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Differential effects of childhood trauma subtypes on fatigue and physical functioning in chronic fatigue syndrome

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Abstract

Objective: There is wide consensus that childhood trauma plays an important role in the aetiology of chronic fatigue syndrome (CFS). The current study examines the differential effects of childhood trauma subtypes on fatigue and physical functioning in individuals suffering from CFS.

Methods: Participants were 155 well-documented adult, predominantly female CFS patients receiving treatment at the outpatient treatment centre for CFS of the Antwerp University Hospital in Belgium. Stepwise regression analyses were conducted with outcomes of the total score of the Checklist Individual Strength (CIS) measuring fatigue and the scores on the physical functioning subscale of the Medical Outcomes Short Form 36 Health Status Survey (SF-36) as the dependent variables, and the scores on the five subscales of the Traumatic Experiences Checklist (TEC) as the independent variables.

Results: The patients' fatigue ($\beta = 1.38$; $p = 0.025$) and physical functioning scores ($\beta = -1.79$; $p = 0.034$) were significantly predicted by childhood sexual harassment. There were no significant effects of emotional neglect, emotional abuse, bodily threat, or sexual abuse during childhood.

Conclusion: Of the childhood trauma subtypes investigated, sexual harassment emerged as the most important predictor of fatigue and poor physical functioning in the CFS patients assessed. These findings have to be taken into account in further clinical research and in the assessment and treatment of individuals coping with chronic fatigue syndrome.

Keywords: chronic fatigue syndrome, childhood trauma, functional disorder, sexual abuse, somatoform disorder

1. Introduction

Chronic fatigue syndrome (CFS) is part of a broad category of “functional somatic syndromes”. Patients suffering from this highly debilitating condition present with medically unexplained and long-lasting fatigue as well as a variety of other symptoms [1]. There is a growing body of research suggesting an important aetiological role of childhood trauma, which has been found to be associated with an approximate fourfold risk of developing the disorder, even when accounting for comorbid psychiatric disorders. [2-11]

Researchers repeatedly found significant associations between childhood stress and symptoms of fatigue among otherwise healthy adults and among breast-cancer survivors [6,12-15]. Van Houdenhove et al. [10] already observed that victimized CFS and/or fibromyalgia patients show higher levels of fatigue than non-victimized peers, notably in the absence of a significant association with reduced physical activity. However, given their dichotomous approach of victimization, these results should be interpreted with caution. The authors, moreover, did not report which type of childhood trauma was the most predictive. In the study by Kempke et al. [16], it was emotional abuse only that significantly predicted fatigue (and pain) levels in their CFS sample. Although their findings are partially in line with an earlier study [7], Heim et al. also assigned a significant role to sexual abuse in CFS symptomatology. Reduced physical functioning is another important behavioural symptom in CFS [1]. Numerous studies in various populations found childhood abuse and the cumulative amount of abuse to be related to higher levels of functional impairment and poorer perceived physical well-being or health later in life relative to the scores obtained in participants without such exposure histories [3,17-22]. Interestingly, in participants with serious mental illness childhood sexual abuse predicted reduced physical health more strongly than childhood physical abuse [21].

Systematic data on the impact of different subtypes of childhood trauma is scarce, while several authors have proposed that each form of child maltreatment may affect later-life psychosocial and cognitive functioning and overall mental health uniquely above and beyond the effects they may have in common. [23-24] Thus, in the present study, we examine the differential impact of subtypes of self-reported early childhood trauma on fatigue and physical functioning levels in a well-described population of CFS patients.

2. Material and methods

1.1 Patients

A total of 558 adult patients receiving treatment at the outpatient clinic at the outpatient clinic for CFS of the Antwerp University Hospital in Belgium were invited by letter to take part in our and a genetic study [25]. All patients had been diagnosed with CFS by an experienced internist according to the Centre for Disease Control criteria [1] using serial physical examinations and laboratory measurements. [For the diagnosis of fibromyalgia an internist used the American College of Rheumatology criteria \(ACR\) \(1990\) \[26\].](#) ~~No alternative medical diagnosis could be established.~~ Additionally, all patients were interviewed by a psychiatrist or a psychiatry trainee (under supervision) in accordance with the Dutch version of the Structured Clinical Interview for DSM-IV Axis I Disorders, version 2.0 [276]. The psychiatric exclusion criteria for CFS as formulated by the US Centers for Disease Control and Prevention were adopted [1].

The study was carried out in accordance with the latest version of the Helsinki Declaration. Participants were all over 18 years of age at the time of diagnosis and inclusion and they all gave their written informed consent.

1.2 Dependent variables

1.2.1 Checklist Individual Strength (CIS) [287]

The validated and reliable (Cronbach's alpha .90) 20-item Checklist Individual Strength (CIS) was administered to measure several aspects of fatigue. Each item is scored on a 7-point Likert scale. Four subscales are distinguished: the respondent's perceived fatigue, concentration, motivation, and physical activity in the previous two weeks. In our study we will examine the CIS total score as dependent variable.

1.2.2 Medical Outcomes Short Form 36 Health Status Survey (SF-36) [298]

The SF-36 is a generic measure of functional health and perceived well-being that consists of 36 items evaluating subjective health or various aspects of health-related quality of life, more specifically physical, mental, and social functioning. The questionnaire includes the following scales: physical functioning, social functioning, role limitations due to physical or emotional problems, mental health, vitality, pain, and general health perception. They are scored from 0–100 (transformed scale = ((actual raw score - lowest possible raw score)/possible raw score range) x 100), with higher scores indicating better health. In our study, we used the 10-item physical functioning subscale (10 items) that measures mobility and the ability to perform physically demanding tasks (i.e., walking a mile, walking a block, bending or stooping, and bathing). The measure has demonstrated strong internal consistency ($\alpha \approx 0.80$) [3029].

1.3 Independent variables

1.3.1 Traumatic Experiences Checklist (TEC) [319]

During one of the test sessions the patients were asked to fill in the original Dutch version of the Traumatic Experiences Questionnaire (TEC) [319]. The TEC is a 30-item self-report questionnaire inquiring about 29 types of potential trauma, including criterion-A events of PTSD [324], as well as other potentially overwhelming events. In this study, five domains of early traumatic experiences were assessed: emotional neglect (e.g. being left alone, insufficient affection), emotional abuse (e.g. being belittled, teased, called names, threatened verbally, or unjustly punished), physical abuse (e.g. being hit, tortured, or wounded), sexual harassment (i.e. being submitted to sexual acts without physical contact), and sexual abuse (i.e. having undergone sexual acts involving physical contact). Each item consists of a short description of the event of concern, with all items being preceded by the question: “Did this happen to you?”

The TEC format allows the presence and severity of childhood trauma to be assessed using four variables: 1. Presence of the event(s); 2. Duration of the event(s) (in terms of less or more than one year); 3. Relationship to the perpetrator (parent or sibling versus other person(s)); and 4. Subjective response (in terms of feeling slightly versus moderately, severely, or extremely traumatized by the event(s)). The variables are given a score of 1 if they apply, and a score of 0 if they do not. They are scored per age period in which the event(s) occurred (0-6, 7-12, and 13-18 years). Summated, the trauma severity scores range from 0 to 12 for four subscales: emotional neglect, emotional abuse, sexual harassment (acts of a sexual nature not involving physical contact), and sexual abuse (unwanted sexual acts involving physical contact). The sum score of the fifth subscale, bodily threat, ranges from 0-21 (0-12: physical abuse; 13-21: additional scores concerning threat of life, pain, and bizarre punishment).

The psychometric characteristics of the TEC have been examined in a population of Dutch psychiatric outpatients. Its internal consistency and test-retest reliability were good, and its scores strongly correlated with the scores on the Stressful Life Experiences Questionnaire. [319] The TEC has also been administered to nonclinical samples, where it proved sufficiently sensitive to capture low levels of childhood maltreatment [332].

1.4 Statistical analyses

Statistical analyses were performed using SPSS, version 21 (IBM, New York). First, we determined the prevalence of demographic, clinical, and childhood trauma characteristics of the study group, as well as the descriptive statistics of the fatigue and physical functioning measures. Secondly, stepwise regression analyses were conducted to examine the predictive value of the reported traumatic experiences on fatigue and physical functioning, with the scores of the total fatigue scale (CIS total) and the physical functioning scale (SF-36 physical

functioning) as the dependent variables and the scores on the five TEC subscales as the independent variables. Because the objective of our study was to determine by which specific type of childhood trauma effects were mediated, we did not incorporate the TEC Total Score in the analysis because this summated score is not independent from the subscale scores. A p-value of <0.05 was adopted as the level of significance.

3. Results

3.1 Study group characteristics

Of the 558 patients we approached, 168 responded to the invitation and attended the test sessions (response rate: 30.1%). Thirteen patients did not fully complete the CIS, the SF-36, and/or the TEC and were therefore excluded from the study, resulting in 155 participants in total. The characteristics of the study group are presented in Table 1. Neither age nor gender correlated with the predictor and outcome variables. Patients were predominantly women (92.3%, n=143), and the mean age for the full study group was 42.13 years (SD = 8.29). Besides CFS, 34.2% of the participants were also suffering from fibromyalgia and 48.4% had a current or past major depression and/or anxiety disorder. This comorbidity is in line with what previous studies comparing CFS sufferers to the general population reported [343]. The frequencies of the childhood trauma types were comparable to those obtained in population-based studies [6]. Half of the patients (50.3%, n = 78) reported to have experienced at least one type of trauma, while about one third (32.3%, n = 50) had experienced two or more types of trauma as measured with the TEC. Considering the different trauma domains, 31.6% (n = 49) of the patients reported emotional neglect, 27.7% (n = 43) emotional abuse, 29.0% (n = 45) bodily threat, 18.7% (n = 29) sexual harassment, and 9.0% (n = 14) sexual abuse. [There were no significant differences \(p<.01\) in rates of childhood trauma between CFS patients with or without co-morbid fibromyalgia.](#)

Table 2 lists the patients' total CIS score, as well as their scores on the physical functioning subscale of the SF-36. The scores of our CFS group were comparable to the CFS reference scores reported by Vercoulen et al. [287] (CIS total) and Crawley et al. [354] (SF-36 physical functioning scale). Also, the scores in our study were much higher than the CIS total reference scores for healthy subjects [287] and much lower than the SF-36 reference

scores for physical functioning in the general population [365], indicating that the patients in our study experienced pronounced fatigue and reduced physical functioning.

3.2 Impact of childhood trauma on functioning

Table 3 shows the CIS total scores and the SF-36 physical functioning subscale scores as predicted by the different TEC subscales. Concerning the total fatigue outcome, analyses showed no significant associations ($p > 0.05$) with a childhood history of emotional neglect, emotional abuse, bodily threat, or sexual abuse in our CFS sample. Only sexual harassment was found to be a significant predictor of heightened total fatigue scores ($t = 2.26$; $\beta = 1.38$; $p = 0.025$), while this adverse childhood event also showed a significant association with reduced physical functioning ($t = -2.13$; $\beta = -1.79$; $p = 0.034$), which, again, was not the case for the other four childhood trauma types.

4. Discussion

Investigating the impact of five different childhood trauma subtypes on fatigue and physical performance levels using the Traumatic Experiences Checklist (TEC) in a sample of 155 carefully screened CFS patients receiving treatment at our university-based referral clinic, we found sexual harassment to be the only significant predictor of elevated fatigue and reduced physical functioning. Our findings are in line with other studies showing that childhood sexual trauma is an important predisposing factor for CFS and for other disorders involving chronic fatigue [4-7,11].

Still, it is important to emphasize that in our study it was the TEC sexual harassment subscale, and not its sexual abuse subscale, that was predictive of later-life elevated fatigue and poor physical functioning. Sexual harassment refers to acts of a sexual nature in terms of unwanted behaviours or approaches that do not involve physical contact. The term “unwanted sexual attention” (UWSA) also describes these non-physical, sexual behaviors. Such unsolicited attention may include comments, looks, and gestures directed at an individual’s sexuality and/or appearance. Even though childhood UWSA is a nearly universal experience for girls, debates regarding the relative harm it causes continue. [376-398] In this study, the number of participants reporting exposure to sexual abuse was much smaller than the number reporting exposure to sexual harassment (9.0% vs. 18.7%). Consequently, the statistical power of the sexual abuse scale may have been insufficient. Furthermore, scores on the sexual harassment and sexual abuse scales strongly correlated (Pearson correlation: 0.520; P (2-tailed) < 0.001).

Nevertheless, the impact of sexual harassment appears to be underestimated. Whealin et al. [376] found a significant overlap between women reporting UWSA during childhood and those reporting childhood sexual abuse. Apparently, childhood UWSA may have a long-term emotional impact, with women scoring lower on measures of self-concept or sense of

self, self-esteem, and body image than peers without such experiences. Additionally, Whealin and colleagues found other symptomatic complaints during childhood, such as stomachaches, crying, feeling unhappy, feeling anxious and afraid, having nightmares, poor sleep quality and appetite, to be correlated with verbal sexual attention and sexual harassment in both boys and girls, even after controlling for the experience of childhood sexual abuse. [376,398] It is plausible that all these symptoms together can contribute to a chronic state of fatigue and poor physical functioning.

There are many complementary hypotheses of why childhood sexual trauma, be it abuse or harassment, seems to have a more profound impact on symptom severity in CFS patients. A first important pathway is maladaptive coping mechanisms. A history of childhood sexual abuse has repeatedly been identified as a significant predictor of PTSD, especially when patients also complaining of chronic fatigue are compared to a control group without this type of trauma [4,11,21,4039]. These victimized individuals are characterized by less effective psychological defence and coping styles, which may lead to an increased sensitivity for future stressors, unhealthy behaviours and lifestyles, as well as psychiatric problems such as anxiety, depression, and sleep disorders. All these factors may directly or indirectly contribute to a person's fatigue and functional limitations [410,421].

Secondly, childhood trauma has been shown to cause dysfunctions in the human stress system, most notably in the hypothalamic-pituitary-adrenal (HPA) axis, which increases a person's vulnerability for a wide variety of psychological and (functional) somatic disorders. [5,11,343,432] Moreover, in a recent study, Kuhlman et al. [443] suggested that different subtypes of childhood trauma exposure are associated with "distinct anomalies in HPA-axis functioning", which are not better accounted for by age, sex, or depression. Regrettably, this study did not investigate the influence of childhood sexual abuse. With respect to CFS, results regarding the role of early-life stress in determining HPA-axis disturbances remain equivocal

[454]. Heim et al. [7] showed that only CFS patients with a history of trauma had lower mean cortisol levels (hypocortisolism) after awakening compared to control subjects. However, these findings could not be replicated by Kempke et al. [465]. Moreover, in a previous study of our group [476], it was found that, rather than the CFS patients *with* a history of early-life stress, it were the CFS patients *without* a history of early-life stress that showed lower cortisol responses in a stress challenge test (i.e. dexamethasone/corticotrophin-releasing factor test) compared to healthy controls. Evidently, further research is required to delineate the link between childhood trauma and an HPA-axis dysfunction in CFS.

Notably, as CFS has been associated with HPA axis hypofunction and enhanced glucocorticoid receptor (GR) sensitivity [48-49] and as epigenetic mechanisms may also mediate GR sensitivity and the impact of adverse childhood events [50], we examined DNA methylation of the GR gene in CFS and its association with childhood sexual and physical trauma in a sample of the current study population [25]. In contrast to our expectations, DNA methylation of the GR gene was not associated with childhood trauma in CFS patients. However, taken the (limited) evidence for a genetic vulnerability of CFS into account [51], further research on the genetic and epigenetic interactions with childhood trauma is required, in analogy with research in depressive disorder and posttraumatic stress disorder.

A third possible pathway may involve cognitive distortions leading to personality changes in the long run. Briere et al. [23] noted that when children are abused, they may develop an internal working model that makes them view the world as hazardous. Due to their having been powerless in the past, they may overemphasize any danger and adversity in their present environment. This may cause adult survivors to develop chronic perceptions of helplessness, powerlessness, and danger over time, where their cognitive distortions will cause emotional distress and thus increase the risk of CFS. Early traumatic experiences may also influence personality traits such as neuroticism or negative affectivity, which are known

to increase somatization tendencies [5247]. In this context, Lobbetael et al. [5348] stated that different types of childhood trauma could have varying effects on personality disorder pathology, and, more specifically, found that sexual abuse was associated, among other dysfunctional personality traits, with symptoms of avoidant personality disorder. In their pilot study of female patients, Sansone et al. [5449] observed that three forms of childhood abuse were contributory factors to somatic preoccupation (on specific body areas or fatigue) in adult life, where childhood sexual abuse, more so than physical or emotional abuse, appeared a unique predictor.

Revictimization has also been proposed as a possible pathway. Indicative of an inability to engage in healthy social interactions and fairly prevalent in adults having suffered childhood abuse, revictimization generates additional stress, which leads to a vicious cycle characterized by increasing stress levels and allostatic load [8,424,550]. The majority of studies report an increased risk of revictimization in those sexually abused as children due to its destructive effect on self-esteem. Also, in adolescent girls dating, risk factors for victimization include sexual harassment by male peers during (early) childhood. [4039,564,572]

Finally, we would like to elaborate on the concept of embodiment. According to social learning theory, chronic unwanted sexual attention teaches recipients to become overly self-conscious regarding their looks and body; rather than developing a subjective view of themselves, they will eventually come to see themselves as an object in the eyes of others, resulting in the high levels of dissatisfaction with and anxiety about their bodies so commonly reported by (young) women. [387] In this regard, impairments in embodied mentalizing (the capacity to interpret bodily sensations and signals) or heightened body awareness [550], also often seen in CFS patients, further perpetuate complaints like fatigue and reduced physical functioning. In her 1992 paper, Leslie Young [583] describes the problem of embodiment in

victims having been sexually abused as children: *“There is a physical violation of the human body where the boundary between “inside me” and “outside me” is physically crossed, moreover disappeared, against a person’s will and best interests. It could be that at the time of the abuse the focus is not on the suffering of the body but rather on physically surviving. In adulthood, when experiencing somatic symptoms, like fatigue, could blind one to the absence of the body, which is to say the absence of spontaneous movement, physical expressivity and the excess of physical and sexual pleasure that animates one's very being.”*

Several limitations have to be taken into account when interpreting the results of our study. We, inevitably, relied on retrospective self-reports of childhood trauma and these tend to involve a substantial rate of false negatives, while false positive reports are thought to be rare. However, ~~However,~~ although many studies using retrospective reports of adverse experiences in childhood indeed show some such bias, the bias was never sufficiently great to invalidate the reports [594]. Secondly, although CFS is more prevalent in women and the greater majority (92.3%) of the participants in our study were indeed female, this has to be taken into account considering that Keyes et al. [6055] found patterns of association between childhood maltreatment and the underlying psychopathology (internalizing versus externalizing) dimensions to differ by gender. Further research is needed to determine the exact influence of gender on the predictive value of childhood trauma on fatigue and physical functioning in CFS. Lastly, we did not consider adulthood trauma or life stresses that might have mediated the relationship between childhood adversity and (the persistence or severity of) fatigue symptoms and physical impairment in our CFS sample.

In conclusion, underscoring that there is a differential effect of childhood trauma subtypes on fatigue and physical functioning, we found sexual harassment to be the most important predictor of CFS. These findings have to be taken into account in further clinical

research and in the assessment and treatment of individuals coping with chronic fatigue syndrome.

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Conflicts of interest

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