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Child Abuse and Chronic Pain in a Community Survey of Women

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This study examined the relationship between a self-reported history of child physical and sexual abuse and chronic pain among women (N = 3381) in a provincewide community sample. Chronic pain was significantly associated with physical abuse, education, and age of the respondents and was unrelated to child sexual abuse alone or in combination with physical abuse, mental disorder (anxiety, depression, or substance abuse), or low income. Number of health problems and mental health disorders did not mediate the relationship between physical abuse and chronic pain. Despite considerable evidence from the clinical literature linking exposure to child maltreatment and chronic pain in adulthood, this may well be the first population-based study to investigate this relationship for child physical and sexual abuse independently. The significant association between childhood history of physical abuse and pain in adulthood calls for a greater awareness of the potential for chronic pain problems associated with this type of maltreatment. Further research is needed to understand the mechanism for this complex relationship.

Keywords: *chronic pain; child physical abuse; child sexual abuse; women*

Chronic pain is a common and disabling health problem in Canada, with estimates of general population pain prevalence ranging from 14% to

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31% (Crook, Rideout, & Browne, 1984; Millar, 1996; Moulin, Clark, Speechley, & Morley-Forster, 2002; Van Den Kerkhof et al., 2003). Epidemiologic, clinical, and experimental studies have all consistently found that the burden of pain is greater for women than for men (Mayer, Berman, Chang, & Naliboff, 2004; Meana, Cho, & DesMeules, 2003). Women are more likely to receive treatment for many pain conditions, report more severe pain, and have more frequent pain and pain of longer duration than is the case for men (Dao & LeResche, 2000).

A substantive body of literature based on samples drawn from tertiary pain clinics has identified child physical and sexual abuse as having etiologic significance in the development of chronic pain syndromes for women (Green, Flowe-Valencia, Rosenblum, & Tait, 1999; Lampe et al., 2003). Specific associations have been reported for facial pain (Goldberg, Pachas, & Keith, 1999), pelvic pain (Bodden-Heidrich et al., 1999; Fry, Beard, Crisp, & McGuigan, 1997; Fry, Crisp, & Beard, 1997; Lampe et al., 2003; Nijenhuis et al., 2003), vaginismus (Reissing, Binik, Khalife, Cohen, & Amsel, 2003), gastrointestinal pain (Drossman, Li, Leserman, Toomey, & Hu, 1996), and fibromyalgia (Goldberg et al., 1999; Imbierowicz & Egle, 2003), although inconsistencies have been noted (Nickel, Egle, & Hardt, 2002; Taylor, Trotter, & Csuka, 1995; Van Houdenhove et al., 2001).

Matched-control studies of child welfare samples with documented histories of maltreatment have yielded conflicting findings. Retrospective studies have found increased rates of muscle tension and gastrointestinal symptoms among sexually abused youth (Rimsza, Berg, & Locke, 1988) and significantly elevated, unexplained pain among children with court-documented abuse who were followed into adulthood (Raphael, Widom, & Lange, 2001). However, no elevated pain was found among maltreated children when assessed prospectively (Raphael et al., 2001). Court-documented cases of abuse, however, represent a very small portion of the actual occurrence of abuse, and the reports of pain in adulthood of those with court-documented abuse likely differ from adults who report retrospectively on experiences of abuse (Davis, Luecken, & Zautra, 2005). Kendall-Tackett and Becker-Blease (2004) and MacMillan, Jamieson, and Walsh (2003) have argued that prospective studies may miss cases as a high percentage of maltreated children never come to the attention of authorities and cases of abuse that remain unreported may persist or may be more severe than reported cases.

Few population-based studies have examined this relationship. McBeth, Macfarlane, Benjamin, Morris, and Silman (1999) reported an almost sevenfold increase in high tender point count in adults reporting childhood

abuse. Ciccone, Elliott, Chandler, Nayak, and Raphael (2005) found that self-reported sexual or physical abuse, excluding rape, was not associated with fibromyalgia syndrome in a community sample of women. Women who reported rape were 3.1 times more likely to have fibromyalgia syndrome; however, the study did not gather the data that would be needed to differentiate rape in childhood from rape in adulthood. Linton (1997) reported a fivefold increase in the reported rate of pronounced pain in Swedish women with physical abuse; sexual abuse increased the risk fourfold. In a 1-year follow-up, both types of abuse increased the risk fourfold for poor physical function (Linton, 2002). A Norwegian study found significantly high rates of headache, abdominal, or muscular pain among college students reporting sexual abuse histories (Bendixen, Muus, & Schei, 1994), and decreased sensitivity to experimentally induced pain was associated with a self-reported history of childhood abuse among college students, particularly women (Fillingim & Edwards, 2005). A U.S. cohort study that controlled for concurrent depression reported that adult chronic self-reported pain was associated with a modest elevation in self-reported and documented sexual abuse (Brown, Berenson, & Cohen, 2005). Chronic pain was not significantly associated with self-reported and documented physical abuse. A secondary data analysis of five population-based samples in the United States found a significant relationship between sexual assault in childhood and headache in adulthood (Golding, 1999).

A recent meta-analysis (Davis et al., 2005) of the relationship between retrospective reports of childhood abuse and the experience of chronic pain in adulthood concluded the following: (a) individuals reporting histories of child maltreatment reported more pain symptoms and related conditions than did those not reporting childhood maltreatment; (b) patients with chronic pain were more likely to report maltreatment histories than were healthy controls; (c) patients with chronic pain were more likely to report maltreatment histories than were nonpatients with chronic pain identified from the community; and (d) in community samples, those individuals reporting pain were more likely to report histories of maltreatment than were individuals not reporting pain.

Despite these associations, little is known about the mechanisms linking childhood abuse and pain syndromes in adulthood; they likely involve complex, multiple pathways (Kendall-Tackett, 2002). Kendall-Tackett (2002) identified four key pathways (behavioral, social, cognitive, and emotional) through which child maltreatment can influence health. The behavioral theory posits that maltreated individuals are more likely to engage in a number of high-risk health behaviors, including tobacco, alcohol, and substance abuse (Felitti

et al., 1998; Simpson & Miller, 2002), eating disorders (Felitti, 1991), suicidal ideation (Fergusson, Beautrais, & Horwood, 2003), and high-risk sexual behaviors (Champion & Kelly, 2002; Parillo, Freeman, Collier, & Young, 2001), which result in negative health consequences and increased levels of chronic pain. The social pathway suggests that impairments in the ability to form and maintain positive social relationships, more common among those with maltreatment histories (Page, 1999), increase likelihood of poor health consequences. Thus, increased chronic pain may be a direct consequence of poor health or mediated by the association found between higher levels of pain and decreased levels of social support (Zaza & Baine, 2002). The cognitive model hypothesizes that distortions in the internal working model attributed to child maltreatment results in reduced efficacy; reduced feelings of self-worth; increased negative, mistrusting, and fearful thoughts; and a negative perception of health (Golding, Cooper, & George, 1997). Cognitive distortions may play a direct role in pain perception by lowering thresholds for labeling painful stimuli as noxious (Alexander et al., 1998; Leserman, Li, Drossman, & Hu, 1998; Scarinci, McDonald-Haile, Bradley, & Richter, 1994). Alternatively, researchers have postulated that childhood physical abuse may lead to hypoalgesia or a generalized decreased tendency to express distress in somatic terms such that the link between pain and distress is broken as a protective mechanism (Raphael et al., 2001). The emotional mechanism is supported by the well-documented relationship between child maltreatment and emotional dysregulation, particularly depression, anxiety, and posttraumatic stress disorder (Penza, Heim, & Nemeroff, 2003). The link between chronic pain and psychological factors, however, is not well understood. Psychological impairment may precede the onset of pain or may arise as a complication of chronic pain (Kuch, 2001; Turk & Okifuji, 2002).

Child maltreatment may have neurobiological effects by altering brain development (Shea, Walsh, MacMillan, & Steiner, 2005; Teicher, Andersen, Polcari, Anderson, & Navalta, 2002). The interaction between trauma and chronic stress may produce pathophysiological effects, which increase the probability of developing a number of conditions associated with chronic pain (Heim, Ehlert, Hanker, & Hellhammer, 1998). The biopsychosocial pathway proposed by Meagher (2004) suggests that psychosocial stress such as child abuse results in an overactivity of neuronal pathways of fear and pain, which thorough cognitive, behavioral, and neurobiological changes contributes to the development of anxiety disorders and chronic pain.

The link between child abuse and internalizing disorders, particularly depression, anxiety, and posttraumatic stress disorder, has been well established

(Penza et al., 2003). It is less certain whether psychological impairment precedes or arises as a complication of chronic pain (Kuch, 2001; Turk & Okifuji, 2002). Increased health risk behaviors (Champion & Kelly, 2002; Fergusson et al., 2003; Hillis, Anda, Felitti, Nordenberg, & Marchbanks, 2000; Hobfoll et al., 2002; Parillo et al., 2001), with increased rates of revictimization (Arias, 2004) or alterations in brain development or function (Teicher et al., 2002; Vythilingam et al., 2002), may be factors in mediating the relationship through physical health conditions. A recent review concluded that methodological weaknesses precluded determination of causal relationships between child maltreatment and pain (Raphael, Chandler, & Ciccone, 2004).

This study seeks to better understand the relationship between child abuse and adult chronic pain in a large community-based representative sample of women by evaluating the mediating relationship of physical and mental health. We hypothesized that child physical and sexual abuse will be associated with self-reported pain.

Method

Sample

In 1990, the Ontario Health Survey (OHS), a comprehensive community survey of Canada's most populated province, was conducted to gather information about the physical health of provincial residents. The target population included individuals age 15 years and older who resided in private dwellings; homeless persons, people in institutions, foreign service personnel, First Nations people living on reserves, and persons residing in extremely remote locations were excluded. One member from OHS-participating households was randomly selected to participate in the Ontario Mental Health Supplement (OHSUP), which collected information on mental disorders, including prevalence, impairment, correlates, and use of mental health services. Detailed survey methodology is available elsewhere (Boyle et al., 1996). In this analysis, women age 65 and older were excluded because only limited psychiatric data were collected on seniors. Verbal consent was obtained for the OHSUP prior to the start of the interview. Interviews were carried out between November 1990 and March 1991. No institutional ethics review board approval was necessary as this article represents a secondary analysis of OHS and OHSUP data, a public-use data file at the Ontario Ministry of Health.

Of the 14,758 households eligible for the OHS, 13,002 (88.1%) participated. Of those, 9,953 (76.5%) took part in the OHSUP, for an overall

response rate of 67.4%. Participation rates were higher among younger people and individuals living in rural areas. On key measures of health status, employment, income, and marital status, however, there was little difference between respondents and nonrespondents.

Of the 4,285 women under age 65, 3,381 (78.9%) had complete data. The majority of missing cases resulted from nonresponse to the self-completed OHS questionnaire (22.8%), with a nonresponse of 13.0% to the pain question in the OHS and 5.4% to the abuse questions in the OHSUP. Nonresponders to the abuse questions were significantly more likely to be younger, have less than high school education, and report depression and one or more psychiatric disorders. In the full regression model, there were no significant differences between responders and nonresponders. The weighted correlation between self-reported and proxy informant measures of pain was moderately good (r = .46). On average, proxy informant pain ratings were lower by 0.7 points (on the 5-point scale). No statistically significant differences were found between responders and nonresponders to the pain question on any of the variables of interest using either informant. Table 1 shows the characteristics of the sample.

Measures

Measures of child physical abuse, sexual abuse, and a wide range of psychiatric disorders were collected in the OHSUP; all other measures were obtained from the OHS. Self-reported chronic pain was assessed from the respondent and a proxy informant (head of the household) on the 5-point pain attribute (*free of pain or discomfort*, *pain or discomfort that does not prevent any activities*, *pain or discomfort that prevents a few*, *some*, or *most activities*) of the Health Utilities Index-Mark III (HUI-III; Feeny et al., 2002). The HUI-III is in current use in two Canadian population surveys (Catlin & Will, 1992; Government of Canada, 1994), and the kappa estimate of the test-retest reliability of the 5-point pain attribute was 0.67 (Boyle, Furlong, Feeny, Torrance, & Hatcher, 1995). The 5-point measure was collapsed into three categories for both types of informants: (a) free of pain or discomfort, (b) pain or discomfort that does not prevent any activities, and (c) pain or discomfort that prevents a few, some, or most activities.

The Child Maltreatment History Self-Report (CMHSR) was used to assess history of exposure to child physical and sexual abuse. Respondents were asked about their experiences of physical and sexual abuse by an adult when they were "growing up." The definition of physical abuse included a positive response to any one or more of six events, ranging from being pushed, grabbed, or shoved (often or sometimes) to being physically

Table 1
Characteristics of the Sample by Self-Reported Pain Status

Variables	Free of Pain and Discomfort (n = 1262)[a]	Pain or Discomfort That Does Not Prevent Any Activities (n = 1165)[a]	Pain or Discomfort That Prevents a Few, Some, or Most Activities (n = 954)[a]	Total (N = 3381)[a]
	% (SE)			
History of child abuse				
Physical abuse only	11.1 (1.25)	13.8 (1.52)	20.4 (2.49)	14.7 (1.02)
Sexual abuse only	5.9 (1.24)	6.3 (1.40)	5.1 (1.04)	5.8 (0.75)
Both physical and sexual abuse	6.9 (1.00)	4.8 (0.93)	10.5 (1.57)	7.2 (0.66)
Number of health conditions				
3 or more problems	11.2 (1.59)	17.4 (1.61)	31.4 (2.55)	19.1 (1.08)
2 problems	13.6 (1.41)	24.7 (2.14)	24.0 (2.81)	20.5 (1.24)
1 problem	33.5 (1.97)	26.4 (2.02)	24.8 (2.47)	28.5 (1.27)
Psychiatric disorder				
Anxiety (lifetime)	23.2 (1.79)	23.4 (2.10)	30.8 (2.72)	25.4 (1.23)
Depression (lifetime)	8.4 (1.36)	10.4 (1.47)	15.8 (2.08)	11.2 (0.96)
Substance abuse (lifetime)	5.2 (0.84)	5.2 (0.80)	6.7 (1.14)	5.6 (0.51)
Control variables				
Education (not finished high school)	24.6 (2.00)	28.9 (1.90)	39.4 (2.64)	30.3 (1.23)
Low income	8.2 (0.97)	7.8 (1.12)	13.2 (1.75)	9.5 (0.77)
Age, M (SD)	34.2 (0.48)	38.1 (0.60)	37.6 (0.7)	36.5 (0.33)

a. Unweighted numbers; all estimates based on weighted data.

attacked (often, sometimes, or rarely). The definition of sexual abuse included one or more of four items measuring unwanted experiences, ranging from being the victim of repeated indecent exposure to being sexually attacked. The definition of contact sexual abuse included the items "touched the sex parts of your body" and "tried to have sex with you or sexually attacked you." Data from adolescents (N = 34) recruited from a clinic sample showed 2-week test-retest reliability kappas of 0.75 for physical abuse and 1.0 for sexual abuse (H. L. MacMillan & J. E. Fleming, unpublished data). Women with reported child physical or sexual abuse or both had statistically higher rates of psychiatric disorders, providing evidence of the concurrent validity of the instrument (MacMillan et al., 2001). Four groups were constructed: no abuse, physical abuse only, sexual abuse only, and both types of abuse ("combined abuse"). The instrument is described in detail in a

separate publication (MacMillan et al., 1997). Most of the OHSUP interview was conducted face-to-face. However, the CMHSR was completed by respondents in private and returned to the interviewer in a sealed envelope. All participants were given a list of local mental health resources to contact if they so desired.

The Composite International Diagnostic Interview (CIDI), a standardized interviewer-administered questionnaire for the evaluation of mental disorders according to the criteria of the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (*III–R*), was used to determine the lifetime prevalence of (a) anxiety disorder (consisting of one or more of social phobia, simple phobia, agoraphobia, panic disorder, and generalized anxiety disorder); (b) major depressive disorder; and (c) substance abuse (alcohol abuse or dependence or illicit drug abuse or dependence (World Health Organization, 1990). Field trials of the CIDI have shown good interrater reliability, test-retest reliability, and validity for psychiatric diagnoses used in this study (Offord et al., 1996; Wittchen, 1994).

Respondents reported the presence or absence of 19 major categories of chronic health problems (e.g., diseases of the circulatory, respiratory, and digestive systems); the variable "number of health problems" was a count of these problems; severity of health problems was not captured. Age, socioeconomic status (SES; education level: completed high school or not), and current household income (low income: below the poverty line or not—an OHSUP-derived variable that took into account family size and urban or rural residence) were control variables.

Statistical Analysis

Individual responses were weighted to obtain unbiased point estimates, based on the probability of selection in the OHS sample. Weighting procedures incorporated adjustments for household nonresponse in the OHS and person-level nonresponse in the OHSUP. Poststratification weighting was applied to bring the age and sex distribution of the sample into agreement with that of the Ontario population in 1990. Details of the weighting procedure are found elsewhere (Boyle et al., 1996).

Analyses were carried out using Survey Data Analysis Software for Windows (release 7.5.3, Research Triangle Institute, Research Triangle Park, North Carolina), which makes statistical adjustments for survey design effects. Cases with missing information on any relevant variable were excluded from all analyses. To examine predictors of nonresponse to the child abuse questions, bivariate and regression analyses were run on

age, SES (low income, education), chronic pain, physical health (number of health problems—continuous and categorical), and mental health (anxiety, depression, lifetime substance abuse including alcohol abuse or dependence or illicit drug abuse or dependence, any of the disorders). The outcome was missing abuse status, either positive or negative.

Regressions tested the bivariate relationships between chronic pain and child abuse, age, SES, physical health, and mental health. The "no abuse" group was the reference group, and all pair-wise comparisons were made to the reference group. A multinomial cumulative logit model tested the associations between chronic pain and child physical and sexual abuse and contact-only sexual abuse. We hypothesized a priori that child abuse would lead to an increase in chronic pain through two pathways: (a) increased prevalence of physical health problems and (b) increased prevalence of mental health problems. In considering the first hypothesis, abuse would lead to an increase in physical health problems, which would, in turn, lead to chronic pain (the indirect effect of abuse). To assess the indirect effects of physical health, two regression models were run in hierarchical fashion: the first included age, low income, education, and mental health; the second model adds number of physical health problems to the first model. The second pathway examined the contribution of mental health to reports of chronic pain. We hypothesized that abuse would lead to mental health problems, which in turn would lead to chronic pain (the indirect effect of abuse). To assess the indirect effects of this second pathway, two regression models were run in hierarchical fashion: the first included age, low income, education, and number of health problems; the second model added any mental health disorder. This model was also tested using the pain rating from the proxy informant to determine the effects of nonresponse to the pain attribute.

Results

The full multinomial cumulative logit model is presented in Table 2. Results of the regression of contact-only sexual abuse did not differ from those for sexual abuse; betas were changed only at the first or second decimal places. Therefore, findings are reported for sexual abuse. In this model, physical abuse was significantly associated with chronic pain; sexual abuse alone and both types of abuse combined were not. Number of health problems and education and age of the respondents were also significantly associated with chronic pain. Neither income nor any of the mental disorders were significantly related to chronic pain. When number of health problems was removed from the model, the β coefficient for physical abuse ($\beta = .50$, $SE = 0.16$, $p = .001$) was

Table 2
Multinomial Regression (Cumulative Logit Model) on Self-Reported Pain Status

	β Coefficient	*SE* β	Odds Ratio	95% Confidence Interval
History of child abuse				
Physical abuse only	.50	0.17	1.66	1.20-2.29
Sexual abuse only	–.02	0.24	0.98	0.62-1.56
Both types of abuse	.16	0.22	1.17	0.75-1.82
Number of health conditions				
One	.23	0.13	1.26	0.97-1.64
Two	.88	0.15	2.40	1.78-3.25
Three or more	1.15	0.18	3.16	2.21-4.53
Psychiatric disorder				
Anxiety	.12	0.15	1.13	0.85-1.50
Depression	.16	0.19	1.17	0.81-1.70
Substance abuse	–.03	0.22	0.97	0.63-1.50
Control variables				
Education (not finished high school)	.51	0.11	1.66	1.33-2.08
Low income	.19	0.16	1.21	0.89-1.65
Age	.01	0.00	1.01	1.00-1.02

similar, discounting an indirect effect of abuse mediated through physical health problems. Also, when any mental disorders were removed from the model, the β coefficient was comparable ($\beta = .53$, $SE = 0.17$, $p = .001$). Results from the proxy informant are similar, with low income, age, number of health problems, and physical abuse alone significantly associated with pain. Lifetime depression and education using proxy informant were not significantly associated with pain. Both types of abuse combined approached significance with the proxy informant (odds ratio, 1.96; confidence interval, 0.98-3.64).

Discussion

To our knowledge, this is the first large population-based study demonstrating an association specifically between child physical abuse and self-reported chronic pain among women. Studies of patients recruited from tertiary pain clinics or child welfare agencies suffer from selection biases (Hudson & Pope, 1995); such patients have maltreatment histories that differ from community samples in severity, frequency, duration, number of

perpetrators, and relationship to the perpetrator or perpetrators (Hanson, Resnick, Saunders, Kilpatrick, & Best, 1999). The results of such studies do not necessarily extend to the general population, because patients recruited through clinical facilities may report higher rates of pain (Finestone et al., 2000; Scarinci et al., 1994) and have higher frequencies of comorbid disorders, including depression and anxiety (Ballas & Staab, 2003) and alcohol and substance use or dependency (Friedman, Li, & Mehrotra, 2003). Other studies have failed to control for variables including social status, income, education, and substance use. In addition, studies that focus on a single type of abuse, combine subtypes of abuse, or include traumatic events occurring in adulthood are problematic in that they cannot determine the specificity of effects (Ciccone et al., 2005; Linton, 1997; Raphael et al., 2001; Yucel et al., 2002). Although physical and sexual abuse often occur together (Felitti et al., 1998; MacMillan et al., 1997), identifying the independent contributions of each type of abuse may assist in identifying possible mechanisms for this relationship.

Pain and Abuse

In the bivariate analyses, sexual abuse alone was not significantly associated with reported chronic pain. Physical abuse alone and in combination with sexual abuse increased respondents' pain ratings; however, in the cumulative logit model, only physical abuse remained significant. Number of health problems and psychiatric disorders were significantly related to combined abuse. There was no interaction effect between physical and sexual abuse. It is likely that the associations between both physical and sexual abuse with number of health problems and psychiatric disorders rendered the combined abuse group nonsignificant in the full regression. The relationship between physical abuse and pain was also demonstrated using proxy informant.

Comparison With Other Studies

It is difficult to compare the prevalence of chronic pain found in this sample with other epidemiological surveys because great variation exists in definition and measurement (Verhaak, Kerssens, Dekker, Sorbi, & Bensing, 1998). The prevalence of pain in the current study (28.1%), however, is comparable to other Canadian epidemiological surveys (Crook et al., 1984; Millar, 1996; Moulin et al., 2002). Our findings may underestimate the prevalence of chronic pain because the upper age limit for this study (64 years) is

younger than in most studies. Few surveys of chronic pain have included functional impairment as in this study. A Swedish population study using a 5-point scale assessing chronic pain with impairment in activities of daily living similar to the measure in this study determined a chronic pain rate of 12.8% with no differences reported by gender (Andersson, 1994; Andersson, Ejlertsson, Leden, & Rosenberg, 1993). Although rates vary, a recent review concluded that the prevalence of self-assessed pain was not different from that based on diagnosis made by a physician after a clinical examination (Verhaak et al., 1998). Further, the use of complex or multidimensional definitions of pain had little influence on reported prevalence compared with more simplistic approaches (Verhaak et al., 1998). It has been postulated that self-assessment of chronic pain may yield a lower prevalence rate than do other methods (Verhaak et al., 1998). The higher rates of depression and any mental disorder reported for responders compared with nonresponders of the abuse questions could yield a greater association between abuse and chronic pain if mental health mediated the relationship. However, mental health disorders did not mediate the relationship between abuse and pain in this analysis. The prevalence of sexual abuse in this study is at the lower end of the reported rate for most community-based studies; differences in definition and measurement are likely responsible (Leserman, 2005) and may reduce the likelihood of detecting a positive association with pain.

Little consensus has been achieved on the nature of the relationship between child physical and sexual abuse and chronic pain among community-based samples, making it problematic in evaluating the present findings. In this study, child physical abuse significantly increased chronic pain, consistent with a number of studies (Bendixen et al., 1994; Linton, 1997; McBeth et al., 1999), yet contrasting with the work of Brown et al. (2005), which found no such association. The present study failed to demonstrate a relationship between sexual abuse (with or without contact) and self-reported chronic pain. Again the literature using community-based samples provides mixed support for this association. In addition, many of these studies include sexual victimization in both adulthood and childhood, which confounds the relationship. Drossman et al. (1996) found that severity of abuse was related to severity of pain symptoms among women with gastrointestinal disorder although Van Houdenhove et al. (2001) did not observe a relationship between sexual abuse and pain among patients with chronic fatigue syndrome or fibromyalgia.

The pathways linking physical abuse and sexual abuse with the experience of chronic pain in adulthood are complex and likely multiply determined.

Physical health conditions have been proposed as a mediator in this relationship (Felitti et al., 1998). However, results from this study do not support the idea that number of health problems plays a significant role in mediating the relationship between abuse and chronic pain.

Previous research has shown a positive relationship between chronic pain and psychological disorder (Linton, 2000; Pincus, Burton, Vogel, & Field, 2002), particularly anxiety (Guidetti & Galli, 2002) and depression (Cassano & Fava, 2002; Guidetti & Galli, 2002). The association is less clear for substance abuse, with recent reviews reporting elevated (Dersh, Polatin, & Gatchel, 2002) or similar (Compton & Estepa, 2000) rates of chronic pain compared with the general population. In this sample, women who endorsed depression and one or more mental disorders were less likely to complete the abuse questionnaires. There was a 7% nonresponse rate to abuse questions among women with depression with one or more mental disorders, compared with 3% in the remaining sample. Psychiatric factors did not remain significant in the cumulative logit model using either informant; this may be because of their strong association with number of health problems. Further, there was no evidence to support the idea that the association between abuse and chronic pain is mediated by any of the mental disorders examined. Diagnostic and methodologic issues including reliance on clinical samples likely accounts for some of these discrepant findings.

Study Strengths/Limitations

The strengths of the OHS/OHSUP studies include their large sample size, the use of sophisticated sampling and weighting procedures to ensure adequate statistical power, and samples that are representative of the general population. Instruments included a reliable measure of a broad range of psychiatric disorders and a multi-item instrument measuring child physical and sexual abuse that has good preliminary reliability. The evaluation of chronic pain incorporates functional impairment and was correlated with a proxy informant measure. The study also controlled for other important covariates, such as age, income, and education, and examined the effects of nonresponse. Information about exposure to child abuse and presence of psychiatric disorder was collected after the assessment of chronic pain and number of health problems, a fact that reduces the bias of past negative events influencing current reports. Limitations of the study include its cross-sectional design, which precludes assessment of a causal relationship between exposure to child abuse and current chronic pain. The pain measure consists of one dimension

of global pain rather than pain related to a specific body part, which may have led to an underreporting of pain, as would the use of proxy information. Further, the pain measure confounds pain with limitations in function. The OHSUP relies on retrospective reports, which may result in underreporting of abuse (Hardt & Rutter, 2004). It is likely that number of health problems is less predictive of chronic pain than is the severity of health condition(s), data which were not included in this survey. Finally, the survey failed to measure neglect or emotional abuse; however, these forms of maltreatment are difficult to conceptualize and operationally define (Glaser, 2002).

In summary, a significant relationship exists between childhood physical abuse and self-reported chronic pain in a community sample of women. This finding is consistent with previous studies highlighting the importance of routine evaluation of the presence of childhood abuse as a possible predictor of the onset of chronic pain states. Although the increase in self-reported pain with physical abuse is modest (odds ratio, 1.66), the individual and societal costs of chronic pain and the resultant disability, loss of working days, and medical treatment make it an area worthy of further attention (Kendall-Tackett, 2000).

The extent to which childhood adversities including child physical and sexual abuse are associated with the development of chronic pain needs to be evaluated in longitudinal studies of representative samples. Understanding whether physical abuse is a causal factor in pain conditions and, if so, what factors modify this relationship is important in reducing the possible consequence of exposure to victimization among girls. Why do some female children exposed to physical abuse go on to experience chronic pain conditions, and yet many do not? Research investigating the factors that influence this relationship is necessary to ameliorate the long-term burden of child maltreatment.

References

Alexander, R. W., Bradley, L. A., Alarcon, G. S., Triana-Alexander, M., Aaron, L. A., Alberts, K. R., et al. (1998). Sexual and physical abuse in women with fibromyalgia: Association with outpatient health care utilization and pain medication usage. *Arthritis Care Research*, *11*(2), 102-115.

Andersson, H. I. (1994). The epidemiology of chronic pain in a Swedish rural area. *Quality of Life Research*, *3*(Suppl.), S19-S26.

Andersson, H. I., Ejlertsson, G., Leden, I., & Rosenberg, C. (1993). Chronic pain in a geographically defined general population: Studies of differences in age, gender, social class, and pain localization. *Clinical Journal of Pain*, *9*(3), 174-182.

Arias, I. (2004). The legacy of child maltreatment: Long-term health consequences for women. *Journal of Women's Health*, *13*(5), 468-473.

Ballas, C. A., & Staab, J. P. (2003). Medically unexplained physical symptoms: Toward an alternative paradigm for diagnosis and treatment. *CNS Spectrums*, *8*(12 Suppl. 3), 20-26.

Bendixen, M., Muus, K. M., & Schei, B. (1994). The impact of child sexual abuse: A study of a random sample of Norwegian students. *Child Abuse & Neglect*, *18*(10), 837-847.

Bodden-Heidrich, R., Kuppers, V., Beckmann, M. W., Ozornek, M. H., Rechenberger, I., & Bender, H. G. (1999). Psychosomatic aspects of vulvodynia: Comparison with the chronic pelvic pain syndrome. *Journal of Reproductive Medicine*, *44*(5), 411-416.

Boyle, M., Furlong, W., Feeny, D., Torrance, G. W., & Hatcher, J. (1995). Reliability of the Health Utilities Index-Mark III used in Cycle 6 Canadian General Social Survey Questionnaire. *Quality of Life Research*, *4*(3), 249-257.

Boyle, M. H., Offord, D. R., Campbell, D., Catlin, G., Goering, P., Lin, E., et al. (1996). Mental health supplement to the Ontario Health Survey: Methodology. *Canadian Journal of Psychiatry*, *41*(9), 549-558.

Brown, J., Berenson, K., & Cohen, P. (2005). Documented and self-reported child abuse and adult pain in a community sample. *Clinical Journal of Pain*, *21*(5), 374-377.

Cassano, P., & Fava, M. (2002). Depression and public health: An overview. *Journal of Psychosomatic Research*, *53*(4), 849-857.

Catlin, G., & Will, P. (1992). The National Population Health Survey: Highlights of initial developments. *Health Reports (Statistics Canada Cat. 82-003)*, *4*, 313-319.

Champion, J. D., & Kelly, P. (2002). Protective and risk behaviors of rural minority adolescent women. *Issues in Mental Health Nursing*, *23*(3), 191-207.

Ciccone, D. S., Elliott, D. K., Chandler, H. K., Nayak, S., & Raphael, K. (2005). Sexual and physical abuse in women with fibromyalgia syndrome: A test of the trauma hypothesis. *Clinical Journal of Pain*, *21*(5), 378-386.

Compton, P., & Estepa, C. A. (2000). Addiction in patients with chronic pain. *Lippincotts Primary Care Practice*, *4*(3), 254-272.

Crook, J., Rideout, E., & Browne, G. (1984). The prevalence of pain complaints in a general population. *Pain*, *18*(3), 299-314.

Dao, T. T., & LeResche, L. (2000). Gender differences in pain. *Journal of Orofacial Pain*, *14*(3), 169-184.

Davis, D. A., Luecken, L. J., & Zautra, A. J. (2005). Are reports of childhood abuse related to the experience of chronic pain in adulthood? A meta-analytic review of the literature. *Clinical Journal of Pain*, *21*(5), 398-405.

Dersh, J., Polatin, P. B., & Gatchel, R. J. (2002). Chronic pain and psychopathology: Research findings and theoretical considerations. *Psychosomatic Medicine*, *64*(5), 773-786.

Drossman, D. A., Li, Z., Leserman, J., Toomey, T. C., & Hu, Y. J. B. (1996). Health status by gastrointestinal diagnosis and abuse history. *Gastroenterology*, *110*, 999-1007.

Feeny, D., Furlong, N., Torrance, G. W., Goldsmith, C. H., Zhu, Z., DePauw, S., et al. (2002). Multi-attribute and single-attribute utility functions for the Health Utilities Index Mark 3 System. *Medical Care*, *40*(2), 113-128.

Felitti, V. J. (1991). Long-term medical consequences of incest, rape, and molestation. *Southern Medical Journal*, *84*(3), 328-331.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., et al. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, *14*(4), 245-258.

Fergusson, D. M., Beautrais, A. L., & Horwood, L. J. (2003). Vulnerability and resiliency to suicidal behaviours in young people. *Psychological Medicine*, *33*(1), 61-73.

Fillingim, R. B., & Edwards, R. R. (2005). Is self-reported childhood abuse history associated with pain perception among healthy young women and men? *Clinical Journal of Pain*, *21*(5), 387-397.

Finestone, H. M., Stenn, P., Davies, F., Stalker, C., Fry, R., & Koumanis, J. (2000). Chronic pain and health care utilization in women with a history of childhood sexual abuse. *Child Abuse & Neglect*, *24*(4), 547-556.

Friedman, R., Li, V., & Mehrotra, D. (2003). Treating pain patients at risk: Evaluation of a screening tool in opioid-treated pain patients with and without addiction. *Pain Medicine*, *4*(2), 182-185.

Fry, R. P., Beard, R. W., Crisp, A. H., & McGuigan, S. (1997). Sociopsychological factors in women with chronic pelvic pain with and without pelvic venous congestion. *Journal of Psychosomatic Research*, *42*(1), 71-85.

Fry, R. P., Crisp, A. H., & Beard, R. W. (1997). Sociopsychological factors in chronic pelvic pain: A review. *Journal of Psychosomatic Research*, *42*(2), 1-15.

Glaser, D. (2002). Emotional abuse and neglect (psychological maltreatment): A conceptual framework. *Child Abuse & Neglect*, *6*(6-7), 697-714.

Goldberg, R. T., Pachas, W. N., & Keith, D. (1999). Relationship between traumatic events in childhood and chronic pain. *Disability and Rehabilitation*, *21*(1), 23-30.

Golding, J. M. (1999). Sexual assault history and headache: Five general population studies. *Journal of Nervous Mental Disease*, *187*(10), 624-629.

Golding, J. M., Cooper, M. L., & George, L. K. (1997). Sexual assault history and health perceptions: Seven general population studies. *Health Psychology*, *16*(5), 417-425.

Government of Canada. (1994). *National Longitudinal Survey of Children: Overview of Survey Instruments* (Cat. No 94-02). Ottawa, Ontario: Author.

Green, C. R., Flowe-Valencia, H., Rosenblum, L., & Tait, A. R. (1999). Do physical and sexual abuse differentially affect chronic pain states in women? *Journal of Pain and Symptom Management*, *18*(6), 420-426.

Guidetti, V., & Galli, F. (2002). Psychiatric comorbidity in chronic daily headache: Pathophysiology, etiology, and diagnosis. *Current Pain and Headache Reports*, *6*(6), 492-497.

Hanson, R. F., Resnick, H. S., Saunders, B. E., Kilpatrick, D. G., & Best, C. (1999). Factors related to the reporting of childhood rape. *Child Abuse & Neglect*, *23*(6), 559-569.

Hardt, J., & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry*, *45*(2), 260-273.

Heim, C., Ehlert, U., Hanker, J. P., & Hellhammer, D. H. (1998). Abuse-related posttraumatic stress disorder and alterations of the hypothalamic-pituitary-adrenal axis in women with chronic pelvic pain. *Psychosomatic Medicine*, *60*, 309-318.

Hillis, S. D., Anda, R. F., Felitti, V. J., Nordenberg, D., & Marchbanks, P. A. (2000). Adverse childhood experiences and sexually transmitted diseases in men and women: A retrospective study. *Pediatrics*, *106*(1), E11.

Hobfoll, S. E., Bansal, A., Schurg, R., Hobfoll, I., Johnson, R., Young, S., et al. (2002). The impact of perceived child physical and sexual abuse history on Native American women's psychological well-being and AIDS risk. *Journal of Consulting and Clinical Psychology*, *70*(1), 252-257.

Hudson, J. I., & Pope, H. G. (1995). Does childhood sexual abuse cause fibromyalgia? *Arthritis and Rheumatism*, *38*(2), 161-163.

Imbierowicz, K., & Egle, U. T. (2003). Childhood adversities in patients with fibromyalgia and somatoform pain disorder. *European Journal of Pain*, *7*(2), 113-119.

Kendall-Tackett, K. (2000). The long-term health effects of victimization. *Joining Forces*, *5*(1), 1-4.

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.

Kendall-Tackett, K., & Becker-Blease, K. (2004). The importance of retrospective findings in child maltreatment research. *Child Abuse and Neglect*, *28*(7), 723-727.

Kuch, K. (2001). Psychological factors and the development of chronic pain. *Clinical Journal of Pain*, *17*(Suppl.), S33-S38.

Lampe, A., Doering, S., Rumpold, G., Solder, E., Krismer, M., Kantner-Rumplmair, W., et al. (2003). Chronic pain syndromes and their relation to childhood abuse and stressful life events. *Journal of Psychosomatic Research*, *54*(4), 361-367.

Leserman, J. (2005). Sexual abuse history: Prevalence, health effects, mediators, and psychological treatment. *Psychosomatic Medicine*, *67*(6), 906-915.

Leserman, J., Li, Z., Drossman, D. A., & Hu, Y. J. (1998). Selected symptoms associated with sexual and physical abuse history among female patients with gastrointestinal disorders: The impact on subsequent health care visits. *Psychological Medicine*, *28*(2), 417-425.

Linton, S. J. (1997). A population-based study of the relationship between sexual abuse and back pain: Establishing a link. *Pain*, *73*(1), 47-53.

Linton, S. J. (2000). A review of psychological risk factors in back and neck pain. *Spine*, *25*(9), 1148-1156.

Linton, S. J. (2002). A prospective study of the effects of sexual or physical abuse on back pain. *Pain*, *96*(3), 347-351.

MacMillan, H. L., Fleming, J. E., Streiner, D. L., Lin, E., Boyle, M. H., Jamieson, E., et al. (2001). Childhood abuse and lifetime psychiatric disorder in a community sample of Ontario residents. *American Journal of Psychiatry*, *158*(11), 1878-1883.

MacMillan, H. L., Fleming, J. E., Trocme, N., Boyle, M. H., Wong, M., Racine, Y. A., et al. (1997). Prevalence of child physical and sexual abuse in the community: Results from the Ontario Health Supplement. *Journal of the American Medical Association*, *278*(2), 131-135.

MacMillan, H. L., Jamieson, E., & Walsh, C. A. (2003). Reported contact with child protection services among those reporting child physical and sexual abuse: Results from a community survey. *Child Abuse & Neglect, 27*(12), 1397-1408.

Mayer, E. A., Berman, S., Chang, L., & Naliboff, B. D. (2004). Sex-based differences in gastrointestinal pain. *European Journal of Pain*, *8*(5), 451-463.

McBeth, J., Macfarlane, G. J., Benjamin, S., Morris, S., & Silman, A. J. (1999). The association between tender points, psychological distress, and adverse childhood experiences: A community-based study. *Arthritis and Rheumatism*, *42*(7), 1397-1404.

Meagher, M. (2004). Links between traumatic family violence and chronic pain: Biopsychosocial pathways and treatment implications. In K. A. Kendall-Tackett (Ed.), *Health consequences of abuse in the family: A clinical guide for evidence-based practice* (pp. 155-177). Washington, DC: American Psychological Association.

Meana, M., Cho, R., & DesMeules, M. (2003). Chronic pain: The extra burden on Canadian women. In M. DesMeules, D. Stewart, J. Payne, B. Vissandjée, A. Kazanjian, & H. McLean (Eds.), *The Women's Health Surveillance Report: A multidimensional look at the health of Canadian women* (pp. 35-36). Ottawa, Ontario: Canadian Institute for Health Information.

Millar, W. J. (1996). Chronic pain. *Health Report*, *7*, 47-53, 51-58.

Moulin, D. E., Clark, A. J., Speechley, M., & Morley-Forster, P. K. (2002). Chronic pain in Canada: Prevalence, treatment, impact and the role of opioid analgesia. *Pain Research and Management*, *7*(4), 179-184.

Nickel, R., Egle, U. T., & Hardt, J. (2002). Are childhood adversities relevant in patients with chronic low back pain? *European Journal of Pain*, *6*(3), 221-228.

Nijenhuis, E. R., van Dyck, R., ter Kuile, M. M., Mourits, M. J., Spinhoven, P., & van der Hart, O. (2003). Evidence for associations among somatoform dissociation, psychological dissociation and reported trauma in patients with chronic pelvic pain. *Journal of Psychosomatic Obstetrics and Gynecology*, *24*(2), 87-98.

Offord, D. R., Boyle, M. H., Campbell, D., Goering, P., Lin, E., Wong, M., et al. (1996). One-year prevalence of psychiatric disorder in Ontarians 15 to 64 years of age. *Canadian Journal of Psychiatry*, *41*(9), 559-563.

Page, T. (1999). The attachment partnership as conceptual base for exploring the impact of child maltreatment. *Child and Adolescent Social Work Journal*, *16*(6), 419-437.

Parillo, K. M., Freeman, R. C., Collier, K., & Young, P. (2001). Association between early sexual abuse and adult HIV-risky sexual behaviors among community-recruited women. *Child Abuse & Neglect*, *25*(3), 335-346.

Penza, K. M., Heim, C., & Nemeroff, C. B. (2003). Neurobiological effects of childhood abuse: Implications for the pathophysiology of depression and anxiety. *Archives of Women's Mental Health*, *6*(1), 15-22.

Pincus, T., Burton, A. K., Vogel, S., & Field, A. P. (2002). A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. *Spine*, *27*(5), E109-E120.

Raphael, K. G., Chandler, H. K., & Ciccone, D. S. (2004). Is childhood abuse a risk factor for chronic pain in adulthood? *Current Pain and Headache Reports*, *8*(2), 99-110.

Raphael, K. G., Widom, C. S., & Lange, G. (2001). Childhood victimization and pain in adulthood: A prospective investigation. *Pain*, *92*(1-2), 283-293.

Reissing, E. D., Binik, Y. M., Khalife, S., Cohen, D., & Amsel, R. (2003). Etiological correlates of vaginismus: Sexual and physical abuse, sexual knowledge, sexual self-schema, and relationship adjustment. *Journal of Sex and Marital Therapy*, *29*(1), 47-59.

Rimsza, M. E., Berg, R. A., & Locke, C. (1988). Sexual abuse: Somatic and emotional reactions. *Child Abuse & Neglect*, *12*(2), 201-208.

Scarinci, I. C., McDonald-Haile, J., Bradley, L. A., & Richter, J. E. (1994). Altered pain perception and psychosocial features among women with gastrointestinal disorders and history of abuse: A preliminary model. *American Journal of Medicine*, *97*(2), 108-118.

Shea, A., Walsh, C. A., MacMillan, H. L., & Steiner, M. (2005). Child maltreatment, HPA axis dysregulation and psychiatric morbidity in females. *Psychoneuroendocrinology*, *30*(2), 162-178.

Simpson, T. L., & Miller, W. R. (2002). Concomitance between childhood sexual and physical abuse and substance use problems: A review. *Clinical Psychological Review*, *22*(1), 27-77.

Taylor, M. L., Trotter, D. R., & Csuka, M. E. (1995). The prevalence of sexual abuse in women with fibromyalgia. *Arthritis and Rheumatism*, *38*(2), 229-234.

Teicher, M. H., Andersen, S. L., Polcari, A., Anderson, C. M., & Navalta, C. P. (2002). Developmental neurobiology of childhood stress and trauma. *Psychiatric Clinics of North America*, *25*(2), 397-426, vii-viii.

Turk, D. C., & Okifuji, A. (2002). Psychological factors in chronic pain: Evolution and revolution. *Journal of Consulting and Clinical Psychology*, *70*, 678-690.

Van Den Kerkhof, E. G., Hopman, W. M., Towheed, T. E., Anastassiades, T. P., Goldstein, D. H., & Canadian Multicentre Osteoporosis Study Research Group. (2003). The impact of sampling

and measurement on the prevalence of self-reported pain in Canada. *Pain Research & Management: Journal of the Canadian Pain Association*, *8*(3), 157-163.

Van Houdenhove, B., Neerinckx, E., Lysens, R., Vertommen, H., Van Houdenhove, L., Onghena, P., et al. (2001). Victimization in chronic fatigue syndrome and fibromyalgia in tertiary care: A controlled study on prevalence and characteristics. *Psychosomatics*, *42*(1), 21-28.

Verhaak, P. F., Kerssens, J. J., Dekker, J., Sorbi, M. J., & Bensing, J. M. (1998). Prevalence of chronic benign pain disorder among adults: A review of the literature. *Pain*, *77*(3), 231-239.

Vythilingam, M., Heim, C., Newport, C. D., Miller, A. H., Vermetten, E., Anderson, E., et al. (2002). Reduced hippocampal volume in adult major depression: The role of childhood trauma. *American Journal of Psychiatry*, *159*(4), 2072-2080.

Wittchen, H. U. (1994). Reliability and validity studies of the WHO's Composite International Diagnostic Interview (CIDI): A critical review. *Journal of Psychiatric Research*, *28*(2), 57-84.

World Health Organization. (1990). *Composite International Diagnostic Interview (CIDI): a) CIDI interview (version 1.0), b) CIDI-user manual, c) CIDI training manual, d) CIDI-computer programs*. Geneva, Switzerland: World Health Organization.

Yucel, B., Ozyalcin, S., Sertel, H. O., Camlica, H., Ketenci, A., & Talu, G. K. (2002). Childhood traumatic events and dissociative experiences in patients with chronic headache and low back pain. *Clinical Journal of Pain*, *18*(6), 394-401.

Zaza, C., & Baine, N. (2002). Cancer pain and psychosocial factors: A critical review of the literature. *Journal of Pain and Symptom Management*, *24*(5), 526-542.

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