

Supplemental Online Content

Danese A, Widom CS. Associations between objective and subjective experiences of childhood maltreatment and the course of emotional disorders in adulthood. *JAMA Psychiatry*. Published online July 5, 2023. doi:10.1001/jamapsychiatry.2023.2140

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This supplemental material has been provided by the authors to give readers additional information about their work.

eMethods

The current work builds on previously published research¹ (Danese & Widom, 2020). The description of the methods of this study are similar to those published previously.

Design

This prospective cohort design study was initiated in 1986 with a large group of documented cases of childhood physical and sexual abuse and neglect (N = 908) and a comparison group of children matched on the basis of age, sex, race/ethnicity, and approximate family social class at the time of the child maltreatment (N = 667)². Characteristics of the design include: (1) an unambiguous operationalization of abuse and neglect; (2) a prospective design; (3) separate neglected and abused groups; (4) a large sample; (5) a comparison group matched as closely as possible for age, sex, race and approximate social class background; and (6) assessment of the long-term consequences of abuse and neglect beyond childhood and adolescence into adulthood.

The rationale for identifying the abused and neglected group was that their cases were serious enough to come to the attention of the authorities. Only court-substantiated cases of child abuse and neglect were included here. Cases were drawn from the records of county juvenile and adult criminal courts in a metropolitan area in the Midwest during the years 1967 through 1971. To avoid potential problems with ambiguity in the direction of causality, and to ensure that temporal sequence was clear (that is, child abuse or neglect led to subsequent outcomes), abuse and neglect cases were restricted to those in which children were less than 12 years of age at the time of the abuse or neglect incident. Thus, these are cases of childhood abuse and/or neglect. These design characteristics represent major strengths, but they also pose limitations about the generalizability of the findings.

Neglect cases reflected a judgment that the parents' deficiencies in child-care were beyond those found acceptable by community and professional standards at the time. These cases represented extreme failure to provide adequate food, clothing, shelter, and medical attention to children. *Physical abuse* cases included injuries such as bruises, welts, burns,

abrasions, lacerations, wounds, cuts, bone and skull fractures, and other evidence of physical injury. *Sexual abuse* charges included felony sexual assault, fondling or touching, sodomy, incest, and rape.

A critical element of the design involved the selection of a comparison group, matched with the maltreated sample on the basis of age, sex, race/ethnicity, and approximate family social class during the time period under study. Matching for approximate family social class was important in this study because it is theoretically plausible that any relationship between child abuse and neglect and subsequent outcomes may be confounded with or explained by social class differences. It is difficult to match exactly for social class because higher income families could live in lower social class neighborhoods and vice versa. The matching procedure used here is based on a broad definition of social class that includes neighborhoods in which children were reared and schools they attended. Similar procedures, with neighbourhood school matches, have been used in studies of individuals with schizophrenia³ to match approximately for social class. A research methods textbook⁴ also recommended using neighbourhood and hospital controls to match on variables that are related to outcomes, when random sampling is not possible. Busing was not operational at the time, and students in elementary schools in this county were from small, socio-economically homogeneous neighborhoods. The comparison group establishes the base rates of pathology we would expect in a sample of adults from comparable circumstances who did not come to court attention in childhood as victims of abuse or neglect.

To accomplish the matching, the abuse and neglect sample was divided into two groups, those under and those of school age at the time of the abuse or neglect incident. Using county birth record information, children under school age were matched with children of the same sex, race, date of birth (+/- 1 week), and hospital of birth during period 1967 through 1971. Of the 319 abuse and neglect cases, matches were found for 229 (72%) of the group. For children of school age, records of more than 100 elementary schools for the same time period were used to find matches with children of the same sex, race, date of birth (+/- 6 months), class in elementary school during the years 1967 through 1971, and approximate

home address. Since busing did not exist during this period in this metropolitan area, the elementary schools represented very homogeneous neighborhoods. Matches were never made with students from another school, although it was sometimes necessary to select students from different classes or even different grades in the same school. Where an abused or neglected child had been held back a grade, resulting in a discrepancy between the child's age and grade, the match was made with age. Where a child had attended special education classes during the period, attempts were made to include matches from such classes. Of the 589 school-age children in the abuse and neglect sample, we found matches for 438, 74.4% of the group. Overall, 667 matches (73.4%) were found for the 908 abused and neglected children.

Non-matches occurred for a number of reasons. In the case of birth records, they occurred if the abused or neglected child was born outside the county or state, if information about date of birth was missing, or if there had been a change of name for an adopted child. In the case of school records, non-matches occurred because the elementary school had closed and class registers were consequently unavailable, or because schools had been primarily uniracial (they were not necessarily integrated at the time) and a same race match could not be found.

The design⁵ involves the assumption that the major difference between the abused and neglected and comparison groups is in the abuse or neglect experience. Since it is not possible to randomly assign participants to groups, the assumption of equivalence for the groups is an approximation. If the comparison group included subjects who had been officially reported as abused at some earlier or later time period, this would jeopardize the design of the study. Therefore, official records were checked and any proposed comparison group child who had an official record of abuse or neglect in their childhood was eliminated. In these cases (n=11), a second matched child was assigned to the comparison group to replace the individual excluded. Thus, the control group does not contain any known cases of child abuse or neglect. The number of participants in the comparison group who were actually abused, but not reported, is unknown.

Participants

For this paper, we use data from three follow-up phases, which involved tracing, locating, and interviewing the abused and/or neglected children and comparison group members in 1989-1995 (interview 1; mean age 28.7 years; n=1,196), in 2000-2002 (interview 2; mean age 39.5 years; n=896), and in 2003-2005 (interview 3; mean age 40.7 years; n=807).

Although there was attrition associated with death, refusals, and an inability to locate individuals over the various waves of the study, the composition of the sample has remained about the same (see **Table S4** for details). The abuse and neglect group represented 56%–58% at each time period; females comprised 49%–53% of the sample; and White, non-Hispanic individuals represented 60%–66% of the sample across the five time points. There were no significant differences across the samples on these variables or in mean age across the phases of the study. The sample was predominantly from the lower end of the socioeconomic spectrum: at interview 1, 60.0% completed high school, 54.9% held unskilled or semiskilled jobs, and only 13.7% held semiprofessional or professional jobs⁶. This characteristic limits the extent of generalizing to children from middle and upper socioeconomic status families.

Procedures

All interviews took place in the participant's home or other convenient place. The first interview was conducted between 1989 and 1995 and included a series of structured and semi-structured questionnaires and rating scales obtaining information about cognitive, intellectual, emotional, psychiatric, social and interpersonal functioning. The interviewers were blind to the purpose of the study, to the participants' group membership, and to the inclusion of an abused and/or neglected group. Similarly, the subjects were blind to the purpose of the study and were told they had been selected to participate as part of a large group of individuals who grew up in that area in the late 1960s and early 1970s. After a complete description of the study was provided to the subjects, subjects signed a consent

form acknowledging that they were participating voluntarily. Institutional Review Board approval was obtained at each wave of the study and participants were provided written, informed consent. For those individuals with limited reading ability, the consent form was presented and explained verbally.

Measures and Variables

In addition to reliability and validity, one important criterion in selecting and designing instruments for use in this research was the ability to compare findings from this research to the results of other studies. In selecting these measures, we were mindful of structuring the interviews to be sensitive to the feelings and needs of our participants and to not overwhelm them with negative and highly intrusive and stressful questions.

Objective experience of child maltreatment. Official reports of child abuse and/or neglect, based on records of county juvenile (family) and adult criminal courts from 1967-1971, were used to operationalize maltreatment. Only court-substantiated cases involving children under the age of 12 at the time of abuse and/or neglect were included. Within the present sample of 1,196, 56.5% were abused and/or neglected and 45.4% were neglected, 9.2% physically abused, and 8.0% sexually abused. Findings based on this objective measure of maltreatment have been replicated by several, more contemporaneous cohorts^{7,8}, showing that (1) the construct of childhood maltreatment captured in our sample is similar to the construct captured by other, more recent measures and (2) that the findings are relevant to modern society. Of note, substantiated court records provide the legal standard on which child protection actions are based and, thus, provide the strongest possible evidence for the objective experience of child maltreatment. In our previous work 20 years ago⁹, we have described court records as ‘prospective’ measures of child maltreatment. Subsequent work featured different types of prospective measures, more commonly based on parent/informant report and in some cases based on medical, child protection, or court records¹⁰. Therefore, we have used here the more accurate terminology of ‘objective’ measures to clarify which type of prospective measure was used.

Subjective experience of child maltreatment. Retrospective self-reported measures were chosen to include a broad set of maltreatment experiences representative of the experiences cited in the original (objective) court cases and participants were asked to respond about experiences that occurred before age 12 to make the retrospective reports as similar to the court cases as possible. In addition, because no single retrospective assessment measure is universally endorsed by researchers, multiple measures of each type of maltreatment were included to be as comprehensive as possible. Four measures were used to assess self-reports of childhood sexual abuse during Interview 1, all of which were adapted from previous work by Finkelhor^{11,12}, and Russell¹³ and are described in Widom and Morris¹⁴. Two measures were used to assess retrospective self-reports of childhood physical abuse during Interview 1: the Conflict Tactics Scale (CTS)¹⁵ and the Self-Report of Childhood Abuse Physical (SRCAP)¹⁶. Retrospective assessments of neglect were more challenging because at the time these retrospective reports were collected, the field lacked a validated neglect instrument (there is now a new retrospective measure that reflects distinct components of neglectful experiences and that has been validated in children¹⁷). Lacking such an instrument, questions were designed to cover a range of neglect experiences (i.e., inadequate provision of food, clothing, shelter, and supervision) that were similar to the charges in the official neglect petition. To assess childhood neglect, participants were asked three questions during Interview 1: (a) “Were there ever times when you were a young child that a neighbour fed you or cared for you because your parents didn’t get around to shopping for food or cooking, or when neighbours or relatives kept you overnight because no one was taking care of you at home?” (b) “When you were a young child, did anyone ever say that you weren’t being given enough to eat, or kept clean enough, or that you weren’t getting enough medical care when it was needed?” and (c) “When you were a very young child, did your parents ever leave you home alone while they were out shopping or doing something else?” If the participant responded “yes” to any of these questions and the age at which the neglect occurred was determined to be prior to 12 years old, they were considered to be self-reporting childhood neglect. Of note, measures of child neglect that are currently commonly used, such as the

CTS¹⁵ or the CTQ¹⁸, ask questions that are not dissimilar to those used in our study (e.g., asking mother about whether they were unable to get enough food to the child, they were unable to bring the child to the doctor or hospital, or they had left the child alone at home; or asking for self-reports on similar topics). In our previous work 20 years ago⁹, we have described these self-reports as ‘retrospective’ measures of child maltreatment to refer to the temporal ordering of the events. Here we refer to ‘subjective’ measures to reflect the increasing understanding of the psychological influences on these self-reports^{10,19,20}.

Lifetime and current psychopathology. During interview 1, lifetime and current psychopathology were assessed during a two-hour in-person interview between 1989-1995 (mean age= 28.7 years) using the National Institute of Mental Health Diagnostic Interview Schedule, Version III Revised²¹ to permit DSM-III-R²² diagnoses. The DIS-III-R is a highly structured interview schedule designed for use by lay interviewers. The survey company who had used these methods as part of the Epidemiological Catchment Area studies²³ was hired to conduct the interviews. Field interviewers received a week of study-specific training and successfully completed practice interviews before beginning the study interviews. Field interviewer supervisors recontacted a random 10% of the respondents for quality control. Frequent contacts between field interviewers and supervisors were held to prevent interview drift, to monitor quality, and to provide continuous feedback. Computer programs for scoring the DIS-III-R were used to compute DSM-III-R diagnoses for Major Depressive Disorder and Generalized Anxiety Disorder. Adequate reliability for the DIS-III-R has been reported²⁴.

Lifetime psychopathology represents depression and anxiety meeting diagnostic criteria at any point in a person’s life, whereas *current* psychopathology reflects depression and anxiety diagnoses sometime within the past year (the 12 months before the interview). Papers from this study using the same psychiatric assessment methods have been published in leading psychiatric journals^{25,26}.

Prospective measures of course of illness. To measure the course of depression and anxiety after the assessment of the subjective experience of childhood maltreatment during

interview 1, we examine whether participants met clinical symptom severity threshold for depression or anxiety diagnosis across the second and third interviews.

Depression was assessed at interviews 2 and 3 using the Center for Epidemiologic Studies Depression Scale (CES-D)²⁷, a 20-item self-report measure with good sensitivity and specificity and high internal consistency for general and psychiatric populations²⁸.

Participants were asked to indicate how they felt during the past week on a 4-point scale ranging from rarely or none of the time (less than 1 day) to most or all of the time (5–7 days). Symptom scores for Interview 2 were $M = 11.80$, $SD = 11.15$, $\alpha = 0.79$ and for interview 3, $M = 13.29$, $SD = 11.24$, $\alpha = 0.79$. The suggested cut-off for the presence of clinically significant depressive symptoms in the general population is 20²⁹.

The Beck Anxiety Inventory³⁰ was administered at both time points (interviews 2 and 3). The BAI is a 21-item self-report measure of anxiety in which participants were asked to rate how much they have been bothered by specific symptoms over the past week on a 4-point scale from 0 (not at all) to 3 (severely). Scores were: at interview 2 ($M = 9.24$, $SD = 10.28$, $\alpha = 0.93$) and interview 3 ($M = 7.28$, $SD = 9.81$, $\alpha = .93$). The suggested cut-off for clinically significant anxiety is 16³¹.

Data Analyses

In order to characterize the overlap between groups of participants identified by virtue of prospective or retrospective measure of childhood maltreatment, we computed the agreement between these two measures using Cohen's kappa.

To separate the relative contribution of objective and subjective measures of child maltreatment to psychopathology, we identified three groups: (i) adult participants who were identified as victims of child maltreatment by virtue of official records but did not retrospectively recall the experience ('*objective-only*' measure); (ii) adult participants who were identified as victims of child maltreatment by virtue of official records and also retrospectively recalled the experience ('*objective + subjective*' measures); and (iii) adult participants who retrospectively

recalled being maltreated in childhood but were not identified as victims of child maltreatment by virtue of official records (*'subjective-only'* measure).

The number of depressive or anxiety episodes (defined as the count of assessments when participants met symptom severity clinical threshold for depression or anxiety diagnosis, across the second and third interviews) in these three groups was then compared to the number of depressive or anxiety episodes in the participants with neither objective nor subjective measure of childhood maltreatment with Poisson regression models.

To test the sensitivity of the results to various sources of artefact and bias, we re-ran group comparisons [1] using individual types of maltreatment as independent measures, [2] expanding the regression models to account for current psychopathology at the time of assessment of the subjective measure (interview 1), [3] expanding the regression models to account for lifetime psychopathology until the time of assessment of the subjective measure (interview 1), and [4] using the number of depressive or anxiety symptoms (defined as the total number of symptoms of depression or anxiety across the second and third interviews) as dependent measures with negative binomial regression models.

Missing values in outcomes were imputed assuming missing at random (MAR) or missing completely at random (MCAR) mechanisms through Multiple Imputation by Chained Equations (MICE) in STATA 17.

All statistical tests were two-sided. All analyses were carried out in STATA 17 and R 4.2.

Data availability

The data reported in the current article are not publicly available because they contain extremely sensitive information that could compromise research participant privacy and confidentiality. We cannot provide individual level data from this project because our

confidentiality agreement with the participants in this study precludes this. The data are available on request from the corresponding author [CSW] by qualified scientists. Requests require a concept paper describing the purpose of data access, ethical approval at the applicant's university in writing, and provision for secure data access.

Code availability

The data analysis script is available from the corresponding author [AD] upon request.

eTable 1. Agreement Between Objective and Subjective Measures of Child Maltreatment

Maltreatment type	Cohen's kappa
Child maltreatment (vs no maltreatment)	0.25
Child physical abuse (vs no physical abuse)	0.09
Child sexual abuse (vs no sexual abuse)	0.17
Child neglect (vs no neglect)	0.32

eTable 2. Association of Subjective and Objective Measures of Different Childhood Maltreatment Types With Count of Depression and Anxiety Episodes Over the Observational Period

	No	Yes
Child physical abuse		
Panel A: Subjective measure		IRR [95%CI]
Depression	-	1.65 [1.30-2.09]
Anxiety	-	1.53 [1.19-1.97]
Panel B: Objective measure		
Depression	-	1.31 [0.96-1.79]
Anxiety	-	1.10 [0.72-1.69]
Child sexual abuse		
Panel A: Subjective measure		IRR [95%CI]
Depression	-	1.73 [1.36-2.20]
Anxiety	-	2.10 [1.63-2.72]
Panel B: Objective measure		
Depression	-	1.64 [1.20-2.25]
Anxiety	-	1.56 [0.98-2.55]
Child neglect		
Panel A: Subjective measure		IRR [95%CI]
Depression	-	1.58 [1.28-1.95]
Anxiety	-	1.58 [1.22-2.06]
Panel B: Objective measure		
Depression	-	1.43 [1.18-1.74]
Anxiety	-	1.42 [1.22-1.81]

eTable 3. Association of Subjective and Objective Measures of Childhood Maltreatment With the Number of Depressive and Anxiety Symptoms Over the Observational Period

IRR	No	Yes
Panel A: Subjective measure		IRR [95%CI]
Depressive symptoms	-	1.34 [1.18-1.51]
Anxiety symptoms	-	1.43 [1.22-1.67]
Panel B: Objective measure		
Depressive symptoms	-	1.32 [1.16-1.49]
Anxiety symptoms	-	1.29 [1.12-1.49]

eTable 4. Characteristics of the Sample Over 4 Waves

	Records	Interviews		
		1	2	3
DATES	1967-1971	1989-1995	2000-2002	2003-2005
N	1575	1196	896	807
Mean age at interview (SD)		29.2 (3.8)	39.5 (3.5)	41.2 (3.5)
Mean age at petition (SD)	6.4 (3.3)	6.3 (3.3)	6.2 (3.3)	6.3 (3.3)
Childhood family SES (SD)		-0.07 (0.62)	-0.015 (0.513)	-0.022 (0.523)
Sex (% female)	50.7	48.7	51.0	52.7
White (%)	66.2	62.9	62.2	60.4
Black (%)	32.6	34.9	35.2	37.3
Hispanic (%)	0.3	3.8	4.0	4.0
Abuse/neglect (%)	57.7	56.5	55.8	56.8
Physical abuse (%)	10.2	9.2	8.8	9.7
Neglect (%)	44.3	45.4	45.3	45.9
Sexual abuse (%)	9.7	8.0	7.6	7.5
Depression (%)			23.4	20.4
Anxiety (%)			19.0	14.5

Note: Childhood family SES is based on information collected during the first interview (1989-1995) and represents a composite variable created by standardizing and averaging six poverty indicators: maternal and paternal levels of education, family's welfare receipt, maternal and paternal employment status, and living in a single- or double-parent household until the age of 18 (Nikulina, Widom, & Czaja, 2011). All six measures were positively and significantly associated with each other, with an average correlation coefficient $r = .28$, and Cronbach's alpha = .679. Higher scores are indicative of higher childhood family SES.

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