Seven Years Later: Developmental Transitions and Delinquent Behavior for Male Adolescents Who Received Long-Term Substance Treatment*

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ABSTRACT. Objective: Few studies have applied the "life course perspective" to the study of drug use, a noticeable omission in the field. The current study addresses this gap by examining patterns of interpersonal crime, substance use, and emotional problems over 7 years for a sample of 196 high-risk males as they transition from adolescence to young adulthood, with a specific focus on the role of transitions (living alone, employment, marrying or cohabiting with a romantic partner, graduating from high school or acquiring a General Equivalency Diploma, and becoming a parent) on these patterns. **Method:** We surveyed youth who were adjudicated as delinquent in Los Angeles between February 1999 and May 2000 and referred by probation officials to Phoenix Academy, a long-term residential substance-treatment provider for adolescent probationers. Males ages 13-17 (*N* = 196) were given face-to-face interviews at study entry and at 3, 6, 12, 24, 30, 72, and 87 months. **Results:** Living independently and cohabiting were associated with decreased substance problems. Living with children was associated with increased interpersonal crime. Living away from parents was associated with an increase in substance problems following the transition and then a subsequent decrease in problems over time. No effects were found for receiving a diploma or having employment. **Conclusions:** It is crucial to begin to understand how developmental transitions may affect high-risk adolescents' involvement in criminal behavior, substance use, and emotional problems. The current study suggests that several transitions were associated with a reduction in problems as these youth transitioned into young adulthood. (*J. Stud. Alcohol Drugs* **70:** 641-651, 2009)

MANY YOUNG PEOPLE EXHIBIT delinquent behaviors, including using substances and committing minor offenses (e.g., petty theft); however, for the majority of youth, these behaviors desist as they transition into adulthood (Hirschi and Gottfredson, 1983; Laub and Sampson, 2001). Specifically, among youth identified as delinquent at age 7 and followed over the course of their lives, almost 50% reached their peak of offending before age 18, and all but 3% reached their peak of offending before age 25 (Sampson and Laub, 2003). Similarly, many youth initiate alcohol or drug use during adolescence and young adulthood (Chen and Kandel, 1995; DeWit et al., 1997; Gfroerer et al., 2002; Labouvie and White, 2002). However, the majority do not progress to more "serious" drug involvement (e.g., from alcohol or marijuana to cocaine or heroin; Kandel, 1975; Morral et al., 2002) or develop substance-use disorders (Wagner and Anthony, 2002).

Equivocal findings have arisen from previous research regarding the persistence of emotional problems during adolescence. There is a substantial body of evidence indicating that many adults who meet criteria for mental health disorders also met criteria during adolescence (Kim-Cohen et al., 2003; Newman et al., 1996). However, several studies have shown that fewer than half of those with emotional problems during childhood and adolescence continue to have emotional problems in adulthood (Ferdinand and Verhuist, 1995; Hofstra et al., 2000, 2002).

Researchers have attempted to determine factors that distinguish youth who desist from offending from those who continue to offend, use drugs, or develop drug-use disorders or whose emotional problems may persist. Evidence suggests that those who exhibit delinquent behaviors or emotional problems earlier in the life course are at greatest risk for persistent offending behaviors (Moffitt, 1993; Moffitt and Caspi, 2001), as well as having more serious problems with alcohol and other drugs (Anthony and Petronis, 1995; D'Amico et al., 2005; Zimmermann et al., 2003). More controversial is the role of significant life events that often mark young people's transition to adulthood. Moving out of a parents' home, getting a job, marrying or cohabiting with a romantic partner, and having children are the types of life events that may prompt people to desist from engaging in delinquent behaviors. However, it is difficult to say whether the life transition caused the change in behavior or whether the people who select these types of transitions are also more likely to desist from these types of behaviors.

Research to date that has examined the influence of significant life events on delinquency has focused on offending behaviors, with mixed results. Studies have generally indi-

cated that when men marry, they tend to desist from committing offending behaviors (e.g., Sampson et al., 2006). When men divorce or separate from their spouse, their chances of offending increase (Horney et al., 1995; Sampson et al., 2006). What is notable about this research, however, is that the opposite effects are seen when the life event under investigation is cohabiting—that is, individuals are more criminally active when they cohabit with romantic partners (Horney et al., 1995; Piquero et al., 2002; Sampson et al., 2006). Effects related to parenting are also mixed. If effects exist following this transition, they appear to be modified by factors such as gender, age, or type of offending (Siennick and Osgood, 2008). Similar investigations into the effects of moving out of the parents' house among contemporary cohorts of youth are sparse (Bachman et al., 1984; Goldscheider and DaVanzo, 1985; White et al., 2006). Moving out of a parents' residence may decrease drug involvement because individuals must spend their earnings on basic necessities, such as rent and groceries, that their parents may have been largely responsible for in the past. On the other hand, reductions in parental restrictions placed on behaviors (particularly in a society with ample credit opportunities; Ritzer, 1995) may allow for increased involvement with drugs and alcohol (Bachman et al., 1984; Goldscheider and DaVanzo, 1985; White et al., 2006). Yet even in light of extant research, isolating whether the life event has a causal influence on behavior or whether a third factor is causing both the life event and reduction in delinquency is a largely unanswered question (for a review of this literature, see Siennick and Osgood, 2008).

Although a great many studies have examined the influence of significant life events on offending behaviors, few studies have applied the "life course perspective" (Elder, 1985) to the study of drug use, which is a noticeable omission in the field (Hser et al., 2007; Rutter, 1996). As noted in a recent review (Hser et al., 2007), research is needed to identify how significant life events might influence drug users' likelihood of experiencing adverse drug outcomes, their achieving stable cessation, and their likelihood of relapsing to a specific type of drug or a new drug substitute.

In the current study, we examine patterns of interpersonal crime, substance use, and emotional problems over 7 years for a sample of 196 boys who had been placed by probation officials in a residential substance-treatment program as they transition from adolescence to young adulthood. Specifically, we examine whether significant events in these boys' lives—leaving their parents' homes, living with a spouse or partner, graduating from high school or receiving their General Equivalency Diploma (GED), taking on parental responsibilities, and whether they were employed at the time of the survey—were followed by a noticeable departure from their previous pattern of behavior across the three domains previously mentioned.

Method

Participants

The study population consists of youth adjudicated as delinquent in Los Angeles between February 1999 and May 2000 and referred by probation officials to Phoenix Academy, a long-term residential substance-treatment provider for adolescent probationers (Morral et al., 2003). Youth from three juvenile detention facilities in Los Angeles were approached to determine eligibility for the study; the Los Angeles Superior Court provided research participation consent. Eligibility requirements were that youth (1) were between 13 and 17 years old, (2) provided written informed assent, and (3) provided permission to notify a parent or legal guardian of study participation. Youth were excluded if (1) they could not fully comprehend English language interviews, (2) they were admitted to a residential program before being interviewed by research staff, or (3) a parent requested that his or her child be excluded. All recruitment and study procedures were approved by the juvenile court, the probation department, and the institution's review board.

We focused only on the males in this study, resulting in an analytic sample of 196 boys (mean [SD] age at baseline = 15.8 [1.0] years). Boys were given face-to-face interviews at study entry (baseline) and were then followed up at 3, 6, 12, 24, 30, 72, and 87 months from intake into the treatment program. At each interview, participants were promised confidentiality and were remunerated. Eight boys in the subsample died between baseline and the 87-month follow-up (most from violent causes; see Ramchand et al., 2009). Excluding those who were deceased, retention of the subsample ranged from 85% at 72 months to 92% at 30 months (mean study retention across all waves was 90%).

The racial makeup of the sample was 62.2% Hispanic, 14.8% white (non-Hispanic), and 10.2% black; the remainder of the sample was either mixed race or another group. The mean duration of treatment for all youth sent to Phoenix Academy was 162 days (Morral et al., 2004). At intake, 61% of the boys reported that marijuana was the drug that they liked to use the most, followed by amphetamines (11%) and cocaine or crack cocaine (10%). More than one third of the boys (41%) reported that they did not need treatment; approximately 27% said that marijuana was the drug for which they most needed treatment. Boys were also heavily involved in the criminal justice system: at intake, they reported a mean of 4.6 arrests that resulted in booking over the course of their lives. The most prevalent arrests were for violation of probation or parole (54%), drug possession/distribution/sale (52%), larceny (29%), and vandalism (28%).

Instrument and measures

At each assessment, participants were interviewed using the Global Appraisal of Individual Needs (GAIN; Dennis, 1999).

Time sampling design

Rather than continuously monitoring the status of the boys, we employed a time sampling design. At each of the interviews, boys were asked to recall their status, events, and behaviors from the 90 days preceding the interview.

Transition measures

Living with parents. For the surveys occurring within the first year of the study period (interviews at intake and 3, 6, and 12 months), boys were asked "During the past 90 days, who had legal custody of you?" Those who reported "parents living together," "separated parents with shared custody," or "a single parent" were defined as living with parents. At follow-up assessments (24 months and later, when most youth were older than age 18 and thus legal custody was no longer relevant), youth were asked: "Have you lived with anyone else during the past 90 days?" Those who reported that they lived with their parents were defined as such.

Marriage/cohabiting. Those who reported that they were married and lived with a "spouse, significant companion or other sexual partner" were coded as being married. Those who reported that they were not married but lived with a "spouse, significant companion or other sexual partner" were considered to be cohabiting. These questions were included at the 24-month interview and all subsequent interviews.

High school degree/GED. At each wave, youth were asked: "Have you ever received a high school degree, GED, other diplomas, degrees, certificates, or licenses from the schools or the trainings you've attended?" Those who reported having received a high school diploma or GED were defined as achieving this outcome.

Living with children. Youth who reported living with any biological or adopted children of their own were defined as living with children.

Status measure

Employment activity index. Youth were asked how many days in the previous 90 days they had worked for pay. This was divided by 90 to give a proportion of days they worked, and the proportion of days they missed work or were in trouble at work was subtracted from this figure. Finally, the variable was scaled by multiplying by 10 to improve the ease of interpretation of the parameter estimates; thus, scores ranged from zero (no employment) to 10 (full-time employment with no missed work or trouble at work).

Outcomes

Interpersonal crime. The interpersonal crime measure is composed of six items related to interpersonal violent crime (e.g., use a weapon to get money or things from another person, hit someone or get into a physical fight, made some-

one have sex with you by force). Respondents were asked to report which of these behaviors they had engaged in during the past year (at intake) and past 90 days (at follow-up assessments). Because of the highly skewed nature of the data (for most time periods, approximately 60%-80% of respondents scored 0, with the majority of the remainder scoring 1, and very small numbers scoring up to 5), the variable was dichotomized, and therefore the interpersonal crime measure was scored as 1 if they reported any such activity or 0 if they did not.

Substance problem scale. The substance problem scale is composed of 16 items related to the self-reported recency of boys' problems with substance use. Seven items correspond with Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994) dependence criteria (e.g., needed more drugs or alcohol to get high, were unable to cut down) and four items correspond with DSM-IV abuse criteria (e.g., kept using drugs, even when it was keeping you from meeting responsibilities). Two items assessed substance-induced health/psychological problems (e.g., substance use caused you to feel depressed), and three items assessed low severity symptoms of use (e.g., hiding use). All items reflect problems experienced in the past month. The scale ranges from 0 to 16; internal consistency estimates ranged from .89 to .95.

Emotional problem scale. The emotional problem scale is composed of six items that assess recency (e.g., last time your life was disturbed by memories or things from the past), frequency (e.g., how many days bothered by any nerve, mental, or psychological problems), and severity (e.g., how many days problems paying attention, controlling your behavior, or breaking rules) of unspecified psychological distress. Each item is scaled from 0 (least severe, least frequent, greatest time since event) to 100 (most severe, most frequent, least time since event), and the score is calculated as the mean of these items. Internal consistency ranged from .65 to .82.

Covariates

Time spent in a controlled environment. We created a variable representing the number of days that youth spent in a controlled environment in the past 90 days using respondents' self-report of time spent in a longer term residential program, hospital, jail, prison, or in detention.

Age. Age at the start of the study was included as a covariate (range: 13-17 years).

Ethnicity. Ethnicity was included as a covariate. It was coded as Hispanic, black, or other, a standard classification used in longitudinal research (Light and Nandi, 2007) with "other" used as the reference category.

Analysis plan

We first examined the potential for attrition bias, using a logistic regression model for each time point to model the

probability that an individual failed to be interviewed (for any reason), with the following predictors: Hispanic ethnicity; black ethnicity; being a marijuana user; age at first interview; and baseline substance problem scale, emotional problem scale, and interpersonal crime scores.

We used multilevel modeling to explore the relationship between the transitions under investigation and each outcome variable. Thus, we estimated separate models for the three outcome variables (substance problem scale, emotional problem scale, and interpersonal crime scale) with each of the four transition variables: cohabiting/being married (the effects of which were estimated separately in the same models; see details later), living with children, possessing a high school diploma or GED, and living away from one's parents, for a total of 12 models. For these models, we examined the status of each person with regard to each of the transition variables at each assessment point. If the individual had made a transition (e.g., received diploma), we noted this, and at each subsequent time point we calculated the time in months since the status had been reported as changed. If the status was reported as having transitioned back to the original state (i.e., if a person moved back in with their parents after having lived apart), the time counter was reset to zero. We assumed that if the individual reported the same status at two time points the status was constant. In the employment models, we estimated three separate models for employment activity, one for each of the outcome variables. We treated employment activity as a status variable, rather than a transition variable, because we were not able to assess whether employment had continued for all months between the assessments. Thus, we examined employment status in the previous 90 days only and did not assess the time since employment had commenced.

We fit multilevel regression models using SAS Proc Mixed (for continuous outcome variables: substance problem scale and emotional problem scale scores) or SAS Proc Glimmix for the dichotomous outcome variable (interpersonal crime) using SAS 9.2 (SAS Institute Inc., Cary, NC). For each model, we included two time-invariant covariates (age at baseline and ethnicity) and a time-varying covariate (time spent in a controlled environment). We also included the transition/status variable of interest—the current status and, where appropriate, the number of years since the individual had most recently transitioned into that status.

We made a number of simplifying assumptions to ensure that the models were both estimable and interpretable. We treated the main effect of time as a categorical covariate to de-trend its effects without assuming any functional relationship between time and the outcome. We did this by creating dummy codes for each assessment period and used the final time point (87 months) as the reference category. We treated time since an event had first been reported as having occurred as continuous and its effect as linear, which allowed us to examine long-term consistent changes over time. To

increase our power to detect effects, we made the simplifying assumption that there was no interaction between when the event occurred in a person's life and the effect of that event. For example, the effect of living apart from one's parents for 1 year was assumed to be equal, regardless of the time point at which the youth moved out. This allowed us to compare the change in outcome variables associated with a change in status to the control group of individuals who did not change status. It also allowed us to compare each individual's rate of change to his rate of change before he changed status.

We examined two predictor variables: the transition event itself and time since the transition. As a predictor variable, the transition event determined whether individuals who currently had a particular status (e.g., living apart from parents) differed on outcomes (e.g., substance problems) from those who did not have that particular status. Time since the transition event examined whether the amount of time spent in a status (e.g., time spent living apart from parents) affected an individual's outcome (e.g., substance problems) in addition to the change in status. This effect can also be conceptualized as an interaction between the status change and time.

Thus, the multilevel model we fitted to the data can be represented as the following:

$$\hat{y}_{ij} = \beta_{0i} + \beta_{1j}time_{ij} + \beta_2 transition_{ij} + \beta_3 transitiontime_{ij} + \beta_4 ce_{ij} + \beta_5 x_i$$

where $\hat{y}_{ij}$ is the predicted score on the outcome for person i at time j (or for the interpersonal crime measure, the log of the odds of the probability of reporting interpersonal crime). The model contains a random (varying) intercept term, with each individual, i, having a separate intercept (β_0). Each time point (except for the final, reference category) has an individual estimate (β_{1j}). Whether the event had occurred is shown in the equation as $transition_{ij}$, where the transition variable is coded as either 0 or 1, to represent for each individual (i) whether the event had occurred at the jth time point. The time that has passed since the transition took place for the ith person at the jth time is referenced with the $transitiontime_{ij}$ variable; the coefficient associated with this variable, β_3, represents the effect of the transition having occurred (note that this variable was not included for employment activity). For marriage/cohabiting, we included two variables, indicating marriage and cohabiting, both compared with the reference category of being single. The fact that β_3 is not subscripted with j means that the effect of the transition is assumed to be equal for each time point. The variable ce indicates time the individual spent in a controlled environment in the 90 days preceding the interview date; the effect is again assumed to be consistent for all time periods. Finally, x represents a vector of time-invariant covariates: age of the individual at the start of the study and race (black and Hispanic). The model for the status variable employment was

identical, with the exception that the *transitiontime* parameter was not estimated.

When a person drops out (whether for a single time point or permanently), the multilevel modeling of the growth curve continues to use that person's data at each period that it is available; thus, these are full information estimates. This approach ensures that parameter estimates are unbiased when the data are missing at random or missing completely at random (Schafer and Graham, 2002).

Results

For the attrition analysis, we modeled the probability of responding to each of the follow-up interviews, with predictors of age, ethnicity, and age at first interview. There were no significant effects for any of these demographic variables. For the independent variables, only the probability of responding at 72 months was predicted at above chance level: Individual baseline variables that predicted response rates at this time point were interpersonal crime (odds ratio = 3.1, p = .007) and substance problems scale (odds ratio = 1.2, p = .005) scores, indicating that those with more violent criminal and more severe substance-use problems at baseline were more likely to complete the 72-month assessment.

Descriptive statistics for the three main outcomes are provided in Table 1. Substance problems declined during the first 12 months (boys were receiving substance-abuse treatment in a residential facility during this interval), followed by an increase at 24 months, and then remained stable up to 87 months. Emotional problems showed a slight decline to the endpoint of 30 months, followed by an increase. Interpersonal crime at baseline was measured for the past year; at all other time points it was measured for past 90 days. Interpersonal crime decreased slightly from 3 to 6 months, with a tendency to slightly increase over time up to the final assessment, when it dropped back to 12-month levels.

Table 2 shows transition status and outcome variables at each period, respectively. Of note, employment is not included in this table, as there was no transition. Recall that the possible values of employment activity scores range from 0 to 10: Scores were low at 3 and 6 months (0.9), then increased up to 30 months (to 3.6), where scores declined slightly and then remained stable at 72 and 87 months at approximately 3.0. Table 3 presents the parameter estimates for the multilevel regression models of employment. Because of space restrictions, we do not present estimates for the dummy-coded time variables ($\beta_{1f}s$ in the earlier equation) or the time-invariant covariates age and race.

The parameter estimate associated with each transition gives the predicted difference in the score on the outcome that would occur at the measurement occasion immediately following the transition. Our model would thus predict that a person living independently would score 0.48 points higher on the substance problem scale than a person who was living with his parents. The time since transition change shows the predicted difference in the mean scores on the outcome between a person who had transitioned recently and a person who had transitioned 12 months ago, conditioned on covariates. Thus, living independently is associated with a predicted decrease in the substance problem scale of 0.19 points per year, relative to a person who continued to live with his parents.

Table 3 provides parameter estimates, confidence intervals, and p values from the models for the variables. Figure 1, parts a through c, aids in the interpretation of the parameter estimates by graphically showing the de-trended baseline of the predicted outcome assuming that an individual reported a change in status at the 24-month period. Note that our models allow a person to transition at any point in time; however, in these graphs it was necessary for us to select a point to mark the transition (between 12 and 24 months) and plot the selected line. For the continuous variables, we plotted the control line at the grand mean (the mean of all individuals on all occasions) and present predicted values (i.e., the line of best fit). For the categorical variable (interpersonal crime), we present the models in probability form, showing the predicted probability of reporting interpersonal crime. The horizontal line is de-trended and fixed at the grand mean and should not be interpreted. We have adjusted the other estimates so that they represent the departure from the control

TABLE 1. Means and percentages for problems across all waves of the study

Month	n	Substance problems (range: 0-16) Mean (SD)	Emotional problems (range: 0-100) Mean (SD)	Interpersonal crime %
0	196	3.78 (4.34)	22.6 (16.3)	66.8%
3	176	1.23 (2.91)	26.3 (18.0)	19.6%
6	178	1.56 (3.15)	23.2 (16.4)	16.9%
12	175	1.92 (3.66)	21.3 (17.9)	25.0%
24	180	2.73 (3.87)	19.2 (16.0)	29.4%
30	183	2.53 (3.56)	15.6 (15.6)	27.8%
72	156	2.49 (3.48)	19.7 (19.7)	35.9%
87	165	2.55 (3.89)	24.9 (19.8)	25.6%

Notes: The baseline variable for interpersonal crime asked for crimes in the past year. All other responses for all variables were for the past 90 days.

TABLE 2. Percentage of youth who reported each event at each time point

Month	Cohabiting %	Married %	Living with children %	Living apart from parents %	High school diploma or GED %
0	–	–	6	24	1
3	–	–	11	58	2
6	–	–	8	57	2
12	–	–	12	40	8
24	0	0	14	78	25
30	5	1	20	86	34
72	19	4	43	64	58
87	12	7	47	68	57

Notes: GED = General Equivalency Diploma.

TABLE 3.   Interrupted growth model coefficient estimates

	Living with children		HSD/GED		Marriage/cohabiting		Living apart from parents		Employment	
Variable	β (95% CI)	p	β (95% CI)	p	B (95% CI)	p	β (95% CI)	p	β (95% CI)	p
Substance problem scale										
Transition	0.45 (-0.27, 1.17)	.220	-0.28 (-1.06, 0.50)	.481			0.48 (0.02, 0.94)	**.040**	0.00 (-0.06, 0.07)	.897
Marriage					-1.81 (-4.57, 0.95)	.198				
Cohabiting					1.05 (-0.76, 2.85)	.256				—
Time since transition	-0.14 (-0.34, 0.06)	.169	0.15 (-0.07, 0.36)	.174			-0.19 (-0.35, -0.04)	**.016**	—	
Marriage					0.21 (-0.73, 1.15)	.663				
Cohabiting					-0.65 (-1.23, -0.08)	**.026**				
Age	-0.04 (-0.31, 0.23)	.786	-0.04 (-0.31, 0.24)	.793	-0.18 (-0.54, 0.17)	.307	-0.03 (-0.30, 0.24)	.837	-0.03 (-0.30, 0.24)	.845
Controlled environment	-2.73 (-3.17, -2.30)	<.001	-2.75 (-3.19, -2.31)	<.001	-3.47 (-4.10, -2.85)	<.001	-2.68 (-3.12, -2.24)	<.001	-2.82 (-3.28, -2.35)	<.001
Emotional problem scale										
Transition	3.20 (-0.22, 6.63)	.066	1.43 (-2.24, 5.11)	.444			1.55 (-0.62, 3.72)	.162	0.00 (-0.32, 0.33)	.977
Marriage					-0.44 (-14.80, 13.90)	.952				
Cohabiting					4.42 (-4.96, 13.80)	.355				—
Time since transition	-0.86 (-1.8, 0.08)	.073	0.58 (-0.42, 1.58)	.257			-0.67 (-1.40, 0.07)	.077	—	
Marriage					-0.62 (-5.50, 4.25)	.802				
Cohabiting					-2.67 (-5.66, 0.31)	.079				
Age	-0.73 (-2.26, 0.79)	.344	-0.75 (-2.27, 0.77)	.334	-1.14 (-2.91, 0.64)	.210	-0.70 (-2.23, 0.83)	.367	-0.71 (-2.3, 0.88)	.382
Controlled environment	1.91 (-0.12, 3.95)	.066	2.01 (-0.05, 4.08)	.056	-0.45 (-3.68, 2.78)	.785	1.91 (-0.18, 3.99)	.073	2.12 (-0.21, 4.46)	.074
Interpersonal crime	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Transition	1.79 (1.05, 3.06)	**.033**	0.88 (0.48, 1.62)	.681			0.87 (0.73, 1.04)	.123	0.98 (0.93, 1.03)	.378
Marriage					0.63 (0.05, 8.73)	.729				
Cohabiting					0.78 (0.18, 3.31)	.733				—
Time since transition	0.89 (0.77, 1.05)	.159	1.12 (0.95, 1.32)	.181			0.89 (0.62, 1.28)	.535	—	
Marriage					0.84 (0.34, 2.08)	.704				
Cohabiting					1.18 (0.75, 1.84)	.473				
Age	0.85 (0.71, 1.02)	.074	0.85 (0.71, 1.02)	.084	0.84 (0.68, 1.05)	.133	0.97 (0.86, 1.10)	.649	0.88 (0.73, 1.07)	.198
Controlled environment	0.63 (0.45, 0.88)	.008	0.65 (0.46, 0.92)	.015	0.59 (0.36, 0.95)	.030	0.65 (0.46, 0.91)	.013	0.52 (0.35, 0.76)	.001

Notes: **Bold** indicates statistical significance. HSD/GED = high school degree/General Equivalency Diploma; CI = confidence interval; OR = odds ratio.
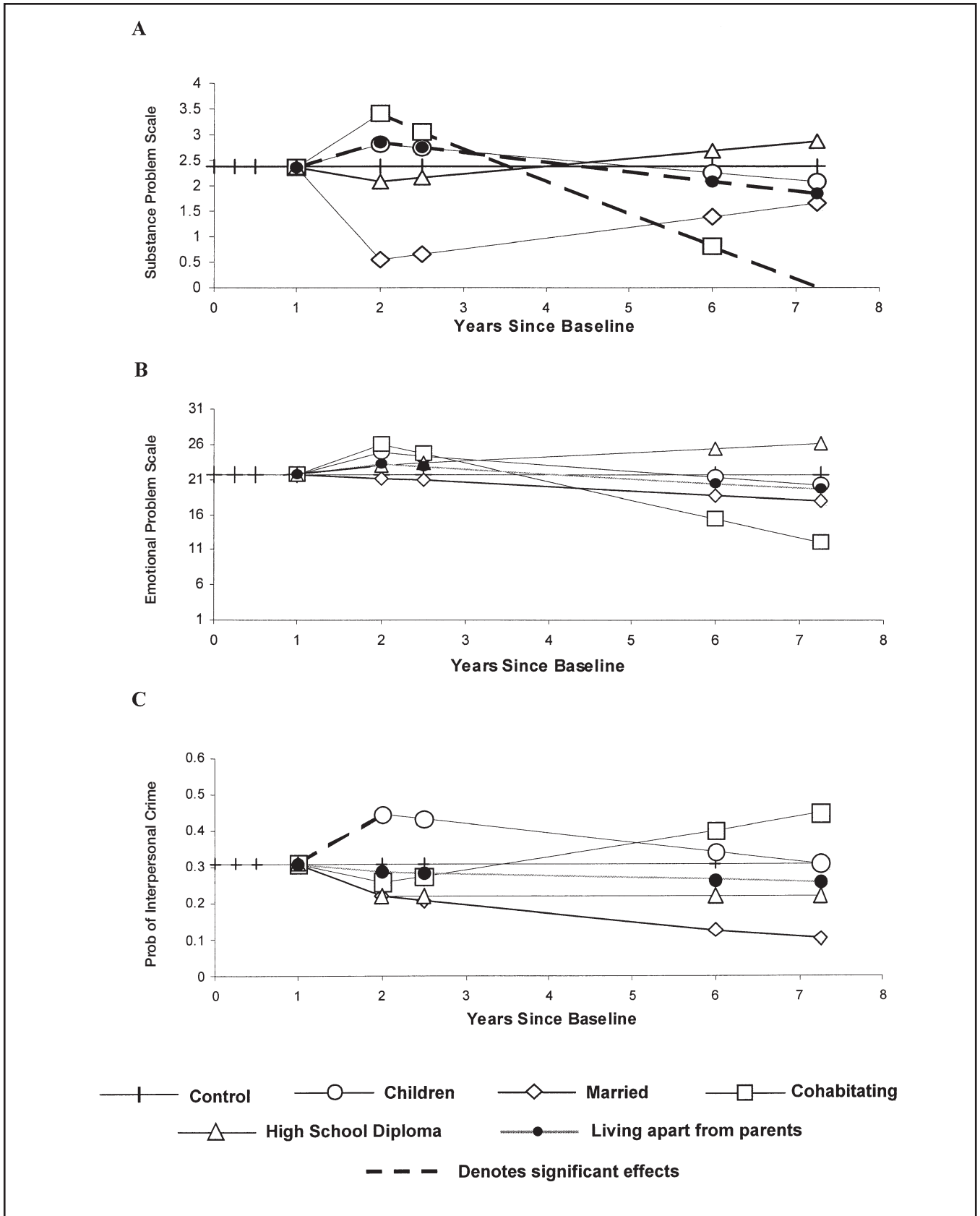
FIGURE 1.   The effect of transitions on substance problems (A), emotional problems (B), and interpersonal crime (C); Prob = probability

line; hence, the difference between the lines represents the difference between the control and transition groups at that point.

For the substance problem scale, cohabiting (but not marriage) was associated with a statistically significant decrease in problems following the transition. In contrast, individuals who moved away from their parents had a statistically significant increase in their substance problems (of 0.48 points per year) following the transition, but this was followed by a significant decrease in problems over time (of 0.19 points per year). For emotional problems, two effects approached significance. Specifically, there was a trend for those living apart from parents ($p = .077$) and cohabiting ($p = .079$) to have fewer emotional problems.

For committing interpersonal crime, the parameter estimates are presented as odds ratios, and hence are multiplicative, rather than additive. In Figure 1c, we present the probability of committing interpersonal crime that is predicted by the model. We found that living with children was associated with an increase in the probability of interpersonal crime, but the change in the probability of interpersonal crime based on the time since this event occurred did not achieve significance. The most frequently reported interpersonal crime was "hit someone or got into a physical fight." Receiving a high school diploma and employment activity were not significantly associated with any of the outcomes.

Discussion

The current study is one of the first to follow adolescents 7 years after they received treatment for problematic substance use. We examined whether developmental transitions that occur as youth emerge from adolescence into early young adulthood were associated with changes in substance problems, emotional problems, and interpersonal crime among this population.

First, our descriptive statistics showed a U-shaped pattern in substance and emotional problems and involvement in interpersonal crime. As youth entered treatment at baseline, problems were high. During and right after treatment, problems decreased, and problems subsequently increased over time after treatment was completed. This is consistent with extant studies of substance abuse treatment programs that show high rates of relapse (with respect to substance use; Williams and Chang, 2000) and recidivism (with respect to crime; Lipsey and Wilson, 1998).

Overall, results indicated that leaving the parents' residence was initially associated with an increase in substance problems, but in the period following the departure there was a substantial decrease. There was also a trend for emotional problems to decrease over time after youth moved out of the parents' home. Thus, similar to previous work in this area, youth who leave home may initially increase their substance

use (White et al., 2006) and have more problems, which then tend to decrease over time. This reduction in substance and emotional problems among boys in our study may be because as they become more independent and take on more responsibilities, such as working, relationships, and paying bills, their lives require more personal organization and they have less time for unstructured socializing or to affiliate with deviant peers (Siennick and Osgood, 2008).

Interpersonal crime was higher among youth who reported living with children. Although we conditioned on time spent in a controlled environment, it was possible for criminally active people (e.g., in jail for 7-14 days of the 90-day period) to be living with children. We suspect that by using a continuous variable for controlled environment, more criminally active youth were included in our analyses who also reported living with children, thus increasing the chances that crime would be reported for this sample.

Cohabiting with a partner was associated with a decrease in substance problems relative to the noncohabiting (and unmarried) youth. There was also a trend for cohabiting males to report decreased emotional problems. This aligns with previous findings relating to marriage but differs from studies finding a detrimental effect of cohabitation on criminal activity for males (Horney et al., 1995; Piquero et al., 2002; Sampson et al., 2006). Given the young age of our sample (mean = 15.8 years at baseline), there were few married youth, which limited our power to detect a relationship between marriage and problems. In addition, we did not have information regarding the full time periods between assessments. Thus, if a participant reported that he was cohabiting at two time points, it was necessary for us to extrapolate between these two and assume that the cohabitation had been continuous. We also cannot assume that a youth who reported living with a partner at 24 months was also living with the same partner at 30 months. The data do allow us, however, to note that this youth was stable in that he reported this transition at both time points; that is, at both time points, he was living with a partner, whether it was the same partner or a different partner. Youth who were stable in reporting this transition across time points also tended to report fewer substance and emotional problems.

We did not detect any statistically significant associations between receiving a diploma and employment activity and the outcomes we assessed. Because we were not able to measure employment activity for the entire period between assessments, this limited our ability to assess the effect of employment on problems. Other research in this area has shown that entering into formal employment reduces arrests among older, but not younger, offenders (Uggen, 2000). Further work in this area is needed.

Of note, previous research with this sample of juvenile justice–involved youth has shown high rates of death, criminal involvement, and mental health and substance problems during both adolescence and early young adulthood (Ram-

chand et al., 2009). The current study adds to this literature by describing how specific transitions that youth may experience as they enter young adulthood may affect their criminal and substance involvement and overall emotional problems. It is notable that some of these transitions, such as living independently and cohabiting, decreased the likelihood of some problems among this high-risk population.

Although this study contributes new information to the literature in this area, there are limitations. First, the sample in this study was a limited sample of juvenile delinquents; thus, it is not clear whether results will generalize to other populations of delinquent youth. The sample comprised a majority of Hispanic youth, with smaller numbers of other ethnic groups. Nevertheless, our sample of youth offenders is comparable to national samples of youth who are in custodial care on rates of mental and physical health problems (Golzari et al., 2006; Teplin et al., 2002) and substance problems (Snyder and Sickmund, 2006).

In addition, the data in this study were all collected using self-report in one-on-one interviews. The limitations of self-report in general are well known, although possibly exaggerated (Chan, 2009); however, much research has shown that self-report among youth is valid when certain procedures like those used in the current study are implemented, such as providing a confidential setting and discussing confidentiality and establishing rapport with the participant before the interview (D'Amico and McCarthy, 2006; Dennis et al., 2002; Shillington and Clapp, 2000). Of note, we had extremely high rates of retention across all study waves (90%), which highlights that youth felt comfortable participating and were willing to be contacted and interviewed many times over the course of this 7-year study.

There were only two significant findings in our attrition analyses, and these occurred at the 72-month follow-up. Specifically, youth with higher rates of interpersonal crime and substance problems were more likely to be retained. There was a 2.5-year gap between the 30-month and 72-month assessments. We hypothesize that youth with more problems and higher crime rates were more likely to be incarcerated and, therefore, were easier to follow-up after this gap in assessment periods.

Our self-report method of assessment also did not include items that captured the multidimensionality of the potentially important covariate socioeconomic status (Braveman et al., 2005; Ensminger et al., 2000) among this group. This is not unusual with an adolescent population, particularly with high-risk youth, because it is difficult to obtain good proxies of socioeconomic status (e.g., Teplin et al., 2002; Snyder and Sickmund, 2006). In addition, we did not measure all of the potential living situations for youth who were not living with parents (e.g., living alone, living with roommate, living in a group home). Instead, our focus was on how youth who lived with their parents differed from those who did not live with their parents.

Leaving one's parental home; living with a spouse or partner; receiving a high school diploma; becoming responsible for children; and becoming a productive, employed member of society are five of many events that serve as markers of the transitions to adulthood. We focused on these markers because of the precision of event-level data afforded us by the data, although we note that other transitions, such as entering the military, are worth examining in future research on similar samples of high-risk males.

In addition, as youth were not randomly assigned to life transitions, it is possible that selection effects or other factors influenced current findings. Specifically, youth who chose to have children or live with a partner may also be the youth who were more likely to quit using substances, or those youth who continued to live with their parents may have had other problems that precluded them from being able to live independently. It is also important to note that some of these transitions (e.g., living with a partner and having children) may occur simultaneously, which may have exponential effects on potentially reducing or increasing problems. Future work in this area could begin to address this question. Finally, we may have underestimated the substance problems, emotional problems, and interpersonal crime in this population because youth reported only on the previous 90 days at each assessment point. Future research could assess these outcomes over longer periods.

In sum, it is crucial to begin to understand how developmental transitions may affect high-risk adolescents' substance use, emotional problems, and involvement in crime. The current study suggests that several transitions, including living independently and cohabiting, are associated with a reduction in problems as these youth transition into young adulthood.

Acknowledgments

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