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Pathways to Adult Marijuana and Cocaine Use: A Prospective Study of African Americans from Age 6 to 42*

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Abstract

This study examines pathways to adult marijuana and cocaine use in a cohort of African Americans from Woodlawn, an inner city community in Chicago. Assessments were conducted in first grade (age 6), adolescence (age 16), early adulthood (age 32), and in mid adulthood (age 42). The Social Adaptation Life Course Framework guided the focus on social adaptation, social bonds, and economic resources as predictors of adult drug use. Results indicate that more frequent substance use in adolescence and lower income and less frequent church attendance in early adulthood increase the risk of midlife drug use. Shyness in first grade related inversely to later cocaine use and marijuana use (marginally significant). Indirect pathways to drug use also were identified. Gender differences were not significant. The findings show continuities in social maladaptation over time and the importance of social integration and economic resources in the early adult years.

Most research on drug use has focused on initiation, typically occurring in adolescence, while studies of adult drug use tend to examine periods of peak use, typically in early adulthood (20s). Thereafter, drug use generally declines, although a number of people continue or begin to use drugs in their 30s and 40s (Merline et al. 2004; Grant et al. 2003). Drug use during this stage of life is of particular concern because it is past the time of normative experimentation, and may indicate problem use, which often hinders the successful fulfillment of family and work roles. In addition, problems with drug use in mid adulthood could trigger a decline in health and social role functioning that continues into later stages of adulthood. Among African American adults the use of drugs is especially problematic given that they are more likely to develop drug-related difficulties than are White adults (Herd 1995; Wallace 1999).

Research on adult drug use is limited by the predominant use of cross sectional surveys, prohibiting distinctions between antecedents and consequences or identification of mediating and moderating relationships among risk factors (McCord 1993; Nurco et al. 1998). Of the existing longitudinal studies on drug use, few have extended into the 40s, the beginning of mid adulthood. This understudied period, characterized by a complex array of both stable and changing social roles, brings challenges distinct from those faced in early adulthood (e.g., parents with declining health, significant childcare duties, increased responsibilities at work and in community organizations, and extensive economic demands) (Lachman 2004). African Americans face a disproportionate level of social, economic, and health problems during this phase of life (Bureau of Labor Statistics 2005; CDC 2004; U.S. Census 2005). It has been proposed that they are fairly resilient until about age 40 when they begin to succumb to ongoing

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pressures and turn to unhealthy coping behaviors, including drug and alcohol use, cigarette smoking, and unhealthy eating (Jackson 2006). Learning more about antecedents affecting midlife health and psychological well-being, including those in early adulthood, is important for preventing premature declines in health and functioning later in life (Lachman 2004).

The goal of this prospective study is to identify pathways across the life course to marijuana and cocaine use among African American men and women in their late 30s and 40s using data from the Woodlawn Project. Prior Woodlawn research has found childhood and adolescent social adaptation, family and social bonds, and school achievement to be associated with drug use in early adulthood. Here we aim to: 1) extend this inquiry to mid adulthood and determine if these relationships still remain given the changes in social roles in adulthood; 2) examine for the first time the influence of early adult factors (i.e., social bonds, income, and school attainment) on mid adult marijuana and cocaine use, and 3) identify indirect pathways over the life course to mid adult marijuana and cocaine use.

CONCEPTUAL FRAMEWORK

Our conceptual model is guided by the Social Adaptational Life Course Framework (Kellam et al. 1975), which proposes that one's performance in key social roles over the life course reflects both individual characteristics and interactions with the social environment (see Figure 1). Social role performance at each stage of life has an important developmental influence on subsequent adaptation and maladaptation, including illegal drug use. We aim to determine whether drug use in midlife (30s and 40s in this study) is related to social role performance at earlier stages of life (first grade classroom behaviors, adolescent school achievement, early adult educational attainment). Thus, are the trajectories that are established early on still important to a stage of life that is far removed in time?

Our conceptual framework also takes into account social bonds and social structural characteristics (e.g., economic disadvantage), allowing for consideration of individual and contextual influences on drug use. According to theories of social control, strong bonds with appropriate social groups (e.g., family, co-workers, peers, community groups) encourage adherence to positive social norms and give meaning to one's life (Burton 1998; Hirschi 1969; Umberson 1987). We therefore expect that midlife drug use will be influenced by the strength of bonds within important social contexts, such as school, family, and community over the life course. In addition, the structural theories of Pearlin and Turner suggest individual behaviors are often in response to structural factors such as economic disadvantage and other adverse conditions (Pearlin et al. 2005; Turner 2003).

Social Adaptation

We hypothesize that social adaptation at various stages along the life course will influence later adaptation because there is continuity in behaviors. Early in the life course, school and family are key social contexts. We view social adaptation as being influenced by both individual and social context characteristics. For example, teacher ratings of a child reflect the child's characteristics, the atmosphere of the classroom, and the characteristics of the teacher, such as experience and background. Prior Woodlawn research found that teacher ratings of first grade social adaptation, especially aggressive behavior (less authority acceptance) and shy behavior (less social contact) were related to drug use in adolescence and early adulthood (Ensminger, Juon, and Fothergill 2002; Kellam et al. 1983). These findings correspond with those from other longitudinal studies that aggressive children are at greater risk for substance use in both adolescence and early adulthood (Brook and Newcomb 1995; Hawkins, Catalano, and Miller 1992), and that shy behavior is protective (Sieber and Angst 1990; Farrington 1989).

Earlier Woodlawn research also found that first grade readiness for school predicted earlier initiation of drug use in adolescence (Kellam, Simon, and Ensminger 1983) but decreased risk of use in early adulthood (Ensminger et al. 2002). These findings support Moffitt's (1993) theory that adolescent-limited drug use can be considered experimental, while use that continues into adulthood may indicate more deeply rooted problems (Block, Block, and Keyes 1988).

In the current study, we assess whether poor adaptation in childhood (aggressive behavior, low readiness to learn) distinguishes those who are at risk of drug use in midlife (and conversely, if shy behavior distinguishes those who are not at risk). We are interested in these relationships for two primary reasons: 1) to assess whether childhood adaptation has long-term effects, and 2) to identify indirect paths from childhood social adaptation to mid adult drug use.

We also explore the role of social adaptation in adolescence (academic achievement) and early adulthood (educational attainment), which have been linked to an increased risk of substance use in adolescent and early adult populations (Brunswick and Messeri 1984; Fothergill and Ensminger 2006). Here, with two adult assessment periods, we can examine whether educational attainment assessed in early adulthood is associated with subsequent drug use.

We also hypothesize that adolescent substance use will affect mid adult drug use both directly and indirectly. Although a large number of adolescents experiment with drugs and alcohol without becoming frequent users (Johnston, O'Malley, and Bachman 1988; Newcomb and Bentler 1988), use in adolescence has been shown repeatedly to predict use in early adulthood (Brook et al. 1995; Duncan et al. 1997). Previous research with the Woodlawn data found that adolescent substance use increased the risk for early adult drug use (Ensminger et al. 2002; Green et al. 2006), and we expect this relationship to continue into mid adulthood. Teens whose use of drugs is a maladaptive response to social role expectations rather than normative experimentation may be more likely to use drugs in mid adulthood as a maladaptive response to the demands of this time of life.

Social Bonds

Family is a key social context in childhood and adolescence, and prospective studies, including the Woodlawn Study, have found that family bonds deter adolescent drug use (Elliott, Huizinga, and Ageton 1985; Ensminger, Brown, and Kellam 1982). We now examine whether family bonds in adolescence influence mid adult drug use, either directly or indirectly. We also expect early adult family bonds to be important given that this is a period of transition during which individuals begin to develop families, careers, and commitments to community institutions, while ties to parents may weaken as these new relationships develop (e.g., with spouse, children). Failure to develop or maintain family relationships in early adulthood may increase the risk for marijuana and cocaine use in mid adulthood.

Church involvement is widely regarded as an indicator of community integration, particularly among African Americans, who report higher levels of religiosity than other groups (Chatters 2000; O'Malley, Johnston, and Bachman 1998). Involvement with church, which reinforces positive social norms, may help the transition to adulthood. Most studies on the association of religion with substance use have found an inverse, contemporaneous relationship (e.g., Bowie, Ensminger, and Robertson 2005; Gorusch, 1995). However, we know of no prospective studies that have examined the association between religion in early adulthood and subsequent drug problems.

Economic Resources

Cross sectional studies have found economic resources to be inversely related to drug use in adulthood (e.g., National Institute on Drug Abuse 1990), and a few longitudinal studies have found early economic disadvantage to be related to substance use in early adulthood (Farrington 1989; Poulton et al. 2002). Examining the impact of economic disadvantage on health behaviors in mid adulthood is of particular interest because this is when African Americans begin having disproportionately high morbidity and mortality (Cooper et al. 2001; Sorlie et al. 1995). Much of this difference is attributed to socioeconomic differences along the life course, although the mechanisms are not well understood (Williams and Collins 1995).

One way childhood economic disadvantage may affect adult substance use is through its effects on social roles and relationships (McLoyd 1990; Sampson and Laub 1990). Families under economic stress may have weaker parent-child relationships (Larzelere and Patterson 1990), which in turn can lead to drug and alcohol use (Lempers et al. 1989). An earlier Woodlawn study found that family socioeconomic status in first grade indirectly affected early adult drug use problems through its impact on educational attainment (Fothergill and Ensminger 2006). We expect that childhood family income will continue to influence drug use in mid adulthood directly and indirectly. We also hypothesize that the individual's own income in early adulthood will be related to mid-adult drug use. Income at this stage of life represents not only the availability of important resources, but also the individual's ability to achieve economic independence, a key indicator of successful transition to adulthood.

Gender

Males consistently report more drug use than females (Kessler et al. 1994; Kandel et al. 1997), and evidence shows that the prevalence of childhood and adolescence risk factors differs by gender in both frequency and pattern. For example, males are more likely to be aggressive, and females are more likely to be shy (Kellam, Simon, and Ensminger 1983). Studies, including our own, provide increasing evidence that men and women experience different trajectories to drug use (e.g., Boyd, Blow, and Orgain 1993; Ensminger et al. 2002).

Research Questions

This study differs from past examinations of drug use in several important ways. First, the antecedents of midlife drug use have not been investigated extensively within either the Woodlawn study or other longitudinal studies. Second, in studying mid life drug use we focus on an understudied group at a stage of life when most have stopped using drugs. Third, antecedents that have been identified for drug use at earlier stages may or may not be relevant for this mid adult stage when different roles and expectations exist. Further, the importance of young adult characteristics for later mid adult drug use has not been examined in the literature. Economic well-being, community involvement, and family relationships have different meanings in early adulthood than in adolescence, and their relevance for mid life outcomes is relatively unknown.

We hypothesize that social adaptation, social bonds, and economic resources over the life course relate to how the individual responds to the multiple and complex demands of mid adulthood. Drug use at this time may reflect failure to accomplish key tasks in adulthood: 1) to meet social role performance expectations; 2) to develop supportive relationships at home or in the community, or 3) to acquire sufficient economic resources to handle responsibilities. Our research questions focus on the role of *social adaptation*, as indicated by prior behaviors and academic success; *social integration*, as indicated by family and church involvement, and *structural influences*, as indicated by economic resources. We expect these three domains to interact throughout the life course to affect risk for mid adult drug use. We examine marijuana

and cocaine use separately as they are perceived differently and may have distinct etiologies and constituents. Our specific research questions are as follows:

1. Do first grade aggressive behavior, shy behavior, and readiness to learn directly relate to marijuana or cocaine use 30–35 years later? Do they indirectly affect later drug use through their influence on later social adaptation, social bonds, and economic resources?
2. Do weak adolescent family bonds directly increase the risk for marijuana or cocaine use 25 years later? Do they have indirect effects through later family and church bonds? Do early adult family and church bonds increase the risk of mid adult drug use?
3. Does economic disadvantage in childhood or early adulthood directly or indirectly increase the risk for marijuana or cocaine use in mid adulthood?
4. Do pathways to drug use differ for males and females? If so, how?

METHODS

Study Design and Population

This is a prospective, longitudinal study of a cohort of 1,242 males and females who began first grade in 1966–67 in Woodlawn, an inner city community on the south side of Chicago. The cohort has been followed for more than 35 years. In the 1960s Woodlawn was one of the five poorest areas in Chicago, yet there was economic variation in the community. Teachers and mothers (or mother surrogates) reported on the children's social adaptational status, their mental health, and the family and classroom contexts. In 1975–1976, when the study cohort was in adolescence, 939 of the mothers or mother surrogates were re-interviewed as well as 705 of the teenaged cohort members (see Kellam et al. 1983). In 1992–94, when the cohort was age 32–34, 80% (n=952) of those who were alive and mentally competent were interviewed. In 2002–2003, we successfully located 1002 (84%) of the 1187 individuals who were not known to have died. Of these 1002, 833 (83%) were re-interviewed (see Crum et al. 2006). To test for attrition biases, comparisons were made between those who were interviewed in 2002–2003 and those who were not interviewed in regards to relevant factors assessed in first grade, adolescence, and early adulthood. We found no relationship between interview status at midlife and multiple social adaptation indicators (i.e., first grade school readiness, first grade shy and aggressive behavior, adolescent school achievement, and adolescent substance use). We did find that those interviewed in mid adulthood reported higher educational attainment, higher first grade and early adult family income, and stronger early adult family bonds than those not interviewed. These differences could lead to an underestimation of the impact of educational attainment, income, and family bonds; we consider this in our discussion of the results.

Measures

Table 1 shows the frequency or mean value and standard deviation of each dependent and independent variable for males, females, and the total population.

Midlife marijuana use and cocaine use—Each of the dependent variables, marijuana use and cocaine use in mid-adulthood, was represented by a latent construct comprising self-reports of frequency and recency of use in the past 10 years. Frequency responses ranged from 0=*none in the past 10 years* to 7=*more than 200 times*. The recency responses were categorized as 0=*never or not at all in the past 10 years*, 1= *in the past 1–10 years*, and 2=*within the past year*.

First grade school readiness—The standardized Metropolitan Readiness Test (range 9–99), which was administered in classrooms by school personnel, scores a child's initial responses to the cognitive tasks of the classroom (Anastasi 1968).

First grade shy and aggressive behavior—Teachers used the Teachers' Observations of Classroom Adaptation (TOCA) to rate a child's level of adaptation in five domains. This study used the aggression and shyness ratings, which ranged from 0 (*fully adapting*) to 3 (*severely maladapting*) (Kellam et al. 1983), because we have found them to relate to earlier drug use, school achievement, and delinquency (Ensminger and Slusarcik 1992; Ensminger, Kellam, and Rubin 1983). Cues that teachers were given in rating children as shy were: timid, alone too much, friendless, aloof. Aggressiveness was indicated by teachers as: fighting too much, stealing, telling lies, resisting authority, destructiveness, disobedience, uncooperativeness.

Adolescent school achievement—This construct comprised four indicators: scores from Chicago Public School tests of 7^{th} and 8^{th} grade math and reading achievement (range 25–140).

Adolescent substance use—This construct included four indicators: adolescents' self reports of how many times they had ever used marijuana, beer or wine, and hard liquor and how many times they had used marijuana in the past two months (1=*never* to 6=*more than 40 times*).

Early adulthood educational attainment—This construct comprised two indicators: self reports of years of schooling (range 4–20) and self reports and school records of level of education completed (1=*dropout* to 8=*graduate degree*).

Childhood family income—This observed indicator was based on the mother's report of household income in 1966. Responses ranged from 0=<*$1,000* to 10=*$10,000+*.

Early adulthood income—This observed indicator was based on self reports of household income in 1992. Responses ranged from 1=<*$1,000* to 23=*$75,000+*.

Mid adulthood income—To control for concurrent income, the model included an observed indicator based on self reports of household income in 2002. Responses ranged from 1=< *$1,000* to 18=*$100,000+*.

Adolescent family bonds—A latent construct was based on the adolescent's report on the frequency of engaging with family in five ways: going out for entertainment; doing homework; playing sports/recreation; hanging out around the house; engaging in community activities. Responses ranged from 6=*several times a week* to 2=*every few months* and 1=*less often*.

Adult family bonds—In early adulthood, this latent variable comprised six indicators asking which family members the respondent could turn to when 1) sick, 2) in need of money, 3) had decision to make, 4) felt sad, 5) was in a fight with a friend, and 6) needed help with children. For each circumstance, respondents answered yes/no to each of five family members (father, mother, spouse/partner, sibling, other relative), and the responses (0–5) were summed for each of the six problems. In mid adulthood, a sixth family member was added: child(ren), thus the range was 0 to 6 for each problem. This measure was included to control for the influence of concurrent family bonds.

Church attendance—The young adult variable was based on self reports of frequency of church attendance. Responses ranged from 1=*less than once a year* to 6=*several times per week*. The same variable was included in mid adulthood to control for current church attendance.

Analyses

Multivariate analyses were conducted through structural equation modeling (SEM) with AMOS 7.0 (Arbuckle 2006). This method has several advantages for this study: it identifies pathways over the life course; it assesses direct and indirect effects; it allows for the use of both latent and observed indicators; and it uses full information Maximum Likelihood (ML) estimation (Little and Rubin 1987; Schafer 1997). ML is a theory-based approach that provides efficient estimation of statistical parameters from incomplete data, and thus allows retention of the complete sample for all analyses. Parameter estimates from ML are less biased than those from listwise or pairwise deletion or imputation of means (Schafer, 1997).

Measurement model—We began our analyses with confirmatory factor analyses to check the measurement models for both males and females. Resulting factor loadings indicated the relative influence of each observed indicator per latent variable. Each model had significant factor loadings and adequate fit statistics. We then tested for gender differences using a multi-group model in AMOS. We found no significant differences between the male and female measurement models, allowing us to continue to test gender differences in the structural pathways.

Structural model—For each of the marijuana and cocaine constructs, we built and analyzed a structural model, which shows the strength and direction of the hypothesized relationships among constructs. The structural model included arrows from each of the explanatory variables and constructs to drug use in mid adulthood, representing our hypotheses about direct effects. To capture indirect pathways over the life course, the model also included arrows from each first grade construct to each adolescent construct, from each adolescent construct to each early adult construct, and from each early adult construct to each mid adult construct. Also, correlations between variables and constructs within the same time period were determined. We hypothesized that first grade family income would relate directly to income in early adulthood.

The fit of each model was evaluated according to several criteria: the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the relative chi-square index, the ratio of the chi-square statistic to the degrees of freedom. The CFI, which adjusts for the degrees of freedom, compares the fit of the model against the null model with values ranging from 0 to 1; scores over .90 represent a good fit (Bentler 1992). The RMSEA takes into account the error of approximation in the population and evaluates how well the model would fit the population covariance matrix with unknown but optimally chosen parameter values. A fit less than .05 is considered a good fit, and a fit less than .08 is acceptable (Arbuckle and Wothke 1999). Finally, for the ratio of the chi-square statistic to the degrees of freedom, values less than 5 indicate an acceptable model (Bollen 1989).

RESULTS

Gender Differences

We ran separate models for males and females to assess gender differences in the pathways to marijuana or cocaine use over the life course. AMOS's multigroup model identified no significant gender differences in the overall structural models for either drug. We therefore combined males and females in our final analyses and present those results below.[1]

Marijuana Use

Figure 2 shows the SEM model for marijuana use. For ease of interpretation, only statistically significant pathways are shown. All factor loadings for the measurement models within the final structural model are statistically significant, $p<0.005$. The model fit the data reasonably well (χ^2/df=2.5, RMSEA=.04, CFI=.94). Table 2 summarizes the direct, indirect, and total effects on marijuana use.

Direct effects—We found three factors with direct effects on mid adult marijuana use. Those who used drugs and alcohol more frequently in adolescence and those with low income in early adulthood were more likely to use marijuana in adulthood; those who went to church frequently in early adulthood were less likely to use marijuana in mid adulthood. Those who were shy in first grade were marginally ($p<.10$) less likely to use marijuana in mid adulthood.

Indirect effects—School readiness and aggressive behavior in first grade influenced adult marijuana use indirectly through adolescent drug use such that those who were aggressive and those who had low readiness scores were more likely to use drugs as teenagers. Those who were shy in first grade were less likely to use drugs in adolescence. Those from families with low incomes were more likely to have low school achievement, which increased the likelihood of having a low income in early adulthood. Adolescents who used drugs were less likely to attend church in early adulthood. Those who had low school achievement and those who used drugs in adolescence were more likely to have low income in early adulthood.

Total effects—The total effects capture the combination of direct and indirect effects on marijuana use in midlife, helping us to assess the overall impact of each construct over a number of years. Although AMOS does not provide significance levels for these analyses, we considered effects of .10 or greater to be potentially important since direct effects of this size were statistically significant. There were five factors with total effects at .10 or greater: adolescent substance use (.256), early adult church attendance (−.142), early adult income (−.105), first grade aggressive behavior (.105), and adolescent school achievement (−.100). While the large total effects for adolescent substance use, early adult church attendance, and early adult income corresponded to their large direct effects, first grade aggressive behavior and adolescent school achievement had high total effects due to their strong indirect associations.

Cocaine Use

The model for cocaine use is shown in Figure 3. Again, only statistically significant pathways are shown. All factor loadings for the measurement models were statistically significant ($p<0.005$). Fit statistics indicate that the model fit the data reasonably well (χ^2/df=2.5, CFI=.94, RMSEA=.04). Table 2 summarizes direct, indirect, and total effects on cocaine use.

Direct effects—We found four factors with direct effects on mid adult cocaine use. Shy first graders were less likely to use cocaine in mid adulthood; adolescent drug and alcohol users were more likely to use cocaine in mid adulthood; those who went to church more frequently in early adulthood were less likely to use cocaine in mid adulthood; and those with low incomes in early adulthood were more likely to use cocaine in mid adulthood.

Indirect effects—Shy behavior, aggressive behavior, and school readiness in first grade influenced adult cocaine use indirectly through adolescent drug use. Children who were

[1]We also assessed the significance of the gender differences in individual parameters (e.g., does the relationship between early adult church attendance and marijuana use differ significantly for males and females?). In the marijuana model, only one parameter was significantly different for males and females: the relationship between income in early adulthood and marijuana use was stronger for females (−.183 vs. −.027, *p=.034*). There were no significant gender differences in the cocaine model.

aggressive or had high readiness scores as first graders were more likely to use drugs as teenagers; those who were shy were less likely to report substance use in adolescence. Those who were from low-income families in first grade were less likely to do well in school, which in turn related to having a low income in early adulthood. Adolescents who used drugs were less likely to attend church and more likely to report low income in early adulthood.

Total effects—For cocaine use, five variables had total effects equal to or above .10: early adult income (−.219), adolescent substance use (.214), first grade aggression (.108), early adult church attendance (−.107), and first grade shy behavior (−.100). These total effects largely reflect the high direct effects of each of these variables, although again first grade aggressive behavior had strong total effects because of its combined direct and indirect effects.

DISCUSSION

Little is known about drug use in mid adulthood, particularly among African Americans. This understudied period of the life course is characterized by multiple social roles (e.g., parent, grandparent, son/daughter, employee, community member), some of which are stable, others transitional. Researchers have suggested that in mid adulthood African Americans may adopt unhealthy behaviors in response to social and economic pressures that have built up over time (Jackson 2006). Drug use in mid adulthood may be in response to the multiple, complex demands of this period as well as to failure to meet social role expectations earlier in life.

Guided by the Social Adaptation Life Course Framework and theories of social control and structural disadvantage, we hypothesized that social adaptation, social bonds, and economic resources over the life course influence marijuana and cocaine use among African Americans in mid adulthood. By using structural equation modeling to examine four assessment periods over the life course, we identified multiple pathways to marijuana and cocaine use. Social adaptation, social bonds, and economic resources at various stages of life were found to have direct and indirect relationships with later use of these drugs.

Hypothesizing that substance use in mid adulthood was rooted in poor social adaptation in childhood, adolescence, and/or early adulthood (i.e., aggressive and shy behavior, school achievement, teen drug use, educational attainment) (Kellam et al. 1975), we found adolescent drug use to be a key factor in the development of risk for later marijuana use and cocaine use. These results support the theoretical hypothesis that early maladaptive behaviors lead to subsequent maladaptation. Our findings indicate not only the persistence of adolescent drug use into mid-adulthood, but also that adolescent drug use leads to lower adult income and less church attendance, both of which were associated with later drug use. This suggests that adolescent drug use is important not only because of its continuity but also because of its impact on other factors that increase risk for later drug use.

Contradictory to our framework, one indicator of social (mal)adaptation, first grade shy behavior, was protective in its impact on midlife cocaine use (marginally so for marijuana use). What is surprising in these results is the considerable length of time that elapsed between recognition of shy behavior in first grade and drug use in mid adulthood, even with many other factors controlled, highlighting the importance of studying pathways that are set into place in early childhood. Early shyness may reduce risk-taking behavior in general. Also, because of their reduced social interactions, shy individuals may have more limited opportunities to use drugs and be less influenced by drug-using peers.

Aggression in first grade and adolescent school achievement were not directly related to mid adult drug use. However, the total effect of childhood aggression suggests long-term negative

implications of being aggressive early in the life course for outcomes 35 years later in mid adulthood. Similarly, school achievement had strong indirect effects.

The finding of no relationship between educational attainment and mid adult drug use is noteworthy. This may be because of education's high correlation with income and church attendance in early adulthood, highlighting the interrelationship of economic and social resources and the need to recognize the complexity of the pathways to drug use. It may also be that education is less salient for mid adult drug use than it is for early adult use. The Social Adaptational Life Course Framework explains that the influence of various social fields shifts over the life course, but to date little research has examined which social fields influence mid adult behaviors. Additional research is needed to further examine the role of education and other social fields on mid adult drug use.

We next examined whether marijuana and cocaine use in mid adulthood is related to weak social bonds in adolescence and early adulthood. Results show that church attendance in early adulthood plays an important role in decreasing later marijuana and cocaine use. While studies have shown contemporaneous correlations between church involvement and substance use (e.g., Gorusch 1995), this is the first known study to find this longitudinal relationship. Potential selection effects (i.e., those who use drugs are less likely to attend church) were minimized by including adolescent substance use in the model. The finding corresponds with Durkheim's (1951) social integration theory and Hirschi's (1969) social control theory that social ties prevent deviant behaviors and alienation from social norms. It also supports what is known about the importance of church among African Americans. Church involvement in early adulthood may be a critically important buffer against the build up of pressures that lead to unhealthy coping behaviors in mid adulthood. Increasing young adults' involvement with church has the potential to not only prevent later drug use but also to help steer troubled individuals in a more prosocial direction (Catalano and Hawkins 2000).

Neither adolescent nor adult family bonds related to later drug use. Although others have found family bonds to be an important part of the pathway to drug use (e.g., Elliott et al. 1985), it may be that family bonds are important concurrently but do not have a sustained impact. We did find a strong negative correlation between adolescent family bonds and adolescent drug use and a strong positive correlation between early adult family bonds and income. It may be that as a person matures, the role of family bonds may change so that drug use becomes more independent of family relative to other bonds, such as that with community.

Focusing on the relationship between mid adult drug use and prior economic disadvantage, our goal was twofold: to assess whether the influence of early family income on drug use persisted beyond early adulthood and to examine whether early adult income was associated with later drug use, a relationship not yet examined in prior research. Childhood family income was not directly related to either midlife marijuana or cocaine use but was indirectly related, primarily through its influence on school achievement. In addition, family income was correlated with early readiness for school and early classroom aggressive behavior; thus, being from an economically disadvantaged family may influence later outcomes by its impact on adaptation in the early years.

Early adult income was related to both marijuana and cocaine use. We suspect that having poor income in early adulthood exacerbates the stress of the growing social role expectations of adulthood, thereby increasing the risk of drug use in mid adulthood. This is an important finding given the dearth of longitudinal studies of drug use with more than one assessment period in adulthood. As noted earlier, these findings regarding income may be underestimated given that those who were not found for follow-up were more likely to have lived in low-income families in first grade and to report low income in early adulthood.

Finally, contrary to our expectations, we found no significant gender differences in either the marijuana or cocaine use model, and thus we combined males and females in our final analyses. Prior research on adolescent and early adult drug use suggests that males and females can differ in risk for drug use (e.g., Boyd and Mieczkowski 1990). One explanation for this discrepancy is that those who use drugs in mid adulthood have a distinct set of problems and are more deviant than those who use earlier in the life course when drug use is more normative and experimental. Thus, males and females who continue or begin to use drugs at this later stage of life may have more similarities than differences in their life histories. Also, differences in drug use trajectories for males and females may be related to the cohort under study. Gender roles and the acceptability of drug use for females have changed greatly over the life course of this cohort.

In summary, the main contributions of this paper are 1) demonstrating the long-term effects of childhood and adolescent maladaptation on drug use in mid adulthood, relationships that have not been tested in earlier research, and 2) identifying factors in early adulthood that contribute to the risk of mid adult drug use. Although correlational analyses are common in adulthood, little is known about the impact of early adult factors on subsequent drug use.

The study has limitations that should be acknowledged. First, the Woodlawn population is all African American and from a specific community in Chicago that was disadvantaged at the initiation of the study. The generalizability of the findings is limited until replicated with other populations. For example, it may be only in disadvantaged populations that early maladaptive behavior affects later drug use. In populations that are not disadvantaged, there may be multiple opportunities to escape these deviant pathways. Prior Woodlawn findings have often been replicated in other populations. Second, attrition and other missing data must be considered even though missing data were taken into account using maximum likelihood estimation. Finally, self-reports of drug use may be biased (Schwarz 1999), although studies have shown self reports to be valid 70–90% of the time in some populations (Darke 1998), and prior tests with the Woodlawn data found no evidence of systematic bias (Ensminger et al. 2006).

Using prospective data collected over 35 years from multiple sources and focusing on African American males and females, this study provided a rare opportunity to study the development of risk for mid adult marijuana and cocaine use within a community population. Findings show continuities in social maladaptation over time and the importance of social integration and economic resources in the early adult years. Results support those suggesting that drug use has early origins and that early prevention may be effective; they also point to early adulthood as a key transition point in life and a critical time for preventing long-term or late initiation of drug use.

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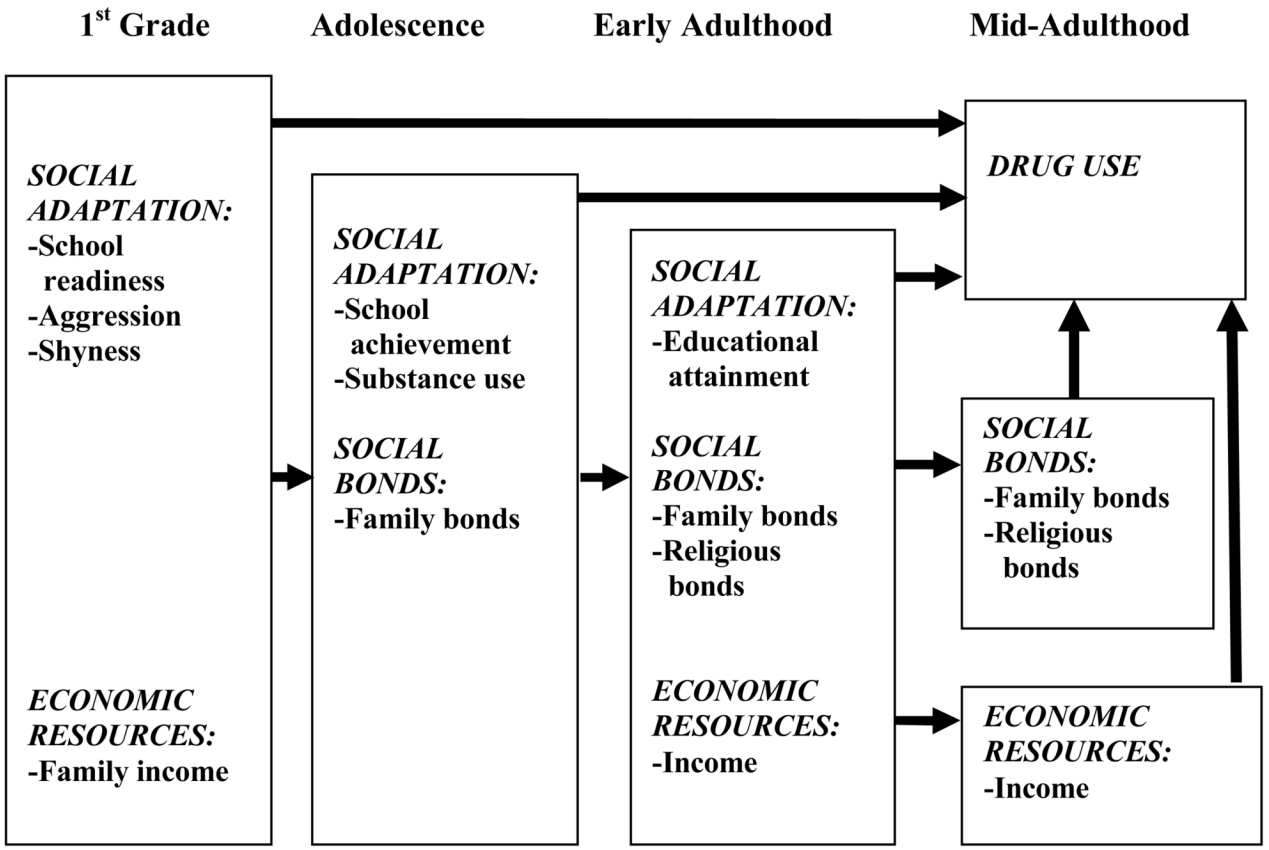

FIGURE 1.
Conceptual Framework

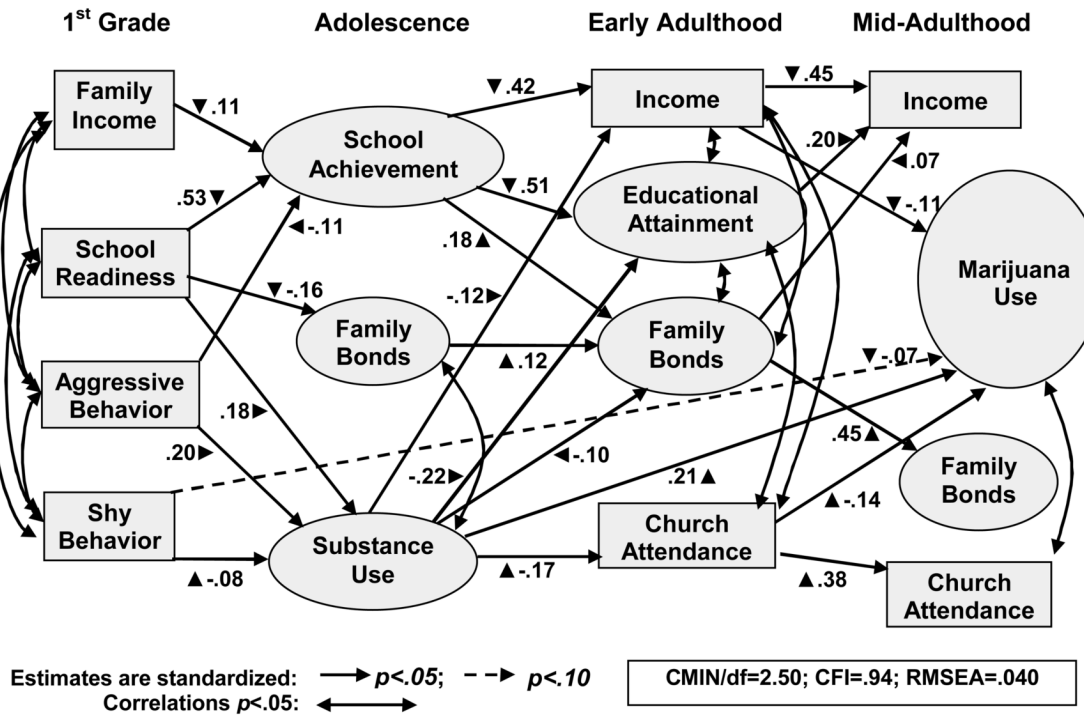

Figure 2.

Marijuana model with full-information maximum likelihood standardized estimates. Rectangles are observed variables; ellipses are latent. Arrows show significant pathways (solid lines=$p<.05$; dashed lines=$p<.10$). Two-headed arrows show significant correlations with $p<.05$ (estimates not included to reduce the complexity of the figure). The analytical model tested pathways from each first grade variable to each adolescent variable, from each adolescent variable to each early adult variable, from each early adult variable to each mid adult variable, and from first grade family income to early adult income; nonsignificant paths are not shown. All factor loadings for the indicators of each latent variable are statistically significant ($p<0.005$).

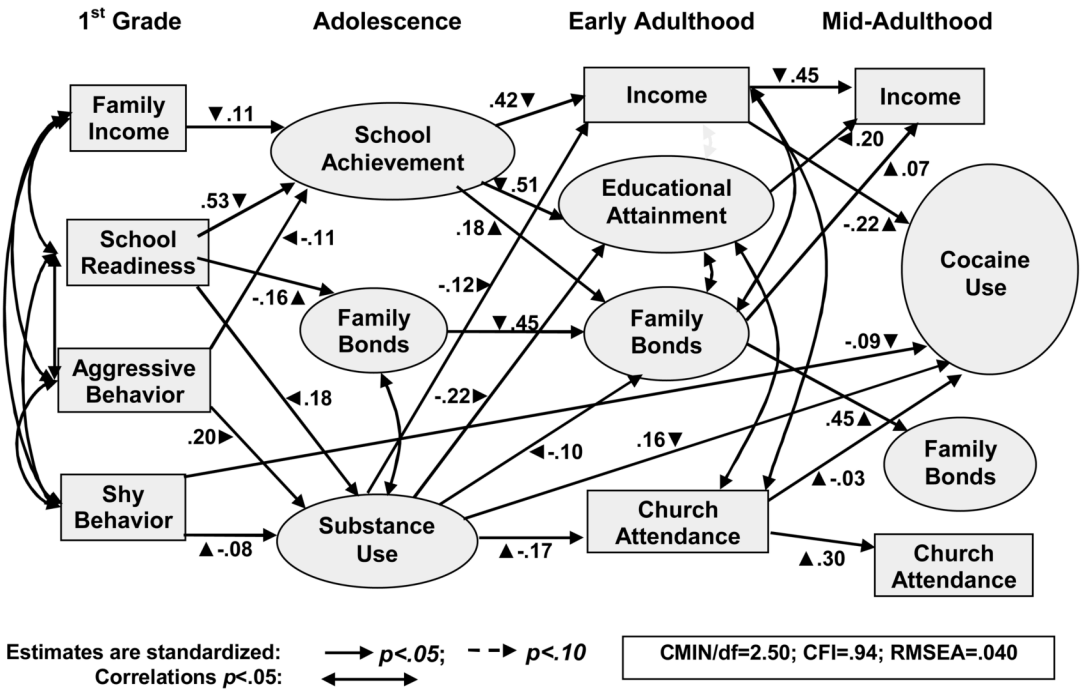

Figure 3.

Cocaine model with full-information maximum likelihood standardized estimates. Rectangles are observed variables; ellipses are latent. Arrows show significant pathways (solid lines=$p<.05$; dashed lines=$p<.10$). Two-headed arrows show significant correlations with $p<.05$ (estimates not included to reduce the complexity of the figure). The analytical model tested pathways from each first grade variable to each adolescent variable, from each adolescent variable to each early adult variable, from each early adult variable to each mid adult variable, and from first grade family income to early adult income; nonsignificant paths are not shown. All factor loadings for the indicators of each latent variable are statistically significant ($p<0.005$).

TABLE 1

Summary of Study Variables by Gender and for the Total Group[a]

		Males	Females	Total
SOCIAL ADAPTATION				
First Grade School Readiness: mean, sd		57.0, 18.3	59.1, 18.7	58.1, 18.5
First Grade Shy Behavior:** % maladapting		35.1%	26.8%	30.9%
First Grade Aggressive Behavior:*** % maladapting		38.7%	24.8%	31.6%
Adolescent School Achievement: mean, sd				
Math achievement test-7th grade***		82.5, 12.9	85.6, 12.3	84.2, 12.7
Reading achievement test-7th grade**		80.6, 14.2	83.8, 13.5	82.3, 13.9
Math achievement test-8th grade***		89.6, 12.0	92.4, 11.8	91.1, 12.0
Reading achievement test-8th grade**		86.3, 15.8	89.5, 15.4	88.0, 15.7
Adolescent Substance Use:				
Beer or wine ever:***	no	14.6%	25.8%	20.3%
	<10 times	38.6%	43.5%	41.1%
	10–39 times	23.7%	19.7%	21.6%
	40 or > times	23.1%	11.1%	16.9%
Hard liquor ever:**	no	53.5%	61.7%	57.7%
	<10 times	27.4%	28.3%	27.9%
	10–39 times	11.5%	6.4%	8.9%
	40 or > times	7.6%	3.6%	5.6%
Marijuana ever: ***	no	28.4%	48.6%	38.8%
	<10 times	27.3%	27.1%	27.2%
	10–39 times	15.5%	13.0%	14.2%
	40 or > times	28.7%	11.3%	19.8%
Marijuana past 2 months: ***	no	35.6%	57.5%	46.8%
	<10 times	28.0%	28.2%	28.1%
	10–39 times	19.5%	9.4%	14.3%
	40 or > times	16.9%	5.0%	10.8%
Early Adult Years of Schooling: mean, sd ***		12.3, 1.9	12.9, 2.0	12.6, 2.0
Early Adult Educational Attainment***				
No diploma or GED		22.6%	18.2%	20.3%
GED		9.5%	4.8%	7.1%
High school diploma		21.3%	17.2%	19.2%

	Males	Females	Total
Some vocational/trade school	14.5%	12.1%	13.3%
Some college	19.3%	29.5%	24.6%
Associate's degree	4.4%	6.5%	5.5%
Bachelor's degree	7.7%	10.5%	9.2%
Graduate degree	0.7%	1.2%	0.9%
ECONOMIC RESOURCES			
Family Income Below Federal Poverty Level*			
1st grade	56.4%	50.6%	53.4%
Early adulthood	38.4%	39.3%	38.9%
Mid adulthood	22.8%	27.9%	25.6%
SOCIAL BONDS			
Family Bonds: mean, sd			
Adolescence ***	4.9, 1.1	4.6, 1.3	4.7, 1.2
Early Adulthood	1.7, 1.1	1.7, 1.1	1.7, 1.1
Mid Adulthood **	1.5, 1.0	1.8, 1.1	1.7, 1.1
Early Adult Church Attendance*			
Less than once/year	33.7%	26.2%	29.8%
Once/year to less than once/week	39.9%	43.0%	41.5%
Once/week or more	26.4%	30.8%	28.7%
Mid Adult Church Attendance**			
Less than once/year	23.4%	14.9%	18.7%
Once/year to less than once/week	40.5%	40.4%	40.4%
Once/week or more	36.1%	44.7%	40.9%
MID-ADULT DRUG USE			
Marijuana Recency***			
Never/not in the past 10 years	66.4%	77.7%	72.6%
Used, but not in the past year	20.1%	12.9%	16.1%
Used in the past year	13.6%	9.4%	11.3%
Marijuana Times Used in Past 10 Years			
Never	66.8%	78.7%	73.3%
1–2 times	4.4%	3.3%	3.8%
3–5 times	5.2%	2.9%	3.9%
6–10 times	4.9%	2.4%	3.5%
11–49 times	3.5%	4.0%	3.8%

	Males	Females	Total
50–99 times	3.8%	3.3%	3.5%
100–199 times	3.0%	2.0%	2.4%
200+ times	8.4%	3.3%	5.6%
Cocaine Recency*			
Never/not in the past 10 years	78.9%	86.0%	82.8%
Used, but not in the past year	14.6%	10.7%	12.5%
Used in the past year	6.5%	3.3%	4.7%
Cocaine Times Used in Past 10 Years**			
Never	79.3%	86.4%	83.2%
1–2 times	3.0%	2.2%	2.6%
3–5 times	1.4%	0.9%	1.1%
6–10 times	2.2%	1.5%	1.8%
11–49 times	3.3%	1.5%	2.3%
50–99 times	3.5%	0.9%	2.1%
100–199 times	1.4%	1.3%	1.3%
200+ times	6.0%	5.3%	5.6%

[a]Total Group N at First Grade assessment is 1242 (48.8% males), at Adolescent assessment N=705 (48.7% males), at Early Adulthood assessment N=952 (47.9% males), and at Mid Adulthood N=833 (44.9% males)

*$p<0.05$;

**$p<0.01$;

***$p<0.001$ in chi-square analysis or Student's t-test by gender

TABLE 2

Standardized Effects on Mid Adult Marijuana Use and Cocaine Use from Structural Equation Modeling Analysis

	MARIJUANA USE			COCAINE USE		
Predictor	**Direct Effect**	**Indirect Effect**	**Total Effect**	**Direct Effect**	**Indirect Effect**	**Total Effect**
1st Grade Family Income	.005	−.033	−.027	.034	−.034	−.000
1st Grade School Readiness	−.014	−.001	−.015	−.029	.000	−.030
1st Grade Shyness	−.063^	−.017	−.080	−.088*	.012	−.100
1st Grade Aggression	.044	.061	.105	.057	.050	.108
Adolescent Substance Use	.210*	.046	.256	.163*	.050	.214
Adolescent School Achievement	−.025	−.075	−.100	.050	−.115	−.065
Adolescent Family Bonds	−.029	−.009	−.037	.028	.002	.029
Early Adult Church Attendance	−.142*	.000	−.142	−.107*	.000	−.107
Early Adult Family Bonds	.018	.000	.018	.057	.000	.057
Early Adult Family Income	−.105*	.000	−.105	−.219*	.000	−.219
Educational Attainment	−.049	.000	−.049	−.053	.000	−.053

Note: AMOS 7.0 provides statistical significance levels for direct effects only when using maximum likelihood estimation. Other indirect and total standardized estimates >0.10 are considered meaningful.

* $p<0.05$,

^ $p<0.10$.