Predictors of Drug-Use Patterns in Maltreated Children and Matched Controls Followed Up Into Middle Adulthood*

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ABSTRACT. Objective: This study examines whether child abuse; child neglect; demographic, family and social, behavioral, economic, and neighborhood risk; and protective factors predict different drug-use patterns into middle adulthood. **Method:** Using a prospective cohort design, individuals with documented cases of childhood physical and sexual abuse and neglect (processed during 1967-1971) and a matched control group were followed into middle adulthood. Participants completed in-person interviews in 1989-1995 (average age 29), 2000-2002 (average age 39.5), and 2003-2004 (average age 41). The sample for this study included 374 women and 332 men. **Results:** Four patterns of drug use were revealed: (a) abstinence and low use (34%), (b) adolescent and young adult limited use (31%), (c) chronic-persistent use (29%), and (d) late use (7%). The chronic-persistent pattern was associated with being male, parental substance-use problems, involvement in crime, and neighborhood problems. The late-use pattern was significantly associated with childhood neglect and being Black, when other risk factors were controlled; bivariate analyses also indicated associations with female gender, lower income, and greater neighborhood disadvantage. **Conclusions:** This study revealed two patterns of drug use involving substance use and substance-related problems in middle adulthood that are associated with different sets of risk factors. Further research is needed to understand the late-drug-use pattern, which appears to disproportionately involve low-income Black women with histories of childhood neglect. These individuals may be missed in efforts to prevent or reduce drug use among youths. (*J. Stud. Alcohol Drugs, 71,* 801-809, 2010)

NUMEROUS STUDIES HAVE SUGGESTED that childhood adversity and stress, including abuse and neglect, may lead to problems with substance use (e.g., Bensley et al., 1999; Fergusson et al., 2008; Nelson et al., 2006; Simpson and Miller, 2002; Wand, 2000; Widom et al., 2006). However, most research on this relationship has used cross-sectional designs relying on retrospective reports of child abuse and neglect, often from adults identified as substance users. Evidence from a prospective study tracking abused and neglected children and matched controls into adulthood found that the link between child abuse and neglect and drug use did not emerge until middle adulthood and existed only for women (Widom et al., 2006). Examining how child abuse and neglect relates to patterns of drug use from young to middle adulthood (rather than focusing on one of these time points) may help to understand this relationship. The current investigation takes a life course approach (Hser et al., 2007) to examine patterns of drug use among abused and neglected children and matched controls followed into middle adulthood.

Experimentation with drugs is relatively common during adolescence and emerging adulthood, but most individuals mature out of using drugs as they grow up (Bachman et al., 1997; Chen and Kandel, 1998). Indeed, most drug use begins and ends before individuals reach their late 20s (Chen and Kandel, 1995; Raveis and Kandel, 1987). However, a subset of individuals continue to use illicit drugs after young adulthood, which can result in significant economic, social, and health costs (Hser et al., 2007). Few studies have examined patterns of drug use beyond adolescence or emerging adulthood, or the influence of environmental and economic factors on drug-use patterns (Hamil-Luker et al., 2004). The few studies that have examined developmental trajectories of illicit drug use generally categorize users based on age at onset and extent of use (Chassin et al., 2004; Hser et al., 2007; Kandel and Chen, 2000).

Patterns of substance use may differ by race/ethnicity. Specifically, some evidence suggests that Blacks are less likely than Whites or Hispanics to use substances in adolescence but are more likely to use substances after age 35, a pattern referred to as the race/ethnic "crossover effect" (French et al., 2002; Watt, 2008). This effect may be the result of age-related differences in risk and protective factors. Blacks may benefit from protective factors in adolescence (e.g., religiosity, direct exposure to the negative consequences of substance use, increased vigilance of parents) but may be disproportionately exposed to risk factors in

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adulthood, such as poverty and access to drugs. For example, Watt (2008) found that the crossover effect was largely accounted for by sociodemographic factors (socioeconomic status, social support, religiosity) and may be explained by increased access to drugs in adulthood among Blacks relative to Whites.

A number of social, neighborhood, and economic factors predict drug use, including being male, family history of substance use, family and life stress, neighborhood disorganization and availability of drugs, school problems and lower educational attainment, unstable employment, and involvement in delinquency and crime (Butters, 2002; Chassin et al., 2004; Fergusson et al., 2008; Hamil-Luker et al., 2004; Hser et al., 2007; Kandel and Chen, 2000; Wiesner and Windle, 2006; Wiesner et al., 2005). On the other hand, social roles such as marriage, parenting, and full-time employment may contribute to cessation of drug use as individuals age (Bachman et al., 1997; Hamil-Luker et al., 2004). However, no studies have examined the contribution of childhood abuse and neglect to long-term patterns of drug use.

In the present study, we examined patterns of drug use in a sample of individuals with documented histories of child abuse and neglect and matched controls followed into middle adulthood (approximate age 41). The primary goals of this study were to (a) examine patterns of drug use from young adulthood to middle adulthood, extending the age range of most of the prior studies; (b) determine the relationship between childhood abuse and neglect and patterns of drug use into middle adulthood; and (c) characterize drug-use patterns in terms of demographic, family and social, behavioral, economic, and neighborhood risk and protective factors.

This study had three major hypotheses. First, we expected a history of childhood abuse and neglect to be positively associated with chronic-persistent drug use (i.e., use in both young adulthood and middle adulthood) and that this relationship would hold for specific types of maltreatment (physical abuse, sexual abuse, and neglect). Second, we expected that chronic-persistent drug use would be positively associated with risk factors (e.g., being male, having a parent with substance-use problems) and negatively associated with the protective factors of marriage, childrearing, and employment. Third, drawing on the race/ethnic crossover effect (Watt, 2008), we expected that Blacks would be at increased risk for late drug use (i.e., drug use in middle adulthood but little to no drug use at young adulthood).

Method

Overview

Data were collected as part of a large prospective cohort design study in which abused and neglected children were matched with nonabused, nonneglected children and followed into adulthood. Because of the matching procedure, the participants are assumed to differ only in the risk factor—that is, having experienced childhood physical or sexual abuse or neglect. Because it is not possible to assign subjects randomly to groups, the assumption of equivalency for the groups is an approximation. The control group may also differ from the abused and neglected individuals on other variables associated with abuse or neglect. For complete details of the study design and subject selection criteria, see Widom (1989a).

The initial phase of the study compared abused and/or neglected children with the matched comparison group (N = 1,575) on juvenile and adult criminal-arrest records (Maxfield and Widom, 1996; Widom, 1989b). The second phase involved tracking, locating, and interviewing abused and neglected and comparison groups during 1989-1995, approximately 20 years after incidents of child abuse and neglect (n = 1,196). This interview consisted of a series of structured and semistructured questionnaires and rating scales, including the National Institute of Mental Health Diagnostic Interview Schedule (DIS-III-R; Robins et al., 1989), a standardized psychiatric assessment that yields Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R; American Psychiatric Association, 1994) diagnoses. Subsequent follow-up interviews were conducted in 2000-2002 and in 2003-2004.

Participants and design

The original sample of abused and neglected children (n = 908) was made up of substantiated cases of childhood physical and sexual abuse and neglect processed from 1967 to 1971 in the county juvenile (family) or adult criminal courts of a midwestern metropolitan area. Cases of abuse and neglect were restricted to children 11 years of age or younger at the time of the incident. A control group of children without documented histories of child abuse or neglect (n = 667) was matched with the abuse/neglect group on age, sex, race/ethnicity, and approximate family social class during the time that the child abuse and neglect records were processed.

The control group represents a crucial component of the study design. Children who were younger than school age at the time of the abuse and/or neglect were matched with children of the same sex, race, date of birth (±1 week), and hospital of birth through county birth-record information. 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 1967-1971; and home address, preferably within a five-block radius of the abused/neglected child. Overall, matches were found for 74% of the abused and neglected children. Nonmatches occurred for a number of reasons. For birth records, nonmatches occurred in situations where the abused and

neglected child was born outside the county or state or when date-of-birth information was missing. For school records, nonmatches occurred because of lack of adequate identifying information for the abused and neglected children or because the elementary school had closed and class registers were not available.

Of the original sample, 1,307 subjects (83%) were located and 1,196 (76%) participated in the first interview (1989-1995). Of those participants, 896 (75%) completed the second interview (2000-2002), and 807 (67%) completed the third interview (2003-2004). The composition of the sample at the various waves of interviews has remained about the same. The child abuse and neglect group represented 56%-58% at each time period; White, non-Hispanics represented 59%-62% of the samples; and women represented 49%-53% of the samples. There were no significant differences across the samples on these variables or in mean age across the waves of the study. The sample for this study included non-Hispanic Black and non-Hispanic White participants with complete data regarding use of illicit drugs at the first interview and at either the second or third interview (n = 706). We excluded participants of Hispanic and other ethnic backgrounds (n = 51) because there is evidence that age-related patterns of substance use differ significantly among race/ethnic groups, and only the subsamples of non-Hispanic Blacks and Whites were large enough to compare. To be conservative, we also excluded individuals who did not complete either the second or third interview and reported no drug use during the one interview that was completed, because there was no reliable way to determine whether these participants used drugs in middle adulthood. Sample sizes in the analyses differ slightly as a result of missing data on particular variables. The sample of 706 participants included in this study consisted of 394 individuals with cases of child abuse or neglect (58.8%) and 312 controls. The child abuse/neglect group included 52 cases of sexual abuse, 64 cases of physical abuse, and 322 cases of neglect (cases of different types of child abuse/neglect total more than 427 because some individuals had cases of more than one type). The sample included 374 women (53.0%) and 332 men. Ethnic/racial composition was 64.6% White, non-Hispanic.

Procedures

Participants completed the interviews in their homes or, if preferred by the participant, another place appropriate for the interview. The interviewers were blind to the purpose of the study and to the inclusion of an abused and neglected group. Participants were also blind to the purpose of the study and were told that they had been selected to participate as part of a large group of individuals who grew up in the late 1960s and early 1970s. Institutional review board approval was obtained for the procedures involved in this study; subjects who participated gave written, informed consent. For individuals with limited reading ability, the consent form was presented and explained verbally.

Measures

Childhood abuse and neglect. Childhood physical and sexual abuse and neglect (≤ age 11) were assessed through review of official records of cases processed during the years 1967-1971. 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 varied from relatively nonspecific charges of "assault and battery with intent to gratify sexual desires" to more specific charges of "fondling or touching in an obscene manner," sodomy, incest, rape, etc. 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 and represented extreme failure to provide adequate food, clothing, shelter, and medical attention to children.

Illicit drug use. Use of illicit drugs (marijuana, cocaine, psychedelics, heroin) was assessed in young adulthood (1989-1995 at approximately age 29) and in middle adulthood (2000-2002 at approximately age 39 or 2003-2004 at approximately age 41). In young adulthood, participants reported lifetime illicit drug use on the DIS-III-R substance-use disorders module. Based on this information, a dichotomous variable was created to reflect use of any illicit drug more than five times in the individual's lifetime (yes = 1, no = 0). This assessment, therefore, indicated any significant use of drugs in adolescence and/or young adulthood and reflected the period during which most drug use takes place (Chen and Kandel, 1995). We used the criteria of five times or fewer to designate no or "low" drug use in adolescence and young adulthood because most of the sample (72%) reported using drugs at least once during that period, and more than five times is the cutpoint on the DIS-III-R that elicits further questions about use of specific drugs. Therefore, this cutoff represents the most systematic way to distinguish negligible use from meaningful use of drugs in adolescence and young adulthood. Use of drugs more than five times at young adulthood discriminates between those who met the criteria for a drug-use disorder on the DIS-III-R at young adulthood and those who did not, $\chi^2(1) = 69.72$, $p \leq .001$; correlates with more drug-use disorder symptoms on the DIS-III-R, $F(1, 513) = 65.90$, $p \leq .001$; and predicts drug- or alcohol-related problems reported on the Rutgers Alcohol Problem Index (RAPI; White and Labouvie, 1989) at middle adulthood, $F(1, 494) = 6.75$, $p \leq .01$.

In middle adulthood, participants reported drug use in a structured interview with questions adapted from the Rutgers Health and Human Development Project (Pandina et al., 1984) and the Monitoring the Future Study (Johnston et al., 2002). A dichotomous variable was created to reflect any

past-year use of illicit drugs (marijuana, cocaine, heroin, and psychedelics) reported at either the 2000-2002 or 2003-2004 interview (yes = 1, no = 0). This score represents current use of illicit drugs in middle adulthood.

Participants were categorized into four drug-use groups based on whether they reported illicit drug use in young adulthood (1989-1995 interview) and middle adulthood (2000-2002 or 2003-3004 interview): (a) The abstinence and low-use group reported no use of any illicit drug more than five times at the young adulthood interview and no illicit drug use in middle adulthood, (b) the adolescent and young adult limited-use group reported illicit drug use at the young adulthood interview but not in middle adulthood, (c) the chronic-persistent drug-use group reported illicit drug use at both time points, and (d) the late-use group reported no use of any drugs more than five times at the young adulthood interview but reported past-year use of illicit drugs in middle adulthood.

Characteristics of illicit drug use. Age at onset was assessed through self-reports of first use of any drug on the DIS-III-R substance-use disorders module during the 1989-1995 interviews. Problems related to drug and alcohol use were assessed with the DIS-III-R in 1989-1995 and reflected DSM-III-R criteria for a substance-use disorder. During the 2000-2002 and 2003-2004 interviews, substance-use problems were based on an adaptation of the RAPI that assessed combined problems associated with alcohol or illicit drug use. This version of the measure did not separately assess problems associated with alcohol and illicit drugs. The RAPI assesses the occurrence of 18 negative consequences of substance use in the last year and has demonstrated reliability (α's > .80) and discriminant and construct validity (White and Labouvie, 1989, 2000). The RAPI has been modified and validated for use with drugs such as marijuana (Johnson and White, 1995). In most cases, reports from the 2000-2002 administration of the RAPI were used. However, we used data from the 2003-2004 interviews in cases where participants reported drug use at the 2003-2004 interview but either did not complete the 2000-2002 interviews or did not report drug use at that time. This strategy was employed to capture problems during the time participants reported drug use. Scaled scores were used to represent the number of problems endorsed (0-18).

Demographic variables. Gender (female = 1, male = 0) was based on documentation from the 1989-1995 interview. Black race (non-Hispanic Black = 1, non-Hispanic White = 0) was based on self-reports at the 1989-1995 interview.

Risk factors. Parental substance-use problems (either a mother or father with a drug or alcohol problem) and incomplete high school (fewer than 12 grades completed) were assessed through self-reports at the 1989-1995 interview, and dichotomous variables were created for each (yes = 1, no = 0). Involvement in crime was a dichotomous (yes = 1, no = 0) variable based on arrest records updated in 1994 (not including prostitution), and prostitution reflected an arrest for prostitution and/or self-report of trading sex for money at the 1989-1995 interview (yes = 1, no = 0). Household income was a scaled variable ranging from 1 to 10 (1 = <5,000 to 10 = >100,000) based on self-reports at the 2000-2002 interview. Neighborhood problems were assessed with a general neighborhood problems scale (0-12) completed by participants at the 2000-2002 interview. Neighborhood disadvantage (percentage poverty, female-headed households, and families on public assistance) was assessed with 1970 census data reflecting childhood neighborhood and 2000 census data reflecting middle adulthood neighborhood. Scores on each composite from the census data were transformed to *z* scores.

Protective factors. Participants reported their relationship status at both the 1989-1995 and 2000-2002 interviews, and this information was used to create a dichotomous variable reflecting whether participants have ever been married or in a cohabiting relationship (1) or were never married or in a cohabiting relationship (0). Participants reported whether they had children at all three interviews, and a dichotomous variable was created to reflect whether they had children in young and middle adulthood (have children = 1, do not have children = 0). Employment status (employed full time = 1, not employed full time = 0) was assessed through self-reports at the 1989-1995 and 2003-2004 interviews.

Analyses

Analyses proceeded in a series of stages. First, one-way analysis of variance (ANOVA) was used to compare the drug-use groups in terms of age at onset and substance-related problems. Significant between-group differences were further examined using post hoc Tukey honestly significant difference (HSD) tests. Second, cross tabulations and chi-square analyses compared the childhood abuse and neglect groups (any abuse or neglect, physical abuse, sexual abuse, and neglect) with matched controls in terms of the prevalence of the four drug-use patterns. Third, ANOVA and chi-square analyses examined differences between the four drug-use groups in terms of risk and protective variables. Significant between-group differences were further examined using post hoc Tukey HSD tests. Fourth, separate multiple logistic regression models examined predictors of each drug-use pattern (e.g., chronic-persistent use versus all other groups), controlling for the set of predictors. Distributions of all continuous variables included in the analyses approximate normality (skewness < 3.0; kurtosis < 10.0).

Results

Patterns of illicit drug use

In young adulthood, more than half the sample (59%) reported ever using at least one illicit drug more than five

times. By contrast, 35% of the sample reported past-year use of any illicit drugs in middle adulthood. The majority of participants were classified in the abstinence and low-use group (34%), the adolescent and young adult limited-use group (31%), or the chronic-persistent use group (29%). A smaller group (7%) was classified in the late-use group.

Differences in drug-use characteristics among four groups

Table 1 shows the mean age at onset and mean number of substance-related problems in young and middle adulthood for each of the four drug-use groups. The drug-use groups differed significantly from each other in terms of age at onset, $F(3, 490) = 12.78$, $p < .001$. The chronic-persistent use group had the earliest age at onset at approximately age 15 (range: 14.90-15.78), followed by the adolescent and young adult limited-use group (range: 15.06-16.00). By contrast, those in the abstinence/low-use and late-use groups, who reported any use of drugs in young adulthood, did not use them until approximately age 18 (range: 16.94-18.50 for abstainer/low use and 16.55-20.25 for late use). As shown in Table 1, the drug-use groups also differed significantly from each other in terms of problems associated with alcohol use, $F(3, 700) = 51.80$, $p < .001$, and drug use, $F(3, 702) = 74.03$, $p < .001$, reported in young adulthood. The adolescent/young adult limited and chronic-persistent groups did not differ significantly from each other regarding problems associated with alcohol or drug use in young adulthood, but these two groups reported more problems than either the abstinence/low-use or late-use groups. The drug-use groups also differed from each other in terms of substance-related problems (drug and alcohol combined) reported in middle adulthood, $F(3, 667) = 52.16$, $p < .001$. The adolescent/young adult limited group and the abstinence/low-use group reported few substance-related problems in middle adulthood and did not differ significantly from each other, whereas the chronic-persistent and late-use groups reported more substance-related problems in middle adulthood than the abstinence/low-use or adolescent/young adult limited groups. Moreover, the chronic-persistent and late-use groups did not differ significantly from each other in terms of reported substance-related problems in middle adulthood.

Relationships between childhood abuse and neglect and drug-use patterns

Table 2 shows the prevalence of each drug-use pattern in the child abuse and neglect group and in control groups. Child abuse and neglect, in general, was not significantly related to the drug-use patterns, $\chi^2(3) = 6.27$, $p > .05$. However, those in the childhood neglect group differed significantly from those in the control group regarding patterns of drug use, $\chi^2(3) = 8.69$, $p < .05$. Additional analyses revealed that individuals with histories of childhood neglect were at increased likelihood of being in the late-drug-use group, $\chi^2(1) = 6.65$, $p < .05$.

Relationships between risk variables and drug-use patterns

Table 3 shows differences across the four groups in terms of demographic, social, economic, and neighborhood risk and protective factors. The groups differed from each other in terms of both gender and race. Men were more likely to be chronic-persistent or adolescent/young adult limited users, whereas women were more likely to be in the abstinence/low-use and late-use groups. Blacks were more represented in the late-use group (61%) than the other groups (28%-37%). The drug-use groups also differed in their likelihood of reported parental substance-use problems, high school completion, arrest history, prostitution, household income, reported neighborhood problems, and neighborhood disadvantage. The chronic-persistent group was most likely

TABLE 1. Differences across drug-use groups in age at onset and substance-related problems

	M (*SD*) for the full sample and each drug-use group					
Variable	Full sample ($n = 706$)	Abstinence/ low use ($n = 242$)	Adolescent/ young adult limited use ($n = 215$)	Chronic-persistent use ($n = 203$)	Late use ($n = 46$)	*F* (*df*)
Age at onset, any drug use	15.86 (3.45)	17.72 (3.13)^{a,b}	15.53 (3.50)^{a,c}	15.34 (3.14)^{b,d}	18.40 (3.95)^{c,d}	12.78*** (3, 490)
No. of problems related to alcohol use in young adulthood	2.61 (2.70)	1.12 (1.87)^{a,b}	3.51 (2.72)^{a,c}	3.59 (2.78)^{b,d}	1.89 (2.23)^{c,d}	51.80*** (3, 700)
No. of problems related to drug use in young adulthood	1.70 (2.50)	0.23 (0.79)^{a,b}	2.63 (2.65)^{a,c}	2.80 (2.88)^{b,d}	0.20 (0.69)^{c,d}	74.03*** (3, 702)
No. of problems related to alcohol and/or drug use in middle adulthood	2.12 (3.83)	0.73 (2.16)^{a,b}	1.13 (2.50)^{c,d}	4.58 (4.89)^{a,c}	3.42 (5.11)^{b,d}	52.16*** (3, 667)

Notes: Overall group differences (*F*) and significance (*p*) are based on one-way analysis of variance. Means for each variable with the same superscript letters differ significantly from each other, based on post hoc Tukey honestly significant difference tests ($p < .05$). For example, the ^{a,b} next to the age at onset for the abstinence/low-use group indicates that age onset in this group differs significantly from age at onset in the adolescent/young adult limited-use group, which has an ^{a,} and the chronic-persistent group, which has a $^{b.}$

***$p \leq .001$.

TABLE 2. Prevalence of drug-use patterns in individuals with histories of childhood abuse or neglect and matched controls

Variable	Any abuse or neglect (n = 394) %	Physical abuse (n = 64) %	Sexual abuse (n = 52) %	Neglect (n = 322) %	Controls (n = 312) %
Abstinence and low use	32.0	32.8	46.2	30.1	37.2
Adolescent and young adult limited use	30.2	35.9	17.3	31.1	30.8
Chronic-persistent use	29.4	26.6	32.7	29.5	27.9
Late use	8.4	4.7	3.8	9.3	4.2
$\chi^2(3)$	6.27	0.79	4.11	8.69*	–

Notes: χ^2 = chi-square tests comparing child abuse and neglect groups with the control group regarding proportion of individuals in each of the drug-use groups.
*$p \leq .05$.

to report parental substance problems, most likely to be involved in crime and prostitution, and reported the most neighborhood problems. The late-use drug-use group reported significantly lower household incomes than those in the other groups. The groups did not differ in terms of childhood neighborhood disadvantage (1970 census). However, in middle adulthood (2000 census data), the late-use group came from the most disadvantaged neighborhoods, and the adolescent/young adult limited group came from the least disadvantaged neighborhoods.

Table 3 also shows differences between the drug-use groups in regard to marriage, childrearing, and employment assessed at young adulthood. Marriage was the only one of these protective factors that differed between the groups. Individuals in the late-use group were the least likely to report current or past marriage or a cohabiting relationship, and those in the adolescent/young adult limited group were the most likely to report a marriage or a cohabiting relationship. The groups did not differ significantly in terms of full-time employment or having children. Results with these variables assessed at middle adulthood were consistent for marriage, $F(3, 696) = 5.11$, $p \leq .01$; childrearing, $F(3, 701) = 0.72$, $p > .10$; and employment, $F(3, 699) = 0.85$, $p > .10$.

Multivariate analyses

Separate logistic regression models for each drug-use group included variables that significantly differentiated

TABLE 3. Differences across drug-use groups in terms of risk and protective factors

Variable	Full sample (n = 706)	Abstinence/ low use (n = 242)	Adolescent/ young adult limited use (n = 215)	Chronic-persistent use (n = 203)	Late use (n = 46)	F (df)
	Prevalence (%) in the full sample and each drug-use group					
Gender, female	53.0	68.6^{a,b}	44.7^{a}	40.9^{b,c}	63.0^{c}	15.35*** (3, 702)
Race/ethnicity, Black	35.4	36.4^{a}	27.9^{b}	36.5^{c}	60.9^{a,b,c}	6.09*** (3, 702)
Parent with substance problem	51.3	41.7^{a}	53.0	65.0^{a,b}	32.6^{b}	10.69*** (3, 702)
No high school graduation	38.8	27.3^{a,b,c}	40.7^{a}	48.5^{b}	52.2^{c}	8.56*** (3, 696)
Arrest history[1]	47.9	30.6^{a,b,c}	48.8^{a}	66.5^{b}	52.2	20.81*** (3, 702)
Prostitution	9.8	2.9^{a,b}	10.7^{a,d}	17.7^{b,d,e}	6.7^{e}	9.71*** (3, 700)
Marriage in young adulthood	68.7	65.3^{a}	76.7^{a,b}	67.0	56.5^{b}	3.78** (3, 702)
Children in young adulthood	73.2	74.4	72.9	73.4	67.4	0.32 (3, 701)
Full-time employment in young adulthood	62.2	63.2	64.2	62.6	45.7	1.95 (3, 702)
	M (SD) for the full sample and each drug-use group					
Household income[2]	5.66 (2.63)	5.97 (2.61)^{a,b}	5.93 (2.63)^{c}	5.30 (2.52)^{a}	4.23 (2.70)^{b,c}	7.37*** (3, 667)
No. of neighborhood problems	1.70 (0.83)	1.54 (0.75)^{a}	1.61 (0.73)^{b}	1.95 (0.92)^{a,b}	1.88 (0.95)	10.43*** (3, 692)
Neighborhood disadvantage (1970 census)[3]	0.63 (1.03)	0.59 (1.03)	0.56 (0.99)	0.68 (1.04)	0.91 (1.06)	1.74 (3, 657)
Neighborhood disadvantage (2000 census)[3]	0.24 (0.97)	0.17 (0.96)^{a}	0.09 (0.91)^{b,c}	0.43 (0.99)^{a,b}	0.51 (1.02)^{c}	6.08*** (3, 690)

Notes: Prevalence is reported for dichotomous variables and means are reported for continuous variables (household income, number of neighborhood problems, and neighborhood disadvantage). Overall group differences and significance are based on chi-square tests one-way analysis of variance (ANOVA) for dummy-coded dichotomous variables and ANOVA for continuous variables. Prevalence or means for each variable with the same superscript letters differ significantly from each other, based on post hoc Tukey honestly significant difference tests ($p < .05$). See notes for Table 1. [1]Does not include arrests for prostitution; [2]1 = < 5,000 to 10 = > 100,000; [3]z scores transformed from sum of percent poverty, female-headed households, and families on public assistance.
**$p \leq .01$; ***$p \leq .001$.

TABLE 4. Results of logistic regressions predicting drug-use patterns

	Abstinence and low use			Adolescent and young adult limited use			Chronic-persistent use			Late use		
Variable	β	OR	95% CI	β	OR	95% CI	β	OR	95% CI	β	OR	95% CI
Childhood neglect	-0.10	0.90	0.61, 1.34	0.11	1.12	0.76, 1.65	-0.33	0.72	0.47, 1.10	0.91*	2.49	1.14, 5.40
Gender, female	0.95***	2.57	1.72, 3.84	-0.46*	0.63	0.43, 0.93	-0.65**	0.52	0.34, 0.79	0.41	1.51	0.72, 3.17
Race, Black	-0.09	0.91	0.57, 1.46	-0.16	0.85	0.54, 1.54	-0.21	0.81	0.50, 1.32	1.28**	3.60	1.56, 8.32
Parental substance problems	-0.28	0.76	0.51, 1.11	-0.05	0.95	0.65, 1.39	0.72***	2.05	1.35, 3.12	-0.86*	0.43	0.21, 0.88
No high school graduation	-0.57**	0.56	0.37, 0.86	0.14	1.15	0.77, 1.72	0.20	1.22	0.80, 1.86	0.55	1.73	0.84, 3.55
Arrest history[1]	-0.62**	0.54	0.35, 0.82	0.10	1.11	0.73, 1.68	0.63**	1.87	1.20, 2.92	-0.09	0.92	0.42, 1.99
Prostitution	-1.31**	0.27	0.10, 0.73	0.42	1.53	0.79, 2.96	0.56	1.76	0.92, 3.36	-0.53	0.59	0.16, 2.15
Household income	-0.01	0.99	0.91, 1.09	0.05	1.05	0.97, 1.15	-0.01	0.99	0.91, 1.08	-0.12	0.88	0.76, 1.03
Neighborhood problems	-0.16	0.85	0.65, 1.21	0.19	0.83	0.63, 1.08	0.32**	1.38	1.07, 1.78	-0.01	1.00	0.68, 1.47
Neighborhood disadvantage[2]	0.01	1.01	0.79, 1.28	-0.11	0.90	0.71, 1.13	0.19	1.21	0.96, 1.53	-0.14	0.87	0.60, 1.27
Marriage	-0.50*	0.61	0.39, 0.94	0.39	1.47	0.95, 2.28	0.11	1.11	0.70, 1.76	0.18	1.20	0.55, 2.59

Notes: β = unstandardized logistic regression coefficient; OR = odds ratio; CI = confidence interval. [1]Does not include arrests for prostitution; [2]based on 2000 census.
*$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.

between the drug-use groups in previous analyses. Results of the logistic regressions are reported in Table 4. When the entire set of variables was included ($n = 589$ because of missing data), the significant predictors of the abstinence/low-use pattern were being female, high school completion, no criminal history, no prostitution, and not being married at young adulthood. The only factor significantly associated with the adolescent/young adult limited pattern was being male. The chronic-persistent pattern was also associated with being male, as well as parental substance-use problems, arrest history, and more self-reported neighborhood problems. The late-use pattern was associated with childhood neglect, being Black, and no reported parental substance-use problems.

Discussion

Findings from this study help to elucidate patterns of drug use from young to middle adulthood and reveal an important set of psychosocial variables that predict different patterns of drug use. Differences in age at onset and substance-related problems suggest meaningful distinctions between four patterns of drug use: (a) low use and abstinence, (b) adolescent and adult limited use, (c) chronic-persistent use, and (d) late use. Both the adolescent/young adult limited and chronic-persistent groups reported that they began using drugs at approximately age 15, but the former group desisted use after young adulthood, whereas the latter continued into middle adulthood. Those in the abstinence/low-use and late-use groups who reported any drug use (five times or fewer) at young adulthood did not begin until approximately age 18. The adolescent/young adult limited and chronic-persistent groups both reported elevations in substance-related problems in young adulthood, and the chronic-persistent and late-use groups reported elevated substance problems in middle adulthood. In other words, the groups who reported use of drugs in middle adulthood were also at risk for substance-related problems in middle adulthood.

Results of this study reveal two patterns involving substance use and substance-related problems in middle adulthood: chronic-persistent use and late use. The chronic-persistent drug-use pattern was associated with a number of expected risk factors: being male, parental substance-use problems, involvement in crime, and neighborhood problems. The late-use pattern was associated with a different set of risk factors: childhood neglect and being Black. The late-use pattern was also associated with lower household income, living in the most disadvantaged neighborhoods in adulthood, and not being married, although these relationships were no longer significant when other variables were controlled. Furthermore, individuals exhibiting the late-use pattern were less likely than those in other groups to report that their parents had problems with substance use. This pattern of drug use has received less attention in previous literature than the chronic-persistent pattern, possibly because few studies have followed individuals beyond young adulthood. The combination of childhood adversity, social disadvantage, and low socioeconomic status may have led to illicit drug use later in life among these individuals who lacked obvious signs of risk early in life (e.g., parental substance-use problems or use of illicit drugs in adolescence). Childhood neglect may have led to problems across social, economic, and environmental domains that contributed to drug use in adulthood. Yet, it is possible that drug use in this group in middle adulthood contributed to economic difficulties, rather than the other way around.

Findings that Blacks were overrepresented in the late-use group is consistent with evidence of a "crossover effect,"

whereby early substance use is less common in Blacks than in Whites, but substance use after age 35 is more common in Blacks than in Whites (French et al., 2002; Watt, 2008). Recent findings from a nationally representative study suggest that this trend is largely accounted for by social and demographic disadvantages (Watt, 2008). In our sample, Blacks were more than three times more likely than Whites to be in the late-drug-use group, even when other social and demographic risk factors were controlled.

Being male was the only factor that predicted the adolescent and young adult limited-drug-use pattern, when other variables were controlled. In general, this group tended to fall between the abstainer/low-use and the chronic-persistent use groups with regard to other risk variables. Differences between this group and the chronic-persistent use group are consistent with characterizations of antisocial behavior more generally in terms of "life-course persistent offenders," who have significant problems in many areas throughout their lives, and "adolescent limited offenders," who engage in limited amounts of risk-taking behavior during a developmental period when such behavior is common (Moffitt, 2003).

The late-use drug pattern was the only one associated with childhood maltreatment, specifically neglect. Indeed, individuals with histories of childhood neglect were more than twice as likely as controls to be in the late-drug-use group. This finding may help to explain previous results with this sample linking childhood maltreatment to drug use among women in middle adulthood (Widom et al., 2006) but not adolescence or early adulthood (Widom et al., 1999). A history of neglect in childhood may have contributed to an array of long-term disadvantages and failure to achieve social roles, leading to use of illicit drugs after the age when most individuals mature out of such behavior. The finding that neglect was the only type of childhood maltreatment associated with this drug-use pattern supports other evidence suggesting that childhood neglect may, in some cases, result in worse developmental outcomes than physical abuse (Bousha and Twentyman, 1984; Egeland et al., 1983). It is important to note, however, that the majority of the maltreated children in this sample experienced neglect, and failure to find significant relationships between other forms of child abuse or neglect and the drug-use patterns could be the result of the relatively small numbers of physical and sexual abuse cases.

Overall, the abstinence/low-use group tended to have fewer risk factors than the other groups. They were the most likely to be women and to have completed high school, and least likely to be involved in crime or prostitution. However, protective factors identified in other studies (marriage, childbearing, and employment) were not strongly associated with either abstinence or cessation from drug use in this sample.

This study has several strengths. First, it employs a prospective matched cohort design following individuals with documented cases of child abuse and neglect and matched controls into adulthood. The uniqueness of this research is the study's prospective cohort design using unambiguous cases of childhood abuse and neglect and clear temporal relationships, rather than reliance on retrospective self-reports from adults. Retrospective reports of child abuse and neglect are problematic because of recall errors, possible response biases, and ambiguity of temporal order (Widom et al., 2004). Second, official records of crime, prostitution, and neighborhood disadvantages also minimized problems associated with self-reports. Third, the sample is large and heterogeneous, including men and women, and Whites and Blacks. Fourth, this study followed individuals beyond adolescence and young adulthood into middle adulthood. Fifth, we examined a number of social and interpersonal risk and protective factors as predictors of different drug-use patterns.

Despite its strengths, several important limitations of this study must also be noted. First, although use of official records of child abuse and neglect is an advantage, this strategy means that only cases of child abuse and neglect that came to the attention of authorities were included. Second, the sample is skewed toward the lower end of the socioeconomic spectrum, and therefore results may not generalize to other socioeconomic groups. Third, the sample represents individuals who grew up in the late 1960s and early 1970s in the midwest part of the United States, and findings may not generalize to individuals from other generations or geographic regions. Fourth, cases of child abuse and neglect occurred before age 12, and therefore findings may not generalize to abuse or neglect in adolescence. Fifth, because we did not assess age at onset of drug use in middle adulthood, we are missing this information for individuals in the late-use group who reported no use at all in young adulthood. Therefore, the average age at onset in this group and differences from other groups are most likely underestimates. Finally, it is important to note that these drug-use patterns do not reflect trajectories derived from multiple data points, because only two time points were assessed.

In summary, results of this prospective study with abused and neglected children and matched controls followed into middle adulthood reveal four distinct life-course patterns of drug use. Perhaps the most intriguing findings relate to the small group of individuals who reported little if any drug use in adolescence or young adulthood but reported drug use and substance-related problems in middle adulthood. Individuals in this group were more likely to have documented cases of childhood neglect, were more likely to be Black, and were the most economically disadvantaged. Despite numerous problems and life stressors evident by middle adulthood, it is likely that these individuals would have been missed in efforts to prevent or reduce drug use because they did not appear to be at risk earlier in life. Further research is needed to understand this pattern of late drug use that persists in middle adulthood and appears to involve primarily Black women with histories of childhood neglect.

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