# Childhood abuse, chronic pain, and depression in the National Comorbidity Survey[☆]

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## Abstract

**Objective:** The current study examined the effects of childhood sexual and physical abuse on reports of pain in men and women ($N = 1,727$).

**Methods:** Data from the National Comorbidity Survey, a nationally representative sample, were utilized. Childhood experiences of physical and sexual abuse were assessed, and pain reports in relation to current health problems were obtained. Regression and mediation analyses were used to examine the relationship between childhood abuse and current pain reports and to determine whether depression mediated this relationship.

**Results:** Individuals who experienced abuse reported more health problems compared to those participants without abuse histories. Among participants with a current health problem, those who experienced abuse reported more pain compared to those participants without abuse histories. Because childhood abuse is associated with depression and depression is associated with more reported pain, the influence of depression on the relationship between childhood abuse and adult pain reports was examined. After controlling for differences between the abused and non-abused participants on specific health problems, depression was not found to have mediated the relationship.

**Conclusions:** Childhood abuse was associated with more reported pain. The higher rate of depression found among adults who experienced childhood abuse was not the primary factor for these increased pain reports. Rather, childhood abuse and depression independently contributed to pain reports. Treatment of both underlying problems

(i.e., pain and depression) is recommended in addressing the needs of abused individuals with these comorbid disorders.

## Introduction

Researchers from a wide range of medical specialties have noted that a relatively high percentage of patients with chronic pain have a history of childhood physical or sexual abuse (Kendall-Tackett, 2001). Specifically, clinical and case-control studies have found a higher proportion of child abuse survivors among patients with chronic pain syndromes, including generalized pain (Finestone et al., 2000; Green, Flowe-Valencia, Rosenblum, & Tait, 2001; Kendall-Tackett, 2001; Kendall-Tackett, Marshall, & Ness, 2003), pelvic pain and vulvodynia (Harlow & Stewart, 2005; Lampe et al., 2003), fibromyalgia (Boisset-Pioro, Esdaile, & Fitzcharles, 1995), chronic musculoskeletal pain (Kopec & Sayre, 2004), headache (Golding, 1999), irritable bowel syndrome and gastro-intestinal illnesses (Drossman et al., 2000; Leserman et al., 1996; Talley, Fett, & Zinsmeister, 1995). However, many of these studies were conducted in clinical settings, with participants who were being treated for chronic pain. As suggested by Raphael, Chandler, and Ciccone (2004), studies based on clinical samples can be problematic since there is a relationship between health care utilization and self-reported abuse, which may, in turn, artificially increase the apparent relationship between abuse and pain. Because abuse survivors who seek treatment for pain may not be representative of abuse survivors in the population, epidemiological studies may further enhance our understanding of the relationship between childhood abuse and pain reports.

Epidemiological studies have generally supported findings garnered from clinically based samples, and have found that painful medical conditions (e.g., painful gynecological problems, headaches, arthritis, musculature pain, tender-point pain, back pain, and generally distressing physical symptoms) are more common in abuse survivors (Golding, 1994, 1999; Goodwin, Hoven, Murison, & Hotopf, 2003; Linton, 2002; McBeth, Macfarlane, Benjamin, Morris, & Silman, 1999; Romans, Belaise, Martin, Morris, & Raffi, 2002; Walker et al., 1999).

In contrast, in their review of case-control and population-based studies based on cross-sectional and prospective data examining the relationship between childhood abuse and pain, Raphael et al. (2004) argue that findings have been mixed. Specifically, they found that five out of six studies examining childhood sexual abuse and pain (Bendixen, Muus, & Schei, 1994; Jamieson & Steege, 1997; Linton, 1997; Newman et al., 2000; Romans et al., 2002) found higher rates of pain associated with abuse. For the two cross-sectional studies that reported on childhood physical abuse and pain (Goodwin et al., 2003; Romans et al., 2002), only one found an association between abuse and pain. Findings for the two prospective studies were again mixed. In a prospective study (based on participants' retrospective reports of abuse), Linton (2002) found that among participants with no pain at baseline, childhood abuse was associated with an increased occurrence of new episodes of back pain 1 year later (OR = 2.65). However, for those already reporting back pain at baseline, no clear relationship between childhood sexual or physical abuse and pain at follow-up was shown.

In another study, investigators examined the relationship between childhood abuse and pain, both prospectively and retrospectively, in the same participants (Raphael, Widom, & Lange, 2001). Children

were identified as abused based on documented cases and were matched with a non-abused comparison group. These children were followed into young adulthood and were asked retrospectively about childhood abuse experiences and about current pain syndromes. The prospective results, based on the comparison of groups identified as abused or non-abused during childhood, showed no relation between past abuse and pain syndromes. In contrast, the retrospective reports of abuse from these same participants did show a relationship. Inconsistencies in findings may be the result of the misidentification of the participants. For example, when interviewed as young adults, almost half (49%) of the matched "non-abused" control group participants reported childhood abuse experiences. Therefore, it is not surprising that there were no differences found in the prospective study. The retrospective data from these participants were consistent with previous studies finding an association between childhood abuse and pain.

## Childhood abuse and depression

Depression is common among adult survivors of childhood physical and sexual abuse (Levitan et al., 1998; Molnar, Buka, & Kessler, 2001; Roosa, Reinholtz, & Angelini, 1999; Turner & Muller, 2004). Biological, psychological, and social mechanisms have been identified linking childhood abuse to depression. For example, changes in neurological processes increasing sensitivity to stress (Drossman, 1994; Heim, Newport, Bonsall, Miller, & Nemeroff, 2001) and a negative attributional style (Sachs-Ericsson, Verona, Joiner, & Preacher, 2006) are associated with childhood abuse and an increased risk of depression. Further, individuals with a history of sexual assault have less support from friends and family (Golding, Wilsnack, & Cooper, 2002), and social support has been repeatedly shown to be a major protective factor against depression (Plant & Sachs-Ericsson, 2004).

## Pain and comorbid depression

Comorbidity between pain and psychiatric disorders has been well established (Dersh, Polatin, & Gatchel, 2002), and psychiatric conditions may enhance the experience of pain (Hernandez & Sachs-Ericsson, 2006). Of the psychiatric conditions comorbid with pain, the most common is depression (Faucett, 1994; Fishbain, Cutler, Rosomoff, & Rosomoff, 1997; Kendall-Tackett, 2003; Magni, Moreschi, Rigatti-Luchini, & Merskey, 1994; McWilliams, Cox, & Enns, 2003; Van Houdenhove & Egle, 2004). For example, using data from the National Comorbidity Survey (NCS), McWilliams et al. (2003) found that for participants with arthritis, chronic pain was positively associated with both mood and anxiety disorders.

There have been many explanations offered as to why there is a high comorbidity between painful medical conditions and depression. Depression may have existed before the pain symptoms, or they both may have been caused by a common neurobiological mechanism (Malt, Berle, Olafsson, Lund, & Ursin, 2000). The high comorbidity found between pain and depressive symptoms may be related to the characteristics that they share, including lower levels of serotonin, sleep disturbances, and cognitive distortions (Kendall-Tackett, 2003). Psychiatric conditions may have also developed as a response to living with chronic pain (Van Houdenhove & Egle, 2004).

Despite the overlap of the conditions, the role of depression in chronic pain is still not entirely understood. For abuse survivors, severity of the abuse experience may influence both the severity of depression and chronic pain (Walker, Katon, Roy-Byrne, Jemelka, & Russo, 1993). However, childhood abuse may not be directly related to increased painful medical conditions but rather may have an indirect effect

through the increased risk of depression (Sachs-Ericsson, Blazer, Plant, & Arnow, 2005). Given the still unclear connection between childhood abuse, chronic pain, and depression, the present study will explore this relationship by considering whether depression mediates the relationship between abuse and pain.

*Research questions*

The present study will add to the existing literature in several ways. First, the data is derived from a large community sample, and thus is not based on a clinical or utilization sample but rather a representative US sample of adult men and women. Second, our analysis will not limit itself to a single medical condition. Painful medical conditions that have a relatively low base rate in the population are less likely to show significant differences between abused and non-abused participants than disorders that are more prevalent. In the current study we examine the effects of childhood abuse (sexual or physical) on pain reports in men and women with a considerable range of current health problems. Third, the possible influence of clinical depression on the relationship between childhood abuse and pain will also be examined in order to clarify whether increased pain reports in abuse survivors are related to increased rates of depression.

We predict that participants who experienced childhood abuse will report more pain in relation to their health problems when compared to non-abused participants with current health problems. Additionally, because of the overlap between symptoms of pain and depression, the influence of depression on the relationship between abuse and pain will also be explored.

## Method

*Sample*

The current study draws on the National Comorbidity Survey (Kessler et al., 1997), a nationwide epidemiological study designed to assess the prevalence and psychosocial correlates of psychiatric disorders. Researchers administered the survey to a national US sample. The survey was carried out in the early 1990s with a household sample of over 8,000 respondents, aged 15–54 years. Part II (which included questions related to psychosocial correlates of psychiatric disorders, including childhood abuse and recent medical problems) was administered to respondents who screened positive for any lifetime diagnosis in Part I, and a random sample of participants assessed in Part 1 who did not receive a diagnosis. The current report is based on the second sub-sample who received Part II ($N = 5,877$). More detailed descriptions of the NCS sampling design and procedures are reported elsewhere (Kessler et al., 1994; Kessler & Walters, 2003). The original NCS data collection protocol was approved by the University of Michigan's Internal Review Board (IRB). Secondary analysis, for data made available for public access with no personal identifiers, such as the NCS, is exempt from IRB approval at the home institution of the first author.

*Sampling and weighting.* Participants were selected through a multistage area probability sample based on households within a stratified sample of counties in the US. The response rate was 82.6%. Weights were developed to adjust for differential probability of selection both within and between households and to adjust the data to the national population distribution. More details on weighting are reported elsewhere (Kessler, 1994; Kessler et al., 1994).

*Participants.* Participants were interviewed in their homes, and informed consent was obtained prior to the interview being conducted. There was an equal distribution of men and women. The average age of the participants was 33.2 years (*SD* = 10.7), and participants were 75.6% Caucasian, 11.6% African American, 9.4% Hispanic, and 3.4% categorized as "Other."

*Interviewers.* The interviewers were 158 individuals who had an average of 5 years of experience in interviewing. The interviewers received an intensive 7-day training course and were carefully supervised.

## Measures

To improve the accuracy of participants' responses, the researchers provided a life review section at the beginning of the interview that provided participants with instructions designed to improve recall and to motivate them to answer items honestly (Kessler, 2000). Several other procedures were conducted to improve reliability of the data particularly in regard to abuse. Specifically, field studies, including a pilot study, were conducted and certain procedures used in the survey (described below) were identified that increased the validity of the reports of traumatic events (e.g., child abuse) (see Kessler et al., 1998).

*Childhood experiences of abuse.* The physical and sexual abuse items were embedded in a section that assessed childhood and adult adverse experiences, followed by an assessment of post-traumatic stress disorder (PTSD) which may have occurred in response to such adverse life experiences. When the childhood and adult adverse experiences module was introduced, participants were provided with a booklet containing a numbered list of the traumas. Previous studies found that some participants were uncomfortable talking about abuse (see Kessler et al., 1999). Instead of asking participants directly about these abuse experiences, participants were asked to read the descriptions of each traumatic event and then indicate to the interviewer the number representing each of the events that they had experienced in their lifetimes. While piloting the NCS, researchers found that referring to the traumatic event by number (e.g., "At what age did Event #1 first occur?"), rather than by the description of the event, increased the participants' willingness to report such incidents (Kessler et al., 1999) and increased accuracy of recall (Kessler & Wethington, 1991). It is also important to note that the PTSD module of the NCS, in which the abuse items were embedded, has been shown to have good validity and reliability (Kessler, 2000).

*Abuse items.* The list of negative life events included the following two items related to rape and molestation: (a) "You were raped? (Someone had sexual intercourse with you when you did not want to by threatening you or using some degree of force)" and (b) "You were sexually molested? (Someone touched or felt your genitals when you did not want them to)." If participants responded positively to either question, they were then asked the age at which the event first occurred. Respondents who reported that they had been raped or molested before the age of 15 were coded 1 (*Yes*) for childhood sexual abuse, while the other participants were coded 0 (*No*).

The list of negative events also included a question about childhood physical abuse: "You were physically abused as a child?" Participants who reported that they had been physically abused as a child were coded 1 (*Yes*), and the other participants were coded 0 (*No*).

In a subsequent section on family life, participants were asked if they had experienced physical abuse growing up in their family, first for milder physical abuse (pushed, grabbed, or shoved) and then for more severe abuse (kicked, bit, hit with a fist or hit with something, beat up, choked, or burned). An

analysis was completed to assess the reliability of the self-reported physical abuse obtained during the PTSD module with the physical abuse reported by participants during the family section. Results showed considerable agreement. Specifically, for the sample as a whole, less than 1% who reported experiencing severe parental abuse in their family did not report being physically abused within the PTSD section. Furthermore, when limiting the sample to only those with a health problem (the focus of the current paper), among participants who reported that that they had been physically abused in the PTSD section, only three participants did not acknowledge physical abuse within the subsequent family section. Moreover, only 11 participants who stated that they had often been physically abused in the family section did not report physical abuse in the earlier module. This strongly supports the validity and reliability of our assessment.

*Any childhood abuse (physical or sexual).* Because of the relatively low rate of sexual or physical abuse in the NCS sample (see Sachs-Ericsson et al., 2005), and to increase power for the analyses that examined the relationship between abuse and pain, a variable was created (i.e., any childhood abuse) that combined childhood sexual and physical abuse. Participants who reported that they had not experienced molestation, rape, or physical abuse in childhood were coded 1 *(No abuse)*, and participants who had experienced molestation, rape, or physical abuse in childhood were coded 2 *(Yes abuse)*.

*Health problems.* Participants were asked to look at a list of health problems and to indicate whether they had experienced any of these problems during the 12 months prior to the interview. Based on their responses, participants were then coded 0 *(No)* or 1 *(Yes)* for health problems. Health problems included AIDS; severe arthritis or rheumatism, or other bone and joint diseases; severe asthma, bronchitis, tuberculosis, or other serious lung problems; blindness or deafness; diabetes; high blood pressure; heart attack or serious heart problems; severe kidney or liver disease; severe hernia or rupture, lupus, thyroid, or autoimmune disorders; multiple sclerosis, epilepsy, or neurological condition; stroke; chronic stomach or gallbladder disease; ulcers; cancer; or any other major medical problem. Participants were asked to give the number from the booklet that corresponded with each health problem they had experienced.

*Pain.* If participants identified having one or more health problems in the last 12 months they were asked about their current experience of pain in relation to their health problems. Specifically, participants were asked: "How much pain do you experience as a result of your health problems?" Participants responded by using a 4-point Likert-type scale anchored by 1 *(None at all)* to 4 *(A lot)*.

Assessment of the validity of the pain measurement is by its very nature difficult to ascertain, because pain is a subjective experience which is assessed predominately through participants' subjective self-report. However, other researchers have used single-item self-report measures of pain, and research supports the validity of one- and two-item versions of commonly used measures of pain (Jensen, 2003).

However, to obtain some indication of the validity and reliability of the pain measure, we examined the correlation between participants' report of pain experienced in relation to their health problem and their subsequent report of the degree to which their health problem interfered with their functioning, which was also rated on a 4-point Likert-type scale. The responses were strongly correlated ($r$ ($n = 1,701$) = .53, $p < .01$), further supporting the validity and reliability of the pain measure.

*Participant's DSM 1-year depression.* The Composite International Diagnostic Interview (CIDI; World Health Organization, 1990), a semi-structured interview, was used to assess the participants' 1-year, *DSM-III-R* psychiatric diagnoses (APA, 1987). The reliability and validity of the CIDI have been established

(Wittchen, 1994). While the current study included only the 1-year diagnoses of major depression, several other psychiatric disorders were also assessed in the NCS.

## Family-of-origin characteristics

*Family-of-origin parental absence.* Participants were asked to indicate if, before the age of 15, they had experienced separation from at least one parent as a function of divorce, death, or abandonment. Participants' responses were coded 0 (*Yes*) or 1 (*No*).

*Family-of-origin income.* Participants were asked to compare their family's income to the average family in their community at the time they were growing up, on a scale from 1 (*Better off*) to 4 (*A lot worse off*).

## Data analyses

First, we performed a series of analyses to provide descriptive statistics for the NCS sample as a whole including the abuse-related characteristics. We then identified the sub-sample of participants who had indicated that they had a health problem ($n = 1,727$), and described this sub-sample's characteristics.

Next, we conducted regression analyses to examine the relationship of childhood abuse to pain reports among individuals with a current health problem ($n = 1,727$). In the first step of the analysis, we included participants' demographics (e.g., gender, age), family-of-origin characteristics associated with childhood abuse (i.e., family-of-origin parental absence and family-of-origin income) (Romans et al., 2002), and the specific health problems that were found to differ between abused and non-abused participants. In this first step of the model, we then included childhood abuse to determine if abuse was related to pain reports.

In the second step of the model, 1-year DSM depression was entered to examine whether the contribution of abuse in predicting pain was reduced with the inclusion of depression (Baron & Kenny, 1986). The role of depression in mediating the relationship between abuse and pain reports was formally tested using a Sobel test (Sobel, 1982), a statistical test to determine whether any observed reduction in the relationship between the predictor variable (abuse) and outcome variable (pain reports) with the inclusion of the mediator (depression) was statistically significant.

## Results

### Abuse characteristics for the NCS sample as a whole

Among the sample as a whole ($N = 5,877$), 10.6% reported a history of any childhood abuse (physical or sexual). Specifically, 3.8% reported they had been physically abused (but not sexually abused) as a child, 5.0% reported they had been sexually abused (but not physically abused) as a child, and 1.8% reported they had been both sexually and physically abused. The type of sexual abuse reported by participants was molestation (5.1%) and rape (1.6%). More women than men reported a history of physical abuse (5.1% vs. 3.3%, $p < .01$) and sexual abuse (11.4% vs. 2.0%, $p < .01$).

For the sample as a whole, among participants who had been molested or raped, 51.9% and 75.5%, respectively, reported it was an isolated event, with the remaining participants reporting an average dura-

tion of molestation of 2.5 years ($SD = 3.5$) and of rape of 3.0 years ($SD = 4.5$). Perpetrators of molestation were relatives/step relatives (59.7%), non-relatives (30.7%), or strangers (9.6%). Perpetrators of rape were relatives/step relatives (24.8%), non-relatives (51.3%), or strangers (23.9%).

For the sample as a whole, among participants who acknowledged childhood physical abuse in the earlier PTSD module, most reported experiencing physical abuse in their family when growing up. The vast majority (80%) reported that they sometimes or often experienced mild physical abuse in their family. Further, over two-thirds reported experiencing more severe forms of physical abuse (e.g., kicking, biting, hitting with a fist or other object, and burning) in their family. Physical abuse perpetrators included parents (67%), step parents (21%), and others (12%).

*Current health problems and childhood abuse*

For the sample as a whole, individuals who experienced any form of childhood abuse were more likely to report having a health problem in the last 12 months than those without any childhood abuse (37.0% vs. 22.5%, $p < .01$). Because we only obtained pain ratings for those participants with a health problem, the focus of this paper and the remaining analyses were restricted to those participants ($N = 1,727$) who had any health problem in the last 12 months. Among this sub-sample, the average age was 36.2 ($SD = 10.8$), and participants were 76.7% Caucasian, 11.7% African American, 9.1% Hispanic, and 2.5% categorized as "Other." Among the participants, 53.2% were female.

Among this sub-sample, two groups were identified based on history of abuse. The first group (85.3%, $N = 1,473$) had a current health problem but did not report having experienced any childhood sexual or physical abuse; the second group (14.7%, $N = 254$) had a current health problem and reported experiencing childhood sexual or physical abuse. There were no significant differences between these two groups for average age, or for racial composition. Descriptive statistics are provided in Table 1.

For the NCS sample as a whole, participants with a history of childhood abuse had higher rates of several specific health problems. However, when limiting the sample to only those individuals with a health problem (the current study sample), there were few significant differences in specific health problems between those with abuse histories and those without abuse histories (see Table 2). Participants with childhood abuse histories did report experiencing more health problems for only one of the health categories: lupus, thyroid, or autoimmune diseases (8.4% vs. 4.3%, $p < .05$). Further, abused participants also reported having more "any other major medical problem" than the non-abused participants (36.4% vs. 28%, $p < .01$). Abused participants had, on average, more medical problems than those without abuse [1.67 problems vs. 1.45 problems; $F (1, 1,725) = 11.5$, $p < .01$]. Finally, rates of

Table 1

Sub-sample of NCS participants with at least one health problem in the last 12 months: demographics by abuse history

| | Childhood abuse No ($n = 1,473$) | Childhood abuse Yes ($n = 254$) | $p$ value |
|---|---|---|---|
| Gender (% female) | 50.2% | 73.7% | <.01 |
| Family-of-origin parental absence (Yes or No) | 25% (Yes) | 48% (Yes) | <.01 |
| Age (years) | 36.36 ($SD = 10.7$) | 35.27 ($SD = 10.6$) | *ns* |
| Family-of-origin income[a] | 2.0 ($SD = .9$) | 2.3 ($SD = 1.1$) | <.01 |

[a] 1 (*Better off*) to 4 (*A lot worse off*) than others in my community.

Table 2

Sub-sample of NCS participants with at least one health problem in the last 12 months: frequency of health problems by abuse history

| Medical problem | Childhood abuse No ($n$ = 1,473) (%) | Childhood abuse Yes ($n$ = 254) (%) | $p$ value |
|---|---|---|---|
| High blood pressure | 28.2 | 24.8 | .27 |
| Other major medical problem | 28.0 | 36.4 | <.01 |
| Severe arthritis, rheumatism, or other bone and joint disease | 21.9 | 23.4 | .65 |
| Severe asthma, bronchitis, or TB or other serious lung problems | 17.3 | 21.3 | .13 |
| Chronic stomach or gall bladder problems | 10.4 | 10.5 | .92 |
| Ulcer | 7.4 | 2.4 | .06 |
| Diabetes | 7.3 | 5.7 | .51 |
| Blind or deaf | 7.2 | 7.0 | .94 |
| Lupus, thyroid, or autoimmune disease | 4.3 | 8.4 | .011 |
| Multiple sclerosis, epilepsy, or neurological condition | 2.8 | 3.8 | .33 |
| Heart attack or serious heart problem | 2.8 | 3.2 | .75 |
| Cancer | 2.3 | 2.4 | .9 |
| Severe hernia or rupture | 2.2 | 3.7 | .19 |
| Severe kidney or liver disease | 2.0 | 3.5 | .14 |
| Stroke | .5 | 1.2 | .24 |
| AIDS | .2 | 0 | 1.0 |

1-year major depression were greater for the abused group than the non-abused group (19.7% vs. 11.9%, $p < .01$).

### Childhood abuse and pain reports

In order to examine the influence of childhood abuse and depression on pain reports, a regression analysis was performed, and the results are summarized in Table 3. In the first step of the analysis, we entered participants' gender, age, and family-of-origin variables. We also controlled for differences in health problems between abused and non-abused participants. Specifically, abused participants reported having a higher frequency of lupus or other autoimmune diseases, any other major medical problem, and number of medical problems; thus, these variables were controlled for in the analyses and each of these health variables were found to predict pain reports. We then entered any childhood abuse. As shown in Table 3, gender, age, family-of-origin income, and parental absence were unrelated to pain reports. Even with the inclusion of the control variables, childhood abuse was still associated with higher pain reports $[F (1, 1,678) = 4.53, p = .033]$.

Because previous research has shown that individuals with depression report more pain, we wished to determine whether those participants who were depressed reported more pain than those who were not depressed. Thus, depression was entered in the second step of the regression analysis. Indeed, depressed individuals reported more pain than those who were not depressed $[F (1, 1,678) = 5.83, p = .02]$. However, after depression was entered, abuse was still related to pain reports such that participants who had been abused reported more pain $[F (1, 1,682) = 4.06, p = .04]$. That is, after controlling for the effect of depression, the relationship between pain reports and abuse remained significant. Therefore, depression did not *fully* mediate the relationship between abuse and pain. However, the relationship between abuse and

Table 3
Childhood abuse, depression, and covariates regressed on to pain reports

| Step | Variables | Unstandard beta | SD error | Standard beta | F | p value | Partial correlation |
|------|-----------|-----------------|----------|---------------|---|---------|---------------------|
| 1 | Age | −.002 | .002 | −.024 | .10 | .32 | −.022 |
|   | Gender | .047 | .051 | .021 | .84 | .36 | .021 |
|   | Family-of-origin income | .040 | .028 | .033 | 2.06 | .15 | .032 |
|   | Family-of-origin parental absence | .078 | .059 | .032 | 1.78 | .18 | .030 |
|   | Lupus, thyroid, or autoimmune disease | −.424 | .119 | −.083 | 12.71 | <.01** | −.080 |
|   | Other major medical problem | −.081 | .014 | −.133 | 32.94 | <.01** | −.129 |
|   | Number of medical problems | .396 | .029 | .333 | 192.65 | <.01** | .313 |
|   | Any abuse | .156 | .073 | .05 | 4.53 | .03* | .048 |
| 2 | | | | | | | |
|   | Depression | .183 | .076 | .056 | 5.83 | .02* | .054 |
|   | Any abuse | .148 | .073 | .047 | 4.06 | .04* | .045 |

* $p < .05$.
** $p < .01$.

pain appeared to have diminished with the inclusion of depression, and, therefore, we wished to determine if participants' depression *partially* mediated the relationship between childhood abuse and pain.

*Mediation analyses*

Several conditions must be met to establish mediation (Baron & Kenny, 1986; Sobel, 1982). As described by Holmbeck (1997), the nature of the mediated relationship is such that the independent variable (abuse) influences the mediator (depression), which, in turn, influences the outcome (pain). Also, critical is the association between the independent and dependent variable. The first condition was already established that abuse (independent variable) predicted pain (dependent variable). Next, a regression analysis revealed that abuse predicted the potential mediator, depression [$F (1, 1,723) = 24.2$, $p < .01$]. As described above and establishing a further condition, depression was related to increased pain. To examine the final condition, a Sobel test (Baron & Kenny, 1986; Sobel, 1982) was conducted and indicated that depression did not mediate the relationship between abuse and pain (Sobel $z = 1.73$, $p = .08$).

**Discussion**

The present study, using data derived from a large epidemiological sample, examined the effects of childhood abuse (sexual or physical) on pain reports in men and women with current health problems. It also investigated the role of depression in mediating this relationship. Participants with a history of childhood sexual or physical abuse reported more pain in relation to their specific health problems. Additionally, higher rates of 1-year depression were found among participants with a health problem who

had been abused compared to those who had not been abused, and depression was associated with higher pain reports. However, after controlling for differences in health problems, depression was not found to mediate the relationship between abuse and pain reports. Thus, the higher rate of depression found among abuse survivors was not the primary factor for these increased pain reports. Rather, childhood abuse and depression independently contributed to higher pain reports.

Several theories have been put forth to account for the higher rate of pain symptoms and painful medical conditions associated with childhood abuse. Pain is truly a biopsychosocial phenomenon. The experience of pain can be modified by a wide range of factors including attitudes and beliefs about pain, coping style, and level of social support. Kendall-Tackett (2001) suggested that childhood abuse may contribute to the types of cognitions and beliefs that are likely to increase the experience of pain. For example, a pessimistic attributional style is more common among abuse survivors (Sachs-Ericsson et al., 2006), and this may contribute to catastrophic and distorted beliefs about bodily sensations that serve to amplify the pain response (Kendall-Tackett et al., 2003). Abuse survivors are also more vulnerable to current stressors and may have limited social support (Golding et al., 2002), both of which exacerbate pain. A theory which may best describe this complex interplay of factors is the gate control theory (Meagher, 2004). According to the gate control theory (Melzack & Wall, 1965), an area of the spinal cord, the dorsal horn, operates as the gate that allows sensations to be transmitted to the brain. The brain plays a dynamic role in the processing of painful perceptions (Meagher, 2004). Thoughts, beliefs, and emotions may also affect how much pain one feels. For example, if people are highly distressed or agitated, they are likely to experience more pain since it is hypothesized that their agitation is opening the gate and amplifying the painful experience to promote hypervigilance in the face of danger. In contrast, positive emotions may close the gate, leading to less pain (Meagher, 2004).

Arnow, Hart, Hayward, Dea, and Barr Taylor (2000) suggested that trauma-related alterations in neurosensory processing may amplify pain (Drossman, 1994), and childhood abuse may actually lower pain thresholds. Moreover, there appears to be an interaction between early trauma and chronic stress that produces pathophysiological responses such as hypothalamic-pituitary-adrenal axis dysregulation (Heim et al., 2001), which increases the probability of developing a number of conditions associated with chronic pain, such as autoimmune diseases (Heim, Ehlert, Hanker, & Hellhammer, 1998). Consistent with this theory, we found that abused participants had higher rates of autoimmune disease than non-abused participants.

Not surprisingly, among participants with health problems, childhood abuse was associated with depression, and depression was associated with higher pain reports. An association between depression and pain has been found repeatedly in the literature (Dersh et al., 2002; Faucett, 1994; Fishbain et al., 1997). Biologically, there is related neurochemistry underlying both depression and pain that may enhance the association (Andrews & Pinder, 2000; Bair, Robinson, Katon, & Kroenke, 2003; Blackburn-Munro & Blackburn-Munro, 2001; Fava, 2003). Analgesic effects are produced by some of the same neurotransmitters that have been implicated in depression, such as serotonin and norepinephrine (Andrews & Pinder, 2000; Blackburn-Munro & Blackburn-Munro, 2001). Thus, the association between pain and depression may be due, in part, to the neurochemical impact depression plays in the pain response (Blackburn-Munro & Blackburn-Munro, 2001).

Because depression is higher among abuse survivors, and depression is associated with higher pain reports, we considered whether depression would mediate the relationship between childhood abuse and pain. However, when the variance in pain reports due to the participants' number and type of health problems was included in the analysis, depression was not found to mediate the relationship between

abuse and pain. Thus, it appears that higher rates of depression among abused individuals are not a primary factor in their increased level of pain. Rather, both childhood abuse and depression independently contributed to higher pain reports.

One relevant study (Heim et al., 2001) found that non-depressed women reporting childhood abuse exhibited elevated adrenocorticotropic hormone (ACTH) responses to corticotropin-releasing factor (CRF), while depressed women (with or without childhood abuse) showed blunted ACTH responses to CRF administration. Thus, both non-depressed individuals with childhood abuse and individuals with depression (with and without childhood abuse) have been found to have hypothalamic-pituitary-adrenal axis dysregulation, which has been implicated in several pain syndromes. Thus, consistent with our findings, it may be that childhood abuse and depression independently contribute to enhanced pain experience.

*Limitations*

In interpreting the findings from this investigation, it is important to consider several methodological limitations. First, the study relied on self-reports of participants' abuse histories that did not incorporate a high degree of behavioral specificity. Researchers have found that questions regarding abuse history that incorporate a high degree of specificity (e.g., being forced to fondle or have oral sex with someone else, or penetration with objects, fingers, etc.) elicit greater rates of reporting than those that do not (Fisher, Cullen, & Turner, 2000). Indeed, other investigations have reported substantially higher rates of both sexual and physical abuse than that reported in this study (Felitti et al., 1998; Walker et al., 1999). As we have stated in our previous papers (Sachs-Ericsson et al., 2005), it is possible that the NCS underestimated rates of childhood abuse because of the lack of specificity of the abuse-related items. In this regard, childhood abuse experiences may be more salient to those who were most affected by the abuse (e.g., those experiencing health and pain problems). In contrast, given the lack of specificity of the abuse items, those least affected by the abuse may be more likely to underreport abuse experiences. Possible underreporting of abuse by those least affected by the abuse may have enhanced the apparent relationship between abuse and reported pain in the current study.

An additional limitation relates to our inability to control for the severity of a health problem. While the number and type of specific health problems could be controlled for, differences in the severity of the health problems between abused and non-abused groups may also have contributed to differences in pain reports. Again, participants with a more severe health problem or who were experiencing more pain may have had a selective bias to recall abuse experiences. Indeed, some studies have suggested that individuals who have painful medical conditions may have a bias to recall abuse (McBeth, Morris, Benjamin, Silman, & Macfarlane, 2001). Recall bias could lead to over-estimating the relationship between abuse and pain. However, Edwards et al. (2001), in their study of recall bias, found no evidence for this type of recall bias effect.

An additional limitation is in the use of single-item, self-report assessments of health problems and a single-item, Likert-type rating of pain. Further, the pain measure is a non-specific pain assessment, not related to body systems, but rather a global assessment of pain which limits the generalizabilty of results. Although it is important to note that single-item, self-report assessments of health and of pain have psychometric limitations, perceived health has been shown to provide an accurate gauge of physical health outcomes (e.g., Pettit et al., 2001; Schmidt & Telch, 1997) to have good predictive validity (Idler & Kasl, 1991; Schoenfeld, Malmrose, Blazer, Gold, & Seeman, 1994), and good agreement with

physician diagnosis (Kobasa, Maddi, & Courington, 1981). Moreover, research supports the validity of one- and two-item versions of commonly used measures of pain (Jensen, 2003). Further, we found good agreement between participants' report of pain in relation to their health problem and participants' report of limitations in functioning due to their health problem, further supporting the validity and reliability of the pain assessment.

It is also important to consider that the NCS data were collected in the early 1990s. This is a large, nationally representative epidemiological sample from which there are data related to the study hypotheses (e.g., childhood abuse, DSM depression, and current pain ratings associated with health problems). There is no apparent reason why the relation of childhood abuse to current pain reports would have substantially changed with a more recent cohort.

A further consideration is that the data were cross-sectional, thus limiting any firm conclusion on causality. In this regard, Raphael et al. (2004) point out that most studies finding significant effects of abuse on pain were based, as was ours, on large cross-sectional data sets that relied on self-reported abuse status. Results based on longitudinal data may be more conclusive in furthering our understanding of the influence of childhood abuse on subsequent health and painful medical conditions. This is an important area for future research.

*Implications*

Our findings support the hypothesis that pain is more common in abuse survivors, and are consistent with the majority of previous studies. Findings about the relationship between pain and abuse have been remarkably consistent in both clinical and community samples. However, at this point, it is unknown what percentage of abuse survivors suffer from chronic pain. Our results should encourage others to include pain as a possible outcome of past abuse in their studies of long-term effects. More immediately, practitioners who work with adult survivors of childhood abuse should consider assessing their clients for chronic pain and making referrals as necessary. Chronic pain can impact both their clients' physical and emotional well being, and any treatment that ignores it will be incomplete.

Our study has also sought to elucidate the relationship between depression and chronic pain. From our data, we determined that depression did not mediate the relationship between abuse and pain. In fact, it appears as though pain and depression are separate, yet co-occurring sequelae of past abuse. That realization should change the way that clinicians approach treatment. While treating depression is likely to make pain less severe, treating depression alone is less effective than if both pain and depression are specifically treated. So, for example, patients can be treated with antidepressants, which will help both their pain and depression. In addition, their pain can be treated with exercise, physical and occupational therapy, stress management, and activity pacing. Patients' catastrophic and distorted beliefs about their health can also be addressed. All of these approaches have been found helpful in reducing chronic pain (Kendall-Tackett, 2003).

*Summary*

In summary, using data from a large community sample, a relationship was found between childhood abuse and increased pain reports in adults. Consistent with past studies, a relationship between pain and depression was found, but depression did not mediate the relationship between abuse and pain. Thus, the higher rate of depression found among abuse survivors was not the primary factor for these increased

pain reports. Rather, childhood abuse and depression independently contributed to pain reports. These results are consistent with previous retrospective studies, indicating that abuse survivors are more likely to suffer from chronic pain as adults.

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