaire. The past 24 h version was decided due to the goal of ending up with larger data set for the purpose of increasing the soundness of the statistical analysis. In this subsample of 405 participants, 69.9% of the participants consisted of females and 30.1% consisted of males which is similar to the larger group in a sense that female participants predominate the sample; $t(15002)=.989$, $p<.01$. The age range of the included participants was between 18 and 78 years of age ($M= 50.88$, $SD= 12.79$), and 73.6% was younger than the age of 60. For the first research question, age differences was significant between the included participants ($M= 50.88$, $SD= 12.79$) and not-included participants ($M=43.63$, $SD=14.76$); $t(15002)=9.77$, $p<.01$.

For the second research question, there were 246 participants that were included for EMA studies for the purpose of exploring the relationship between childhood trauma and thrice-daily recordings of physical discomfort over the course of 1 month. 246 participants were concluded

based on certain interests. First, we needed participants who both completed CTQ and EMA. Furthermore, diary studies could be completed more than once and we used participants' first encounter to the diary study. Some of the participants started filling EMA and stops very quickly and then start filling again and then stops again. Therefore, we only used the most valid observation completion period within the first encounter to the diary. We also needed individuals who completed at least 68 assessments out of 90, to have a data of participants who had a good compliance to completing the study (van der Krieke et al., 2015). Lastly, we included up to only 90 measurements due to some months have 31 days and some people completed the diary more than once. Age for the included participants ranged from 19 to 73 years of age (M=41.63, SD= 13.49) and range from 18 to 90 years of age for excluded participants (M=43.77, SD= 14.76), demonstrating that two groups are not significantly different from each other $t(254.458)= -2.46$, $p>.01$. The female to male ratio was significantly different from the rest of the participants $t(257.794)=6.396$, $p<.01$. In this subsample of 246 participants, 82.9% of the participants were female and 17.1% were male.

People who completed both CTQ, PHQ and diary question consists of 24% of the total participants of interest. Age range was between 21 and 73 years, (M=45.55, SD= 13.94). %75.8 consisted of women and %24.2 consisted of men.

Measures

Childhood Adversity

Childhood adversity was assessed with the Childhood Trauma Questionnaire-Short Version. CTQ-SF is 24-item 5-point Likert scale (1=Never true, 5=Very often true) and a well validated measure (Bernstein et al., 1997; Bogaerts et al., 2011). In our current study, Cronbach alpha was established as .92. It is a self-reported questionnaire with 5 dimensions measuring different types (subscales) of childhood adversity. The factors are as follows: Physical abuse (5

items, α= .78), emotional abuse (5 items, α=.87), sexual abuse (4 items, α= .90), physical neglect (5 items, α= .54), emotional neglect (5 items, α=.91). Subscale scores are calculated according to the factor loadings of the items. (Bernstein et al. 2003).

Psychosomatic Symptoms

Psychosomatic symptoms were assessed with the Patient Health Questionnaire. The version of PHQ that was used in this study had 15 items with response range of 1-3 (0= Not at all,12= Bothered little, 2= Bothered a lot). In the present study, overall consistency was sufficiently high (15 items, α=.74). There are four subscales in the PHQ and they are categorized under the names of cardiopulmonary (3 items, α=.54), gastrointestinal (3 items, α=.74), musculoskeletal (2 items, α=.46) and general symptoms (7 items, α=.49). Cardiopulmonary symptoms include pounding of heart, shortness of breath and chest pain. Gastrointestinal symptoms include stomach pain, constipation, diarrhea, nausea and gas; musculoskeletal symptoms are back pain and pain in arms, legs and joints; general symptoms include menstrual cramps and other problems with the menstrual cycle, headaches, dizziness, problems with sexual intercourse, low energy, feeling tired, trouble sleeping and fainting spells. The subscales were calculated according to the work of Joustra et al. (2018).

EMA Study

In this study participants monitor their daily life on various aspects relating to mental health, three times a day for 30 days with a maximum of 90 assessments. Participants completed the digital diaries every 6 hours in a day. There are 43 items in total. In accord with our research object, the only item we are interested in is the somatic symptom item. The item is as follows “I experience physical discomfort.”, which goes under the somatic symptoms category. The response range is “not at all” to “very much” and the numerical range corresponds to 0 to 100.

Statistical Analysis

Before starting the analyses, 6 linear regression assumptions were checked for each DVs. We checked the level of measurement of the variables, normality, homoscedasticity, linearity, independence of observations and outliers. There were no gross violations in the assumptions, except the normality assumptions of the PHQ clusters. As this was an exploratory analysis, we disregarded this violation.

Independent Samples t-test was used for preliminary analysis. These include, investigating the mean differences in age between people who are included in the analysis and people who are not. T-test was conducted to see if there was a significant difference in female and male ratio between the included and not included participants. Separate independent samples t-test was also used to see if there is a potential selection bias in completing or not completing the PHQ and in completing or not completing the diary (EMA) among individuals who completed CTQ.

For all of the research questions, Pearson correlations were used to see the relationship between all the variables including potential confounders before conducting the regression analyses. Pearson correlation was also used to do to check the reliability of the diary data. This was done by looking at the correlation between CTQ and number of diaries completed (how many out of 90 measurements), as well as between PHQ and number of diaries completed.

For the first research question, we used linear (hierarchical) regression model with gender, age and education as covariates as per outcome of the correlations. For the second research question, linear regression (hierarchical) was applied with 3 covariates, namely gender, age and education level. For the third question, at first, one analysis was made including 5 childhood trauma subscales with 3 covariates; gender, age education predicting total PHQ score. Subsequently four separate analysis was made by putting each PHQ subscales as DVs one at a time. Here IVs are the ones that predicted PHQ scores significantly, namely emotional and sexual abuse. Both IVs were added together to these four analyses.

Level of significance is chosen as *alpha*=.01. The reason why we did not choose it as *alpha*=.05 is because the study has substantial number of variables and the chance of getting significant results increases as the number of variables increases. Therefore, from this particular standpoint, I wanted to be more conservative.

Results

Preliminary Findings

For the first and third research question, mean scores of age, CTQ,PHQ and all the subscales are calculated, see table 1. For the second research question CTQ, diary mean age mean and CTQ subscales were calculated, see table 2.

For the first research question, T-test analysis demonstrates that the mean score of CTQ is significantly different between people who did not complete the PHQ (*M*=40.20, *SD*=13.50) and people who completed the PHQ (M=37.86, SD=11.42); t(816.583)=-3.93, $p<.01$. For the second research question, the results suggest that there was no significant difference in mean score of CTQ between participants who completed the diary (M=39.06, SD=11.85) and did not complete the diary (*M*=39.71, *SD*=13.24); *t*(1593)=-.72 $p=.47$.

Research Question 1: Correlation table showed that age was weakly positively associated to CTQ and the PHQ scores were higher for women than men. On the other hand, education had no positive association with CTQ and PHQ. However, to be conservative, in addition to gender and age, I also wanted to include education as confounding variable. The correlation table showed that CTQ and PHQ is weakly positively associated to each other, see Table 3.

Research Question 2: Among other controlling variables, only age was weakly positively correlated to CTQ. Correlation between CTQ and EMA was positively weakly significant, see Table 4.

Research question 3: The correlation among CTQ subscales range from .26 to .72 (from weak to strong). Correlation between PHQ subscales were weaker overall than CTQ subscales and it ranged from .276 to .384 (from weak to moderate). Correlation between CTQ subscales and PHQ subscales were weak and ranged from .06 to .254. All of the correlations were positive, see table 3. Strength level of the correlations was based on the work of Akoğlu (2018).

Outcome Hypothesis Testing

Research question 1: CTQ positively predicted PHQ, see table 5. The whole model explained 10% of the variance (R^2=.10, F(4, 400)=11.10, p<.01). The change in explained variance from model 1 (where only covariates added) to model 2 (covariates and predictors together) was 4.5% and it was significant (R^2_{change}=.045, p= p<.01).

Research question 2: CTQ positively predicted EMA scores, the second model explained 8.2% of the variance in diary mean scores (R^2=.082, F(4,241)=5.384, p<.01), see table 6. The change in explained variance from model 1 to 2 is 4.2% and it is significant. (R^2_{change}= .042, p<.01).

Research question 3: Of five types of childhood abuse, emotional and sexual abuse are the ones that positively predicted PHQ scores. The explained variance in PHQ is 14.7% (R^2=.147, F(8,396)=8.52, p<.01, see table 7. The change in explained variance from model 1 to model 2 is 9.2% and it is significant (R^2_{change}= .092, p<.01). Unexpectedly, physical abuse, emotional neglect and physical neglect was not associated to PHQ total score (somatic sympotms), see table 7.

The following models include both sexual and emotional abuse as predictors and four different somatic symptom categories as outcomes in 4 separate analyses. The reason is that the other three abuse types did not predict PHQ total score, see table 7. In those models, sexual abuse positively predicted cardiopulmonary symptoms and the explained variance is 4.5% (R^2=.045, F(5,399)=3.73, p<.01, see table 8. The change in explained variance from model 1 to model 2 is 3.3% and it was significant (R^2_{change}= .033, p<.01).

Sexual abuse positively predicted musculoskeletal symptoms and the explained variance was 9.3% (R^2=.093, F(5,399)= 8.18, p<.01) see table 9. The change in explained variance from model 1 to model 2 is 3.3% and it was significant (R^2_{change}= .033, p<.01).

Emotional abuse, positively predicted gastrointestinal symptoms and the explained variance is 6.9% (R^2=.069, F(5,399)=5.88. p<.01. The change in explained variance from model 1 to model 2 is 3.2% and it was significant (R^2_{change}= .032, p<.01), see table 10.

Lastly, sexual abuse and emotional abuse both positively predicted the general symptoms and the explained variance is 14.5% (R^2=.145, F(5,399)=13.59, p<.01). The change in explained variance from model 1 to model 2 is 8% and it was significant (R^2_{change}= .080, p<.01), see table 11.

Additional Findings

It is interesting to note that correlation table suggests that as age of the participants increased, CTQ increased as well, which may imply that people who are older reported more abuse. The correlation was weakly positive, r(1593)=.18, p<.01, see table 3.

We have checked to have an idea about whether PHQ and diary item measured and targeted similar problems in participants. Indeed the correlation between PHQ and diary mean scores was strongly positive, *r*(119)=.623, p<.01.

To compare the results with the previous research, all of the following regression analyses were conducted with three covariates used for the main research questions as well, and emotional and sexual abuse added together as predictors. Emotional abuse was associated to trouble in sleeping, *b*= .03, t(399)=2.70, p<.01.

Sexual abuse is associated to tiredness, *b*= .054, t(399)=3.27, p<.01. Further, sexual abuse was significantly associated to cardiopulmonary symptoms for women, *b*= .070, t(278)=.31, p<.01, but not for men *b*= .041, t(117)=.86, p>.01. Mean score of sexual abuse was not different for females (*M*= 4.950, *SD*= 2.39) than for males (*M*= 4.54, *SD*= 1.83); *t*(296,286)=1.877, *p*>.01.

Further, there was no differences in mean score of cardiopulmonary symptoms between men (*M*=.45, *SD*=.94) and women (*M*=.47, *SD*=.86); *t*(403)=.813, *p*>.01. Lastly, sexual abuse is positively associated to experiencing trouble in sleeping, *b*= .046, t(399)=2.87, p<.01.Ay

There was no positive association between sexual abuse and experiencing pain in sexual intercourse, *b*= .003, *t*(399)=.418, *p*>.01; as well between sexual abuse and back pain, *b*= .03, *t*(399)= 2.13, *p*>.01

We conducted an analysis of all the subscales of CTQ as predictors and EMA as an outcome in one analysis. There were no positive association between physical abuse and EMA, *b*= -.38, *t*(237)=-.57, *p*>.01; sexual abuse and EMA, *b*=.57, *t*(237)= 1.10, *p*>.01; emotional abuse and EMA, , *b*=.62, *t*(237)=1.26, *p*>.01; emotional neglect and EMA, , *b*=.49, *t*(237)=1.38, *p*>.01; physical neglect and EMA, *b*= -.34, *t*(237)=-.57, *p*>.01.

Table 1. Descriptive for Research Question 1 and 3: Age, CTQ and PHQ Subscales (N=405)

Variable	M	SD
Age	50.88	12.79
CTQ Total	37.87	11.42
PHQ Total	4.07	3.41
Physical Abuse	5.63	1.80
Sexual Abuse	4.82	2.24
Emotional Abuse	8.57	3.87
Physical Neglect	6.72	2.15
Emotional Neglect	12.12	4.62

Table 1. (continued)

Musculoskeletal	1.02	.10
Gastrointestinal	.76	1.24
General	1.81	1.66

Table 2. Descriptive for Research Question 2: Age, CTQ, EMA and CTQ Subscales (N=246)

Variable	Mean	SD
Age	41.63	13.49
CTQ Total	39.06	11.86
EMA	24.81	18.86
Physical Abuse	5.87	2.17
Sexual Abuse	4.90	2.40
Emotional Abuse	9.17	4.08
Physical Neglect	6.85	2.34
Emotional Neglect	12.27	4.76

Table 3. Correlations between 6 predictors, 5 outcomes and three controlling variables (N=405)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender	-													
2. Age	-.24*	-												
3. Education	.02	.03	-											
4. CTQ Total	.02	.18*	-.07	-										
5. PHQ Total	.21*	.01	-.08	.23*	-									
6. Physical Abuse	-.11	.08	-.01	.60*	.07	-								
7. Sexual Abuse	.08	.05	.03	.54*	.26*	.26*	-							
8. Emotional Abuse	.12	.1	-.1	.88*	.27*	.46*	.34*	-						
9. Physical Neglect	-.07	.17*	-.11	.78*	.13*	.45*	.35*	.59*	-					
10. Emotional Neglect	-.02	.22*	-.05	.88*	.13	.36*	.29*	.72*	.61*	-				
11. Cardio	.01	.09	-.06	.14*	.63*	.06	.18*	.121	.09	.08	-			
12. Gastro	.19*	-.06	-.04	.124	.70*	.07	.09	.20*	.05	.05	.29*	-		
13. Musculo	.08	.20*	-.06	.14*	.63*	-.02	.19*	.15*	.06	.10	.28*	.28*	-	
14. General Symptoms	.24*	-.11	-.07	.22*	.82*	.07	.25*	.25*	.14*	.12	.38*	.36*	.34*	-

*. Correlation is significant at the 0.01 level (2-tailed)

Table 4. Correlations for 1 predictor, 1 outcome, and three controlling variables (N=246)

Predictor	1	2	3	4	5	6
1. Age	-					
2. Gender	-.28*	-				
3. Education	.001	.18*	-			
4. CTQ	.2*	.01	-.16	-		
5. EMA	-.08	.16	-.09	.21*	-	
6. Number of completed diaries	.05	-.03	-.09	.03	-.02	-

*. Correlation is significant at the 0.01 level (2-tailed).

Table 5. Regression Analysis for the Relationship Between CTQ and PHQ Total Scores

Predictor	b	t	p
Model 1			
Education	-.89	-1.76	.08
Age	.02	.127	.21
Gender	1.69	4.54	.000
Model 2			
Education	-.72	-1.47	.14
Age	.006	.43	.67
Gender	1.58	4.36	.000
CTQ	.07	4.46	.000

Table 6. Regression Analysis for the Relationship Between Childhood Abuse and EMA Scores with Education, Age and Gender as Controlling Variables

Predictor	b	t	p
Model 1			
Education	-6.58	-1.83	.07
Age	-.04	-.45	.66
Gender	8.62	2.58	.01

Table 6. (continued)

Model 2			
Education	-4.44	-1.24	.22
Age	-.11	-1.19	.24
Gender	7.45	2.27	.02
CTQ	.33	3.32	.001

Table 7. Regression Analysis for the Relationship Between All Types of Childhood Abuse and PHQ Total Scores with Education, Age and Gender as Controlling Variables

Predictor	b	t	p
Model 1			
Education	-.89	-1.76	.08
Age	.02	1.27	.21
Gender	1.69	4.54	.000
Model 2			
Education	-.74	-1.51	.13
Age	.01	.82	.41
Gender	1.2	3.23	.001
Physical Abuse	-.09	-.85	.39
Sexual abuse	.30	3.92	.000
Emotional abuse	.25	3.8	.000
Physical Neglect	-.0	-.37	.71
Emotional Neglect	-.08	-1.551	.122

Table 8. Regression Analysis for the Relationship Between Types of Childhood Abuse and Cardiopulmonary Symptoms with Education, Age and Gender as Controlling Variables

Predictor	b	t	p
Model 1			
Education	-.16	-1.20	.23
Age	.01	1.88	.06
Gender	.07	.70	.48
Model 2			

Table 8. (continued)

Education	-.16	-1.18	.24
Age	.005	1.52	.13
Gender	.06	.23	.82
Sexual abuse	.06	3.02	.003
Emotional abuse	.01	.97	.33

Table 9. Regression Analysis for the Relationship Between Types of Childhood Abuse and Musculoskeletal Symptoms with Education, Age and Gender as Controlling Variables

Predictor	b	t	p
Model 1			
Education	-.20	-1.38	.17
Age	.02	4.62	.000
Gender	.3	2.76	.006
Model 2		-	.33
Education	-.20	-1.36	
Age	.02	4.25	.000
Gender	.24	2.28	.02
Sexual abuse	.07	3.09	.002
Emotional abuse	.01	1.05	.30

Table 10. Hierarchical Regression Analysis for the Relationship Between Types of Childhood Abuse and Gastrointestinal Symptoms with Education, Age and Gender as Controlling Variables

Predictor	b	t	p
Model 1			
Education	-.143	-.771	.441
Age	-.001	-.249	.803
Gender	.499	3.644	.000
Model 2			
Education	-.077	-.417	.677
Age	-.004	-.77	.442
Gender	.419	3.068	.002

Table 10. (continued)

Sexual abuse	.008	.286	.775
Emotional abuse	.057	3.388	.001

Table 11. Regression Analysis for the Relationship Between Types of Childhood Abuse and General Symptoms with Education, Age and Gender as Controlling Variables

Predictor	b	t	p
Model 1			
Education	-.38	-1.57	.12
Age	-.006	-1.01	.32
Gender	.82	4.57	.000
Model 2			
Education	-.32	-1.38	1.70
Age	-.01	-1.80	.072
Gender	.66	3.79	.000
Sexual abuse	.14	3.84	.000
Emotional abuse	.07	3.20	.001

Discussion

Main Findings and Interpretations

The study findings suggest that there is a positive relationship between experiencing trauma in childhood and psychosomatic symptoms in adulthood, as well as a positive relationship between childhood trauma and somatic experiences recorded in diary format for 30 days-3 times a day. A retrospective, self-report questionnaire is used to measure childhood abuse. Somatic symptoms were measured in two ways: self-report questionnaire and EMA.

I also found that particular type of childhood trauma predicts particular type of psychosomatic symptom categories. Experiencing emotional abuse is found to be related to experiencing general symptoms, and gastrointestinal problems. Further, experiencing sexual abuse is related to musculoskeletal, cardiovascular and general symptoms. Physical abuse and physical

and emotional neglect was not associated to any kind of subcategories of psychosomatic symptoms. Lastly, we found significant association between childhood trauma and age, which suggest that older people reported more abuse than younger people. The study also found that women experiences higher scores of somatic symptoms. Although, it should be noted that majority of the participants were female, which was around 70%. Nevertheless, finding higher PHQ scores for women was supporting the existing evidence. Research suggest that women experience more intense and numerous bodily symptoms than men (Barsky, 2001).

Additional analyses showed that sexual abuse was positively associated to trouble in sleeping and tiredness; emotional abuse was positively associated to trouble in sleeping.

The positive relation between CTQ and age may have different reasons. One of them is that older people had longer years to receive counselling and treatment, which may have allowed them to accept and express it more freely. Research suggest that higher level of acceptance of adverse emotional experiences is associated to older ages, which may also impact the ease of reporting what was experienced (Shallcross et al., 2013). Further, based on the results, in the old times abuse prevalence could be higher. However, statistical results indicate that from 2005 to 2012, child abuse has been in a steady increase (van Berkel et al., 2020).

Finding positive association between childhood trauma and psychosomatic symptoms was in line with previous research (Mock & Arai, 2011). However, there are certain differences between the studies. Even though the study results were similar, Mock & Arai (2010), asked different questions for childhood trauma that partly overlaps with the current study such as alcohol problems and physical abuse by someone close. These differences may be arising from cultural differences in a way that according to the statistics in 2011, %15 of the Canadian population got divorced (Sinha, 2014). For the chronic conditions, they have asked 24 different illnesses in the past 6 months and the questions in our study may be the symptoms of these illnesses (arthritis, heart

disease, stroke, etc.). Comparing to our study, 6 months of information on chronic illnesses may have provided much more information about the health status of the individuals.

Sonu et al. (2019) investigated the relationship between number of ACEs and the increased risk of developing chronic illnesses. Even though ACE is a more general concept than what our study is measuring for childhood trauma, high number of ACEs can be compared to high scores of childhood trauma. As high number of ACEs imply experiencing more than one type of abuse, high numbers of CTQ may also imply either the certain type of abuse was experienced more severely or the number of abuse is more than 1. Interestingly, Sonu et al. (2019) found that the lowest rate of reported trauma belonged to the oldest group and similar in young and middle-aged adult group; which was the opposite of our study. However, the study included 86,968 respondents which is much larger than our data set and the number of abused children had been increasing between the year of 1998 and 2019 in U.S. (*Child Abuse in the U.S*, 2021).

Eventhough HND is the first study to look at the relationship between childhood trauma and diary recordings (EMA) of somatic experiences over 1 month, there are other studies that used EMA to measure mood, anxiety, pain and the social interaction level of an individual and other emotional states (Neff et al., 2021; Kirchner et al., 2017). Compared to our study, Romano et al. (2020), measured specific symptoms such as headaches, stomachache, heart pain, faintness which are the items of PHQ-15. Using questionnaire items as diary items may have represented more ideas in individual's mind than using only "I experience physical discomfort". By giving specific items individuals might have named their pain and answered the question more accurately. However, we do not have sufficient evidence about this statement. The study of Romano et al. (2020) could also see the frequency of the particular symptoms within and between individuals.

The rise in including EMA into studies suggests that certain concepts need multiple recordings to provide more information about the experiences of the individual. Variability is

expected when it comes to emotional and bodily experiences of an individual. As an additional analysis, finding strong correlation between PHQ-15 and EMA implies that EMA measures similar experiences with PHQ-15, which encourages the future research include EMA as an additional tool for measuring somatic symptoms.

The study found that childhood abuse positively predicted EMA scores. The result was expected as there was a strong correlation between PHQ-15 and EMA, which suggested that PHQ-15 and EMA of somatic symptoms were measuring the similar concept. On the other hand, we did not find significant association between childhood abuse subscales and EMA. I expected that similarly, sexual and emotional abuse would predict EMA mainly because the predictors were significantly related to PHQ-15 and additional findings showed that PHQ-15 and EMA had a strong correlation. One reason that may account for this difference is that the number of participants were lower for people who completed the diary and childhood abuse questionnaire (N=246) than for people who completed PHQ-15 and childhood abuse questionnaire (N=405). Therefore, the possibility of finding significant results may have decreased.

Finding associations between emotional abuse and general symptoms was in line with the previous research as earlier, emotional abuse was found to be associated to troubles in sleeping (Poon & Knight, 2011). However, Poon and Knight (2011) did the study on participants who are over 60 years old, which may have put the age as another factor that may have influence on sleep disturbances since age is associated to increased sleeping problems (Foley, 2020). On the other hand, in our study, everybody (age-wise) above 18 years of age could participate the study and majority of the participants were younger than the age of 60.

Association between emotional abuse and gastrointestinal problems was expected as there were previous evidences that emotional abuse may lead to experiencing irritable-bowel syndrome (IRB) (Bradford et al., 2012), and items that goes under gastrointestinal problems in PHQ were

considered as symptoms of IRB (Mayo Clinic, n.d.). However, it doesn't imply that experiencing PHQ symptoms is equal to having IRB. The main difference between our study and the study of Bradford et al. (2012) is that they used control group and a group with IBS and compared the differences in the scores of emotional abuse. We do not know if the participants in our study experience IBS or only the physical evidence of gastrointestinal problems. Thus, this makes our outcome slightly different from IBS study, as experience of gastrointestinal problems do not have to indicate the existence of IBS. However, it may imply that there is a close communication between emotional abuse and dysfunctional gastrointestinal activities.

As previous research suggested, the current study also found that sexual abuse is linked to experiencing cardiovascular symptoms as well experiencing tiredness, but not pain in sexual intercourse and back pain. Rich-Edward et al. (2012), found that childhood sexual abuse is linked to early onset of cardiovascular events for women when several covariates were added; namely, eating habits, smoking, alcohol consumption, depression, intimate partner violence, etc. The study explained most of the variance considering medical risk factors and adverse lifestyles, Similarly, Kendal-Tackett (2002), found that smoking, substance use, eating disorders and depression can contribute to poorer physical health. Given the low explained variance in our studies compared to unexplained variance, these studies may emphasize the importance of including mediating factors to find out the underpinnings of the mechanism between childhood trauma and somatic symptoms. Moreover, it is worth to note that most of the studies has found the meaningful relationship between sexual abuse and cardiovascular problems only for women. Interestingly, the same case applied for the current study as well. Sexual abuse predicted cardiopulmonary symptoms for women, but not for men. Even though we did not find any differences in the mean score of sexual abuse and cardiopulmonary symptoms between men and women, research suggest that women are less likely to be prescribed to medicine for hearth problems, and this late diagnosis may lead to prolonged

heart problems (Gaggin, & Oseran, 2020). Thus, that might be the reason for the existence of more significant findings about the women in relation to cardiopulmonary symptoms. In addition, women are more likely to experience sexual abuse than men, which may have contributed to meaningful relationship for between sexual abuse and cardiopulmonary problems for women (Meng & D'Arcy, 2016).

Results indicate that childhood sexual abuse is associated to experiencing sleep difficulties and the findings support the previous research. Noll et al. (2006) found that sexually abused individuals had higher scores on sleep disturbances that non-sexually abused individuals. The mechanism that explains this relationship could be the higher risk of developing PTSD and depression in people who had a history of sexual abuse in childhood (Schoedl et al., 2010). Further, substantial amount of research found that difficulties in sleeping is a common symptom in PTSD as well as in depression (Maher et al., 2006; Nutt et al., 2008), which suggest that PTSD and depression might be mechanisms that link childhood sexual abuse to poor sleep quality.

As the current study couldn't find an association between sexual abuse and back pain, Linton (1997), found that there was a clear link between sexual abuse and experiencing back pain. The population of the study was nonclinical as our study, however, unlike our study he measured whether there was a pain in the participants over the past 12 months. Our study on the other hand, only captured the symptoms experienced in last 24 hours, which suggest that Linton (1997), obtained more information about the somatic history of the participants than our study.

The current study did not find any association between sexual abuse and pain in sexual intercourse. Existing literature partly opposes with the current findings, partly because most of the existing studies looked at the relationship between childhood sexual abuse and chronic pelvis pain. However, our study does not obtain information about pelvic pain but a possible symptom of pelvic pain which does not always happen when a person experiences a pelvic pain (Mayo Clinic, n.d.).

For the case of Lampe et al. (2000), who found that significantly more patients who experience pelvic pain had suffered from sexual victimization before age of 15. However, it is unknown if these patients experience pain in sexual intercourse. Therefore, current study differs in the in a way that the previous study had a sample of individuals who experience pelvic pain. Therefore, the studies yielded different interpretations. In the study of Lampe et al. (2000), the results may be generalized to the population of chronic pelvic pain patients, whereas our results may be generalized to the people who experience pain in sexual intercourse.

Sexual abuse is positively associated to feeling more tired. However, measuring tiredness in the last 24 hours may not reflect the relationship between abuse and tiredness, mostly because an individual can feel tired because of many activities (such as feeling tired because of the daily activities). On the other hand, there may be clinical reasons why one may be feeling tired. Research findings suggest that depression plays a mediator role between sexual abuse and chronic fatigue (Weiss, et al. 1999).

Physical abuse was not positively associated to somatic symptoms as expected. Goodwin et al. (2003), found increased risk of gastrointestinal problems for individuals who experienced frequent physical abuse in childhood. One factor that might account for this difference is that they categorized abuse as “any” and “frequent”, which may have given clearer associations for people who were actually considered as abused and people who were not abused did not interfere with the results. Further Goodwin et al. (2003) had 2407 participants in their study, which may have increased like likelihood of obtaining significant results (Skelly, 2011). Moreover, the rate of physical abuse and gastrointestinal symptoms were low in the current study, which may have not allowed to find an association between physical abuse and gastrointestinal problems.

Contrary to the previous research, emotional neglect was not associated to experiencing somatic symptoms. Kascakova et al. (2020) found that emotional neglect is associated to long-

term pain. One possible explanation of this finding might be that the participants who experience some sort of pain also experience anxiety. This is particularly important because research suggest that anxiety can amplify the perception of pain vice versa (Woo, 2010). Further, less sources to manage stress can increase the feelings on pain (Sachs-Ericsson, et al., 2009). Therefore, anxiety could be the factor playing a role in pain perception.

Preliminary findings indicated that people who completed the PHQ had significantly higher scores of CTQ than people who did not complete the PHQ. This finding may suggest that there might have been a selection bias in choosing to complete or not to complete PHQ. As the study suggested that childhood abuse predicted experiencing somatic symptoms, some people may not have wanted to fill the PHQ because of their bodily disturbances.

Reflections on the Findings

The study findings suggest that childhood adversity may be one of the contributors to adult somatic symptoms. This relationship implies the longitudinal relationship between childhood mental states and adult bodily experiences. Emotions and cognitions that comes with the trauma can be stored in our bodies, and manifest themselves through bodily sensations and adverse symptoms. It implies that body keeps the score of the effects of the difficult emotions that was hard to make sense of in childhood. It is not as easy as in adulthood to express and regulate our emotions in young ages. Any emotional hardship (action) we experience from outer world; our physiology is there to respond (reaction).

Further, association between particular types of childhood abuse and particular somatic symptoms may imply that there are specific mechanisms for different types of abuse. However, the mechanisms that explain this difference is still lacking and the results may be arbitrary. Our findings were mostly significant but childhood trauma did not explain much given the explained variances; which may be implying that trauma has diverse impacts on different individuals. What

happens between traumatic experience and somatic symptoms in adulthood may be playing a crucial role in which ways the traumatic experiences have an impact in our later life. Kendal-Tackett (2002) explains the possible mediating factors between these concepts and the implications will be discussed in the next section.

Possible Implications for Clinicians and Policymakers

Beside the aim of contributing to the existing literature, the current study aimed to increase the awareness in clinical practices and policymakers. According to research, emotional abuse is just as harmful, and in the case of our study it may be more harmful than physical abuse to physical health (Dye, 2019). Oates (1996), states that as emotional abuse do not have immediate consequences such as physical injuries that comes right after physical abuse and criminal justice act that comes after sexual abuse, emotional abuse may be staying as a more hidden form of maltreatment, which may hinder the urgency of the interventions and children may be emotionally abused for years. Tomison & Tucci (1997), suggest that even parents can inflict emotional abuse on children without realizing it, which may make the adverse behaviors more challenging to detect.

While working on understanding the relationship between mind and body, more clinicians can get training on therapeutic techniques that focuses on bodily experiences. Dance and movement therapy is an example to body-based approach that can untangle the physical pain and ease the poor physical health. Dance and Movement psychotherapy aims to discover our body through therapeutic techniques and creative expression. It allows to monitor bodily experiences and pinpoint the areas that experiences pain and disturbances (Bernstein, 2019). Further, meaning that physical health has a communication with abuse experiences, physicians and clinicians can increase the communication. This is crucial especially when the individuals see a doctor for their somatic complaints yet there is not enough evidence that the cause is medical (medically unexplained illnesses).

Given the low values of explained variance in our results, our findings suggest that there is much more than the trauma itself that has an impact on the physical health. Trauma is an early life stressor and can have a long-term impact on our stress system, which leads to many types of adverse experiences. The quality of our social relationships, the way we interact with the outside world and the life styles we choose to deal with painful past memories such as using alcohol or engaging in risky sexual behaviors were only few examples (Monnat & Chandler, 2015). For clinicians, this may mean to focus on these factors to reduce the adverse effect of childhood trauma and aim to implement healthy thinking and behavioral styles as well as skills for socialization and coping with trauma.

Beside the factors that could contribute to poor physical health, there may be certain buffer effects to bounce back from traumatic experiences. Jaffee et al. (2017), found that women who have experienced childhood trauma had better physical and psychological health outcome if they are in a supportive and nurturing environment in adulthood, which is characterized by lack of violence and emotional support. If clinicians are informed by current research, they can plan and proceed their therapeutic intervention regarding these buffer effects and implement lifestyles that will prevent or reduce the risk of developing chronic health conditions. van der Kolk (2015), claims that in order to develop healthier thinking patterns and reduce the impact of trauma, we must have an interoceptive awareness. Interoceptive awareness refers to the ability to understand and respond the internal signals that we experience within ourselves (Price & Hooven, 2018). Further, more it has been shown with almost 30 years of experience, that Mindfulness-based Stress reduction has positive effects on physical health through increasing the awareness. This therapy technique has been shown to have a positive impact on immune system, blood pressure, cortisol level and other physical health issues (van der Kolk, 2015).

As trauma have numbers of adverse long-term consequences both on the individual and societal level (Hussai & Bhandari, 2011). According to Centers for Disease Control and Prevention economic resources of the family should be strengthen, quality education and care should be implemented in early life and parenting skills should be monitored and improved by doing home visits in childhood (Preventing Child Abuse and Neglect, 2021). Furthermore, WHO suggests certain actions to be taken to reduce and/or omit childhood abuse. These actions include home visitation, positive parenting to raise children with high social and emotional skills for both general parent population and high-risk families, providing trainings about physical head trauma, teaching children the signs of being abused in schools and training health-care professionals and non-governmental organization about fostering the awareness on the needs of children in high-risk groups (Hardcastle et al., 2015).

Strengths and Limitations

The present study has some additions to existing literature. HND is a study that measured several mental strengths and symptoms. By measuring CTQ and PHQ not only the researchers can look at the relationship between these two concepts, but also can investigate the interactions with other concepts that are in the scope of the HND project. Further, individuals can compare their scores with other people via internet platform. One of the most novel addition to current studies is that HND included diary recordings (EMA) where participants can monitor their experiences and variability of these experiences within and between days. The technology used in HND provides personalized feedback for each participant and allows to see the relationship between variables over time. HND is the first study to investigate the relationship between childhood trauma and somatic experiences recorded via EMA. The current study also investigated the relationship between five categories of childhood trauma and somatic symptom categories. There are not many

studies that included five types of adversity in one study. Thus, this allowed the study to have a rich content in terms of number of findings and diversity of the findings.

Our study is an extension of HowNutsAreTheDutch (HND) by having extracted the data of interest that is in accord with our research topic. By including a diary measurement (EMA) that has thrice-daily recordings allowed both the participants and researchers to have an insight about the longitudinal period of bodily sensations. This time-intensive design creates more accurate understanding of feelings and sensations over the course of 1 month. Rather than measuring bodily disturbances once, HND recorded repeated data to obtain a more reliable source. Considering the nature of what we are studying, measuring bodily sensations only once may not give the best results. Participants may experience difficulty in remembering how they were feeling over the past week or even more (Joustra et al. 2018). Thus, EMA gives more extensive results and provides an overall look for the individuals about to what extent the participants' sensations are variable within certain time period. Even though physical discomfort is measured with one question, the emphasis of the advantage is on the fact that the symptoms are repeatedly measured, and it allows the researchers to get a more representative data of real-life experiences. Furthermore, results indicated that the correlation between EMA and PHQ-15 was strong, which builds up to the evidence that EMA is a scientific method to measure the concept of interest.

Compared to other small studies, HND brings the advantages of having a large data set. Even though there were certain representativeness issues, the research has the sources to collect data that represents the Dutch population in the possible future studies. Further, as discussed above, including EMA studies provides more insight of a certain concept of interest and majority of the studies, except lab designs, use traditional questionnaire method which do not always reflect the accurate description of the individuals' situation.

Even though there are different research on the relationship between childhood abuse and EMA of psychosis (Reininghaus et al., 2016), HowNutsAreTheDutch is the first study to investigate the relationship between childhood trauma and thrice daily recordings of psychosomatic symptoms (EMA). Being the first one with a certain study design creates a new area of research and may encourage doing further studies with diary-assessments.

There are two main limitations in our current study, namely the representation bias and the lack of assessment of potential mediators between childhood abuse and psychosomatic symptoms in adulthood. Former one corresponds to the uneven distribution of the female to male ratio and the fact that most participants come from high education level. Female rates dominate the male rates remarkably where this is not the case in overall Dutch population. HND also found that the education level of participants deviates from the average population which decreases the credibility for the generalizability of the results (van der Krieke et al., 2016).

Latter one corresponds to the side effects of cross-sectional designs. We found an association between childhood abuse and occurrence of psychosomatic symptoms, yet we do not know the relevant life events that the participants experience between the period of abuse and psychosomatic symptoms. The explained variance was small compared to unexplained variance. The lack of the measurement of possible mediators and extraneous factors such as stress regulation or behavioral and emotional factors as well as measures like social support have left the model uncompleted. Further, psychosomatic symptoms may present themselves as chronic illnesses and disturbances. These symptoms may be easily due to various factors such as genetics or unhealthy lifestyles (that may cause pain in the body). Therefore, we cannot know if these symptoms were due to adversity in childhood or other experiences that came along during the different periods of life.

In order to study with larger sample, the current study decided to use the PHQ version that only measured the symptoms in the last 24 hours. However, this has been a remarkable compromise and measuring the symptoms that has only been experienced in the last 24 h increased the chance of missing the experienced somatic symptoms that has happened before the 24 hours. There might be participant who experienced somatic symptoms due to childhood adversity in some period of their life, but the study might not have captured it.

Some of the weaknesses compared to other studies may be that we did not include any mediators or moderators like Mock and Arai (2011) did in their studies by including mental health and SES; Waldinger et al. (2006) including fearful and insecure attachment and McCarthy-Jones & McCarthy-Jones (2014) including body mass index, anxiety and depression. They all found that these mediators significantly linked the childhood abuse adult physical symptoms, which suggest that including these mediating factors informs the research about the mechanisms that happens in the pathway through developing somatic symptoms.

The reliability of the physical neglect category under the childhood trauma questionnaire was the lowest among other subscales (α= .54). One reason could be that there isn't always a meaningful relationship between having drunk or high parents and not having enough to eat. Being drunk could be rooted in emotional issues and not having to eat could be due to financial difficulties.

Future Directions

The study findings indicated and contributed to the existing research that childhood trauma may be predicting somatic problems in adulthood, as well as certain types of abuse maybe predicting certain somatic experiences. However, it is left unexplained that it is likely that certain factors maybe mediating these concepts. Childhood abuse is complex adverse experience that may influence individuals on several levels; such as behavioral, emotional, cognitive, physical and

biological. Future research should carefully examine all these domains to get a more comprehensive understanding of the possible mechanisms that leads to individual have poorer health standards. Interactions between these domains and physical health should be examined to see to what extent these factors have an impact on physical health. The mechanism that explains the relationship between specific type of childhood abuse and specific somatic symptoms are still unknown. If these unique relationships are actually meaningful, investigating in the future may help clinicians to utilize more specific treatment methods.

The study has been a useful addition to studies that only used traditional questionnaires to measure somatic symptoms. One-time, retrospective assessment of somatic symptoms may not reflect the truth and in the case of our study, measuring the symptoms that has only occurred in the last 24 hour may not represent the overall physical health of an individual. Further, somatic symptoms may last for months and years, and sometimes may not express itself for a certain period or there can be a recall bias when using the questionnaires. Experiences like emotional and physical situations can fluctuate within certain periods. More studies should include EMA studies to gain a more accurate picture of internal and external experiences of the individuals.

In addition to asking for somatic symptoms within certain periods (1 month or last 24 hour in our study), existence or past experiences of chronic diseases and conditions should also be examined to understand the severity of the adverse physical outcomes. Further, it would be beneficial to ask the participants if they experienced any kind of injury or other medical conditions that would contribute to their physical discomfort. This is particularly important since somatic symptoms can result from many things other than experiencing childhood abuse. It is important to establish that somatic symptoms are not experienced due other daily life negative events but due to childhood abuse and possible mediating factors. Overall, controlling for outside factors will help to make more accurate associations between childhood abuse and somatic symptoms.

Current study found significant associations for two types of abuse (sexual and emotional) but not for any types of neglect (emotional and physical). This difference may have implications due to behavioral differences between these concepts. Where childhood abuse is characterized by certain action that is taken toward the child, such as molesting in sexual abuse, constant insulting in emotional abuse and beating in physical abuse; neglect is characterized by lack of actions that need to be taken in order to meet the essential needs of a child such as not providing enough nourishment, not engaging in enough social interaction, abandoning, etc. (Child Welfare, 2019). While all forms of childhood adversity should be equally taken into consideration when discussing the negative impacts, the differences in behavioral level may account for the differences in the results. Observable action in abuse behavior may be contributing the poorer physical health. If sexual abuse can lead to experiencing chronic pelvic pain, it is possible the area in the body has been damaged and abused can express it in adulthood as a specific symptoms. Since there is no scientific evidence about these mechanisms, further research should examine if there is a meaningful relationship between neglect and abuse in predicting certain physical health outcomes.

Conclusion

Current study supports the previous findings about the association between childhood adversity and somatic symptoms, as well as specific type of abuses predict certain somatic symptoms. Even though there are studies that investigated the possible mediating factors that may create this longitudinal relationship between childhood trauma and adult somatization, little is known about the mechanism of the relationship between subtypes of the trauma and subtypes of somatic symptom categories. Further investigation will inform the researchers but also clinicians and policymakers to take more accurate actions in their treatment and prevention/intervention plan respectively.

References

Afifi, T. O., MacMillan, H. L., Boyle, M., Taillieu, T., Cheung, K., & Sareen, J. (2014). Child abuse and mental disorders in Canada. *CMAJ: Canadian Medical Association Journal 186*(9), E324–E332. https://doi.org/10.1503/cmaj.131792

Afifi, T. O., MacMillan, H. L., Boyle, M., Cheung, K., Taillieu, T., Turner, S., & Sareen, J. (2016). Child abuse and physical health in adulthood. *Health Reports*, *27*(3), 10–18. https://pubmed.ncbi.nlm.nih.gov/26983007/

Akoğlu H. (2018). User's guide to correlation coefficients. *Turkish Journal of Emergency Medicine*, *18*(3), 91–93. https://doi.org/10.1016/j.tjem.2018.08.001

Arai, S., Mock, S., & Gallant, K. (2011). Childhood traumas, mental health and physical health in adulthood: testing physically active leisure as a buffer. *Leisure/Loisir*, *35*(4), 407-422. https://doi.org/10.1080/14927713.2011.648399

Barsky, A. J., Peekna, H. M., & Borus, J. F. (2001). Somatic symptom reporting in women and men. *Journal of General Internal Medicine*, *16*(4), 266–275. https://doi.org/10.1046/j.1525-1497.2001.00229.x

Baumeister, D., Akhtar, R., Ciufolini, S., Pariante, C. M., & Mondelli, V. (2016). Childhood trauma and adulthood inflammation: a meta-analysis of peripheral C-reactive protein, interleukin-6 and tumour necrosis factor-α. *Molecular Psychiatry*, *21*(5), 642–649. https://doi.org/10.1038/mp.2015.67

Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., Shahly, V., Stein, D. J., Petukhova, M., Hill, E., Alonso, J., Atwoli, L., Bunting, B., Bruffaerts, R., Caldas-de-Bernstein, D., Ahluvalia-Pogge, D., & Handelsman, L. (1997). Validity of the Childhood Trauma Questionnaire in an Adolescent Psychiatric Population. *Journal of*

the American Academy Of Child & Adolescent Psychiatry, *36*(3), 340-348. https://doi.org/10.1097/00004583-199703000-00012

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child abuse & neglect*, *27*(2), 169–190. https://doi.org/10.1016/s0145-2134(02)00541-0

Bernstein, B. 2019. "Empowerment-Focused Dance/Movement Therapy for Trauma Recovery". *American Journal of Dance Therapy* 41(2): 193-213. https://doi.org/10.1007/s10465-019-09310-w

Biodesign Wellness. (2019). *HPA Axis Dysfunction, Adrenal Fatigue, or Something Else?* https://biodesignwellness.com/hpa-axis-dysfunction-adrenal-fatigue-or-something-else/

Bogaerts, S., Daalder, A., Spreen, M., Van der Knaap, L., & Henrichs, J. (2011). Factor Structure of the Dutch Version of the Childhood Trauma Questionnaire-SF among Female Sex Workers in the Netherlands. *Journal of Forensic Psychology Practice, 11*(5), 432-442. https://doi.org/10.1080/15228932.2011.588926

Bradford, K., Shih, W., Videlock, E. J., Presson, A. P., Naliboff, B. D., Mayer, E. A., & Chang, L. (2012). Association between early adverse life events and irritable bowel syndrome. *Clinical gastroenterology and hepatology: the official clinical practice journal of the American Gastroenterological Association*, *10*(4), 385–90.e903. https://doi.org/10.1016/j.cgh.2011.12.018

Brown, D. W., Anda, R. F., Felitti, V. J., Edwards, V. J., Malarcher, A. M., Croft, J. B., & Giles, W. H. (2010). Adverse childhood experiences are associated with the risk of lung cancer: a prospective cohort study. *BMC Public Health*, *10*, 20. https://doi.org/10.1186/1471-2458-10-20

Bussemakers, C., Kraaykamp, G., & Tolsma, J. (2019). Co-occurrence of adverse childhood experiences and its association with family characteristics. A latent class analysis with Dutch population data. *Child abuse & neglect*, *98*, 104185. https://doi.org/10.1016/j.chiabu.2019.104185

Butchart, A., & Harvey, A. P. World Health Organization, International Society for the Prevention of Child Abuse and Neglect, & (2006). *Preventing Child Maltreatment*. World Health Organization.

Child abuse in the U.S. (2021, January). Statistica Research Department. https://www.statista.com/statistics/255206/number-of-child-deaths-per-day-due-to-child-abuse-and-neglect-in-the-us/

Child Sexual Abuse (No. 4). (2017, June). New Zealand Family Violence Clearinghouse. https://nzfvc.org.nz/sites/nzfvc.org.nz/files/DS4-Child-Sexual-Abuse-2017.pdf

Child Welfare. (2019). *Definitions of Child Abuse and Neglect*. https://www.childwelfare.gov/pubpdfs/define.pdf

Dube, S. R., Fairweather, D., Pearson, W. S., Felitti, V. J., Anda, R. F., & Croft, J. B. (2009). Cumulative childhood stress and autoimmune diseases in adults. *Psychosomatic Medicine*, *71*(2), 243–250. https://doi.org/10.1097/PSY.0b013e3181907888

Dye, H. (2019). Is Emotional Abuse As Harmful as Physical and/or Sexual Abuse?. *Journal of Child & Adolescent Trauma*, *13*(4), 399-407. https://doi.org/10.1007/s40653-019-00292-y

Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1997). Childhood sexual abuse, adolescent sexual behaviors and sexual revictimization. *Child Abuse & Neglect*, *21*(8), 789–803. https://doi.org/10.1016/s0145-2134(97)00039-2

Foley, L. (2020). *Insomnia & Seniors | Sleep Foundation*. https://www.sleepfoundation.org/insomnia/older-adults.

Gaggin, H., & Oseran, A. (2020). Gender differences in cardiovascular disease: Women are less likely to be prescribed certain heart medications. *Harvard Health*. https://www.health.harvard.edu/blog/gender-differences-in-cardiovascular-disease-women-are-less-likely-to-be-prescribed-certain-heart-medications-2020071620553.

Gilbert, L. K., Breiding, M. J., Merrick, M. T., Thompson, W. W., Ford, D. C., Dhingra, S. S., & Parks, S. E. (2015). Childhood adversity and adult chronic disease: an update from ten states and the District of Columbia, 2010. *American Journal of Preventive Medicine, 48*(3), 345–349. https://doi.org/10.1016/j.amepre.2014.09.006

Goodwin, R. D., Hoven, C. W., Murison, R., & Hotopf, M. (2003). Association between childhood physical abuse and gastrointestinal disorders and migraine in adulthood. *American Journal of Public Health, 93*(7), 1065–1067. https://doi.org/10.2105/ajph.93.7.1065

Goodwin, R. D., & Stein, M. B. (2004). Association between childhood trauma and physical disorders among adults in the United States. *Psychological Medicine*, 34(3), 509–520. https://doi.org/10.1017/s003329170300134x

Greenfield, E. A., & Marks, N. F. (2009). Profiles of physical and psychological violence in childhood as a risk factor for poorer adult health: evidence from the 1995-2005 National Survey of Midlife in the United States. *Journal of Aging and Health, 21*(7), 943–966. https://doi.org/10.1177/0898264309343905

Hardcastle, K. A., Bellis, M. A., Hughes, K., & Sethi, D. (2015). *Implementing child maltreatment prevention programmes: what the experts say*. World Health Organization. https://www.euro.who.int/__data/assets/pdf_file/0009/289602/Maltreatment_web.pdf

Hussai, F.N., Bhandari M. (2011) The Impact of Trauma on Society. In: Pape HC., Sanders R.,

Borelli, Jr. J. (Eds.), *The Poly-Traumatized Patient with Fractures* (1st ed., pp.1-4). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-17986-0_1

Irish, L., Kobayashi, I., & Delahanty, D. L. (2010). Long-term physical health consequences of childhood sexual abuse: a meta-analytic review. *Journal of Pediatric Psychology, 35*(5), 450–461. https://doi.org/10.1093/jpepsy/jsp118

Jaffee, S. R., Takizawa, R., & Arseneault, L. (2017). Buffering effects of safe, supportive, and nurturing relationships among women with childhood histories of maltreatment. *Psychological Medicine, 47*(15), 2628–2639. https://doi.org/10.1017/S0033291717001027

Joustra, M. L., Janssens, K., Schenk, H. M., & Rosmalen, J. (2018). The four week time frame for somatic symptom questionnaires reflects subjective symptom burden best. *Journal of Psychosomatic Research, 104*, 16–21. https://doi.org/10.1016/j.jpsychores.2017.11.006

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

Kendall-Tackett K. (2002). The health effects of childhood abuse: four pathways by which abuse can influence health. *Child abuse & neglect, 26*(6-7), 715–729. https://doi.org/10.1016/s0145-2134(02)00343-5

Kessler, R. C., McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., Aguilar-Gaxiola, S., Alhamzawi, A. O., Alonso, J., Angermeyer, M., Benjet, C., Bromet, E., Chatterji, S., de Girolamo, G., Demyttenaere, K., Fayyad, J., Florescu, S., Gal, G., Gureje, O., Haro, J. M., … Williams, D. R. (2010). Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *The British Journal of*

Psychiatry: The Journal of Mental Science, 197(5), 378–385. https://doi.org/10.1192/bjp.bp.110.080499

Kirchner, T., Magallón-Neri, E., Ortiz, M., Planellas, I., Forns, M., & Calderón, C. (2017). Adolescents' Daily Perception of Internalizing Emotional States by Means of Smartphone-based Ecological Momentary Assessment. *The Spanish Journal Of Psychology*, *20*. https://doi.org/10.1017/sjp.2017.70

Krieke, L. V., Jeronimus, B. F., Blaauw, F. J., Wanders, R. B., Emerencia, A. C., Schenk, H. M., Vos, S. D., Snippe, E., Wichers, M., Wigman, J. T., Bos, E. H., Wardenaar, K. J., & Jonge, P. D. (2016). HowNutsAreTheDutch (HoeGekIsNL): A crowdsourcing study of mental symptoms and strengths. *International Journal of Methods in Psychiatric research*, *25*(2), 123–144. https://doi.org/10.1002/mpr.1495

Kuzminskaite, E., Vinkers, C., Elzinga, B., Wardenaar, K., Giltay, E., & Penninx, B. (2020). Childhood trauma and dysregulation of multiple biological stress systems in adulthood: Results from the Netherlands Study of Depression and Anxiety (NESDA). *Psychoneuroendocrinology*, *121*, 104835. https://doi.org/10.1016/j.psyneuen.2020.104835

Lampe, A., Sölder, E., Ennemoser, A., Schubert, C., Rumpold, G., & Söllner, W. (2000). Chronic pelvic pain and previous sexual abuse. *Obstetrics and Gynecology*, *96*(6), 929–933. https://doi.org/10.1016/s0029-7844(00)01072-3

Li, H., Mukherjee, D., Krishnamurthy, V., Millett, C., Ryan, K., & Zhang, L. et al. (2019). Use of ecological momentary assessment to detect variability in mood, sleep and stress in bipolar disorder. *BMC Research Notes*, *12*(1). https://doi.org/10.1186/s13104-019-4834-7

Linton, S. (1997). A population-based study of the relationship between sexual abuse and back

pain: establishing a link. *Pain*, *73*(1), 47-53. https://doi.org/10.1016/s0304-3959(97)00071-7

Maher, M. J., Rego, S. A., & Asnis, G. M. (2006). Sleep disturbances in patients with post-traumatic stress disorder: epidemiology, impact and approaches to management. *CNS Drugs*, *20*(7), 567–590. https://doi.org/10.2165/00023210-200620070-00003

Martínez-Mesa, J., González-Chica, D. A., Duquia, R. P., Bonamigo, R. R., & Bastos, J. L. (2016). Sampling: how to select participants in my research study?. *Anais brasileiros de dermatologia*, *91*(3), 326–330. https://doi.org/10.1590/abd1806-4841.20165254

Mayo Clinic (n.d.). *Chronic pelvic pain in women.* https://www.mayoclinic.org/diseases-conditions/chronic-pelvic-pain/symptoms-causes/syc-20354368

McCauley, J. (1997). Clinical characteristics of women with a history of childhood abuse: unhealed wounds. *JAMA: The Journal Of The American Medical Association*, *277*(17), 1362-1368. https://doi.org/10.1001/jama.277.17.1362

Meng, X., & D'Arcy, C. (2016). Gender moderates the relationship between childhood abuse and internalizing and substance use disorders later in life: a cross-sectional analysis. *BMC Psychiatry*, *16*(1), 401. https://doi.org/10.1186/s12888-016-1071-7

Morrison J. (1989). Childhood sexual histories of women with somatization disorder. *The American Journal of Psychiatry*, *146*(2), 239–241. https://doi.org/10.1176/ajp.146.2.239

Moskowitz, D. S., & Young, S. N. (2006). Ecological momentary assessment: what it is and why it is a method of the future in clinical psychopharmacology. *Journal of Psychiatry & Neuroscience:* JPN, 31(1), 13–20.

Mock, S. E., & Arai, S. M. (2011). Childhood trauma and chronic illness in adulthood: mental health and socioeconomic status as explanatory factors and buffers. *Frontiers in Psychology*, *1*, 246. https://doi.org/10.3389/fpsyg.2010.00246

Monnat, S. M., & Chandler, R. F. (2015). Long Term Physical Health Consequences of Adverse Childhood Experiences. *The Sociological Quarterly*, *56*(4), 723–752. https://doi.org/10.1111/tsq.12107

Neff, A., Lee, Y., Metts, C., & Wong, A. (2021). Ecological Momentary Assessment of Social Interactions: Associations With Depression, Anxiety, Pain, and Fatigue in Individuals With Mild Stroke. *Archives Of Physical Medicine And Rehabilitation*, *102*(3), 395-405. https://doi.org/10.1016/j.apmr.2020.08.007

Noteboom, A., Have, M. T., de Graaf, R., Beekman, A., Penninx, B., & Lamers, F. (2021). The long-lasting impact of childhood trauma on adult chronic physical disorders. *Journal of Psychiatric Research*, 136, 87–94. https://doi.org/10.1016/j.jpsychires.2021.01.031

Nutt, D., Wilson, S., & Paterson, L. (2008). Sleep disorders as core symptoms of depression. *Dialogues in Clinical Neuroscience*, *10*(3), 329–336. https://doi.org/10.31887/DCNS.2008.10.3/dnutt

Harvard Health. (2021, February 12). *Past trauma may haunt your future health*. https://www.health.harvard.edu/diseases-and-conditions/past-trauma-may-haunt-your-future-health

Poon, C. Y., & Knight, B. G. (2011). Impact of childhood parental abuse and neglect on sleep problems in old age. *The journals of gerontology. Series B, Psychological sciences and social sciences*, *66*(3), 307–310. https://doi.org/10.1093/geronb/gbr003

Preventing Child Abuse and Neglect. (2021). Centers for Disease Control and Prevention. https://www.cdc.gov/violenceprevention/childabuseandneglect/prevention.html

Price, C. J., & Hooven, C. (2018). Interoceptive Awareness Skills for Emotion Regulation: Theory and Approach of Mindful Awareness in Body-Oriented Therapy (MABT). *Frontiers in psychology*, *9*, 798. https://doi.org/10.3389/fpsyg.2018.00798

Romans, S., Belaise, C., Martin, J., Morris, E., & Raffi, A. (2002). Childhood Abuse and Later Medical Disorders in Women. Psychotherapy and Psychosomatics, 71(3), 141-150. doi: 10.1159/000056281

Sachs-Ericsson, N., Cromer, K., Hernandez, A., & Kendall-Tackett, K. (2009). A review of childhood abuse, health, and pain-related problems: the role of psychiatric disorders and current life stress. Journal of trauma & dissociation: the official journal of the International Society for the Study of Dissociation (ISSD), 10(2), 170–188. https://doi.org/10.1080/15299730802624585

Sansone, R. A., & Sansone, L. A. (2015). IRRITABLE BOWEL SYNDROME: Relationships with Abuse in Childhood. *Innovations in clinical neuroscience*, *12*(5-6), 34–37.

Schoedl, A. F., Costa, M. C., Mari, J. J., Mello, M. F., Tyrka, A. R., Carpenter, L. L., & Price, L. H. (2010). The clinical correlates of reported childhood sexual abuse: an association between age at trauma onset and severity of depression and PTSD in adults. *Journal of Child Sexual Abuse*, *19*(2), 156–170. https://doi.org/10.1080/10538711003615038

Scurich, N. (2020). Introduction to this special issue: Underreporting of sexual abuse. *Behavioral Sciences & The Law*, *38*(6), 537-542. https://doi.org/10.1002/bsl.2491

Shallcross, A. J., Ford, B. Q., Floerke, V. A., & Mauss, I. B. (2013). Getting better with age: the relationship between age, acceptance, and negative affect. *Journal of Personality and Social Psychology*, *104*(4), 734–749. https://doi.org/10.1037/a0031180

Sinha, M. (2014). *Parenting and Child Support After Separation or Divorce* (No. 001). Statistics Canada. https://www150.statcan.gc.ca/n1/en/pub/89-652-x/89-652-x2014001-eng.pdf?st=GzJcPpp3

Skelly A. C. (2011). Probability, proof, and clinical significance. *Evidence-based Spine-care Journal*, *2*(4), 9–11. https://doi.org/10.1055/s-0031-1274751

Sonu, S., Post, S., & Feinglass, J. (2019). Adverse childhood experiences and the onset of chronic disease in young adulthood. *Preventive Medicine*, *123*, 163–170. https://doi.org/10.1016/j.ypmed.2019.03.032

Strathearn, L., Giannotti, M., Mills, R., Kisely, S., Najman, J., & Abajobir, A. (2020). Long-term Cognitive, Psychological, and Health Outcomes Associated With Child Abuse and Neglect. *Pediatrics*, *146*(4), e20200438. https://doi.org/10.1542/peds.2020-0438

Rich-Edwards, J. W., Mason, S., Rexrode, K., Spiegelman, D., Hibert, E., Kawachi, I., Jun, H. J., & Wright, R. J. (2012). Physical and sexual abuse in childhood as predictors of early-onset cardiovascular events in women. *Circulation*, *126*(8), 920–927. https://doi.org/10.1161/CIRCULATIONAHA.111.076877

Reininghaus, U., Gayer-Anderson, C., Valmaggia, L., Kempton, M. J., Calem, M., Onyejiaka, A., Hubbard, K., Dazzan, P., Beards, S., Fisher, H. L., Mills, J. G., McGuire, P., Craig, T. K., Garety, P., van Os, J., Murray, R. M., Wykes, T., Myin-Germeys, I., & Morgan, C. (2016). Psychological processes underlying the association between childhood trauma and psychosis in daily life: an experience sampling study. *Psychological Medicine*, *46*(13), 2799–2813. https://doi.org/10.1017/S003329171600146X

Talbot, N. L., Chapman, B., Conwell, Y., McCollumn, K., Franus, N., Cotescu, S., & Duberstein, P. R. (2009). Childhood sexual abuse is associated with physical illness burden and functioning in psychiatric patients 50 years of age and older. *Psychosomatic Medicine*, *71*(4), 417–422. https://doi.org/10.1097/PSY.0b013e318199d31b

UNICEF. (2019). *Adverse Childhood Experiences (ACE) Study*. UNICEF in Serbia. https://www.unicef.org/serbia/sites/unicef.org.serbia/files/2019-05/Adverse_Childhood%20Experiences_study.pdf

van Berkel, S. R., Prevoo, M., Linting, M., Pannebakker, F. D., & Alink, L. (2020). Prevalence

of child maltreatment in the Netherlands: An update and cross-time comparison. *Child Abuse & Neglect, 103*, 104439. https://doi.org/10.1016/j.chiabu.2020.104439

van der Kolk, B. A. (2015). *The Body Keeps the Sore: Brain, Mind, and Body in the Healing of Trauma* (2nd ed., Vol. 2). Penguin Publishing Group.

Waldinger, R. J., Schulz, M. S., Barsky, A. J., & Ahern, D. K. (2006). Mapping the road from childhood trauma to adult somatization: the role of attachment. *Psychosomatic medicine*, *68*(1), 129–135. https://doi.org/10.1097/01.psy.0000195834.37094.a4

Weiss, E. L., Longhurst, J. G., & Mazure, C. M. (1999). Childhood sexual abuse as a risk factor for depression in women: psychosocial and neurobiological correlates. *The American Journal of Psychiatry*, *156*(6), 816–828. https://doi.org/10.1176/ajp.156.6.816

Widom, C. S., Czaja, S. J., Bentley, T., & Johnson, M. S. (2012). A prospective investigation of physical health outcomes in abused and neglected children: new findings from a 30-year follow-up. *American Journal of Public Health*, *102*(6), 1135–1144. https://doi.org/10.2105/AJPH.2011.300636

Woo A. K. (2010). Depression and Anxiety in Pain. *Reviews in Pain*, *4*(1), 8–12. https://doi.org/10.1177/204946371000400103

Zhong, J., & Shi, G. (2019). Editorial: Regulation of Inflammation in Chronic Disease. *Frontiers in Immunology*, *10*, 737. https://doi.org/10.3389/fimmu.2019.00737