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Developmental Patterns of Alcohol Use in Relation to Persistence and Desistance of Serious Violent Offending among African American and Caucasian Young Men

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Abstract

This study examined the association of alcohol use with persistence and desistance of serious violent offending among African American and Caucasian young men from adolescence into emerging adulthood. Five violence groups were defined: nonviolent, late-onsetters, desisters, persisters, and one-time offenders. We examined alcohol use trajectories for these groups from ages 12 through 24/25 using a four-piecewise linear growth model (ages 12-14, 14-18, 18-21, and 21-24/25). The persisters and desisters reported the highest levels of drinking at age 13. From ages 14 through 18, however, the late-onsetters showed a higher rate of increase in drinking, compared to the persisters and desisters. Starting from age 18, the desisters' drinking trajectory started to resemble that of the nonviolent group, who showed the highest rate of increase in drinking during emerging adulthood. By age 24/25 the persisters could not be distinguished from the late-onsetters; but were lower than the nonviolent and one-timer groups in terms of their drinking. At age 24/25, the desisters were not significantly different from the other violence groups, although they appeared most similar to the nonviolent and one-timer groups. There was no evidence that the association between drinking and violence differed for African Americans and Caucasians. The findings suggest that yearly changes in alcohol use could provide important clues for preventing violent offending.

Keywords

Alcohol; violence; race; piecewise growth curve analysis

Alcohol use has been implicated in about half the incidents of violent crime (Murdoch, Pihl, and Ross, 1990). In addition, those who use alcohol more frequently and in greater quantities are generally more violent than nonusers and violent individuals generally drink more alcohol than nonviolent individuals (Leonard, 2008; White and Gorman, 2000). Relatively little is known, however, about the long-term developmental patterns of co-occurrence between alcohol use and serious violent offending.

Even less is known about how the association between alcohol use and violence differs for African Americans and Caucasians. Although researchers have addressed racial/ethnic differences in violence (Mooradian, 2003; Pope, Lovell, and Hsia, 2002; Tonry, 1997) and drinking (Caetano, Clark, and Tam, 1998; Jones-Webb, 1998) separately, prospective longitudinal studies using minority samples are very limited and no study, to our knowledge, has prospectively examined racial differences in the developmental co-occurrence of alcohol use and serious violence. We use data from the Pittsburgh Youth Study, which consists of about half African American and half Caucasian young men, to examine whether alcohol

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use is related to persistence and desistance of serious violent offending. We also examine whether the associations between alcohol use and serious violent offending differ between African Americans and Caucasians.

BACKGROUND LITERATURE

THE ASSOCIATION BETWEEN ALCOHOL USE AND VIOLENCE

A strong association between acute alcohol use and aggressive behavior has been found in both laboratory and survey studies (for a review, see White, in press). This association has been attributed, in part, to the pharmacological effects of intoxication on aggressive behavior. For example, being under the influence of alcohol can impair cognitive processes that affect perceptions of and attention to environmental cues, interpersonal communication, awareness of negative consequences, behavioral inhibition, and judgment, and this cognitive impairment increases the risk for violence (for greater detail, see Fagan, 1990; Ito, Miller, and Pollock, 1996; Miczek et al., 1994; Parker and Auerhahn, 1998; Pihl, Peterson, and Lau, 1993). Controlled laboratory studies have consistently found that acute intoxication by alcohol is related to aggression when the subject is provoked (for a review, see Bushman, 1997). However, it has also been demonstrated that alcohol's impact on aggressive behavior is moderated by subject characteristics, experimental design conditions, and beverage characteristics (Chermack and Giancola, 1997; Gustafson, 1993; Ito, Miller, and Pollock, 1996; Pihl, Peterson, and Lau, 1993).

Besides laboratory studies, some studies have tested the pharmacological model using self-report survey data about substance use directly prior to offending. For example, White and Hansell (1998) found a stronger relationship of alcohol, than drug (i.e., marijuana or cocaine), use to fighting behavior (see also White et al., 2002). Using individual-level analyses, Felson, Teasdale, and Burschfield (2008) provided support for a causal effect of alcohol intoxication on violence among adolescents; however, the results indicated that alcohol had a greater effect on individuals with violent tendencies than those without (see also Norström and Pape, 2010). Retrospective self-report studies of offenders also provide strong evidence for an association between alcohol use and violent offending. While the rates of alcohol use by offenders at the time of an offense vary greatly across studies and across countries, in general they indicate that about 40-50 percent of all homicides and assaults are committed when the offender, victim, or both have been drinking (Collins and Messerschmidt, 1993; Karberg and James, 2005; Murdoch, Pihl, and Ross, 1990; Roizen, 1993). Similarly, alcohol is involved about one half of all sexual assaults (Abbey et al., 2001; Home Office, 2004; Ullman, Karabatsos, and Moss, 1999). In 2004, 36.8 percent of state prisoners reported that they were under the influence of alcohol at the time of their violent offense, compared to 29.1 percent of property offenders (Rand et al., 2010). In terms of racial differences, a study of incarcerated violent offenders indicated that Caucasian, compared to African American, offenders reported higher rates of binge drinking and alcohol-related problems, and were more likely to commit their violent offense under the influence of alcohol (Greenfeld and Henneberg, 2001).

In general, reports of alcohol use during the commission of a violent crime are higher than those for drug use (White, in press), and alcohol intoxication is more often linked to serious violent crime than nonviolent crime (Felson and Staff, 2010). Thus, the unique association between alcohol use and violence warrants more research. Whereas both laboratory and survey research provide strong support for a pharmacological association between acute alcohol use and violence, the long-term developmental associations between alcohol use and violence are not well understood. These developmental associations are the focus of this study and below we discuss what is known about them.

DEVELOPMENTAL PATTERNS OF ALCOHOL USE AND VIOLENCE

Several studies have looked at developmental patterns of alcohol use or violence, but few have examined their co-occurrence. Alcohol use and violence, on average, follow different developmental patterns from adolescence into adulthood. Heavy drinking peaks in the early 20s (Bachman et al., 1997; Chen and Kandel, 1995), whereas violent offending peaks in mid to late adolescence (Elliott, 1994). Most youth mature out of heavy drinking as they enter young adulthood (Weingardt et al., 1998; White, Labouvie, and Papadaratsakis, 2005).

These normative patterns, however, are not consistent for all youth. For example, there are differences between African Americans and Caucasians in both patterns of drinking and patterns of violence. In general Caucasian youth are more likely to drink and to drink more heavily than African American youth (Lee et al., 2010; for greater detail on race differences in substance use and for potential explanations as to why these differences occur, see Wallace and Murdoff, 2002). In contrast, rates of violence have been consistently higher among African Americans than Caucasians, even after controlling for socioeconomic status (SES) and possible police bias (Fagan et al., 1987; Hawkins et al., 1998; Haynie and Payne, 2006; Mooradian, 2003; Pope, Lovell, and Hsia, 2002*;* Reaves, 2006). Not only are self-reported rates of violence higher for African American, than Caucasian, men, but violence also extends later in the life cycle for African Americans. In a national study, nearly twice as many African Americans, compared to Caucasians, continued violent offending after age 21 (Elliott, 1994). Similarly, maturation processes out of drinking differ by race. For example, Neilsen (1999) found that Caucasians were more likely to mature out of drunkenness than African Americans. Thus, when examining developmental associations between violence and alcohol use, it is possible that the conflicting racial differences in rates of these two behaviors across different phases in the lifespan could confound the observed relationship. More research is, therefore, needed to understand the association between alcohol use and violence during and beyond adolescence and racial differences in this association.

Most studies examining developmental co-occurrence have been based on self reports of offending and have focused on the associations of alcohol with relatively minor forms of aggressive behavior (e.g., fighting or hitting) rather than serious violence. Several of these studies showed that individuals, especially men, who were aggressive in childhood or adolescence were more likely to drink frequently and heavily in adolescence and adulthood (Farrington, 1995; White, Brick, and Hansell, 1993; White and Hansell, 1996). Heavier drinking in adolescence (i.e., greater quantities and frequencies) has been linked to violence (ranging from self-reports of minor incidents, such as fighting and hitting to hurt, to index offenses, such as robbery and felony assault) in later adolescence and adulthood (Fergusson and Horwood, 2000; Menard and Mihalic, 2001; Orlando et al., 2005; Swahn and Donovan, 2004; Welte and Wieczorek, 1999). Other studies have shown that the relationship is reciprocal and that one behavior facilitates the other and vice versa over time (Huang et al., 2001; White et al., 1999).

Alcohol use trajectories characterized by high use and early onset have been linked with delinquency and conduct disorder (Hill et al., 2000; Tucker, Orlando, and Ellickson, 2003). In a joint trajectory analysis with the data set used in the current study, White, Jackson, and Loeber (2009) found that trajectories of drinking frequency were related to trajectories of violence (e.g., assault, gang fighting) prevalence during adolescence (ages 12-18), but not during emerging adulthood (ages 18-25). This finding was not unexpected, given that most youth mature out of violence around age 18 (Elliott, 1994) but increase their drinking in their early 20s (White, Labouvie, and Papadaratsakis, 2005). It is important, therefore, to understand how changes in alcohol use are related to desistance and persistence of violent offending across adolescence and young adulthood and to compare these relationships for African Americans and Caucasians.

DEFINING DESISTANCE IN SERIOUS VIOLENT OFFENDING

Desistance from crime has been conceptualized and operationalized in many different ways (Kazemian, 2007). Although most empirical studies have adopted a static definition, a prevailing view in the field is that it is best to view desistance as a process (dynamic definition) rather than a discrete event (Bushway, Thornberry, and Krohn, 2003; Kazemian, 2007). For example, Kazemian, Farrington, and Le Blanc (2009) have argued that desistance defined as a dichotomous measure does not account for changes in rates of offending (for details on the advantages and disadvantages of static vs. dynamic measures of desistance, see Bushway, Thornberry, and Krohn, 2003; Ezell, 2007; Kazemian, 2007).

Unlike desistance from property crime and less serious types of crime that can be assessed more reliably across different situations and time, it is very difficult to measure desistance in serious violent offending (i.e., armed robbery, aggravated assault, rape, and homicide) as a process given its low frequency overall and legal actions that prevent the same individual from committing violent offenses. In other words, serious violent offending tends to have an intermittent occurrence over one's life (Piquero, Hawkins, and Kazemian, in press). Therefore, for this analysis, we define desistance as stopping the commission of serious violent crimes for an extended period (Stouthamer-Loeber et al., 2004) and use a conceptual definition of desistance (see Measures section below).

We allow for a gap of at least seven years (ages 18-25) in identifying desistance, which is a larger window than found in several studies that have used a one- to three-year window (Kazemian, 2007). This gap fits well with an adapted definition of desistance by Bottoms and colleagues (2004: 371) as "any significant lull or crime-free gap… in the course of a criminal career." Nevertheless, we acknowledge that it is not possible to know whether some of the youths defined in this study as desisters will again violently offend at some point later in their lives. Laub and Sampson (2001) distinguished "termination" (the end of offending) from "desistance" (the process), and several researchers have argued that termination is not definite until death (Kazemian, 2007).

DESISTANCE FROM CRIMINAL OFFENDING AND THE ROLE OF DRINKING AND DRUG USE

A few previous studies have examined the associations between substance use and desistance from criminal offending. For example, Kazemian, Farrington, and Le Blanc (2009) found that, among young men who had offended in adolescence, heavier drinking and drug use at age 18 predicted a higher likelihood of engaging in frequent and serious offending at age 32. In addition, their results showed that young men who reduced their substance use were more likely to reduce their serious offending. They concluded that reductions in substance use may play a key role in de-escalation of offending. Maruna (2001) also argued that desistance from offending is linked to desistance from drug use (see also Hussong et al., 2004; Stoolmiller and Blechman, 2005). Thus, desistance and persistence may depend on changes in life circumstances including alcohol and drug use (Kazemian, Farrington, and Le Blanc, 2009).

Within-individual analyses have shown that individuals are violent more often on days when they are drinking than when they are not (Chermack and Blow, 2002; Felson, Teasdale, and Burchfield, 2008; Mulvey et al., 2006). Welte and colleagues (2005) found that individuals commit more offenses at those periods in their lives when they are most involved with substances. Mulvey and colleagues (2006) conducted a within-subjects analysis of substance use and crime commission on a daily basis among a high-risk sample. Violent days were more likely to be substance-using days and vice versa, although the findings for marijuana use were weaker than for alcohol and other illicit drugs. In an offender population, periods

of reductions in cocaine/heroin and alcohol use were related to reductions in income-generating crime, but not violent crime (Gottfredson, Kearley, and Bushway, 2008). In contrast, Horney, Osgood, and Marshall (1995) found that periods of illegal drug use were related to increases in assault as well as drug dealing and property crime. Consistent with Gottfredson, Kearley, and Bushway (2008), Horney, Osgood, and Marshall (1995) did not find a significant effect of periods of heavy drinking on violent crime. None of these studies, however, examined the association of alcohol use and violence over an extended period of time or examined racial differences in the association.

CURRENT STUDY

The current study examines how patterns of drinking (taking into account quantity and frequency) from adolescence into emerging adulthood are related to persistence and desistance of serious violent offending. We extend previous developmental analyses, which have generally focused on more common forms of aggressive behaviors (e.g., Huang et al., 2001; White and Hansell, 1998), by focusing on serious violent offending. In addition, whereas several studies have examined community samples with low rates of serious offending, the present study uses a community sample with disproportionally high numbers of adolescents exhibiting significant risk for antisocial behavior. Furthermore, whereas most previous developmental analyses of alcohol use and violence have been limited to adolescence, this study extends that research by examining associations in adolescence and emerging adulthood.

Many studies examining desistance have relied on official reports of violent offending. On one hand, official reports may over-represent desistance compared to studies using self-report data (Stouthamer-Loeber et al., 2004). On the other hand, self-report data may under-represent desistance because of initial under-reporting (for a discussion of the advantages and disadvantages of official reports compared to self reports, see Dunford and Elliott, 1984; Hindelang, Hirschi, and Weiss, 1981; Kazemian and Farrington, 2005). We address the limitations of using either self or official report by combining both official and self reports of serious violent offending. In addition, when studying the association between drinking and desistance or persistence of violence, one needs to control for “time not at risk” (i.e., time incarcerated or institutionalized), which could reduce opportunities to drink and to offend (Piquero et al., 2001). Therefore, we test our models first without considering time not at risk and a second time controlling for institutionalization during emerging adulthood. Also, it is possible that other drugs may take the place of alcohol as youth become emerging adults and their drug use may be related to their violent offending (White and Gorman, 2000). Therefore, we also test our models first without considering use of marijuana and other illicit drugs and a second time controlling for other drug use during emerging adulthood.

Furthermore, we extend prior research by examining whether the association between alcohol use and violent offending differs for African Americans and Caucasians. The former report higher rates of violence than the latter, whereas the latter report higher rates of drinking than the former. This contradiction highlights the importance of examining whether the association between alcohol use and violence differs for Caucasians and African Americans. No study, to our knowledge, has examined these developmental associations specifically for African Americans during this period in the life course.

Because of our interest in persistence and desistance of serious violent offending, we compare these two types of offenders to each other and the rest of the sample. We hypothesize that persisters will drink more than other youth during adolescence and emerging adulthood. In addition, we hypothesize that desisters will be similar to persisters in

their drinking trajectory during adolescence but similar to other youth during emerging adulthood. We also hypothesize that alcohol use will be more strongly related to persistence of serious violence for Caucasians than for African Americans.

This study contributes to criminal career research by examining whether the association of alcohol use to serious violent offending varies during different developmental periods and whether the strength and timing of this association differs for African American and Caucasian young men. Although this study does not test a causal relationship, the results of this study could have significant implications for designing age- and race-appropriate violence prevention programs. From a policy perspective, understanding the association between alcohol use and serious violent offending is significant in as much as these types of offenses have severe negative consequences for victims and for society (Felson and Staff, 2010: 1348).

METHOD

DESIGN AND SAMPLE

Data were collected as part of the Pittsburgh Youth Study (PYS), a prospective longitudinal study of the development of delinquency, substance use, and mental health problems (Loeber et al., 2008). The PYS began in 1987 and initially consisted of three cohorts of inner-city boys (N = 1,517) who had been randomly selected from the first, fourth, and seventh grades of Pittsburgh public schools (called the youngest, middle, and oldest cohorts, respectively). Approximately 850 boys in each grade (85 percent of the target sample) were screened. The 15 percent nonparticipation rate did not result in sample selection bias regarding achievement test scores and racial distribution, which were the only two variables available from school records that could be compared (Loeber et al., 2008). After the initial screening, the top 30 percent who screened at highest risk for anti-sociality (based on parent, teacher, and participant information) were included in the sample for follow-up surveys, together with 30 percent randomly selected from the remainder. The study was approved by the University of Pittsburgh Institutional Review Board. Families were compensated for their participation. Informed oral assent was obtained from boys through age 17 after which informed written consent was obtained. Informed written consent was obtained from legal guardians until young men became age 18. Just over half of the sample was African American, and the rest was almost all Caucasian. Over 90 percent lived with their natural mother at the time of their screening. The boys were fairly evenly distributed across socioeconomic status (SES) levels, although about one-third received public assistance (see Loeber et al., 2008).

The present study analyzed only the youngest (N = 503) and oldest (N = 506) cohorts because the middle cohort (N = 508) was followed up only for the first four years of the study. Boys in the youngest and oldest cohorts were interviewed at six-month intervals during the first three to four years of the study and then annually until the youngest cohort was approximately 19/20 years of age and the oldest was approximately 24/25 years of age. The six-month intervals were combined and we report annual data for all our analyses. Retention rates averaged above 90 percent during these 14 years. The youngest cohort was reinterviewed about five years later at the approximate age of 24/25. A total of 78 participants (15.5 percent) from the youngest cohort were not reinterviewed at this assessment because they were deceased, not located, or refused to participate. These participants were thus eliminated from this analysis to prevent the misclassification of desistance/persistence status.[1] In addition, the sample for this analysis was limited to only those who were African Americans (n=503) or Caucasians (n=391); we excluded 37 participants who were neither Caucasian nor African American or who had mixed race/ethnicity. The present study sample includes 894 cases.

MEASURES

Serious Violent Offending—As stated earlier, to measure serious violent offending we combined self-report and official-report data. Self-report data came from the Self-Reported Delinquency (SRD) scale (Elliott, Huizinga, and Ageton, 1985), which is widely used in national surveys. This measure reports on the frequency (number of times) and circumstances of delinquent/criminal acts in the past year. Serious violent offending includes completed or attempted rape or sexual assault, strong arming, and attacks intended to seriously hurt or kill. Official court conviction records (juvenile, FBI and State arrest records) were searched and updated in 2010. Serious violent offenses from the court records included: homicide, manslaughter, rape, serious assault, and robbery. We counted the number of offenses each year reported by either source (participant or official record) and carefully checked the two sources against each other to ensure that a specific offense was counted only once.

We defined desisters as those youth who committed at least two serious violent offenses in adolescence (between ages 12 and 17) but none during emerging adulthood (between ages 18 and 24/25) ($n = 76$; 8.5 percent). Thus, we excluded one-time offenders from the desister category, which is consistent with the literature (Kazemian, Farrington, and Le Blanc, 2009). Persisters were defined as those who committed at least one serious violent offense in adolescence and at least one more in emerging adulthood ($n = 103$; 11.5 percent). Late-onset serious violent offenders were those who did not commit any serious violent offense in adolescence but committed at least two in emerging adulthood, again excluding one-time offenders ($n = 51$; 5.7 percent). The nonviolent group was comprised of those who committed no serious violent offenses either in adolescence or in emerging adulthood ($n = 580$; 64.9 percent). A fifth group who did not fit any of our conceptual definitions (i.e., one-time offenders in either adolescence only [$n = 50$] or emerging adulthood only [$n = 34$]) was also examined ($n = 84$; 9.4 percent).

Alcohol Use—Participants reported their frequency (number of times) of drinking beer, wine, and hard liquor in the past year (ranging from 0 to 365) and their typical quantity of each alcoholic beverage consumed, which ranged from 0= no drinks to 5= six or more drinks. For each type of alcoholic beverage, we multiplied quantity by frequency each year and summed across the three beverage types for an annual quantity-times-frequency index (QFI). This QFI is widely used in alcohol use research (e.g., Sobell and Sobell, 1995). The QFI score at each age was then log transformed (natural log plus one) and the resulting logged variables showed acceptable distributions (i.e., skewness was less than 2.1 and kurtosis was less than 2.0 at all ages). For the descriptive analyses in Table 1, we present original, unlogged data separately for quantity and frequency.

Demographic and Control Variables—Race was coded as 0 = Caucasian and 1 = African American. Cohort was coded 0 = youngest and 1= oldest. Parental SES was measured using the Hollingshead's (1975) index of social status based on data collected from the primary caretaker at the first follow-up assessment. The SES index is the product of occupational status and highest educational level (the higher score attained between two caretakers or the score attained by the single caretaker). A higher score on the SES index indicates higher SES.

[1]Attrition analyses in the youngest cohort indicated that the 78 individuals who were not followed up at age 24/25 did not differ significantly ($p > .05$) from the remaining 425 who were followed up in terms risk status at screening, parental SES, alcohol use at age 13, or violent offending at age 13. There was a significant difference in attrition by race ($p = .045$) and that was accounted for by the fact that more African Americans than Caucasians had died.

Institutionalization status was derived for each age by combining data from the SRD, demographic questionnaire, subjects' health questionnaire that asked about serious injury and hospitalization, and interviewers' post-interview reports. Institutionalization was coded as 1 (yes; 0 = no) if the participant or the interviewer reported incarceration or hospitalization due to physical health, mental health, or substance use problems each year.

Each year participants reported on their frequency (number of times) of substance use. Marijuana use was measured as the number of times that marijuana was used each year (range from 0 to 365). Prevalence rather than frequency of other illicit drug use (i.e., hallucinogens, cocaine, crack, heroin, phencyclidine [PCP], tranquilizers, barbiturates, codeine, amphetamines, and other prescription medications for nonmedical reasons) was used due to low prevalence of other illicit drug use in this sample (Lee et al., 2010). It was coded 1 if any substance was used in the last year and 0 if no substances were used in the last year.

ANALYSES

We conducted ANOVA and chi-square tests for descriptive analyses to compare violence group characteristics using SAS (SAS Institute, 2002-2008). All other analyses were conducted using Mplus 6.11 (Muthén and Muthén, 2011). Drinking trajectories, based on the annual QFI data, were modeled using a multi-group, piece-wise growth curve approach across four developmental phases for the five violence groups. The piece-wise growth curve analysis captures nonlinearity yet allows for easy interpretation of developmental trends during specific time windows within a long-term period (Flora, 2008). The intercept was set at age 13, a time point often used to demarcate early-onset alcohol use. Transition points or 'knots' included ages 14, 18, and 21, representing fixed time points where two adjacent linear slopes join. We selected these knots to represent developmental changes during the following four time periods: ages 12 - 14 (early adolescence when onset of alcohol use begins), ages 14 - 18 (later adolescence by which time most youth have tried alcohol), ages 18 - 21 (early emerging adulthood when heavy drinking peaks), and ages 21 - 24/25 (later emerging adulthood when heavy drinking begins to decline). Thus, we estimated means of the intercept at age 13 and four linear slopes as well as covariance elements among the intercept and slopes.

The piece-wise growth curve analysis was chosen instead of growth curve analysis with high-order polynomials such as quadratic or cubic growth curve models because developmentally alcohol use may represent homotypic discontinuity (i.e., the same behavior with discontinuous underlying processes and implications) and also because we felt that in each period we might see a different association between alcohol use and serious violent offending. Interpreting these linear slopes across the violence groups was more straightforward in the present study than interpreting expected quadratic trends over the entire observed period. The separate slopes, therefore, serve as vehicles to make comparisons across groups in the different time periods of interest.[2] Although for the primary analysis the intercept was set at age 13, we also analyzed the model by changing the coding of the intercept to age 24/25 so that we could compare drinking levels across violence groups at age 24/25. These two piecewise growth curve models with different ages for the intercept were set up to be equivalent in all estimates with the exception of the intercept values (i.e., mean values at age 13 and 24/25).

[2]We examined single-piece quadratic growth curve models as well as two-piece (adolescence and emerging adulthood) quadratic growth curve models. The single-piece quadratic growth curve models were more parsimonious than the one shown in this paper, whereas the two-piece quadratic growth curve models required more parameters than the one shown in this paper. We decided that the model shown in this present study represented the most straightforward way to get comparisons of amounts of change across groups in the different and important developmental time periods.

We then created dummy coding variables for the violence groups to test their differences in growth parameters. We also tested race-by-violence-group interaction effects on these growth parameters. For testing the interaction effects, we created effect coding variables for violence groups and race, and then created interaction terms by multiplying these variables. In all analyses, the persisters and desisters were separately used as two reference groups, and we repeated analysis for the growth model with the intercept set at age 24/25.

Finally, to control for "time not at risk" (i.e., institutionalization), marijuana use, and illicit drug use, we added three time-varying covariates measured between ages 18 and 24/25 into the model that set the intercept to age 24/25. We tested intercept and slope differences across violence groups in the oldest cohort sample only because annual data on institutionalization and drug use were not available for the youngest cohort during this period. We examined whether any of the violence group differences in the alcohol use intercept and slopes could be attributed to these control variables.

As noted in the Design and Sample section, participant attrition rates across time were low. We directly estimated alcohol growth curve parameters using maximum likelihood estimation under the assumption of missing at random (MAR) using Mplus. (Note that one case was eliminated from the analyses because it was missing alcohol use data across the entire study period.) The institutionalization and drug use variables had some missing data in the oldest cohort across ages 18 to 24, ranging from 5 to 17 percent. We imputed these missing data using Proc MI in SAS because Mplus does not handle missing values in covariates (Muthén and Muthén, 2008). The imputation data set included participants' marijuana and illicit drug use data from ages 13 to 24, annual living situation (i.e., living in jail, prison or hospital/mental hospital) from ages 18 to 24, and conviction data from ages 18 to 24.

RESULTS

CHARACTERISTICS OF THE VIOLENCE GROUPS

Table 1 shows descriptive statistics for the violence groups. There were more African Americans than Caucasians in the four groups that committed violence and more Caucasians than African Americans in the nonviolent group ($\chi^2 = 46.61$, $df = 4$, $p < .01$). There were also significant cohort differences in group membership ($\chi^2 = 30.20$, $df = 4$, $p < .01$), indicating that there were proportionally more members of the oldest than youngest cohort in the four violence groups, especially the late-onset and persister groups, than in the nonviolent group. Parental SES was higher for the nonviolent group compared to the other groups ($F = 9.70$, $dfs = 4, 889$, $p < .01$).

Table 1 also shows group differences in average quantity and frequency (number of times) of beer, the most frequently consumed alcoholic beverages, at each of the four age periods (i.e., the mean across ages within each period). Results from analysis of variance (ANOVA) indicated that all of the comparisons during adolescence (at ages 12-14 and 14-18) were statistically significant ($p < .001$; the *F*-statistics are available in Supporting Material S.1). In emerging adulthood, group differences were also significant ($p < .01$) except for average beer frequency between ages 21 and 24/25. Findings for the other beverage types were fairly consistent with those for beer (these data are also available in S.1).[3]

[3]We chose to show the results for beer because beer was by far the beverage of choice among these young men. For the most part, however, the same significant group differences were observed for the other two beverages except that hard liquor quantity at ages 18-21 was not significant, whereas beer quantity at ages 18-21 was (see S.1).

The average numbers of violent offenses committed across violence groups, based on the official conviction data and the self-report data, are also shown in Table 1. Examination of the means indicated that the groups differed as expected based on how they were conceptually defined.

ALCOHOL USE AND SERIOUS VIOLENCE

We analyzed a multi-group, piece-wise growth curve model across the five violence groups. Means and variance components of growth parameters were estimated to be different across the groups. Overall goodness of fit statistics showed an adequate fit of the model to the data (χ^2 = 732.25, *df* = 396, RMSEA = .069, CFI = .916). Figure 1 graphically shows the estimated alcohol trajectories for the five violence groups. It shows that the desisters and persisters drank most in early adolescence and started to diverge in drinking during late adolescence (ages 14 – 18). At that point, the late-onset offenders and one-time offenders started to increase their drinking to match the levels of the persisters. It also shows how the nonviolent group increased their drinking over time and surpassed all groups except the one-time offenders during late emerging adulthood. Trajectory figures broken down by race and the cohort are available in Supporting Material S.2 and S.3, respectively.[4]

We created dummy variables for the violence groups and regressed them onto the growth parameters (see Table 2). SES, race, and cohort were also included as covariates. The model fit the data well (χ^2 = 262.31, *df* = 128, RMSEA = .034, CFI = .966). We first tested the model using persisters as a reference group, and repeated this analysis using desisters as a reference group to better contextualize group differences in growth parameters. In both models, overall goodness of fit statistics and parameters for other covariates are expected to be the same. At age 13, the persisters showed significantly higher levels of alcohol use, compared to all other groups except desisters. Between ages 12 and 14, persisters experienced greater growth in alcohol use, compared to the nonviolent group. During ages 14 to 18, late-onsetters increased their rate of drinking more so than the persisters did. In early emerging adulthood (ages 18-21), the nonviolent and the one-timer groups reported greater rates of growth in drinking than the persisters, whereas in later emerging adulthood (ages 21-24) only the nonviolent group reported a greater rate of growth than the persisters. These differential growth trends in emerging adulthood resulted in higher levels of drinking at age 24/25 for the nonviolent group and one-timers, compared to the persisters.

Comparing the groups against the desisters, at age 13 the desisters reported significantly higher levels of drinking than all other groups besides the persisters and a greater rate of growth from age 12 to 14 than the nonviolent group. The late-onsetters and one-timers experienced greater rates of increase in drinking from ages 14 to 18, compared to the desisters. During emerging adulthood (ages 18-24/25), the desisters did not significantly differ from any other group in terms of alcohol use level or growth slope.

In terms of covariates, race was significantly associated with alcohol use level at both age 13 and age 24/25 and growth in alcohol use from ages 14 to 18. African Americans reported

[4]The overall patterns for African Americans and Caucasians were generally similar to the one reported in Figure 1 with a few exceptions (see S.2). First, drinking levels were higher for Caucasian males overall than African American males. Second, the divergent pathways of alcohol use between the persisters and desisters in late adolescence were clearer for Caucasians than African Americans. Third, alcohol use levels for Caucasian one-time offenders were nearly as high as persisters from age 14 on and became the highest of any group from age 18 on. One-time offending African Americans drank the most heavily of all groups only between ages 20 and 23. Finally, whereas Caucasian desisters reduced their drinking during emerging adulthood, African American desisters increased their drinking during this same time period.
Although, for the most part, alcohol use levels were higher in the oldest, compared to youngest cohort, trajectories across the violence groups were generally similar for both cohorts (see S.3). The major difference seen is for the desisters, who appear to peak highest in early adolescence and mature out of drinking more dramatically by age 24/25 in the youngest, compared to oldest cohort.

significantly lower levels of drinking than Caucasians at ages 13 and 24/25, as well as slower rates of growth in drinking from ages 14 to 18. Being in the oldest, compared to youngest, cohort was associated with higher levels of alcohol use at both ages 13 and 24/25, as well slower rates of growth from ages 12 to 14 but greater rates of growth from ages 14 to 18. SES was not related to drinking levels at ages 13 and 24/25. However, higher levels of SES were significantly associated with higher rates of growth from ages 14 to18.

RACE DIFFERENCES IN THE ASSOCIATIONS BETWEEN ALCOHOL USE AND SERIOUS VIOLENCE

We next tested the interaction terms between the violence groups and race as covariates of growth parameters. The model overall fit the data well ($\chi^2 = 305.08$, $df = 160$, RMSEA = .032, CFI = .963). However, it did not significantly improve the model fit over the previous model that included only the violence groups and race ($\Delta\chi^2 = 42.77$, $\Delta df = 32$, $p = .097$). Thus, the findings indicate that, although there were race differences in violence group membership and in alcohol use trajectories, the associations between the violence groups and patterns of drinking did not differ for Caucasians and African Americans (see note 4 above).

ALCOHOL USE AND SERIOUS VIOLENCE CONTROLLING FOR TIME NOT AT RISK AND DRUG USE

As shown above, during the later period of emerging adulthood, the persisters and late-onset offenders, who committed most of the violent offenses during emerging adulthood, decreased their alcohol use substantially, while the nonviolent group substantially increased their drinking (see Figure 1). Furthermore, compared to the persisters, the nonviolent and one-timer groups reported greater rates of growth during emerging adulthood and higher levels of alcohol use at age 24/25 (Table 2). These findings contradict prior studies, which have shown a positive association between heavy drinking and violent offending (Leonard, 2008; White and Gorman, 2000). Taking into account the potentially high prevalence of incarceration among serious violent offenders, we postulated that the steep decrease in drinking for the persisters might have been accounted for by the effect of being institutionalized (incarcerated or hospitalized for a physical health, mental health or substance use problem) during this time period and the lack of (or limited) access to alcohol. It was also possible that, during emerging adulthood, the serious offenders became involved with illicit drugs and thus reduced their drinking. Therefore, we examined institutionalization, marijuana use, and hard drug use during emerging adulthood for members of the oldest cohort ($n = 487$).

There were significant violence group differences in prevalence of institutionalization at every age during emerging adulthood. As predicted, persisters (74.3 percent) and late-onset offenders (87.5 percent) reported the highest overall prevalence rates for institutionalization during emerging adulthood, compared to the desister (63.4 percent), one-timer (51.1 percent), and nonviolent (21.3 percent) groups (for greater details, see also Supporting Material S.4). There were also significant differences among groups for marijuana use at all ages. The overall mean frequency of use from ages 18 to 24 was higher for the late-onsetters (92.3), one-timers (89.0), and persisters (82.5) than the desisters (66.2) and especially the nonviolent group (37.3). Prevalence of hard drug use during ages 18 to 24 did not differ significantly across groups for four of the seven years. Nevertheless, overall prevalence between ages 18 and 24 differed significantly with all violence groups (range from 26.8 percent to 37.8 percent) reporting higher prevalence than the nonviolent group (19.2 percent; see S.4 also for details on drug use differences across the five groups).

To assess whether institutionalization and drug use accounted for reductions in drinking for persisters and late-onset offenders, we repeated the piecewise growth curve analysis (age 24/25 as intercept) that additionally included institutionalization, marijuana use, and drug use between ages 18 and 24 as time-varying covariates of annual drinking variables. (Note that correlations among these three covariates were low; for example, marijuana use and any other drug use were moderately correlated, ranging from .20 to .36 across age.) This analysis was conducted only for the oldest cohort (see Analyses section) and the model fit was acceptable ($\chi^2 = 668.04$, $df = 372$, RMSEA = .04, CFI = .90). Results showed that being institutionalized was consistently related to lower alcohol use from ages 20 through 24/25. In contrast, marijuana use was consistently associated with greater alcohol use from ages 18 through 24/25. Hard drug use was unrelated to alcohol use at any age (see Supporting Materials S.5 and S.6).

After taking these time-varying covariates into account, for the most part, the violence group differences in growth parameters during emerging adulthood did not change. The nonviolent group still showed a statistically higher rate of growth in alcohol use between ages 18 and 21 and between ages 21 and 24/25, compared to the persisters, although drinking levels between the two groups did not differ at ages 24/25 (see Supporting Material S.6). Furthermore, the one-timers no longer experienced a significantly greater rate of growth than the persisters between ages 18 and 21. The desisters, compared to the persisters and late-onsetters, reported significantly higher levels of alcohol use at age 24/25. As a result of adding these time-varying covariates to the model, as well as analyzing a subset sample for this analysis (i.e., only the oldest cohort), there were also a few changes in group differences during adolescence. However, given that the main purpose of this analysis was to examined whether time not at risk (i.e., institutionalization) and drug use during emerging adulthood influenced the group differences in drinking during emerging adulthood, these findings are not discussed (for greater details see S.6).

DISCUSSION

This study examined the developmental associations between alcohol use and persistence and desistance of serious violent offending, and whether the associations differed for African American and Caucasian young men. As with previous studies, we found higher rates of violent offending in both adolescence and emerging adulthood among African Americans compared to Caucasians (Elliott, 1994; Mooradian, 2003; Pope, Lovell, and Hsia, 2002) and higher levels of alcohol use for Caucasians than African Americans (Lee et al., 2010). There were no significant race-by-violence-group interactions, however, suggesting that the association between alcohol use and violent offending is invariant by race. We had expected to find a stronger association between alcohol use and violent offending for Caucasians than African Americans. The fact that we had a small number of Caucasians who committed serious violent offenses, especially during emerging adulthood, might have affected our chances of finding significant interaction effects. Alternatively, it may mean that even though there are race differences in drinking and violence levels, the nature of the association between drinking and violence is consistent across race at least during adolescence and emerging adulthood.

Adolescent violent offenders (i.e., desisters and persisters) reported higher levels of drinking during adolescence than those who were not adolescent violent offenders (the nonviolent and late-onset offender groups) and greater growth than the nonviolent group during early adolescence. During middle to late adolescence, late-onset offenders increased their drinking more so than persisters and desisters did. This increase may have set the stage for their eventual involvement in violent offending or at least served as a warning signal for future problems. In contrast, changes in drinking were related to serious violent offending in mixed

ways during emerging adulthood. That is, whereas the nonviolent group substantially increased their drinking in emerging adulthood, and by age 24/25 their levels of use appeared to surpass all other groups except the one-time offenders, the desisters' drinking trajectory started to resemble that of the nonviolent during the same period (see also Figure 1).

The lower rates of alcohol use during emerging adulthood for persisters, compared to nonviolent youth was not expected. In addition, the negative growth slopes for the persisters and late-onset offenders and positive growth slopes for the nonviolent and desister groups indicated very diverse patterns of alcohol use during emerging adulthood. Therefore, we controlled for time not at risk and drug use during emerging adulthood. Institutional confinement clearly reduced alcohol use from ages 20 to 24 and thus not having access to alcohol due to incarceration could possibly explain the emergence of these divergent alcohol use patterns across the violence groups in emerging adulthood. Nevertheless, including institutionalization did not alter the finding that the nonviolent group drank more than the persisters at age 24/25. Furthermore, marijuana and illicit drug use did not take the place of alcohol use during emerging adulthood and, in fact, marijuana use was positively associated with drinking. There may be other factors that could also account for persisters' decreasing rates of drinking during emerging adulthood. Change in offending patterns is one potential explanation for changes in the link between alcohol use and violent offending. For example, co-offending is more common during adolescence than adulthood (Reiss and Farrington, 1991) and co-offending (e.g., gang fighting) during adolescence has been linked to peer group drinking (Fagan, 1990). Although an examination of co-offending patterns was beyond the scope of this paper, future research should consider this factor as well as other aspects of offending patterns when examining developmental associations between alcohol use and violence.

The fact that drinking was related to violent offending in different ways during emerging adulthood may result from the fact that heavy drinking is normative during emerging adulthood. Thus, it may not be a reliable predictor of serious violent offending during this age period, if one takes a look at data in a limited time window. The alcohol use measure used in the study was comprised of quantity and frequency and alcohol quantity during emerging adulthood was especially high for the nonviolent group, compared to the persisters and late-onset offenders (see S.1). This finding is consistent with the normative pattern of "binge drinking" during emerging adulthood (White et al., 2006). Thus, there may be developmental differences in the associations between alcohol use and violent offending and it is important, therefore, to examine these associations within a developmental perspective (Menard and Mihlaic, 2001).

Previous research has also demonstrated stronger associations between alcohol and violence during adolescence than any other stages in the life course (Lipsey et al., 1997; Temple and Ladoucher, 1986). In fact, consistent with the present findings, our own research has shown relatively strong associations between alcohol use and violence during adolescence (White, Brick, and Hansell, 1993; White et al., 1999), but limited associations during emerging adulthood (White, Jackson, and Loeber, 2009). In adolescence, alcohol use is illegal and may reflect a willingness to break the law as well as parental rules. Thus, this lack of disregard for rules and actual noncompliance, which are important symptoms of disruptive behavior disorders (DBD, see Loeber et al., [2000] for a review) and behavioral characteristics associated with a problem behavior/general deviance syndrome (Jessor and Jessor, 1977; Osgood et al., 1988; White, 1992), may be common threads between early alcohol use and violent offending. In contrast, during emerging adulthood, as alcohol use becomes prevailingly common and legal at age 21, it may not be linked as strongly to other deviant behavior and may even play an adaptive role in one's development (Schulenberg,

Bryant, and O'Malley, 2004). Thus, these stage-of-the-life-course differences in legal and social norms may account, in part, for the higher rates of drinking found among the nonviolent group vs. the persisters during emerging adulthood. Furthermore, as many of the nonviolent group may not have drank in adolescence due to it being illegal, the novelty of drinking during emerging adulthood may have contributed to their steep increases in drinking. As these youth become older and the majority of the nonviolent and desister groups mature out of heavy drinking, the persisters may again stand out as the heaviest drinkers. In other words, persistence in heavier drinking *after* emerging adulthood may be linked to persistence in serious violent offending. Future follow ups of this sample at older ages will shed light on this hypothesis and will allow a longer gap to observe desistance in violent offending.

It should be noted that the current study focused on developmental associations between alcohol use and violence. Thus, the varied patterns of developmental associations between alcohol use and violent offending during emerging adulthood do not mean that there may not be acute alcohol effects on violence during this stage in the life course. Research has demonstrated that the acute effects of alcohol on aggression depend, in part, on an individual's propensity toward aggression (Leonard, 2008). Thus, even though drinking alcohol may increase the risk of violent offending among persisters, the fact that they drink lower quantities of alcohol than the nonviolent group during emerging adulthood may have confounded the observed relationships in this study.

The one-time offenders represent an interesting group. Their alcohol quantity (see S.1) and drug use (see S.4) were higher than most of the other groups during emerging adulthood. Figure 1 shows that their drinking escalated in late adolescence and early emerging adulthood surpassing all other groups through their early 20s. Like the late-onsetters, the one-timers demonstrated greater growth in drinking between ages 14 to 18 than the desisters. Thus, as with the late-onsetters, this growth may be foretelling a later onset or continuation of serious violent offending, which could possibly persist into adulthood. Given the small Ns, we did not differentiate the one-time offenders in adolescence and the one-time offenders in emerging adulthood as separate groups. It is possible that over time some will commit more offenses and meet our conceptual definitions for persisters or late-onsetters. Alternatively, they may represent a group that is involved with drug use and, through their associations with deviant others, they occasionally get involved in offending. Future follow ups are needed to address these speculations.

This study had several advantages over previous studies examining the developmental associations between heavy drinking and violent offending. First, we focused on serious violent offending, rather than less serious types of aggressive behavior, and the measure of serious violent offending was based on both official and prospective self reports of offending. Second, we controlled for time not at risk and other drug use. Finally, we used a high-risk community sample to increase the likelihood of observing serious violence.

Nevertheless, this study had several limitations that should be considered when interpreting the findings. First, as stated earlier, we only followed participants until age 24/25 and we might have identified some young men as desisters or one-time offenders who will offend again later on. This problem of false desistance could result in misleading conclusions about the role of alcohol use in the desistance process (Kazemian, 2007). Estimates of criminal career length from previous studies have differed greatly depending on the length of the observation period.

There was a gap in annual data collection for the youngest cohort from ages 21 to 24/25. While official data on serious violent offending were available during this time period,

annual self-report data were not available for the youngest cohort. However, retrospective self-report data on prevalence of offending were available for the five-year gap. Given the seriousness of these offenses, it is unlikely that these young men forgot their offenses over the five-year recall period. Thus, it is improbable that these retrospective reports would be biased more so than the prospective annual reports. Nevertheless, on one hand, we might have under-estimated the extent of offending during emerging adulthood for this cohort and this absence of annual self-report data might account for the lower rates of persisters and late-onset offenders in the youngest, compared to oldest, cohort. On the other hand, previous analyses of these data have found higher rates of violence in the older than the younger cohort during adolescence (Loeber et al., 2008). Similarly, annual alcohol use data were not available during this period for the youngest cohort and this might have affected the trajectory analysis. Thus, the results for this cohort should be interpreted cautiously. Nevertheless, inspection of the trajectories for the five groups separately for the oldest and youngest cohorts does not reveal important cohort differences in trajectory shapes across the groups (see S.3 and note 4).

In this study, we measured alcohol use with a quantity-frequency index. It is possible, however, that different measures of drinking may have shown a stronger relationship with violent offending in emerging adulthood. For example, level of intoxication may be more important for violence than frequency of drinking (Leonard, 2008). Also, perhaps using a shorter time frame than a one-year measure may have provided a more accurate measure of drinking. Future research should consider alternative measures.

In addition, the generality of findings needs to be replicated with other samples. We included only males and drinking may play a different role in violent offending for males than females (White and Gorman, 2000). Also, the participants were from one geographic area and were either African American or Caucasian. Future research should consider other racial/ethnic groups across diverse areas.

Overall, the results of this study suggest that heavier alcohol use by boys during early adolescence is a risk factor for concurrent violent behavior. In addition, sharp increases in drinking during late adolescence may foretell the onset of later violent offending. On the other hand, higher levels of increases in drinking during emerging adulthood do not appear to be markers for persistence of serious violent offending. Other life changes such as getting married and establishing a career may be much better predictors of desistance than patterns of drinking (Laub and Sampson, 2001), although alcohol may have an impact on these developmental milestones (Kazemian, Farrington, and Le Blanc, 2009). Further, changes in cognitions (e.g., transformation of one’s identity and reconceptualization of the costs and benefits of crime) may become important factors affecting desistance from offending (Bottoms et al., 2004; Laub and Sampson, 2001; Maruna, 2001). More research is needed to determine if heavy drinking may mediate or moderate these other life changes and, thereby, affect desistance from violent offending. Now that we have identified changes in the association between alcohol use and serious violent offending during different periods in the life course, the next step would be to examine theoretical explanations for these changes.

The results have several implications for policy. First, the findings reinforce the well-established link between heavy drinking and violence during adolescence (see also White et al., 1999, 2002), and contribute to the notion that reduction in drinking or abstinence is an important intervention goal for many violent young men. Where this paper contributes new information is to delineate that the relationship between heavy drinking and violence differs by developmental phase, and is different for individuals on different developmental trajectories of violence (persisters, desisters, late onsetters, etc.). The science of predicting individuals in these different trajectory groups is still emerging and far from replicated

across studies to be useful for developing screening devices to predict individuals' trajectory group membership (Loeber and Farrington, in press). However, the results of this paper are useful for policy in other ways, especially because the strength of the association between alcohol use and violence is much clearer in adolescence than in emerging adulthood. The reality of the situation is that many youth, even when under age for alcohol consumption, engage in frequent and excessive drinking. A direct policy implication is to strengthen and tighten alcohol regulations to prevent access to alcohol for adolescents. In other words, the reduction of violence by adolescents is likely to take place by reducing binge drinking (White et al., 2002). In addition, steering youth away from hot-spots of violence around drinking establishments appears worthwhile because of the congregation of violence-prone individuals around such locations (White and Gorman, 2000).

When thinking about early interventions, the focus may suitably be on early-onset violent and alcohol-using youth because of their high likelihood of becoming persistent offenders and problematic drug users into adulthood. For this group, but also for those who onset drinking or violence later during adolescence, we advocate research to assess the efficacy of screening devices to identify those individuals who are likely to engage in both activities and to persist into adulthood. In fact, youth high in both behaviors have poorer adult outcomes than those high in only one (White and Labouvie, 1994). From what we know about screening devices, there is little doubt that other risk factors (e.g., risk factors in the family, poor school functioning, neighborhood factors) can contribute to improved screening (Loeber and Farrington, in press; White, Brick, and Hansell, 1993). Nevertheless, the examination of yearly changes in drinking can provide important clues for identifying individuals at risk for violent offending in adolescence and emerging adulthood. Those at risk for violent offending due to their drinking patterns and those arrested for alcohol-related violence at any age should be given access to evidence-based alcohol-reduction programs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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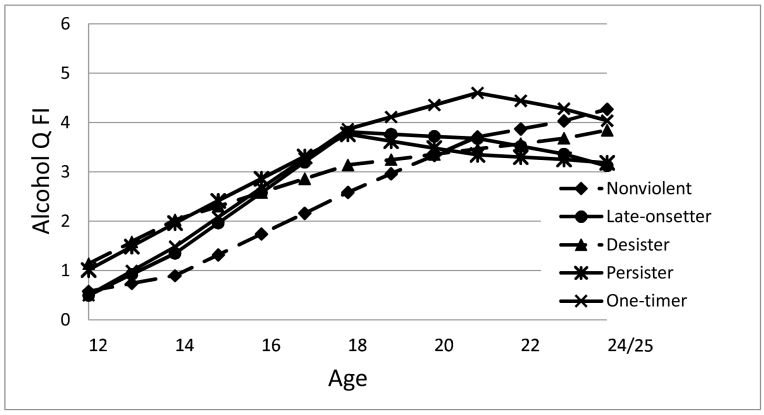

Figure 1. Estimated Piecewise Growth Trajectories of Alcohol Use for the Violence Groups: Total Sample (*N* = 893)

ABBREVIATION: Alcohol QFI = alcohol quantity-frequency index.

NOTES: The alcohol QFI was log-transformed.

Table 1

Characteristics of the Five Violence Groups (N = 894)

		Nonviolent (n = 580)	Late-Onsetter (n = 51)	Desister (n = 76)	Persister (n = 103)	One-timer (n = 84)
		Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %
Demographics						
Race	African American (n = 503)	48.6	78.4	65.8	77.7	60.7
	Caucasian (n = 391)	51.4	21.6	34.2	22.3	39.3
Cohort	Youngest (n = 407)	50.5	21.6	46.0	28.2	46.4
	Oldest (n = 487)	49.5	78.4	54.0	71.8	53.6
Parental SES[b]		37.1 (13.4)	30.4 (15.2)	30.2 (14.2)	31.7 (13.6)	32.6 (11.5)
Alcohol Use						
Beer Frequency	Ages 12-14	2.6 (9.5)	3.4 (8.3)	11.2 (20.0)	11.1 (26.6)	3.5 (7.1)
	Ages 14-18	13.7 (27.7)	29.6 (42.3)	31.3 (49.4)	44.9 (54.9)	29.1 (34.0)
	Ages 18-21	35.9 (56.6)	79.9 (93.0)	54.5 (76.0)	68.4 (88.5)	74.1 (80.4)
	Ages 21-24/25	59.4 (68.5)	72.5 (88.2)	57.0 (69.5)	72.0 (87.6)	75.0 (92.0)
Beer Quantity	Ages 12-14	.7 (1.1)	1.2 (1.4)	1.5 (1.3)	1.7 (1.4)	1.1 (1.3)
	Ages 14-18	1.6 (1.5)	2.1 (1.5)	2.1 (1.5)	2.5 (1.5)	2.3 (1.5)
	Ages 18-21	2.5 (1.9)	2.8 (1.6)	2.5 (1.8)	2.7 (1.7)	3.3 (1.7)
	Ages 21-24/25	3.0 (1.7)	2.3 (1.7)	2.6 (1.8)	2.4 (1.9)	3.1 (1.8)
Conviction for Violence						
Homicide	Ages 12-17	0 (-)[a]	0 (-)	<.1 (.1)	0 (-)	0 (-)
	Ages 18-25	0 (-)	0 (-)	0 (-)	.1 (.3)	<.1 (.1)
Sexual assault	Ages 12-17	0 (-)	0 (-)	.1 (.5)	.1 (.4)	<.1 (.2)
	Ages 18-25	0 (-)	.1 (.7)	0 (-)	<.1 (.2)	<.1 (.1)
Robbery	Ages 12-17	0 (-)	0 (-)	.2 (.7)	.3 (.7)	<.1 (.2)
	Ages 18-25	0 (-)	.4 (1.0)	0 (-)	.3 (.7)	.1 (.3)
Aggravated assault	Ages 12-17	0 (-)	0 (-)	.4 (.7)	.3 (.6)	.1 (.3)
	Ages 18-25	0 (-)	.5 (1.0)	0 (-)	.3 (.7)	<.1 (.2)
Self-Reported Violence						
Attack	Ages 12-17	0 (-)	0 (-)	5.1 (8.8)	9.0 (20.9)	.3 (.5)
	Ages 18-25	0 (-)	6.7 (14.3)	0 (-)	3.9 (6.6)	.2 (.4)
Strongarm	Ages 12-17	0 (-)	0 (-)	1.6 (4.3)	1.6 (8.6)	<.1 (.2)
	Ages 18-25	0 (-)	2.7 (9.3)	0 (-)	9.3 (73.3)	<.1 (.2)
Sexual assault	Ages 12-17	0 (-)	0 (-)	.7 (3.6)	<.1 (.3)	<.1 (.2)
	Ages 18-25	0 (-)	0 (.1)	0 (-)	.7 (5.4)	<.1 (.1)

[a] *NOTES*: Given that no one in this group had any frequency, the standard deviation is not applicable.

[b] Higher scores reflect higher SES.

Table 2

Violence Group Differences in Growth Trajectory Estimates ($N = 893$)

	Persisters as a Reference Group			Desisters as a Reference Group		
	Coefficient	***SE***	***z***	**Coefficient**	***SE***	***z***
Level at Age 13						
SES	.000	.003	.161	.000	.003	.161
Race (1 = African American)	−.406***	.076	−5.313	−.406***	.076	−5.313
Cohort (1 = Oldest Cohort)	.256**	.074	3.436	.256**	.074	3.436
Nonviolent	−.840***	.121	−6.945	−.959***	.134	−7.178
Late-Onsetter	−.641**	.195	−3.294	−.760***	.205	−3.710
Desister	.119	.166	.717	--	--	--
Persister	--	--	--	−.119	.166	−.717
One-Timer	−.518**	.162	−3.204	−.637***	.172	−3.712
Linear Slope 1 from Ages 12 to 14						
SES	−.004	.002	−1.717	−.004	.002	−1.717
Race (1 = African American)	−.121	.064	−1.892	−.121	.064	−1.892
Cohort (1 = Oldest Cohort)	−.246***	.063	−3.910	−.246***	.063	−3.910
Nonviolent	−.394***	.103	−3.825	−.297**	.112	−2.654
Late-Onsetter	−.110	.170	−.646	−.013	.177	−.074
Desister	−.096	.140	−.687	--	--	--
Persister	--	--	--	.096	.140	.687
One-Timer	−.038	.137	−.278	.058	.144	.405
Linear Slope 2 from Ages 14 to 18						
SES	.004*	.002	2.561	.004*	.002	2.561
Race (1 = African American)	−.151***	.043	−3.506	−.151***	.043	−3.506
Cohort (1 = Oldest Cohort)	.202***	.042	4.800	.202***	.042	4.800
Nonviolent	−.040	.067	−.594	.112	.077	1.448
Late-Onsetter	.217*	.106	2.057	.369**	.113	3.252
Desister	−.152	.094	−1.607	--	--	--
Persister	--	--	--	.152	.094	1.607
One-Timer	.149	.090	1.647	.301**	.098	3.063
Linear Slope 3 from Ages 18 to 21						
SES	.003	.003	1.142	.003	.003	1.142
Race (1 = African American)	.022	.073	.303	.022	.073	.303
Cohort (1 = Oldest Cohort)	−.042	.102	−.410	−.042	.102	−.410
Nonviolent	.503***	.105	4.781	.257	.137	1.877
Late-Onsetter	.046	.159	.287	−.201	.182	−1.103
Desister	.246	.158	1.556	--	--	--
Persister	--	--	--	−.246	.158	−1.556

	Persisters as a Reference Group			Desisters as a Reference Group		
	Coefficient	***SE***	***z***	**Coefficient**	***SE***	***z***
One-Timer	.365*	.147	2.486	.119	.172	.694
Linear Slope 4 from Ages 21 to 24/25						
SES	−.003	.002	−1.061	−.003	.002	−1.061
Race (1 = African American)	.123	.066	1.850	.123	.066	1.850
Cohort (1 = Oldest Cohort)	−.034	.091	−.370	−.034	.091	−.370
Nonviolent	.245*	.097	2.532	.084	.126	.667
Late-Onsetter	−.080	.145	−.551	−.241	.166	−1.446
Desister	.161	.146	1.106	--	--	--
Persister	--	--	--	−.161	.146	−1.106
One-Timer	−.089	.133	−.670	−.250	.156	−1.603
Level at Age 24/25						
SES	.012	.007	1.779	.012	.007	1.779
Race (1 = African American)	−.636**	.191	−3.329	−.636**	.191	−3.329
Cohort (1 = Oldest Cohort)	.574**	.190	3.018	.574**	.190	3.018
Nonviolent	.972**	.298	3.261	.255	.361	.706
Late-Onsetter	−.024	.452	−.052	−.741	.501	−1.479
Desister	.717	.432	1.661	--	--	--
Persister	--	--	--	−.717	.432	−1.661
One-Timer	.824*	.397	2.075	.107	.448	.239

ABBREVIATIONS: *SE* = standard errors.

NOTES: Coefficients equal regression coefficients.

* $p < .05$;

** $p < .01$;

*** $p < .001$.