Cumulative Traumas and Psychosis: an Analysis of the National Comorbidity Survey and the British Psychiatric Morbidity Survey

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Previous research has shown that traumatic life events are associated with a diagnosis of psychosis. Rather than focus on particular events, this study aimed to estimate the effect of cumulative traumatic experiences on psychosis. The study was based on 2 large community samples (The National Comorbidity Survey [NCS], The British Psychiatric Morbidity Survey [BPMS]). All analyses were conducted using hierarchical binary logistic regression, with psychosis diagnosis as the dependent variable. Background demographic variables were included in the first block, in addition to alcohol/drug dependence and depression. A variable indicating the number of traumas experienced was entered in the second block. Experiencing 2 or more trauma types significantly predicted psychosis, and there appeared to be a dose-response type relationship. Particular traumatic experiences have been implicated in the etiology of psychosis. Consistent with previous research, molestation and physical abuse were significant predictors of psychosis using the NCS, whereas for the BPMS, serious injury or assault and violence in the home were statistically significant. This study indicated the added risk of multiple traumatic experiences.

Key words: psychosis/trauma/community samples

Introduction

Epidemiological surveys from the United States of America and Europe have consistently reported high rates of exposure to traumatic events and indeed the occurrence of multiple traumatic events for individuals.[1–5] Such evidence indicates that multiple traumatic experiences are not uncommon, and research suggests that such cumulative trauma has a particularly detrimental impact on an individual's physical and mental health. Based on a large community sample in Finland, research suggested that experiencing 3 or more traumatic events significantly increased the likelihood of persistent depression compared with those who did not experience any traumatic events. The odds ratios (ORs) indicated a 6-fold increase in risk.[5] Additional research found a dose-response relationship between number of reported abuse types and poorer mental health in a study involving 8667 health maintenance organization members.[6]

With reference to psychotic illnesses, there is a high rate of multiple trauma experiences in people with severe mental illness, particularly with regard to interpersonal violence.[7] Yet, little work has sought to empirically investigate the link between cumulative trauma and psychosis, despite strong evidence for the relationship between traumatic experiences and psychosis.[8,9] Some pertinent research has however investigated this relationship. For instance, a dose-response type relationship between childhood abuse and psychotic symptoms in adulthood has been reported,[10] in addition to a graded relationship between childhood trauma and hallucinations.[11] Also, the degree of impairment in schizophrenia spectrum disorders was found to be positively associated with the number of types of maltreatment being experienced.[12] In contrast, however, 1 prospective study found no support for an association between childhood sexual abuse and schizophrenic disorders in adulthood. However, the authors noted a number of methodological limitations that may have decreased the probability of finding an association between childhood sexual abuse and mental disorders.[13] The case for a trauma-psychosis link is however consistently supported by research that reports high rates of sexual abuse in childhood, in addition to other traumatic experiences, within psychotic populations.[7,14,15] Indeed, in 1 study, over half of patients admitted as a result of first-episode psychosis reported incidents of childhood sexual abuse.[16] Furthermore, in a review of the case notes of 200 community patients, there was a significantly higher probability of having 2 or more *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition,*[17] symptoms of schizophrenia

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if childhood or adult sexual abuse was experienced.[18] Moreover, recent research reported significantly more childhood trauma (including interpersonal assaults) in a psychosis sample (*n* = 40) versus a nonpsychosis, psychiatric comparison group (*n* = 30). This difference was not present for adult traumatic experiences.[19] In a recent analysis of the National Comorbidity Survey (NCS), a large representative general population sample in the United States of America,[20] multiple traumatic experiences were found to be associated with visual, auditory, and tactile hallucinations, and a dose-response relationship was reported.[21]

Following on from these empirical findings, the purpose of this research is to establish if a graded, or dose-response, relationship exists between the cumulative number of traumas experienced and the likelihood of a diagnosis of psychosis. The analyses are based on large nationally representative samples from the United States of America (NCS) and the United Kingdom (British Psychiatric Morbidity Survey [BPMS]) and focus primarily on interpersonal traumas.[20,22] It was predicted that a dose-response association would exist between trauma and psychosis, with greater trauma increasing the likelihood of psychotic symptoms.

Method

Samples

Two large-scale, nationally representative surveys, one from the United States of America, the other from the United Kingdom, were utilized.

The National Comorbidity Survey. The NCS was a - collaborative epidemiologic investigation (1990–1992) based on a stratified, multi-stage, area probability sample of noninstitutionalized persons aged between 15 and 54 years in the 48 coterminous states of the United States of America designed to study the prevalence and correlates of *Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition,* disorders.[23] The initial survey employed a household sample of over 8000 respondents, and a subsample of the original respondents completed the additional NCS, Part II, that contained a further detailed risk factor battery and additional diagnoses. A full description of the NCS is available.[20] Full data were available for 5782 participants (48% male).

British Psychiatric Morbidity Survey. The second BPMS in Great Britain was a 2-phase assessment of mental disorders conducted in 2000. After first-phase interviews, a sample of people was then selected for a second phase consisting of clinical interviews. The survey focused on adults aged 16–74 years who were recruited using a stratified multistage random probability sampling strategy. Interviews were successfully conducted with 8580 adults (45% male). Details of the survey methods are available.[22]

Instruments and diagnoses

The National Comorbidity Survey. A modified version of the Composite International Diagnostic Interview (CIDI)[24] was used to assess the lifetime prevalence of nonaffective psychosis (a summary category made up of schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder, and atypical psychosis) and depression. The NCS also elicited information on the occurrences of traumatic events (these were presented to the respondent on a list and referenced only by number). We selected 5 questions that represented childhood victimization, threats to physical integrity, and threats to sexual integrity. Specifically, a "yes" or "no" response was required to the following questions:

1. You were seriously neglected as a child
2. You were physically abused as a child
3. You were seriously physically attacked or assaulted
4. You were raped (someone had sexual intercourse with you when you did not want to by threatening you or using some degree of force)
5. You were sexually molested (someone touched or felt your genitals when you did not want them to)

No explicit age limit was stated for "childhood" events. A summed variable was created to represent the total number of traumas experienced (ranging from 0 to 5).

British Psychiatric Morbidity Survey. A 2-phase approach was used to assess the presence of a psychotic disorder. Initially, The Psychosis Screening Questionnaire was used at the first interview and followed by administration of the Schedule for Assessment in Neuropsychiatry for those who met screening criteria.[25,26] Responses from 5 questions from the List of Threatening Experiences[27] were used to represent victimization, threats to physical integrity, and threats to sexual integrity (these were presented to the respondent on a list and referenced only by number). Specifically, a "yes" or "no" response was required to the following statements:

1. Serious illness, injury or assault to yourself
2. Bullying
3. Violence at work
4. Violence in the home
5. Sexual abuse

Background variables

The background variables presented in Table 1 were used in the analyses. For the NCS, diagnoses of depression and alcohol and drug dependence were all CIDI based. For the BPMS, the diagnosis of an alcohol problem was based on a score greater than 8 on the Alcohol Use Disorders Identification Test.[28,29] The Clinical Interview Schedule Revised was used to produce specific

Table 1. Details of Background Variables From the NCS and BPMS and Variable Coding Frame

Variable	NCS	%	BPMS	%
Sex	0—Male	48.2	0—Male	44.9
	1—Female	51.8	1—Female	55.1
Education	1—16+ y	22.4	1—Degree	14.6
	2—13–15 y	26.3	2—Teaching, HND, nursing	7.2
	3—12 y	33.1	3—A level	13.3
	4—0–11 y	18.2	4—GCSE	34.9
			5—No qualifications	30.1
Employment	0—Not employed	26.2	0—Unemployed or economically inactive	38.1
	1—Employed	73.8	1—Working part time or full time	61.9
Living arrangements	0—Lives alone	14.8	0—Not in a couple	40.6
	1—Does not live alone	85.2	1—In a couple	59.4
Income	1—$0–$19 999	28.9	1—£0–£10 999	28.3
	2—$20–$34 999	25.1	2—£11–£20 999	40.9
	3—$35–$69 999	33.6	3—£21–£30 999	24.6
	4—$70 000+	12.4	4—£31 000+	6.3
Ethnicity	0—Other	24.9	0—Other	6.4
	1—White	75.1	1—White	93.6
Urbanicity	0—Nonurban	66.3	0—Semi rural/rural	34.7
	1—Urban	33.7	1—Urban	65.3
Alcohol	0—Not alcohol dependent	85.0	0—No problem drinking	24.3
	1—Alcohol dependent	15.0	1—Problem drinking	75.7
Drug	0—Not drug dependent	92.2	0—Not drug dependent	97.0
	1—Drug dependent	7.8	1—Drug dependent	3.0
Depression	0—Not depressed	82.0	0—Not depressed	97.0
	1—Depressed	18.0	1—Depressed	3.0

Note: NCS, National Comorbidity Survey; BPMS, British Psychiatric Morbidity Survey.

International Classification of Diseases, Tenth Revision, diagnoses of neurosis.[30] The diagnosis of a depressive episode was included as a covariate. A description of the algorithms used is available.[22] Five questions relating to drug dependence were asked, and a positive response to any one indicated some level of drug dependence.

Analysis

Two analyses were conducted; one based on the NCS and the other based on the BPMS. All analyses were conducted using hierarchical binary logistic regression in SPSS 11.0. The dependent variable in each case was the psychosis diagnosis (0, no psychosis; 1, psychosis). The following background variables, or covariates, were used in the first block: sex, age, education, employment status, living arrangements, income, ethnicity, urbanicity, alcohol problem/dependence, drug problem/dependence, and depression. The variable representing the total number of traumas was entered in the second block. A simple contrast was used specifying the first level (no traumas) to be the reference category. All other categories of the predictor variable are compared with the reference category. This provides an estimate of the likelihood of psychosis for each number of traumas compared with the trauma-free group. All analyses used the appropriate sampling weight variable.

Results

Frequency distributions for traumas from the NCS and BPMS are presented in Table 2. The distributions

Table 2. Frequency Distributions for Traumas From the NCS and BPMS

Trauma—NCS	Count (%)	Trauma—BPMS	Count (%)
Physical assault	492 (8.4)	Serious illness, injury or assault to yourself	2393 (27.9)
Sexually molested	416 (7.1)	Bullying	1480 (17.3)
Raped	258 (4.4)	Violence in the home	714 (8.3)
Physical abuse as child	246 (4.2)	Sexual abuse	346 (4.0)
Neglected as child	164 (2.8)	Violence at work	325 (3.8)

Note: Abbreviations are explained in the first footnote to Table 1.

Table 3. Frequency Distributions and Unadjusted Odds Ratios for Cumulative Traumas From the NCS and BPMS

	NCS			BPMS		
Traumas	Trauma Frequency (%)	Psychosis Cases (%)	Unadjusted OR (95% CI)	Trauma Frequency (%)	Psychosis Cases (%)	Unadjusted OR (95% CI)
0	4681 (81)	20 (48.8)	—	4858 (56.7)	14 (23.0)	—
1	798 (13.8)	8 (19.5)	2.53* (1.12–5.69)	2589 (30.2)	14 (21.8)	1.91* (1.02–3.58)
2	197 (3.4)	5 (12.2)	6.63** (2.53–17.42)	808 (9.4)	10 (17.2)	5.05** (2.58–9.91)
3	70 (1.2)	4 (9.8)	15.49** (5.31–45.25)	226 (2.6)	15 (25.3)	30.04** (16.21–55.67)
4	19 (0.3)	1 (2.4)	19.16** (3.35–109.71)	80 (0.9)	5 (6.9)	25.47** (10.07–64.41)
5	17 (0.3)	3 (7.3)	53.26** (14.55–194.98)	11 (0.1)	2 (5.7)	160.37** (53.48–481.20)
Total	5782	41	—	8572	60	—

Note: Abbreviations are explained in the first footnote to Table 1. OR, odds ratio; CI, confidence interval.
*P < .05; **P < .01.

of cumulative traumas for both samples are presented in Table 3. Regarding the experience of different types of traumatic events, Table 3 shows increased endorsement for the BPMS sample. This may be due to the more 'general' nature of the wording of the traumatic experiences in the BPMS, compared with the more specific wording in the NCS survey.

Table 3 shows that the majority of both samples did not experience any traumas and the number of people who experienced cumulative traumas decreased as the number of traumas increased. A very small percentage of individuals experienced 4 or more traumas. For the BPMS, the overall weighted prevalence of psychosis was 0.5%, which was slightly lower than 0.8% for the NCS.[31]

The results from the hierarchical binary logistic regression are presented in Table 4. The addition of the variable representing traumas made a significant improvement in the model for both the NCS (block 1: $\chi^2 = 68$, df = 11, $P < .01$; block 2: $\chi^2 = 93$, df = 16, $P < .01$; $\Delta\chi^2 = 25$, Δdf = 5, $P < .01$) and the BPMS (block 1: $\chi^2 = 158$, df = 11, $P < .01$; block 2: $\chi^2 = 250$, df = 16, $P < .01$; $\Delta\chi^2 = 92$, Δdf = 5, $P < .01$) data. The only significant background variable for the NCS was depression. For the BPMS, significance tests showed that the diagnosis of psychosis is related to being male, lower educational attainment, unemployment, lower income, urban environment, and depression. These differences are likely to be attributable to the minor differences in the study protocols because the odds ratios indicate the effects were in the same direction and of similar magnitude.

In order to identify which specific traumas were maximally related to psychosis, the analyses were rerun with the 5 trauma variables being entered in the second block. A stepwise selection procedure was used to identify the most important variables. For the NCS, the variables representing molestation (OR 2.51; 95% confidence interval [CI] 1.17–5.42; $P < .01$) and childhood physical abuse

(OR 4.20; 95% CI 1.94–9.13; $P < .05$) were statistically significant. For the BPMS, the variables representing sexual abuse (OR 5.69; 95% CI 3.22–10.06; $P < .01$), serious illness, injury or assault (OR 2.94; 95% CI 1.77–4.89; $P < .01$), and violence at home (OR 2.16; 95% CI 1.21–3.87; $P < .05$) were statistically significant.

For both the NCS and the BPMS experiencing 1 trauma was not significantly associated with a diagnosis of

Table 4. Estimates of Hierarchical Binary Logistic Regression Predicting Psychosis Based on the NCS and BPMS

Variable	NCS, OR (95% CI)	BPMS, OR (95% CI)
Age	0.98 (0.95–1.01)	1.00 (0.98–1.01)
Sex	0.87 (0.43–1.75)	0.61* (0.37–0.99)
Education	1.18 (0.83–1.68)	1.31* (1.03–1.66)
Employment	0.57 (0.28–1.14)	0.52* (0.28–0.96)
Living arrangements	0.72 (0.25–2.10)	0.68 (0.41–1.12)
Income	0.89 (0.64–1.25)	0.49** (0.32–0.76)
Ethnicity	0.52 (0.26–1.04)	1.03 (0.40–2.64)
Urbanicity	1.91 (0.90–4.05)	2.65** (1.35–5.19)
Alcohol	0.93 (0.37–2.32)	0.86 (0.49–1.50)
Drugs	1.18 (0.35–3.90)	0.95 (0.36–2.54)
Depression	7.14** (3.55–14.37)	4.70** (2.68–8.27)
No traumas		
1 trauma	1.62 (0.69–3.75)	1.70 (0.86–3.33)
2 traumas	3.37* (1.21–9.33)	4.31** (2.10–8.87)
3 traumas	7.42* (2.34–23.47)	18.01** (8.91–36.40)
4 traumas	7.71* (1.22–48.53)	7.91** (2.61–23.91)
5 traumas	30.16** (7.23–125.7)	192.97** (50.58–736.18)

Note: Abbreviations are explained in the first footnote to Table 1. OR, odds ratios; CI, confidence interval.
*P < .05; **P < .01.

psychosis (see Table 4). However, experiencing more than 1 trauma type was significantly associated with psychosis. For the NCS, there was an increase in the odds ratios as the number of traumas increased, although the difference between the odds ratios for 3 and 4 traumas was small. For the BPMS, the odds ratio for 3 traumas was higher than that for 4 traumas. The odds ratio for 5 traumas was the highest in both samples.

Discussion

The current study set out to examine if cumulative traumas were associated with greater acknowledgment of psychosis symptoms in 2 nationally representative samples, one from the United States of America and the other from the United Kingdom. Results clearly demonstrate that multiple traumatic experiences were associated with an increased likelihood of psychosis. Although a single trauma type did not significantly increase the likelihood of psychosis, experiencing 2 or more types of trauma significantly increased the likelihood of psychosis, with dramatic increases associated with experiencing all trauma types. The findings pertinently demonstrate a dose-response relationship between trauma and psychosis in these nonclinical samples, with increases in psychosis likelihood associated with more trauma exposure. Prior work in representative general population samples had supported a link between multiple traumas and psychiatric illnesses, such as depression.[5] The present results confirmed previous findings within the trauma and psychosis literature by using 2 large community samples and highlighted a dose-response effect with reference to trauma and the increased likelihood of psychosis. Of particular emphasis were interpersonal traumas, and interestingly, these general population samples indicate that more than 1 type of interpersonal trauma is required to increase the likelihood of reporting psychosis symptoms.

Although the dose-response association between the experience of traumas and psychosis was generally evident, the increase in the odds ratios was not entirely consistent for the BPMS. Specifically, the experience of 3 traumatic events resulted in a higher probability of psychosis than with 4 traumatic events. Yet, with this finding aside, the BPMS still showed a clear dose-response effect. Another interesting aspect of the results was that for both samples, the odds ratios associated with 5 traumas were very high relative to those for 4 traumas. For both the NCS and BPMS, the odds ratios associated with 5 traumas were similar or higher than the upper 95% confidence interval for 4 traumas. This suggests that although the relationships appear to be generally monotonic, they are not linear due to this large increase in effect size for 5 traumas.

The current study showed that for the NCS, the traumas most significantly associated to psychosis were molestation and physical abuse as a child. This is largely consistent with previous research in the area.[32] Based on the BPMS, sexual abuse was the trauma with the strongest association with psychosis. Serious illness, injury or assault, and violence in the home were also statistically significant. Such associations have now been reported consistently using both clinical and nonclinical samples.[18,19,33–35] The argument for a causal relationship has been further strengthened by the use of prospective studies[10] or studies that do not rely on retrospective accounts of traumatic experiences.[36] The current findings indicate the added risk of multiple traumas. A recent text provides a substantive review of the literature regarding the link between trauma and psychosis.[37]

The central challenge for future research is identifying and understanding the key mechanisms, which link increased trauma with psychosis symptoms. Cognitive models have identified the importance of misattributions, misinterpretations, and beliefs about psychosomatosensory experiences in the development and maintenance of psychosis symptoms, such as hallucinations and delusions.[38–40] With a rediscovery of the effects of trauma on the body and on psychological as well as somatosensory systems, cumulative interpersonal traumas may heighten psychosomatosensory activation increasing the likelihood of etiologically significant misattributions, along with those that have a maintenance effect.[41,42] Dissociation is another psychological variable proposed to link traumatic experience with especially positive psychotic symptoms.[35,43–46] Hallucinations, for example, may be the consequence of a failure to integrate percepts with affective and cognitive representations of a traumatic event.[47] More traumas would lead to more dissociation and therefore greater fragmentary representations of traumatic events, which may be experienced as hallucinations. These and other explanatory models require empirical assessment.

Alternatively, a Traumagenic Neurodevelopmental model[8] has been proposed that suggests early traumatic life events can produce physiological changes that contribute to greater vulnerability to psychosis. In particular, this model proposes that stressful events produce activation of the hypothalamic-pituitary-adrenal (HPA) axis, which is associated with the release of glucocorticoids, which can subsequently impair the regulation of the HPA axis if exposure to traumatic experiences is prolonged. Such a process has also been implicated in the development of posttraumatic stress disorder[48] (PTSD). This may account for the high rates of comorbid PTSD with psychosis,[49,50] similarity of psychotic and PTSD symptoms[51] and PTSD as a contributing factor in interactive models of psychosis.[52,53] The limitations of using general population samples to infer potential relationships in clinical disorders, such as the psychoses, has been addressed elsewhere[54] as has the type of methodology used here. Additionally, research has addressed the methodological issues associated with the reliability

of retrospective self-report accounts of traumatic experiences and concluded that such reports are "surprisingly reliable."[9(p334)] Indeed, accurate histories have been reported by people with schizophrenia and other psychoses.[8,55–58] An additional limitation of the present research is the possible underestimation of abuse. Previous research has shown that asking about "abuse" as opposed to asking specific questions regarding abuse can lead to lower rates of acknowledgement by around 50%.[59] But a particular limitation of the current study, in light of the variables examined, is no specific age limit or age specificity for traumatic events. With no indication of trauma onset or the chronology of multiple traumas, no conclusions can be drawn on the developmental impact of trauma or at what point during development multiple traumas increase risk of psychosis symptom formation. In addition, the measure of cumulative traumatic experiences used in this study does not account for multiple same trauma experiences or individual differences in the severity of a particular trauma. The analysis also assumes that the effect of the different traumas is comparable.

The current study has demonstrated the relationship between multiple childhood and interpersonal trauma types and increased likelihood of experiencing psychosis symptoms in 2 large, representative, general population samples. As well as highlighting a dose-response relationship between trauma types and psychosis, these results further highlight the need for a thorough trauma assessment in individuals with psychotic illnesses. This increases the likelihood that, where appropriate, interventions can be psychologically formulated and driven. However, there remains a pressing need for a greater empirical understanding of the nature of, and difference between, psychosis associated with trauma and psychosis unassociated with trauma. Studies have tended to report trauma associated with a large number of psychotic individuals, but not all. Thus, there is no empirical foundation to suggest that trauma is an etiological risk factor for all psychoses. Consequently, different treatment strategies may be required for different psychotic presentations and etiological foundations. As this study alludes to, for some individuals, the impact of multiple childhood interpersonal traumas may be pertinent to both case formulation and treatment.

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