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Trajectories of Parental Monitoring and Communication and Effects on Drug Use Among Urban Young Adolescents

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INTRODUCTION

Substance use among adolescents in the United States continues to be a prominent public health concern. Despite considerable health and social consequences of use [1–3], rates of use remain high and initiation occurs early. In 2008, 6%, 7%, and 16% of 8th grade youth had used marijuana, cigarettes or alcohol in the past month, respectively [4] and among 12th grade youth, 19% had used marijuana in the past month, 20% had used cigarettes, and 43% had used alcohol [4]. For many, the age at initiation for these substances is around 13 years [4]. A myriad of factors have been shown to influence the development of these substance use behaviors [5], and published literature clearly establishes parents as key contributors. For example, parental substance use, parenting styles, and communication about family rules and discipline surrounding use have all been shown to influence alcohol, tobacco and marijuana use [6–9]. This influence remains important as youth progress through adolescence and into early adulthood, despite the increased salience of adolescents' peer group [10].

Two important parenting practices among urban, racial/ethnic minority youth that have received considerably less attention in the scientific literature are parent/child communication and parental monitoring. Several studies have illustrated the protective effects of drug-specific communication between parent and child [7,11]. However, there is a limited body of literature examining the effects of more general parent/child communication on adolescent drug use and findings are mixed. Some studies suggest that parent/child communication is a protective factor for alcohol, cigarette and marijuana use [12–14], while others show null or iatrogenic effects [15,16]. In contrast, a longstanding literature has documented the benefits of parental monitoring on a number of deleterious adolescent behaviors, including drug use [6,7]. However, few studies have examined it in concert with general parent/child communication and the majority have used traditional, variable-centered approaches to their statistical analyses, modeling an overall mean level of monitoring and communication for the population and examining how this average influences behavior. This approach assumes one, homogenous pattern or level of monitoring and communication when, realistically, there may be several distinct patterns or types which have differential effects on substance use behaviors [17]. Person-centered analyses address this limitation, allowing for heterogeneity in monitoring and communication over time and examination of effects on substance use behavior across the

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distinct growth patterns. The vast majority of growth mixture modeling applications in the literature to date have been to youth outcomes, rather than protective factors, and these typically show differential effects of programs or other static risk or protective factors on heterogeneous trajectories of substance use [18,19], delinquency [20,21], and the like.

The present study represents a novel approach to understanding parental monitoring and communication during early adolescence and subsequent effects on substance use, using person-centered, multilevel general growth mixture modeling to identify distinct trajectories of parental monitoring and communication among a sample of urban, racial/ethnic minority youth from age 12 to 14 and examining the associations of these patterns with alcohol, cigarette and marijuana use at age 14. We are aware of no previous study that has examined heterogeneous trajectories of parental monitoring and communication that would provide a basis for hypotheses regarding the number and characteristics of patterns. However, a few studies have made divisions by quartile or tertile and have shown increased risk for substance use for youth in the lowest categories [16,22]. Given these differential effects observed from variable-centered approaches and based on Jessor's problem behavior theory [23] and previous studies showing protective effects of parental monitoring and communication [12–14], we hypothesized that membership in the lowest or declining trajectories of monitoring and communication would be positively associated with drug use when compared to membership in the high or increasing trajectories of monitoring and communication.

METHODS

Study Design and Participants

The sample for the present study were derived from a cohort of 5,812 multi-ethnic, early-adolescent youth residing in Chicago, Illinois who participated in a longitudinal, group-randomized controlled trial of a multi-component alcohol use preventive intervention when they were in the 6th through 8th grades [2002–2005; Project Northland Chicago (PNC); 24, 25]. Youth in 61 public schools in Chicago participated in the trial. From a list of all Chicago Public Schools (CPS), schools were selected that included grades 5–8, had low mobility rates (less than 25%) and had 30 or more students per grade. Schools and their surrounding community areas were matched on ethnicity, poverty, mobility, and reading and math test scores and randomized into intervention (n = 29 schools) or control (n = 32 schools) conditions. Recruited schools were similar to those throughout Chicago with respect to ethnicity and test scores. The goals of the PNC intervention were to change personal, social and environmental factors that support alcohol use among young adolescents and included three years of: (1) peer-led classroom curricula, (2) parental involvement and education, (3) peer leadership and youth-planned community service projects; and (4) community organizing and environmental neighborhood change (see Komro et al. [24,25] for more details). Self-report surveys were conducted annually in each study school at four time points when the cohort students were in the 6th, 7th and 8th grades (ages 12 to 14). Response rates ranged from 91% to 96% each year. Previous variable-centered analyses showed no significant intervention effects on alcohol use, drug use, or any hypothesized mediating variables, including norms supportive of use, perceived outcomes supportive of use, resistance self-efficacy, and parental communication and monitoring [25]. The subsample for the present study comprised the 2,621 students who completed surveys in the beginning of 6th (age 12) and end of 8th (age 14) grades. Students were predominantly African American or Hispanic (38% and 32%, respectively); had a relatively equal gender distribution (49% male); lived in two-parent households (57%); and were low-income (67% receiving free, or reduced price, lunch).

Survey Protocol

Surveys were administered in study schools during the fall of 2002, spring of 2003, spring of 2004 and spring of 2005, when the students were in the 6th, 7th and 8th grades. Surveys were administered by three-person teams of trained university-based research staff interviewers using standardized protocols. Prior to survey administration, parents and students were given the opportunity to refuse participation. Parent consent, student assent, and PNC data collection protocols were approved by the University of Minnesota Institutional Review Board for the Protection of Human Subjects, with secondary data analyses approved by the University of Florida Institutional Review Board.

Measures

Parental Monitoring and Communication—Parental monitoring and communication was assessed longitudinally with a five item scale developed for the PNC study: “How often do/does you/your ” “...parent or guardian ask you about what you are doing in school?”; “...parent or guardian praise you when you do a good job?”; “...eat dinner with a parent or guardian?”; “...parent or guardian have a conversation with you that lasts 10 minutes or more?”; and “...parent or guardian ask you where you are going or who you will be with?”. Response options were 1 = “Never,” 2 = “Hardly Ever,” 3 = “Sometimes,” 4 = “A lot,” and 5 = “All the time.” A higher score on this scale indicated more parental monitoring and communication (Range 5–25; Cronbach’s alpha: 0.88). The means for this scale at baseline (2002) and 8th grade were 20.06 and 18.43, respectively.

Alcohol Use—Alcohol use in 8th grade was assessed with two items from the Monitoring the Future study [4]: “During the last 12 months, on how many occasions, or times, have you had alcoholic beverages to drink?” and “During the last 30 days, on how many occasions, or times, have you had alcoholic beverages to drink?”. Seventeen and 42% of students reported using alcohol use in the past year and 6% and 22% had used alcohol in the past month at baseline and 8th grade, respectively. Given the distribution of the data, response options were dichotomized to reflect “0 occasions” versus “1 or more occasions.”

Cigarette Use—Two items from the Monitoring the Future study [4] assessed cigarette use in 8th grade: “Have you ever smoked a cigarette?” and “During the last month, have you smoked a cigarette?”. Seven and 30% of students reported ever smoking a cigarette and 1% and 9% had smoked a cigarette in the past month at baseline and 8th grade, respectively. Given the distribution of the data, response options were 0 = “no” and 1 = “yes.”

Marijuana Use—Marijuana use in 8th grade was assessed with two items from the Monitoring the Future study [4]: “During the last 12 months, on how many occasions, or times, if any, have you used marijuana?” and “During the last 30 days, on how many occasions, or times, if any, have you used marijuana?”. Three and 18% of students reported using marijuana in the past year and 1% and 12% had used marijuana in the past month at baseline and 8th grade, respectively. Given the distribution of the data, response options were dichotomized to reflect “0 occasions” versus “1 or more occasions.”

Statistical Analyses

Multilevel general growth mixture modeling (GGMM) in Mplus [26] was used to (1) identify the number of heterogeneous trajectories of parental monitoring and communication and (2) examine the relationship between these trajectories and alcohol, cigarette and marijuana use in 8th grade. First, multilevel growth mixture modeling was used to identify the number and characteristics of latent trajectory classes that best described the heterogeneity in parental monitoring and communication from 6th to 8th grade. Competing models (i.e., models with 1-

through n -class solutions) were estimated and compared to determine the number of classes necessary to represent the heterogeneity in parental monitoring and communication over time. Selection of the appropriate number of classes was guided by the Bayesian Information Criterion (BIC; 27) and Akaike Information Criterion (AIC; 28), which provide relative measures of model fit. Gender, family composition and treatment group assignment were then examined as potential predictors of trajectory class membership.

In phase 2 of the analyses, logistic regression was used to estimate the effects of the parental monitoring and communication trajectory class membership probabilities on each alcohol, cigarette and marijuana use item while controlling for participants' baseline measure of the outcome and treatment group assignment. Family composition (coded 0 = "Mother and Father Together, 1 = "Other") was added in a second set of models to understand how a two-parent household altered observed effects. Race/ethnicity was also considered for inclusion; however, in this study it was moderately correlated ($r = 0.38$) with family composition. Thus, it was excluded from these analyses. Odds ratios and corresponding confidence intervals were calculated for each trajectory class.

For all analyses, school membership was specified as a cluster variable to account for the dependency of observations among participants within each school and a minimum of 500 sets of starting values was specified to ensure replication of the best loglikelihood and recovery of the most robust solution. Latent variable modeling is more powerful than traditional variable-centered analysis of variance and the general rule-of-thumb is that there be 5 to 10 observations per estimated parameter [29]. With a sample size of 2,621 we had enough power to estimate at least 262 parameters and up to 524. The number of parameters estimated in these models was 62 and 66, for the initial model and the model adding family composition, respectively.

Missing Data

Youth in the PNC cohort who completed surveys at the beginning of 6th and end of 8th grade were eligible for inclusion in the analyses ($n = 2,621$). The analysis sample included 2,448–2,451 students, as a result of missing values. When compared to those who completed surveys only at the beginning of 6th grade ($n = 1,638$), there were no statistically significant differences across genders. However, the analysis sample had significantly more dual-parent households ($\chi^2(1) = 43.50, p < 0.001$), and Hispanic and White youth relative to African American youth ($\chi^2(1) = 51.72, p < 0.001$ and $\chi^2(1) = 34.72, p < 0.001$, respectively) than those who only completed surveys in 6th grade. Additionally, fewer youth in the analysis sample reported alcohol ($\chi^2(1) = 5.86, p = 0.016$) and marijuana ($\chi^2(1) = 41.60, p < 0.001$) use in the past year and alcohol ($\chi^2(1) = 16.14, p < 0.001$), cigarette ($\chi^2(1) = 11.49, p < 0.001$), and marijuana ($\chi^2(1) = 24.23, p < 0.001$) use in the past month in 6th grade compared to those lost to follow-up. Fewer youth in the analysis sample also reported having ever smoked a cigarette ($\chi^2(1) = 27.15, p < 0.001$) in 6th grade compared to those lost to follow-up.

RESULTS

Parental Monitoring and Communication Trajectory Classes

We examined the relative fit of models with one- through six-class solutions. A model with four classes best described the heterogeneity in the trajectories of parental monitoring and communication among the sample (AIC=57838.82; BIC=57971.75). Both linear and quadratic slopes were needed to model the course of parental monitoring and communication. The quadratic slope was treated as a fixed effect, in order to model its significant mean but nonsignificant variance, and the latent intercept and slope were allowed to co-vary. Gender, family composition and treatment group assignment were not significant predictors of trajectory class membership.

The model identified “high,” “medium,” “decreasing,” and “inconsistent” classes of parental monitoring and communication (Figure 1). The “high” class (76.4%) began with the highest rate of parental monitoring and communication that was maintained, despite a slight decline, through 8th grade ($\alpha=20.89$; $\beta=-0.31$; $\beta^2=-0.04$). The youth in the “medium” trajectory (9.1%) began with a mean parental monitoring and communication score of 13.77 and a slight increase in communication was observed as they progressed to 8th grade ($\beta=2.96$; $\beta^2=-0.66$). The “decreasing” class (6.0%) had high parental monitoring and communication at baseline which decreased rapidly from 6th to 8th grade ($\alpha=20.51$; $\beta=0.727$; $\beta^2=-1.22$). Youth in the “inconsistent” trajectory class (8.5%) showed high rates of parental monitoring and communication at baseline (mean = 19.26) which decreased dramatically through 7th grade and then increased from 7th to 8th grade ($\alpha=9.26$; $\beta=-6.33$; $\beta^2=1.62$).

Trajectories of Parental Monitoring and Communication Effects on Drug Use

The associations between parental monitoring and communication trajectories from age 12 (baseline) to 14 (8th grade) and alcohol, tobacco and marijuana use at age 14 are presented in Table 1. Two models are presented, where the first controls for treatment group assignment and baseline levels of the outcome and the second includes an additional measure of family composition. For the first model, relative to the “high” communication trajectory, membership in the “decreasing” and “inconsistent” trajectory classes was significantly associated with greater alcohol (OR: 2.47 and 2.13, respectively) and marijuana (OR: 2.85 and 3.02, respectively) use in the past year, having ever used cigarettes (OR: 3.35 and 1.98, respectively), and greater alcohol (OR: 2.47 and 2.68, respectively), and marijuana (OR: 4.39 and 5.27, respectively) use in the past month. Only the “inconsistent” trajectory showed significant effects on past month cigarette use (OR: 4.02). There were no significant differences in risk for alcohol, cigarette or marijuana use between the “high” and “medium” trajectories of parental monitoring and communication (Figure 2a).

When family composition was added to the model (Model 2), only youth in the “decreasing” trajectory were at significantly greater risk for alcohol (OR: 3.29) and marijuana (OR: 3.36) use in the past year, having ever used cigarettes (OR: 4.77), and alcohol (OR: 3.68) use in the past month. Membership in both the “decreasing” and “inconsistent” classes was significantly associated with marijuana use in the past month (OR: 5.77 and 3.00, respectively) and marginally significantly associated with past month cigarette use (OR: 2.88 and 2.39, respectively). As with the first model, there were no significant differences in risk for substance use between the “high” and “medium” trajectories of parental monitoring and communication (Figure 2b).

DISCUSSION

Among this sample of urban, low-income, racial/ethnic minority, young adolescents, four heterogeneous trajectories of parental monitoring and communication were identified: (1) High (76.4%), (2) Medium (9.1%), (3) Decreasing (6.0%) and (4) Inconsistent (8.5%). Relative to those with high parental monitoring and communication, youth in the decreasing and inconsistent trajectory classes were at significantly greater risk for alcohol and marijuana use in the past year, having ever used cigarettes, and recent (i.e., past 30 day) alcohol, cigarette and marijuana use while controlling for baseline levels of use and treatment group assignment. When family composition was added to the model, significant effects were observed only for the decreasing trajectory across all substance use outcomes and both the decreasing and inconsistent trajectories for past month marijuana use.

Findings highlight the importance of consistent, high levels of parental monitoring and communication during early adolescence in preventing drug use across all family structures. The “high” and “medium” communication classes did not differ significantly in their

association with drug use in 8th grade, irrespective of included covariates, and were characterized by higher, stable levels of monitoring and communication from 6th to 8th grade. In contrast, the two more risky classes (i.e., the decreasing and inconsistent trajectories) both began with rather high levels of monitoring and communication that decreased sharply. The increase in the inconsistent class may have occurred in response to the youth exhibiting problem behavior(s) and, considered together with the other patterns and their effects on behavior, suggest that there may be a minimum communication threshold for risk reduction and that the greatest benefit occurs through preventing problem behaviors through consistent communication rather than reacting to a behavior once it has occurred.

The finding of inconsistent and decreasing patterns of parental monitoring communication and the related effects on substance use are noteworthy. One may argue that a decline in parental monitoring and communication throughout adolescence may be indicative of healthy development, as increasing autonomy is an integral part of youths' progression through adolescence and into adulthood. However, studies have shown that "premature adolescent autonomy" [30] is associated with drug use and other maladaptive behaviors [31]. This may be one explanation for the decreasing and inconsistent trajectories and observed effects, as some parents may be disengaging from protective family management processes in response to their child's onset of puberty or foray into deviant behavior, which subsequently increases their risk for substance use in 8th grade.

While both of these patterns of monitoring and communication were associated with increased risk for substance use in 8th grade, the adverse effects of inconsistent communication were largely reduced when considering family composition. One possible explanation for this finding is that the greater relationship quality and satisfaction, material resources, and social capital that more frequently accompany two-parent households [32,33] may ameliorate the risk for drug use associated with inconsistent communication. Unfortunately, this hypothesis cannot be tested with these data. However, when considering targets for intervention, preventive efforts to improve both the consistency and level of monitoring and communication are both important, as consistency may be more adept to change than spousal relationships and family structure.

It is encouraging that the vast majority (85.5%) of these urban, racial/ethnic minority adolescents experienced stable high or medium monitoring and communication throughout their middle school years (grades 6–8). Youth in inner-cities are differentially exposed to a number of risk factors for drug use that are related to their urban context [34,35] and findings are consistent with other literature that suggests that parents respond to risk in their environment to buffer subsequent effects on adolescent drug use [36,37]. One may reasonably expect that these protective effects may extend to other high-risk behaviors in this sample, such as risky sexual behaviors [38] or delinquency [39]. Future research is needed to determine how patterns of parental monitoring and communication relate to other problem behaviors in early adolescence.

These results contribute to a small body of literature highlighting the importance of more general parental monitoring and communication in preventing high-risk behaviors among youth [12–14] and extend the scientific knowledge by identifying distinct patterns of monitoring and communication and how they uniquely relate to early adolescent drug use. Parents are important targets for preventive interventions and these findings suggest that efforts to increase parental monitoring and communication to higher, consistent levels may significantly reduce alcohol, cigarette and marijuana use. Recent prevention trials have highlighted parents as key contributors to alcohol and other drug use behaviors among racial/ethnic majority and minority youth alike [25,40], suggesting that the need to engage parents in prevention activities may be robust to variations in cultural and geographic context.

However, more research is needed to understand the distinct patterns of parental monitoring and communication across racial/ethnic subgroups and across contexts, as well as to identify the best strategies to engage parents and improve monitoring and communication with their children.

This study has one key limitation which must be acknowledged; measures of parental monitoring and communication were self-reported by the child only, without corroboration by the parent. Thus, there is a potential bias in the levels of monitoring and communication reported. More research is needed that employs reports by both parents and their children, as well as incorporates direct observational assessment. Limitation notwithstanding, this study contributes to a small body of literature examining the effects of general parental monitoring and communication on drug use among urban, racial/ethnic minority, young adolescents. Further, it does so using a novel statistical approach, which identified four distinct patterns of monitoring and communication and their unique effects on alcohol, cigarette and marijuana use. Findings support the role of parents in preventing drug use during early adolescence and suggest that efforts to improve the level and consistency of general parental monitoring and communication may be a fruitful target for prevention. Many youth initiate use of alcohol, tobacco or marijuana in this critical developmental period [4] and considered with the health and social consequences of use [1–3] engaging parents in preventing drug use should remain a priority for prevention.

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Figure 1.
Trajectories of parental monitoring and communication from age 12 to 14.

Figure 2. Odds of alcohol, tobacco and marijuana use in 8th grade for each pattern of parental monitoring and communication relative to the high communication class. (Note: Model 1 controls for treatment group assignment and baseline levels of use, Model 2 also controls for family composition).

Table 1

Trajectories of parent monitoring and communication effects on alcohol and other drug use in 8th grade.

	% 8 th Grade Use ¹	Model 1 ²					Model 2 ³						
		Est. ⁴	SE	p-value	OR	LCL	UCL	Est. ⁴	SE	p-value	OR	LCL	UCL
Past Year Alcohol Use													
High Monitoring/Communication ⁵	39.07	-	-	-	-	-	-	-	-	-	-	-	-
Medium Monitoring/Communication	36.19	-0.219	0.299	0.464	0.80	0.45	1.44	-0.048	0.338	0.887	0.95	0.49	1.85
Decreasing Monitoring/Communication	61.07	0.905	0.358	0.011	2.47	1.23	4.99	1.192	0.417	0.004	3.29	1.45	7.46
Inconsistent Monitoring/Communication	55.56	0.757	0.267	0.005	2.13	1.26	3.60	0.488	0.358	0.173	1.63	0.81	3.29
Past Month Alcohol Use													
High Monitoring/Communication ⁵	20.93	-	-	-	-	-	-	-	-	-	-	-	-
Medium Monitoring/Communication	22.86	0.311	0.294	0.290	1.36	0.77	2.43	0.575	0.317	0.069	1.78	0.95	3.31
Decreasing Monitoring/Communication	36.15	0.903	0.298	0.002	2.47	1.38	4.42	1.303	0.344	<0.001	3.68	1.88	7.22
Inconsistent Monitoring/Communication	31.02	0.984	0.321	0.002	2.68	1.43	5.02	0.340	0.494	0.492	1.40	0.53	3.70
Past Year Marijuana Use													
High Monitoring/Communication ⁵	15.46	-	-	-	-	-	-	-	-	-	-	-	-
Medium Monitoring/Communication	18.57	0.208	0.334	0.533	1.23	0.64	2.37	-0.017	0.425	0.969	0.98	0.43	2.26
Decreasing Monitoring/Communication	32.06	1.049	0.372	0.005	2.85	1.38	5.92	1.212	0.419	0.004	3.36	1.48	7.64
Inconsistent Monitoring/Communication	26.98	1.104	0.329	0.001	3.02	1.58	5.75	0.468	0.439	0.285	1.60	0.68	3.78
Past Month Marijuana Use													
High Monitoring/Communication ⁵	10.12	-	-	-	-	-	-	-	-	-	-	-	-
Medium Monitoring/Communication	10.00	0.390	0.395	0.323	1.48	0.68	3.20	0.241	0.458	0.598	1.27	0.52	3.12
Decreasing Monitoring/Communication	24.43	1.480	0.416	<0.001	4.39	1.94	9.93	1.753	0.461	<0.001	5.77	2.34	14.25
Inconsistent Monitoring/Communication	20.47	1.662	0.410	<0.001	5.27	2.36	11.77	1.098	0.547	0.045	3.00	1.03	8.76
Ever Smoked Cigarette													
High Monitoring/Communication ⁵	27.84	-	-	-	-	-	-	-	-	-	-	-	-
Medium Monitoring/Communication	32.86	-0.039	0.327	0.905	0.96	0.51	1.83	-0.068	0.330	0.837	0.93	0.49	1.78
Decreasing Monitoring/Communication	46.56	1.210	0.421	0.004	3.35	1.47	7.65	1.563	0.496	0.002	4.77	1.81	12.62
Inconsistent Monitoring/Communication	39.35	0.685	0.257	0.008	1.98	1.20	3.28	0.273	0.367	0.456	1.31	0.64	2.70

	% 8 th Grade Use ¹	Model 1 ²					Model 2 ³						
		Est. ⁴	SE	p-value	OR	LCL	UCL	Est. ⁴	SE	p-value	OR	LCL	UCL
Past Month Cigarette Use													
High Monitoring/Communication ⁵	8.06	-	-	-	-	-	-	-	-	-	-	-	-
Medium Monitoring/Communication	10.95	0.319	0.371	0.390	1.38	0.66	2.85	0.322	0.429	0.454	1.38	0.60	3.20
Decreasing Monitoring/Communication	20.61	0.924	0.525	0.078	2.52	0.90	7.05	1.057	0.578	0.067	2.88	0.93	8.93
Inconsistent Monitoring/Communication	14.81	1.391	0.302	<0.001	4.02	2.22	7.26	0.872	0.468	0.062	2.39	0.96	5.99

¹ Proportion of youth within each class reporting use of the respective drugs in 8th grade following maximum-rule assignment to the trajectory classes.

² Estimated controlling for baseline level of the outcome and treatment group assignment.

³ Estimated controlling for baseline level of the outcome, treatment group assignment, and family composition.

⁴ Estimate

⁵ Referent Class