

Parental Monitoring at Age 11 and Subsequent Onset of Cannabis Use Up to Age 17: Results From a Prospective Study

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ABSTRACT. Objective: Smoking cannabis before adulthood is associated with subsequent adverse psychiatric outcomes and might be prevented via parenting interventions such as programs to increase parents' effective monitoring of their children. The aim of this study was to estimate the influence of parental monitoring assessed at age 11 on the initiation of cannabis use before age 18. **Method:** Data are from a longitudinal study of 823 children randomly selected from 1983 to 1985 newborn discharge lists from two major hospitals in southeast Michigan. Parental monitoring was assessed at age 11 via a standardized 10-item scale, and the parental monitoring–cannabis initiation relationship was estimated for the 638 children with complete data. Poisson regression with robust error variances was used to estimate the association that links

levels of parental monitoring at age 11 with the risk of cannabis use up to age 17, adjusting for other important covariates. **Results:** Higher levels of parental monitoring at age 11 were associated with a reduced risk of cannabis initiation from ages 11 to 17 (adjusted estimated relative risk = 0.96; 95% CI [0.93, 0.98]). **Conclusions:** This prospective investigation found that higher levels of parental monitoring were associated with a reduced occurrence of cannabis initiation from ages 11 to 17 years. Consistent with evidence reported elsewhere, these findings from prospective research lend further support to theories about parenting and familial characteristics that might exert long-lasting influences on a child's risk of starting to use drugs. (*J. Stud. Alcohol Drugs*, 73, 173–177, 2012)

IN THE UNITED STATES IN 2008, more than 2 million individuals ages 12 years and older smoked cannabis for the first time (Substance Abuse and Mental Health Services Administration, 2009). Most of these new initiates were younger than 18 years of age. This group of cannabis smokers (i.e., those with onset before age 18) is of particular public health importance for several reasons. Compared with individuals who initiate after age 18, cannabis smokers who initiate before adulthood are more likely to develop cannabis dependence within 24 months after the onset of use, even when elapsed time from onset is taken into account (Chen et al., 2005). They also are more likely to go on to use other drugs (Kandel, 1984; Yamaguchi and Kandel, 1984), possibly because of increased opportunities to try these other drugs (Wagner and Anthony, 2002). In addition, there is some indication that those who initiate cannabis use

in adolescence might be more likely to experience other subsequent psychiatric problems (Fergusson and Boden, 2008a, 2008b; Tien and Anthony, 1990).

Given these findings, public health action to prevent or delay the onset of cannabis smoking should begin no later than early adolescence. Parental monitoring, which encompasses parental knowledge of and supervision of children's activities and whereabouts, is a specific and salient facet of parenting that may lend itself to targeted preventive approaches (Dishion and McMahon, 1998). A series of studies on parental monitoring provides evidentiary support of its importance, with findings linking higher levels of monitoring with lower odds of drug initiation and use (Chilcoat and Anthony, 1996; Chilcoat et al., 1995; DiClemente et al., 2001). With respect to cannabis initiation, a notable earlier study of elementary school students in Seattle found that parents' proactive family management signaled a decreased risk of cannabis initiation (Kosterman et al., 2000). Although the family management variable incorporated several parenting constructs including monitoring, the specific role of monitoring was not assessed.

Against this background of empirical evidence and a well-reasoned theoretical framework to link parental monitoring with drug use initiation (Dishion and McMahon, 1998), several gaps in the literature remain. First, with notable exceptions, few epidemiological studies have specifically examined cannabis initiation in the hypothesized

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parental monitoring–drug initiation relationship. However, because of the reasons described above, individuals who initiate cannabis use before adulthood represent a potentially important risk subgroup. Second, few studies have examined whether the hypothesized preventive influence of adept parental monitoring is uniform across certain subgroups of the population—namely, sex and race/ethnicity. For example, a previous study found that higher levels of parental monitoring were associated with lower odds of tobacco smoking initiation only among White adolescents (Bohnert et al., 2009). Third, previous studies have not uniformly covered the ages at which cannabis initiation is most likely to occur.

Here, in this new research, the focus is on cannabis initiation before adulthood, and the epidemiological evidence is from a cohort of urban and suburban children from a large Midwest metropolitan area. The aim was to estimate prospectively the relationship that links parental monitoring in pre-adolescence (11 years) with the cumulative incidence of cannabis smoking up to late adolescence (17 years). The present investigation sought to bridge gaps in the literature in several ways. First, we focused on cannabis initiation rather than use because of the concern that use might have a reciprocal relationship with monitoring. Second, the late-childhood and adolescent intervals that we covered are the span when cannabis initiation is most likely to occur and when problems related to use begin to develop (i.e., the clinical features and syndrome of cannabis dependence). Third, we adjusted for a host of covariates, including child, peer, and maternal variables, that might confound the hypothesized relationship between monitoring and cannabis initiation. Fourth, we tested whether the association between monitoring and the onset of cannabis use varies between Blacks and Whites and for males versus females.

Method

Sample

Detailed information about the sample is available elsewhere (Breslau et al., 1996) and is summarized briefly here. Low birth weight and normal birth weight children were randomly selected from 1983 to 1985 newborn discharge lists from two hospitals in southeast Michigan, one serving an inner-city community and the other serving a suburban community. Of the 1,095 children eligible for the study, 823 (75.2%) participated in the initial assessment from 1990 to 1992, when they were 6 years of age. Follow-up assessments were conducted at 11 years ($n = 717$; 87.1%) and 17 years ($n = 713$; 86.6%) of age. Six hundred and fifty-seven children completed both follow-up assessments. Participants who had used cannabis before age 11 years (i.e., before parental monitoring was assessed) were excluded ($n = 7$). Twelve children had missing information on one or more of the covariates of interest. Therefore, the resulting sample size

for the analysis was 638 children. The institutional review boards of the participating institutions approved the study.

Measures

Cannabis initiation, ages 11–17 years. The cumulative incidence of cannabis use up to age 17 was assessed during the age 17 assessment via the following standardized, child-reported yes or no question about cannabis use: “Have you ever, even once, used marijuana or hashish?” Similar data from the age 11 assessment were used to identify children who had initiated cannabis smoking by age 11 and were therefore no longer at risk for initiation during the 11–17 age span.

Parental monitoring, age 11 years. The level of parental monitoring was assessed by child self-report at age 11 via a standardized, validated, and reliable 10-item scale (i.e., the Oregon Social Learning Center Parent Monitoring Scale), which has shown utility in previous research (Capaldi and Patterson, 1989; Chilcoat et al., 1995). The items encompass supervision and tracking of activities outside the school environment (e.g., whether an adult was present within 1 hour of the child’s arrival home from school; how often the child talked with the parents about plans for the coming day). The items were summed to construct a parental-monitoring score. Possible scores ranged from a low of 10 to a high of 41.

Child covariates. Birth weight comes from hospital records. Community, sex, and race were as assessed at the baseline assessment at age 6. Externalizing scores come from the mother-reported Child Behavior Checklist at age 11 (Achenbach, 1991). Tobacco smoking and alcohol use at age 11 were assessed via standardized child-reported questions at age 11 years. Peer smoking and alcohol use were assessed by child self-report at age 11 years via two yes or no questions: “Do you have any friends around your age who ever smoke tobacco cigarettes?” and “Do you have any friends around your age who ever drink alcohol?”

Maternal covariates. Maternal smoking was assessed at baseline when children were 6 years of age. Mothers were classified as smokers if they had ever smoked daily for 1 month or more. Maternal education and maternal marital status also were assessed at baseline.

Statistical analysis

Using a method described by Zou (2004), unadjusted and adjusted Poisson regressions with robust error variances were conducted to estimate the predictive association linking parental monitoring at age 11 years with the initiation of cannabis use from the ages of 11 to 17 years. This method has been shown to yield more precise estimates of relative risk than the odds ratio derived in traditional logistic regression, especially when the outcome of interest occurs in greater than 10% of the sample (Zou, 2004). The adjusted model

accounted for an array of potentially confounding variables as well as birth weight and community (i.e., the sampling variables). Male–female subgroup variation in the parental monitoring–cannabis initiation association was evaluated via a product term, as was subgroup variation associated with race. At the α level of .05, product-term coefficients were null and were not included in the final adjusted model. In a post-estimation exploratory step, the method of estimating and plotting fractional polynomials was used to probe into the issue of possible nonlinearity in the parental monitoring–cannabis initiation association (Royston and Altman,

1994). All analyses were conducted using Stata Version 11 (StataCorp LP, College Station, TX).

Results

Parental monitoring at age 11 and the risk of cannabis initiation up to age 17

An estimated 35% of the 638 individuals started smoking cannabis during the follow-up period, from ages 11 to 17 years. The third column in Table 1 depicts the cannabis ini-

TABLE 1. Parental monitoring at age 11 and initiation of cannabis use up to age 17, unadjusted and adjusted models. Data are from 638 children sampled from 1983 to 1985 newborn discharge lists from two hospitals in southeast Michigan with complete information on all variables.

Variable	<i>n</i>	Estimated percentage of cannabis initiation 11–17 years	ERR	[95% CI]	<i>p</i>	AERR	[95% CI]	<i>p</i>
Parental monitoring	638	34.8%	0.94	[0.93, 0.97]	<.001	0.96	[0.93, 0.98]	<.001
Birth weight								
Low	361	34.1%	0.95	[0.77, 1.18]	.661	0.86	[0.70, 1.05]	.132
Normal	277	35.7%	ref.			ref.		
Community								
Urban	331	34.4%	0.98	[0.79, 1.21]	.845	1.01	[0.75, 1.37]	.925
Suburban	307	35.2%	ref.			ref.		
Race								
Black	291	32.3%	0.88	[0.71, 1.09]	.229	0.64	[0.47, 0.86]	.003
White	347	36.9%	ref.			ref.		
Sex								
Male	296	41.6%	1.44	[1.16, 1.78]	.001	1.24	[0.99, 1.54]	.056
Female	342	29.0%	ref.			ref.		
Externalizing at age 11	638	34.8%	1.02	[1.01, 1.03]	.001	1.01	[1.00, 1.02]	.160
Smoked tobacco by age 11								
Yes	63	63.5%	2.01	[1.61, 2.51]	<.001	1.31	[1.02, 1.69]	.037
No	575	31.6%	ref.			ref.		
Drank alcohol by age 11								
Yes	63	54.0%	1.65	[1.28, 2.13]	.001	0.96	[0.71, 1.30]	.784
No	575	32.7%	ref.			ref.		
Had a friend who smoked tobacco at age 11								
Yes	180	52.8%	1.90	[1.55, 2.33]	<.001	1.59	[1.28, 1.98]	<.001
No	458	27.7%	ref.			ref.		
Had a friend who drank alcohol at age 11								
Yes	124	50.0%	1.61	[1.29, 2.00]	<.001	1.25	[0.99, 1.57]	.061
No	514	31.1%	ref.			ref.		
Maternal education								
<High school	99	37.4%	ref.			ref.		
High school	169	37.3%	1.00	[0.72, 1.38]	.988	1.18	[0.86, 1.61]	.309
Some college	246	33.7%	0.90	[0.66, 1.23]	.517	1.07	[0.79, 1.44]	.673
College	124	31.4%	0.84	[0.58, 1.21]	.353	1.38	[0.94, 2.01]	.100
Maternal marital status								
Single	208	42.3%	1.36	[1.10, 1.68]	.005	1.60	[1.25, 2.05]	<.001
Married	430	31.2%	ref.			ref.		
Maternal tobacco smoking at baseline								
Smoker	233	45.9%	1.62	[1.31, 1.99]	<.001	1.52	[1.23, 1.88]	<.001
Nonsmoker	405	28.4%	ref.			ref.		

Notes: ERR = estimated relative risk; CI = confidence interval; AERR = adjusted ERR; ref. = reference.

tiation rate during follow-up (%) for each of the covariates of interest. Table 1 also depicts estimates from the unadjusted and adjusted Poisson regressions linking the covariates of interest with the cumulative incidence of cannabis use from age 11 up to age 17. With respect to parental monitoring, each increase of one point on the parental-monitoring scale signaled an estimated 6% decrease in the likelihood of initiating cannabis smoking by age 17 years (estimated relative risk = 0.94; 95% CI [0.93, 0.97]). A slightly attenuated but statistically robust association remained after adjustment for other important covariates (adjusted estimated relative risk = 0.96; 95% CI [0.93, 0.98]), such that the original estimate of 6% became 4% after covariate adjustment. No subgroup variation for sex or race was detected at the α level of .05.

In the post-estimation analyses (not shown), we found a consistent linear decline in the probability of cannabis initiation for increasing scores on the parental-monitoring scale.

Discussion

Several strengths and selected limitations should be considered before a more detailed discussion of the findings. A major strength is the epidemiological frame for the original study sample, which minimizes the potential of selection biases. This was not a sample of high-risk, delinquent, or drug-involved youths, which has often been the case in research on family factors and parenting in relation to adolescent-onset drug use. Furthermore, the parental-monitoring assessments were taken more than 5 years before the assessment of cannabis initiation. This strength of the research design reduces the threat to the validity of the study estimates in the form of inadvertent reciprocity (i.e., the possibility that a child's expression of curiosity or interest in cannabis smoking might cause parents to increase their monitoring and supervision levels).

There also are potential limitations to note. First, although the findings indicate a robust inverse association between higher levels of early monitoring and the risk of cannabis initiation later on, an important question remains: Namely, does early parental monitoring have a lasting influence regardless of its continuity into late adolescence? The apparent long-term benefits of early parental monitoring might reflect the stability of parenting as children mature (Lloyd and Anthony, 2003) rather than an investment that pays off later on by deterring adolescents from involvement with cannabis. Second, because of the observational nature of this study and the assumption that no other potential explanatory variables were omitted, causal interpretations are not warranted. Third, our parental-monitoring and supervision variable does not allow us to examine how parents acquire information. It is likely that the measure encompasses parent-solicited information as well as spontaneous information provided by the child (Kerr and Stattin, 2000; Stattin and Kerr, 2000).

In general, the findings from the present prospective investigation converge with published evidence from prior research examining the hypothesized association between parental monitoring and drug use overall. For example, an earlier study by Chilcoat and colleagues found that the risk of initiating drug use was higher in lower-monitored children (Chilcoat et al., 1995). The present findings also are largely consistent with results from studies specifically focused on the outcome of cannabis smoking. With respect to cannabis use, our findings are consistent with a cross-sectional study of adolescent females that found that teens with lower parental monitoring had twice the odds of cannabis use (DiClemente et al., 2001). Likewise, the results from the present investigation parallel findings from two prior prospective studies. Specifically, an Australian study found that poor parental monitoring was one of four predictors of adolescent drug use, including cannabis use (Hayatbakhsh et al., 2008), and a population-based study of adolescents in the United States reported that low parental monitoring was associated with cannabis use (Martins et al., 2008). Our findings, however, differ somewhat from those of an investigation of cannabis use patterns in a sample of predominantly Black middle-school students (Reboussin et al., 2007). Although lower parental monitoring was associated with increased odds of membership in a latent class characterized by cannabis use and problems in sixth grade, the relationship was attenuated and nonsignificant by seventh and eighth grade. Reboussin and colleagues, however, examined early cannabis involvement and did not cover the grades or ages when cannabis use is most likely to occur.

As previously noted, a limitation of studying cannabis use rather than initiation is the difficulty in ruling out the possibility that a child's prior interest in or use of cannabis might have caused parents to increase their monitoring levels. For this reason, the present investigation focused on cannabis initiation. With respect to initiation, our findings are congruent with results from a longitudinal study of Seattle youths living in high-crime neighborhoods. Specifically, Kosterman and colleagues (2000) found that parents' proactive family management—a variable assessing parents' monitoring, rules, discipline, and reward practices—was associated with a reduced risk of cannabis initiation. A study using data from the National Survey of Parents and Youth (Tang and Orwin, 2009), however, reported that parental monitoring was not consistently associated with a reduced risk of cannabis initiation across ages 10 to 16 years, and the authors suggested that other factors, namely peers, might have become more influential than parents in later years when parental monitoring was no longer statistically robust. In contrast, we found that both parental monitoring and peer influence (i.e., affiliation with tobacco-using peers) were important predictors of cannabis initiation. Our findings also differ from a relatively small study of boys from higher-crime areas in the Pacific Northwest in which monitoring was not robustly associated

with cannabis onset, although estimates from that study were in the same direction as the present study (Dishion et al., 1999).

In a previous report, we found that the influence of parental monitoring on tobacco initiation varied with respect to race/ethnicity (Bohnert et al., 2009). Lower levels of parental monitoring were linked with higher odds of tobacco initiation only among White adolescents. In the present study, we failed to detect any subgroup differences with respect to race/ethnicity on the parental monitoring–cannabis initiation relationship. The reasons for these differences between the two investigations are unclear; however, reduced statistical power to detect subgroup variation might be at play. In both studies, Black adolescents had lower levels of drug initiation; this finding is consistent with a number of empirical studies and results from national school-based surveys (Guo et al., 2002; Johnston et al., 2009).

Findings from the present prospective research are consistent with and extend prior evidence in this line of research. Public health action in the form of parenting interventions that target monitoring might help to prevent or delay the early onset of drug use. Additional longitudinal studies will be necessary to help elucidate the possible paths from parental monitoring to drug use.

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