Associations Between Adverse Events in Childhood and Chronic Widespread Pain in Adulthood: Are They Explained by Differential Recall?

JOHN McBETH, STELLA MORRIS, SIDNEY BENJAMIN, ALAN J. SILMAN, and GARY J. MACFARLANE

ABSTRACT. ***Objective***. Clinic based studies suggest that adverse events in childhood may predispose to chronic pain in adult life. These have been conducted on highly selected groups, and it is unknown whether these relationships hold in the general population and to what extent the increased rate of adverse childhood events in persons with pain is an artefact of differential reporting. We examined the hypothesis that chronic widespread pain was associated with reports of adverse experiences in childhood and whether any observed relationships could be explained by differential recall.

Methods. A cross sectional population based screening survey was conducted. Subjects completed a questionnaire that included assessments of pain and psychological state. In total, 296 subjects who had demonstrated psychological distress were randomly selected and had a detailed interview, which included an assessment of 14 adverse childhood experiences. Medical records relating to childhood were also examined for those subjects.

Results. The prevalence of self-reported adverse childhood experiences was greatest in adult subjects with current chronic widespread pain. Exposure to illness in family members, parental loss, operations, and abuse were all associated with increased, but nonsignificant, odds of having chronic widespread pain versus those without such exposures. However the only statistically significant association was with childhood hospitalizations. From medical record information the associations of hospitalizations (OR 5.1, 95% CI 2.0–13.0) and operations (OR 3.0, 95% CI 1.2–7.2) with pain previously noted were partly explained by differential recall between subjects with and without pain: hospitalizations, OR 2.2, 95% CI 0.9–5.5; operations, OR 1.2, 95% CI 0.5–3.4.

Conclusion. Although several reported adverse events in childhood were observed to be associated with chronic widespread pain in adulthood, only reports of hospitalizations were significantly associated. Validation of self-reported exposures suggests that there was differential recall of past events among those with and without pain, and this differential recall explained the association between hospitalizations and current chronic pain. Such differential recall may explain other observations of an association between reports of adverse childhood events and chronic pain in adulthood. (J Rheumatol 2001;28:2305–9)

Key Indexing Terms:
CHRONIC PAIN ADVERSE EVENTS CHILDHOOD

From the Arthritis Research Campaign (ARC) Epidemiology Unit, School of Epidemiology and Health Sciences; the Department of Psychiatry and Behavioural Sciences, University of Manchester, Manchester Royal Infirmary; and the Unit of Chronic Disease Epidemiology, School of Epidemiology and Health Sciences, University of Manchester, Manchester, United Kingdom.

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J. McBeth, PhD, Lecturer in Rheumatic Disease Epidemiology; S. Morris, MRCPsych, Consultant Liaison Psychiatrist, ARC Epidemiology Unit, School of Epidemiology and Health Sciences; S. Benjamin, FRCPsych, Honorary Senior Lecturer and Consultant Psychiatrist, Department of Psychiatry and Behavioural Sciences, University of Manchester; A.J. Silman, MD, Professor and Director, ARC Epidemiology Unit, School of Epidemiology and Health Sciences; G.J. Macfarlane, PhD, Professor of Epidemiology, ARC Epidemiology Unit and Unit of Chronic Disease Epidemiology.

Address reprint requests to Prof. G.J. Macfarlane, Unit of Chronic Disease Epidemiology, School of Epidemiology and Health Sciences, Stopford Building, University of Manchester, Oxford Road, Manchester, M13 9PT, UK. E-mail: G.Macfarlane@man.ac.uk

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We demonstrated in population studies that chronic widespread pain (CWP) is associated with psychological distress[1]. More recently we have shown that up to one-sixth of this group have a mental disorder, most notably anxiety and depression disorders[2]. Adverse events in childhood such as parental divorce or abuse are associated with increased levels of psychological distress. Adverse childhood events have historically[3] and more recently[4] been related to the presence of chronic localized pain. Such associations have also been reported with chronic generalized pain syndromes. Two recent reports of childhood abuse in women with fibromyalgia (FM)[5,6] found a high prevalence of sexual abuse in patients. It is unknown whether exposure to adverse events in childhood is associated with the CWP symptoms among this psychologically distressed group of persons. However, one major concern is that there may be differential recall of childhood events such as abuse

between persons with and without pain that may help to explain these associations.

The aims of this study were 2-fold: first, we aimed to test the hypothesis that, in a group of persons with psychological distress, self-reported exposure to adverse events in childhood is associated with reporting chronic pain in adulthood. Second, given the possibility of differential recall of childhood events between those persons with current chronic pain and those without chronic pain we wished to examine, where possible, the influence of differential reporting on the observed relationships.

MATERIALS AND METHODS

Design. The study design was a 2 phase population based survey. In the first phase subject's level of psychological distress was ascertained using a screening questionnaire. Those subjects with high levels of psychological distress, and therefore at high risk of CWP, were invited in the second phase to have a detailed evaluation. This included an assessment of exposure to adverse events occurring in childhood. The relationships between pain and self-reported adverse events were then analyzed.

Screening survey. The sampling frame was the adult population aged 18–65 years who were registered to receive treatment care at a general practice in the South Manchester area of the United Kingdom. Each subject was sent a postal questionnaire and, if necessary, a reminder postcard and further questionnaire. To determine subjects' pain status, the questionnaire enquired whether (1) subjects had experienced pain during the previous month, (2) whether it had persisted for at least 24 hours, and (3) if so, whether the pain had lasted for more than 3 months. Four line drawings of the body were included (front, back, and sides) and subjects were asked to indicate the site of pain.

On the basis of information provided on the study questionnaire, reported pain was categorized into 3 groups as follows: (a) CWP — using the definition of the American College of Rheumatology (ACR) in their criteria for FM[7]; (b) "other pain" — which included all subjects experiencing pain lasting > 24 h during the previous month, but which did not satisfy the definition for CWP; and (c) no pain — subjects who did not report pain lasting more than 24 h in the past month.

The questionnaire included the 12 item version of the General Health Questionnaire (GHQ)[8]. Since its development the GHQ has been widely used in community studies to ascertain levels of psychological disability and has been extensively validated. Each item has 4 possible responses dichotomized as a single positive or negative for each item. Scores are summed to give a total between 0 and 12. We used a GHQ score of 2 or greater to identify a group of subjects with psychological distress. In population studies using the GHQ this cutoff has been shown to be sensitive — although not specific — in ascertaining mental disorder[8,9]. A random sample of subjects who screened positive for psychological distress (the size of which was dictated by resources) were invited to have a detailed evaluation. Such subjects were those who would be most likely to have experienced adverse events in childhood.

Interview. An interview was undertaken by one of us (SM), a research psychiatrist who was unaware of the pain group status and GHQ scores of subjects except that all subjects had scores of 2 or more. Those subjects who attended the interview had a detailed assessment of self-reported childhood events, the Childhood Experiences Interview. The Childhood Experiences Interview was undertaken as part of a larger psychiatric interview that lasted on average 2 hours. Due to the length and sensitive nature of such interviews, we did expect a proportion of subjects to decline to participate. The questionnaire that subjects received asked whether they would be willing to be contacted again by a member of the research team. Of those eligible to be interviewed a proportion (30%) of subjects indicated on the questionnaire that they were not willing to be contacted. When the remaining 70% were contacted they were asked whether they would be willing to participate in a detailed interview that would last 2 to 3 hours. At that stage a further 13% refused. Overall, therefore, 57% agreed to participate. The interview examined reports of 14 adverse childhood experiences. This was based on previous research[10] and included experiences that have been associated with the development of somatization[11,12]. Interrater reliability of interview ratings was assessed prior to the main study and resulted in almost complete agreement. Standardized criteria were used for determining the occurrence and, for some exposures, the severity (none, mild, moderate, or severe) of these experiences occurring during the first 16 years.

Validation of self-reported adverse childhood events. We were concerned that there may be differential recall of adverse childhood events in those subjects with and without pain. We therefore wanted to use an alternative source of exposure information. Events such as parental death would rarely be recorded in the medical notes. Reports of abuse are difficult to validate retrospectively. Of the adverse childhood events assessed during the Childhood Experiences Interview, only hospitalizations and operations were likely to have been recorded in general practitioner notes. The records of all subjects were examined by one of the authors (JM) to determine first whether they contained any information prior to age 16 and second, where information was available, whether any hospitalizations or operations prior to age 16 were recorded. Three raters (JM, SB, GJM) tested the interrater reliability of the assessment on a subsample of subject records, and this was found to be very high. All assessments were made blind to pain status and all other measures included in the questionnaire.

Statistical analysis. Since many individual adverse childhood events were only reported by a small number of subjects, to maximize statistical power the following similar types of exposures were pooled to create single dichotomous variables: (1) mental and physical illness in parents or siblings were collapsed into "illness in family members"; (2) parental divorce, parental death, and separation from parents were collapsed into "parental loss." The relationships between exposure to each adverse childhood event in those subjects with other pain and CWP was compared to those with no pain (the referent group). Differences in these relationships, by age and sex, were examined by stratification and tested using the Mantel-Haenszel test for heterogeneity[13]. Since no significant heterogeneity was evident results are presented as odds ratios (OR) with 95% confidence intervals (CI) adjusted for age and sex. Statistically significant exposures were entered into multiple logistic regression models to identify the relative contribution of each exposure to the risk of CWP.

The data concerning hospitalizations and operations, gathered from the general practitioner records, were examined. False positive rates (defined as the proportion of subjects reporting an event that was not recorded on medical records) and false negative rates (defined as the proportion of subjects who did not report an event that was recorded on medical records) were calculated. A subsequent analysis was then conducted on those subjects for whom general practice record information was available. The OR of the associations between record-determined hospitalizations and operations in those subjects with CWP compared to those subjects with no pain were then calculated.

RESULTS

Of the 1953 subjects surveyed (75% participation rate)[14], 526 eligible subjects (GHQ ≥ 2) were randomly selected to attend the detailed psychiatric assessment. Of these, 301 (57%) participated and complete data was available for 296 subjects. Given the sensitive nature of the intensive home interview required, this participation rate was not unexpected. There were a number of differences between those who agreed to interview and those who did not. The nonparticipants were younger and less likely to have CWP.

However, there was no difference in levels of psychological distress between the 2 groups (Table 1). Of those who attended the interview, 86 (29%) reported no pain, 67 (23%) satisfied the ACR criteria for CWP, while the remainder (n = 143, 48%) reported other pain.

There were too few subjects who reported institutional care (n = 5), foster care (n = 5), childhood psychiatric care (n = 11), and drug overdoses (n = 5) to carry out meaningful statistical analyses. The relationships between the remaining adverse childhood events and pain status are shown in Table 2. With the exception of operations, those subjects with CWP were more likely to have reported each of the remaining adverse childhood events compared to those reporting no pain or other pain. With the exception of illness in childhood, univariate analyses indicated that the odds of reported exposure to an adverse event was increased between almost 2- to 5-fold (Table 2) in subjects with CWP. However, the only statistically significant association was with hospitalizations, which was associated with reporting both other pain and CWP. In our study population, of subjects who self-reported hospital admissions, 87% reported only one admission. The median length of stay during those hospitalizations was 1.5 weeks. These associations did not differ by sex or age group (Mantel-Haenszel tests for heterogeneity, $p > 0.05$). In a multiple logistic regression analysis showing individual contributions of each reported adverse childhood event adjusted for each other (Table 3), a history of hospitalization remained a significant predictor of pain in adulthood. Operations were no longer associated with the presence of pain symptoms. This is most likely due to the association between hospitalizations and operations. Of those persons with CWP and who reported hospitalizations, 32 (71%) also reported operations. Abuse was associated with one of the highest risks although this finding was not significant.

We wanted to examine any effect of recall bias on the observed associations that in univariate analysis had shown associations with CWP. General practitioner record information prior to age 16 was available for 67 (78%) and for 41 (61%) of subjects reporting no pain and CWP, respectively. On examination of the records for hospitalizations and operations, subjects with CWP had a higher false positive rate compared to those with no pain (hospitalizations: 60% vs 14%, operations: 48% vs 23%, respectively) and a lower false negative rate (hospitalizations: 15% vs 43%, operations: 0% vs 31%, respectively). We conducted a separate analysis restricted to those subjects for whom general practice record information was available. In this subgroup the OR of *self-reports* of hospitalization in those persons with CWP relative to those with no pain was slightly higher than that observed for the whole group (Table 4). However, when

Table 1. Distribution of sex, age, and General Health Questionnaire (GHQ) scores of interviewed subjects and those eligible but not interviewed. Values are median (interquartile range) unless stated otherwise.

	Interviewed, n = 296	Not Interviewed, n = 225
Sex, female: n (%)	191 (63)	130 (58)
Age, yrs	44 (32–52)	39 (30–48)
GHQ	4 (3–8)	5 (3–8)

Table 2. Distribution of adverse childhood events and associations with pain status.

Exposure	Pain Status	Exposure Status, n		OR	95% CI
		Present	Absent		
Illness in childhood	No pain	8	78	1	Referent
	Other pain	15	128	1.0	0.4–2.7
	CWP	8	59	0.9	0.3–3.3
Illness in family members	No pain	15	71	1	Referent
	Other pain	30	113	1.2	0.6–2.4
	CWP	25	42	2.2	0.9–5.1
Parental loss	No pain	13	73	1	Referent
	Other pain	25	118	1.2	0.5–2.5
	CWP	18	49	2.1	0.8–5.2
Hospitalization	No pain	36	50	1	Referent
	Other pain	84	59	2.5	1.4–4.6
	CWP	45	22	2.9	1.3–6.2
Operations	No pain	32	54	1	Referent
	Other pain	71	72	2.3	1.2–4.2
	CWP	32	35	1.7	0.8–3.7
Abuse	No pain	2	84	1	Referent
	Other pain	7	136	2.4	0.4–12.3
	CWP	8	59	4.8	0.8–27.4

OR: Odds of exposure to an adverse childhood event: subjects with other pain or CWP relative to those with no pain, adjusted for age and sex. CWP: chronic widespread pain.

Table 3. Multiple logistic regression model of the association of reported adverse childhood events, age, and sex with chronic widespread pain.

	OR	95% CI
Adverse childhood event		
Illness in childhood	0.4	0.1–1.8
Illness in family members	1.9	0.7–5.1
Parental loss	1.8	0.7–4.7
Hospitalization	4.8	1.3–18.1
Operations	0.5	0.1–2.0
Abuse	4.1	0.6–26.9
Demographic		
Sex, female	2.3	1.0–5.3
Age, yrs (in quartiles)		
18–32	1	Referent
33–42	1.2	0.4–3.7
43–52	4.2	1.4–12.9
53–65	11.6	3.4–39.5

OR: Odds of exposure in subjects with CWP compared to those with no pain.

Table 4. Odds of self-reported and recorded hospitalizations.

	N	n Exposed	%	OR	95% CI
Self-reported exposure					
No pain	67	26	39	1	Referent
CWP	41	31	76	5.1	2.0–13.0
Exposure recorded on GP records					
No pain	67	39	58	1	Referent
CWP	41	26	63	2.2	0.9–5.5

OR: Odds of reporting exposure in those subjects with CWP versus those with no pain; N: total number of subjects in group; n: number of subjects reporting hospitalizations; CWP: chronic widespread pain; GP: general practitioner.

the analysis was based on *records* of hospitalization, the odds were reduced to 2.2 and were no longer statistically significant. Similarly, the increased association of CWP based on self-reports of operations was lost when based on records of operations (Table 5).

DISCUSSION

Previous work has demonstrated associations between adverse childhood events and physical symptoms for which no organic cause can be identified, such as chronic pelvic pain[15]. However, these studies have tended to be conducted in the clinic and the associations may reflect selection and referral bias. In addition, factors such as the presence of mental disorder are known to be associated with the propensity to consult medical practitioners with physical symptoms. By examining these associations in a sample of psychologically distressed persons randomly selected from the community these difficulties can be overcome. In this study persons with CWP were more likely to report exposure to adverse events in childhood, although only an association with hospitalization was statistically significant.

Table 5. Odds of self-reported and recorded operations.

	N	n Exposed	%	OR	95% CI
Self-reported exposure					
No pain	67	26	39	1	Referent
CWP	41	31	76	3.0	1.2–7.2
Exposure recorded on GP records					
No pain	67	16	24	1	Referent
CWP	41	10	24	1.3	0.5–3.4

OR: Odds of reporting exposure in those subjects with CWP versus those with no pain; N: total number of subjects in group; n: number of subjects reporting operations; CWP: chronic widespread pain; GP: general practitioner.

The issue of bias must be highlighted when considering these results. Of those subjects who were invited to attend the detailed interview, 57% agreed. In a general population sample this rate of participation in an intensive interview was not unexpected. Those who refused were younger and, in accord with previous findings[1], were therefore less likely to have CWP. They did not, however, differ on any other measures. It is possible that those who did not participate may differ in their reports of exposure to adverse events in childhood. However, this would only affect the present results if the relationship between an adverse event and the presence of CWP differed in those who responded compared to those who did not respond. We have no information on the prevalence of reported adverse events in those who did not participate, but there is no reason to believe that a different relationship exists.

Studies have examined the relationship between chronic pain syndromes and adverse childhood events. For example, 3 recent studies examined the association between FM and self-reported childhood sexual or physical abuse. Taylor and colleagues[6] found an increased prevalence of sexual abuse in female clinic patients with FM compared to a control group consisting of hospital employees, patient friends, and service workers. Boisset-Pioro and colleagues[5] found a trend towards a higher prevalence of childhood physical and sexual abuse in clinic patients with FM compared to patients with other rheumatic diseases. Subsequently Alexander and colleagues[16] reported that in a group of 75 women with FM 57% reported sexual or physical abuse occurring either in childhood or adulthood. However, their data indicated that the high frequency of abuse was associated with health care usage, since clinic patients who reported abuse made a greater number of consultations in a 6 month period than patients not reporting abuse.

We made no distinction between physical or sexual abuse. However, abuse in any form was more commonly reported among subjects with CWP, although this difference was not significant. This may reflect the low number of

subjects reporting abuse, thus reducing the power of our study to detect significant differences. This is reflected in the wide confidence intervals around the high odds ratio for reported abuse. The only adverse childhood event that was significantly associated with the presence of CWP in adulthood was hospitalization. There are several explanations for this finding. It may reflect an association between physical illness and pain symptoms. It is plausible that for some subjects childhood physical illness that resulted in hospitalization could have persisted into adulthood and their pain symptoms may be associated with that illness. Others have found that exposure to adverse events in childhood such as childhood physical illness, coupled with a lack of parental care[12], is associated with reporting physical symptoms in adulthood. It has been proposed that adverse childhood events are associated with the onset of reporting somatic symptoms as an alternative source of care, and that these responses persist into adulthood[12]. Others have proposed that such events may lead to chronic pain through the development of mental disorder, which in turn may lead to a lowered pain threshold[17]. However, unlike previous studies, we have validated reports of childhood hospitalization and found that, after adjusting for the effects of differential reporting, the association was reduced and no longer significant.

In what has been termed "effort after meaning"[18], persons with chronic pain may explore their past experiences in more detail than those without chronic pain in an attempt to identify a cause for their current condition. The validity of reports of early childhood events is difficult to determine. Records of personal history would obviously allow these reports to be validated and general practice records may provide information on events such as hospitalization and operations. The present study found over- and under-reporting of documented events among subjects with and without CWP, respectively. This differential reporting appeared to explain much of the observed association between these self-reported events with current pain. It is possible that the other childhood events on which information was collected may also be subject to differential recall, particularly events such as abuse. However, general practice records are not a gold standard and an alternative hypothesis to explain the observed changes in association is that information on operations and hospitalizations in childhood has not been recorded or has been lost in a systematic way according to pain in adulthood. This seems extremely unlikely.

Studies linking early childhood experiences and the occurrence of pain in adulthood highlight the need to examine such associations in an attempt to understand the etiology of chronic pain. This study has identified some specific reported adverse childhood events associated with the presence of chronic widespread pain, although most were nonsignificant. However, after adjusting for differential recall for the 2 events for which reports could be validated, these associations appeared largely to be an artefact of differential recall. Differential recall must be assessed in future studies of associations between childhood experiences and chronic pain.

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