



Patterned Adolescent Socially Deviant Behavior

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Abstract

Based on Moffitt's theory of Adolescence-Limited and Life-Course-Persistent Antisocial Behavior originally posited in 1993, the purpose of this study is to better understand how adolescent youth (AY) participation in socially deviant behavior (SDB) changes by severity across the adolescent development period. Using data from Waves 1–7 of the National Longitudinal Survey of Youth, 1997, a series of latent transition analyses using twelve indicators measured at four timepoints were used for this study. The analytic sample ($n = 3578$) only included participants who were aged 12 & 13 in 1997 for the purpose of capturing the entire adolescent developmental period (ages 12–19 years old). Four latent statuses were identified in this study: Minimal SDB, Primarily Status Offense SDB, Moderate SDB, and Severe SDB. AY were most likely to remain within a given status between measurements except for Moderate SDB members. Transitions to more harmful statuses were most likely to occur from Moderate SDB to Severe SDB statuses. Overall, youth were most likely to transition to less harmful statuses. Membership of Moderate SDB declined continually across adolescence, while membership to Status Offense SDB continually increased across adolescence. Results suggest that most AY participate in some form of SDB while also changing their participation in SDB by type and severity throughout adolescence. When considering harm to self, others and communities, AY were most likely to participate in SDB that victimized others during early adolescence and the least likely by late adolescence.

Keywords Adolescent · Age-crime curve · Development · Delinquency · Latent transition analysis

In 2017 almost one-million adolescent youth (AY) aged 12–18 were referred to the judicial system for alleged participation in criminal behavior (National Center for Juvenile Justice, 2017; Office of Juvenile Justice and Delinquency Prevention, 2022). Yet, this statistic vastly underestimates the number of youths participating in socially deviant behavior (SDB). This underestimation occurs because most juvenile SDBs are unreported (Morgan & Truman, 2020) or the perpetrators of reported delinquent acts are not identified (National Center for Juvenile Justice, 2015; Snyder & Sickmund, 1999). In fact, research suggest that most youth will participate in some form of SDB during adolescence (Jolliffe et al., 2017), while the number of youth that completely abstain from SDB during adolescence represents less than 10% of the AY population (Moffitt, 1993, 2006).

The relationship between age and SDB among AY is a known phenomenon that is often referred to as the age-crime-curve, where deviant behavior manifest during early-adolescence (ages 12–14), escalates in frequency by mid-adolescence (ages 14–17), and then begins to subside during late adolescence (ages 17 and older) (Kim & Bushway, 2018; Thornberry, 2018). A missing component of age-crime-curve research, however, is how youth participation in SDB changes throughout adolescence. Specifically, the missing component of the age-crime-curve is how the behavior will change in severity during adolescence, where severity refers to harm to self, others and the community. For example, SDB is technically considered any action or behavior that violates social norms, where social norms are considered the collective representation of acceptable behavior for an individual or group (Wilkins, 2013). As such, the age-crime-curve does not delineate the difference between a minor infraction, such as under-age consumption of alcohol, from a more grievous behavior such as assaulting another person. Rather, the age-crime-curve typically represents

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frequency of participation in SDB during specific ages (Kim & Bushway, 2018).

How participation in SDB changes in severity is important because research suggests that certain types of SDB correlates with progressively more harmful types of SDB (DeCamp et al., 2018; Kopak & Hoffmann, 2014; Kopak et al., 2014; Loeber et al., 1998). For example, AY who participate in the relatively minor SDB of alcohol consumption or smoking cigarettes while under-age has an increased probability of substance abuse or selling illicit drugs later in life (Forster et al., 2015; Kopak et al., 2014). Similar to the consistent pattern found in the age-crime-curve, research of SDB severity has also identified a pattern of behavior that suggests participation in any SDB increases the odds for AY to participate in a more harmful behavior later in life (Kopak & Hoffmann, 2014; Kopak et al., 2014).

Because age-crime-curve research suggests that most AY desist from participating in SDB during late-adolescence/early-adulthood (Kim & Bushway, 2018), while SDB severity progression research suggests there is an escalation in harmful behavior once participation in SDB occurs (DeCamp et al., 2018), more research is needed to better understand how participation in specific types of SDB changes during the adolescent development period. Therefore, the goal of this study is to examine a range of SDBs that includes minor infractions such as smoking or consuming alcohol underage through assaulting others or selling illicit drugs using latent transition analyses (LTA) to simultaneously examine the patterned types of SDB and SDB severity as it occurs across the adolescent development period. By concurrently examining how the rates and severity of SDB participation changes during adolescence, this study will provide substantive contributions to the understanding of SDB by completing a longitudinal data analysis that describes individual changes in SDB participation throughout adolescence.

Literature Review

Juvenile Perpetrated Social Deviant Behavior

In 2017, the Office of Juvenile Justice and Delinquency Prevention (2018) reported that 2409 out of every 100,000 AY that were aged 10–17 were arrested for participating in some form of SDB. Socially deviant behavior (SDB) includes actions and/or behavior that violate social norms, where social norms are considered the collective representation of acceptable behavior for an individual or group (Wilkins, 2013). The severity of a specific SDB varies by the level of seriousness or harm caused to an individual or community as a result of the deviant behavior (Ramchand et al., 2009), where the action is often explicitly proscribed by law

or implicitly proscribed through social function (Wilkins, 2013). For example, an SDB that victimizes others such as assault or murder is much more serious than shoplifting or drinking while under-age, whereas the theft of a small piece of candy is much less severe than the theft of a vehicle.

Although 2409 out of 100,000 does not appear to represent a large portion of the AY population, research has also suggested that most SDB is not reported to law enforcement or that perpetrators of reported criminal acts are not identified (Morgan & Truman, 2020), therefore official records of arrest and judicial convictions vastly underrepresent juvenile SDB involvement (National Center for Juvenile Justice, 2015; Snyder & Sickmund, 1999). For example, research conducted among a sample of inner-city adolescent male AY aged 13–17 years old ($n=506$) found there were eighty self-reported offenses of SDB as compared to each single case of SDB brought before juvenile justice courts (Farrington et al., 2007). The same trend of under-reporting SDB also is found in a study conducted among female AY age 12–17 ($n=2450$), where SDB participation was self-reported at rates that were three times higher than what was represented within official police records (Ahonen et al., 2016). In fact, research has also found discrepancies between self-report measures and official arrest/conviction records, where self-reported SDB occurred at much higher rates than reported in juvenile justice records (Gomes et al., 2018). These discrepancies lead to a misrepresentation of who participates in SDB and the range of severity of such behaviors as it occurs during the adolescent development period.

Adolescent youth participation in SDB follows a regular pattern found between age and crime (Stolzenberg & D'Alessio, 2008), whether data is used from official records or self-report measures (Kim & Bushway, 2018). This pattern, known as the age-crime-curve, describes the relationship between the onset and persistence of SDB (crime) and the timepoint in which the behavior began (age) and persists through (Kim & Bushway, 2018). The term “curve” is used to describe the linear relationship between age and crime because of the consistent shape found when comparing data from multiple sources (Brame & Piquero, 2003). In interpreting the age-crime curve, results suggest that on average, most AY begin to engage in SDB at ages 10–14, peak in their participation in SDB at ages 16–17, and begin to desist from SDB throughout early adulthood which are considered ages 19–24 (Brame & Piquero, 2003; Kim & Bushway, 2018; Stolzenberg & D'Alessio, 2008). Although research suggests that this relationship is very stable, recent studies of the age-crime relationship suggest that the curve has changed slightly (Lösel et al., 2012). Specifically, the peak rate of AY involvement in SDB has extended to ages 17–18 and desistance reaches well into the mid-20s (Kim & Bushway, 2018; Stolzenberg & D'Alessio, 2008; Walters, 2018). Although research has not fully explored the change in the age-crime-curve relationship,

Lösel et al. (2012) suggest that change is occurring as a result of children remaining in their parental home well into the young-adult developmental period.

Researchers examining the relationship between actual age of onset and participation in SDB have also identified subgroups of offenders within age-crime data. Specifically, onset of SDB has been differentiated by early and late offenders, where early onset can begin at age 7 and last through 12 (Sampson & Laub, 1997) and later onset occurs during early adulthood considered ages 18 and older (Kratzer & Hodgins, 1999). These findings are important as individuals who are identified as having early or late SDB onset have increased probability of participating in escalating SDB severity across a lifetime (Jolliffe et al., 2017; Moffitt, 2006; Payne & Piquero, 2018), however other research has suggested that these findings are misleading due to inaccuracies of using official arrest and/or police reports (Kazemian & Farrington, 2005; Wiecko, 2014) because most SDB participation is not reported to the authorities (Ahonen et al., 2016). Despite methodological differences, age-crime rate researchers have also identified a small subgroup of individuals ranging from 5 to 7% of a given sample (Jolliffe et al., 2017) that participate in SDB throughout a lifetime and account for most criminal offending within a given society (Jolliffe et al., 2017; Kratzer & Hodgins, 1999).

Some developmental life course theory research suggests that most AY will participate in some form of SDB as they struggle to develop a sense of self and personal identity during the adolescent development period (Dijkstra et al., 2015; Erikson, 1968; Lamb & Sim, 2013; Mercer et al., 2017; Moffitt, 1993, 2006). Moffitt (1993, 2006) goes as far as to postulate that AY who do not participate in some form of SDB are as much of an anomaly as the number of AY who persist in SDB across the life-course. Given that research suggests that only 5–7% of a given population are persistent offenders (Jolliffe et al., 2017) and that a similar proportion of AY completely abstain from SDB (Moffitt, 1993, 2006), this suggests that approximately 80–85% of AY participate in SDB during the adolescent period, yet desist during late adolescence/early adulthood.

To better understand the progression of SDB and how participation will evolve over time, research suggests that there is a pattern of escalation of SDB seriousness (Mulvey et al., 2010), which is based on how individuals participated in SDB previously (Nagin & Tremblay, 2005). Specifically, research incorporating autoregressive behavior suggests that severity changes over-time by using the assumption that many of these behaviors have a shared relationship between previous experiences and the passage of time (DeCamp et al., 2018; Kopak & Hoffmann, 2014; Kopak et al., 2014; Loeber et al., 1998). In other words, future participation in SDB is often dependent on previous participation in SDB, where an AY may participate in a relatively minor offense

in the beginning yet escalate to more serious and harmful SDB during later points of life. For example, research has suggested that AY under the age of eighteen that participate in the relatively minor SDB of alcohol consumption or smoke cigarettes will have increased probability of later life substance abuse (Kopak et al., 2014), whereas participation in the use of illicit substances during adolescence has an increased probability of perpetrating serious SDB regarding property (Loeber et al., 1998; Mulvey et al., 2010). Additionally, Loeber et al. (1998) also found increased probabilities for violent SDB when individuals engage in serious deviant acts involving property, while Mulvey et al. (2010) suggests there is a relationship between AY participation in substance abuse and adult serious offending.

Latent Transition Analysis

To better understand the dynamic relationships between age, rates of participation in SDB and how youth transition among severity types, a latent transition analysis (LTA) was used to compare this study. An LTA in an extension of a latent class analysis, where an LTA quantifies change in the latent classes by producing a matrix of transition probabilities between a specific number of consecutive timepoints (Chung et al., 2008). In other words, an LTA empirically identifies patterns among a given set of observations for the purpose of developing mutually exclusive latent statuses among the sample, and then provides statistical descriptions of how participants transition among the identified latent statuses at each timepoint of the study (Velicer et al., 1996). In addition to transition probabilities among classes, the analysis estimates the proportion of the population in each latent status for each occurrence of measurement, conditional of latent class membership (Collins & Lanza, 2009).

Latent transition analyses are infrequent within criminology and social sciences, however this analysis is being used with increasing rates across other disciplines (Collins & Lanza, 2009). Latent transition analyses are considered particularly informative in examining dynamic latent variables (Velicer et al., 1996), particularly when used to assess developmental stages (Collins & Lanza, 2009). By empirically describing patterns of SDB frequency and severity, as well as how these behaviors will progress, regress or remain stagnate among the latent statuses, researchers and practitioners are provided with more information to assess the stages of SDB development for behavioral modification purposes (Lanza et al., 2010).

Purpose of Study

Because age-crime-curve research suggests that most AY desist from participating in SDB during late-adolescence/early-adulthood (Kim & Bushway, 2018), while SDB

severity progression research suggests there is an escalation of severe behavior once participation in SDB occurs (DeCamp et al, 2018), more research is needed to better understand how participation in specific types of SDB changes during the adolescent development period. To better understand how participation differs during the adolescent development period, the following research questions are investigated for this study:

RQ#1: What latent statuses of socially deviant behavior are identifiable as determined by the characteristics of socially deviant behavior that are inclusive for each unique status?

RQ#2: How do the social deviant behavior characteristics of the identified latent statuses change during the course of adolescent development?

RQ#3: How do adolescent youth proportions differ among the statuses throughout adolescence?

RQ#4: What are the probabilities of adolescent youth remaining or transitioning among latent statuses, dependent on previous status membership throughout adolescence?

By concurrently examining how the rates and severity of SDB participation changes during adolescence, this study will provide substantive contributions to the understanding of SDB through the completion of a longitudinal data analysis which will describe individual changes in SDB participation throughout adolescence.

Method

This study employed a nonexperimental, correlational research design to concurrently examine the relationships between adolescent self-reported social deviant behavior rates, severity and passage of time. A latent transition analysis is considered a repeated measure, autoregressive design, while public access data from the National Longitudinal Survey of Youth, 1997 were used to complete the study. The statistical package SAS® version 9.4 was used to conduct data management functions, and the statistical package Mplus® version 8.6 was used to conduct the latent transition analysis.

Data management functions using SAS® included developing uniform entries for missing data, developing analytic indicators from multiple items, and the development of descriptive statistics. Furthermore, a series of correlations were conducted to examine missing observations to better understand the nature of the missing data, and to examine if differences existed between missing participant observations as compared to the remaining sample. Correlations indicated that the data are missing at random, however, LTA are robust

to missing data. Therefore, further data management functions to account for missing data were not necessary.

Sample

Public access data from the National Longitudinal Survey of Youth, 1997 (NLSY97) was used to complete this study. The NLSY97 is a study that has followed the lives of 8,984 American AY born between 1980 and 1984 (Bureau of Labor Statistics, 1997). Data were first collected 1997 to create a representative, cross-sectional sample consisting of 6748 participants and an additional oversample of 2236 participants was designed to create an over-representative sample of African Americans and Latinx AY. During the first year of data collection, participants were between the ages of 12–18. Since the initial round of data has been collected, 17 subsequent data collection rounds have been completed. For this study, only participants aged 12 & 13 ($n = 3578$) at the start time of data collection during the first wave (1997) were included, and data were used are from years 1997, 1998, 1999, 2000, 2001, 2002, and 2003.

The analytic decision to only include participants aged 12 & 13 at the start time of data was made for three purposes First, much of the literature regarding the age-crime relationship suggests youth begin to participate in SDB at age 10–14, peak in participation at age 16–17 and desist in participation thereafter (Brame & Piquero, 2003; Kim & Bushway, 2018; Stolzenberg & D'Alessio, 2008). By limiting inclusion criteria to youth aged 12 & 13 for the initial time measurement, the analytic model more closely reflects prior age-crime relationship research and the known pattern that exists within the relationship. Secondly, including an increased age range for each measured timepoint would skew results as evidenced by the known relationship between age and SDB participation (Kim & Bushway, 2018). Finally, by including only youth aged 12 & 13 for the initial timepoint in this study, the analysis is able to capture the entire adolescent development period, as defined by ages 12–19 for the purpose of this study. Typically, the adolescent development stage is defined as ages 12–18 (Erikson, 1968; Moffitt, 1993), however increasing the age range by one year allows for increased sample size, which in turn increases statistical power (Collins & Lanza, 2009) and also captures further desistance among the sample (Kim & Bushway, 2018).

Indicators

Twelve indicators from seven waves were included within this study (see Table 1: *Socially Deviant Behavior Indicators*). The selected indicators for this study either directly correlate with statutorily proscribed behavior for juveniles or has been found to relate to the probability of later-life participation in SDB. All selected indicators were consistently

Table 1 Socially deviant behavior indicators

Item at wave one ^a	NLSY 97 variable identifier	
	Time <i>t</i>	Time <i>t</i> + 1, <i>t</i> + 2 & <i>t</i> + 3
R ever smoke? ^b	YSAQ—359	YSAQ—360C
R ever drink? ²	YSAQ—363	YSAQ—364D
R ever run away from home? ^b	YSAQ—375	YSAQ—375
R ever use marijuana?	YSAQ—371	YSAQ—370C
R ever steal anything < \$50.00?	YSAQ—378	YSAQ—390B
R ever purposely destroy property?	YSAQ—385	YSAQ—389D
R ever steal anything > \$50.00?	YSAQ—389	YSAQ—391B
R ever commit other property crimes?	YSAQ—390	YSAQ—392B
R ever (help) sell illegal drugs?	YSAQ—391	YSAQ—394B
R ever belong to a gang?	YSAQ—392	YSAQ—385
R ever carry a handgun? ^b	YSAQ—393	YSAQ—380
R ever attack anyone to hurt or fight?	YSAQ—394	YSAQ—394B

^aDuring Waves 2–7, the item prompt for the participant changes from “R ever” to “Since time of last interview have you”

^bAlthough these activities are not illegal for the general public in most cases, due to participant age during interview, these behaviors are statutorily illegal; R refers to respondent and is used within the NLSY97; YSAQ refers to the survey used for data collection and the number sequence refers to the specific item number within the survey

included within every wave the study. Additionally, respondents were asked “*Have you ever...*” to a series of specific SDB within Wave 1. In subsequent waves, participants were asked “*Since the date of last interview, have you...*” in relation to the same SDB inquired of in Wave 1. The participant response options to the indicators at the time of the interviews were limited to “*Yes*” or “*No*,” which were coded as 1 = *yes* and 0 = *no*, where missing data were coded as -9.

The indicators selected for this study rely on self-report items, which raises concerns of validity due to the nature of self-reported measures. These data, however, were selected specifically to overcome the inaccuracy of official juvenile arrests and convictions as SDB indicators (Morgan & Truman, 2020). This methodological decision is based on the suggestion that researchers have developed and incorporated accurate methods regarding the collection of SDB data using self-report surveys for decades (Pechorro et al., 2019), and that SDB research using self-report data suggests that onset, persistence, acceleration and desistance is significantly different when using official records (Kazemian & Farrington, 2005; Payne & Piquero, 2018; Pechorro et al., 2019). Although there remains an element of bias within the observations (Robins et al., 2009), self-reported SDB has demonstrated high levels of accuracy in regard to reliability and validity (Emmert et al., 2017).

Univariate Analysis

The final sample (n = 3578) used within this study consisted of 1,733 female and 1,845 male adolescent youth (AY). The largest racial/ethnic composition were White

($n_{white} = 1882$; 53%), while the smallest was of other races/ethnicities ($n_{other} = 32$; 0%). Univariate statistics for indicators are provided in Table 2: *Frequency Table of Adolescent Socially Deviant Behaviors*. The most commonly endorsed SDBs among AY were alcohol consumption ($n_{alcohol} = 2959$; 83%) and smoking ($n_{smoke} = 2226$; 62%), which are both considered very low in severity. On the other hand, the least endorsed SDB’s were running away ($n_{runaway} = 696$; 19%), which is considered very low in severity, and gang membership ($n_{gang} = 286$; 8%) which can be considered severe to very severe, dependent on measure of severity applied.

Multivariate Analysis

The research questions were examined using a series of models that incorporated a complex mixture, latent transition analysis (LTA) that adjusted results for stratification, weight, and clustering of the sampling process. As LTA do not need to account for traditional assumptions (Muthén & Muthén, 2000), the results of the univariate analyses were used to describe the features of data normality, while no further analyses or data manipulation techniques were needed to assess for statistical assumptions. Because data are from multiple waves and weight calculations fluctuate between waves (Bureau of Labor Statistics, 1997), the NLSY97 Custom Weighting program was used to generate a custom weight variable specifically designed for this study. Additionally, the provided VSTRAT and VPSU variables were included within each analysis to correct for sample clustering (Bureau of Labor Statistics, 1997).

Table 2 Frequency table of adolescent socially deviant behaviors

Socially deviant behavior	Race/ethnicity														
	African American			Hispanic Latinx			Other race/ethnicity			White			All race/ethnicities		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
<i>Smoke</i>															
No	241	184	425	150	139	289	4	2	6	307	325	632	702	650	1352
	7%	5%	12%	4%	4%	8%	0%	0%	0%	9%	9%	18%	20%	18%	38%
Yes	218	261	479	217	254	471	15	11	26	581	669	1250	1031	1195	2226
	6%	7%	13%	6%	7%	13%	0%	0%	1%	16%	19%	35%	29%	33%	62%
<i>Drink</i>															
No	128	126	254	61	55	116	2	2	4	125	120	245	316	303	619
	4%	4%	7%	2%	2%	3%	0%	0%	0%	3%	3%	7%	9%	8%	17%
Yes	331	319	650	306	338	644	17	11	28	763	874	1637	1417	1542	2959
	9%	9%	18%	9%	9%	18%	0%	0%	1%	21%	24%	46%	40%	43%	83%
<i>Run away</i>															
No	353	363	716	291	328	619	13	10	23	692	832	1524	1349	1533	2882
	10%	10%	20%	9%	9%	17%	0%	0%	1%	19%	23%	43%	38%	43%	81%
Yes	106	82	188	76	65	141	6	3	9	196	162	358	384	312	696
	3%	2%	5%	2%	2%	4%	0%	0%	0%	5%	5%	10%	11%	9%	19%
<i>Marijuana</i>															
No	293	215	508	203	203	406	6	4	10	427	447	874	929	869	1798
	8%	6%	14%	6%	6%	11%	0%	0%	0%	12%	12%	24%	26%	24%	50%
Yes	166	230	396	164	190	354	13	9	22	461	547	1008	804	976	1780
	5%	6%	11%	5%	5%	10%	0%	0%	1%	13%	15%	28%	22%	27%	50%
<i>Carry handgun</i>															
No	418	318	736	335	286	621	17	10	27	827	677	1504	1597	1291	2888
	12%	9%	21%	9%	8%	17%	0%	0%	1%	23%	19%	42%	45%	36%	81%
Yes	41	127	168	32	107	139	2	3	5	61	317	378	136	554	690
	1%	4%	5%	1%	3%	4%	0%	0%	0%	2%	9%	11%	4%	15%	19%
<i>Gang member</i>															
No	438	382	820	336	342	678	17	12	29	850	915	1765	1641	1651	3292
	12%	11%	23%	9%	10%	19%	0%	0%	1%	24%	26%	49%	46%	46%	92%
Yes	21	63	84	31	51	82	2	1	3	38	79	117	92	194	286
	1%	2%	2%	1%	1%	2%	0%	0%	0%	1%	2%	3%	3%	5%	8%
<i>Damage property</i>															
No	320	246	566	276	222	498	9	4	13	626	479	1105	1231	951	2182
	9%	7%	16%	8%	6%	14%	0%	0%	0%	17%	13%	31%	34%	27%	61%
Yes	139	199	338	91	171	262	10	9	19	262	515	777	502	894	1396
	4%	6%	9%	3%	5%	7%	0%	0%	1%	7%	14%	22%	14%	25%	39%
<i>Steal < \$50</i>															
No	308	253	561	237	217	454	8	4	12	531	490	1021	1084	964	2048
	9%	7%	16%	7%	6%	13%	0%	0%	0%	15%	14%	29%	30%	27%	57%
Yes	151	192	343	130	176	306	11	9	20	357	504	861	649	881	1530
	4%	3%	10%	4%	5%	9%	0%	0%	1%	10%	14%	24%	18%	25%	43%
<i>Steal > \$50</i>															
No	402	350	752	324	310	634	16	11	27	785	813	1598	1527	1484	3011
	11%	10%	21%	9%	9%	18%	0%	0%	1%	22%	23%	45%	43%	41%	84%
Yes	57	95	152	43	83	126	3	2	5	103	181	284	206	361	567
	2%	3%	4%	1%	2%	4%	0%	0%	0%	3%	5%	8%	6%	10%	16%

Table 2 (continued)

Socially deviant behavior	Race/ethnicity														
	African American			Hispanic Latinx			Other race/ethnicity			White			All race/ethnicities		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
<i>Other property crime</i>															
No	435	339	774	338	299	637	13	11	24	821	778	1599	1607	1427	3034
	12%	9%	22%	9%	8%	18%	0%	0%	1%	23%	22%	45%	45%	40%	85%
Yes	24	106	130	29	94	123	6	2	8	67	216	283	126	418	544
	1%	3%	4%	1%	3%	3%	0%	0%	0%	2%	6%	8%	4%	12%	15%
<i>Attack others</i>															
No	290	216	506	270	233	503	9	8	17	697	612	1309	1266	1069	2335
	8%	6%	15%	8%	7%	14%	0%	0%	0%	19%	17%	37%	35%	30%	65%
Yes	169	229	398	97	160	257	10	5	15	191	382	573	467	776	1243
	5%	6%	11%	3%	4%	7%	0%	0%	0%	5%	11%	16%	13%	22%	35%
<i>Sell drugs</i>															
No	415	349	764	315	297	612	15	10	25	744	753	1497	1489	1409	2898
	12%	10%	21%	9%	8%	17%	0%	0%	0%	21%	21%	42%	42%	39%	81%
Yes	44	96	140	52	96	148	4	3	7	144	241	385	244	436	680
	1%	3%	4%	1%	3%	4%	0%	0%	0%	4%	7%	11%	7%	12%	19%

No=Participant responded “no” at every measurement; Yes=Participant answered “yes” at least for at least one measurement
 No=Participant responded “no” at every measurement; Yes=Participant answered “yes” during at least one measurement

After the data were imported into Mplus and the variables were designated for the program, a series of latent transition analyses were conducted using the step-wise model fit method. This method used the Akaike Information Criterion (AIC), Bayesian Information Criteria (BIC), Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT), entropy, and the usefulness and interpretability of the resulting classes to best determine the number of classes that should be used for the final model (Muthén & Muthén, 2000). A step-wise analysis begins by estimating two classes, and then increases in by class by one for each subsequent model until the best-fit model indices are met. The subjective interpretation of latent classes included within the final model were determined by the characteristics of the status indicators of the class.

Results

Model Fit

Starting with two statuses and using the step-wise method for determining best-fit models, analysis results indicated that four statuses best described the distinct subgroups of SDB for all adolescent youth included within the study (Four Status Model: AIC = 96,726.122; BIC = 97,264.004; SSABIC = 96,987.562; entropy = 0.804; loglikelihood = - 48,276.061). The fit indices for statuses two–six are reported in Table 3: *Fit Indices*. Although the values for AIC, BIC, SSABIC, entropy and loglikelihood continued to decrease after four statuses, which may have indicated a better mathematically fitting model, the loglikelihood could not be replicated after five statuses nor could

Table 3 Fit indices

Latent status	Number of parameters estimated	AIC	BIC	SSABIC	Entropy	Log-likelihood	Log-likelihood replicated
2	31	104,833.72	105,025.38	104,926.8	0.822	- 52,385.6	Yes
3	56	99,232.96	99,579.18	99,401.24	0.815	- 49,560.4	Yes
4	87	96,726.12	97,264.00	96,987.56	0.804	- 48,276.0	Yes
5	124	95,039.74	95,806.38	95,412.37	0.781	- 47,395.8	Yes
6	167	94,229.09	95,261.58	94,730.94	0.791	- 46,947.5	No

N = 3578

distinct statuses be adequately differentiated by SDB type across the entire adolescent period when more than four statuses were incorporated within the model.

Identified Statuses

Within Fig. 1: *Indicator Probabilities by Status for Specific Behaviors*, the four unique statuses are provided: Status One—Minimal Deviant Behavior, Status Two—Primarily Status Offense Socially Deviant Behavior, Status Three—Moderate Socially Deviant Behavior, and Status Four—Severe Socially Deviant Behavior. The x-axis of figures represents the unique indicators used to describe SDB within the analysis, whereas the y-axis is used to describe the probability of indicator influencing the characteristics of the status. Next, the lines within the chart represent the four time-point measurements used within the study. For example, the solid black line within the charts represents measurement $t + 2$ (ages 15–17), while the dotted line represents measurement $t + 1$ (13–15). Finally, the statuses are rank-ordered by severity caused within the figure with least harm at the top and most harm at the bottom.

The results provided within the figure illustrate how qualitative indices for model fit are derived. For example, in Status Two, members are most likely to limit SDB to drinking and smoking, which are otherwise known as status offenses due to the age of the respondent. Although the probability of smoking marijuana and stealing items valued at less than \$50 becomes elevated for a limited time period, these behaviors are not consistently performed throughout adolescence. Therefore, the qualitative description for this status is: primarily status offenses. Furthermore, you can see in Status One, the probability for members of this status participating in any SDB other than drinking during ages 17–19 is relatively low, and conversely, in Status Four, the probability of members participating in every type SDB remains elevated for all indices except running away during ages 17–19.

Besides qualitative observations, quantitative interpretations can also be extracted from the figure. For example, results can indicate when members of a status are most likely to participate in SDB overall, (see Status Four, $t + 2$), when escalations for specific SDBs occur during the adolescence development period (see Status One, Drinks) or when de-escalations of SDB might occur (see Running Away for all statuses). Another example can include how similar behaviors are across the adolescent period for all statuses (see Running Away) or dissimilar (see Selling Drugs).

Status One: Minimal Socially Deviant Behavior

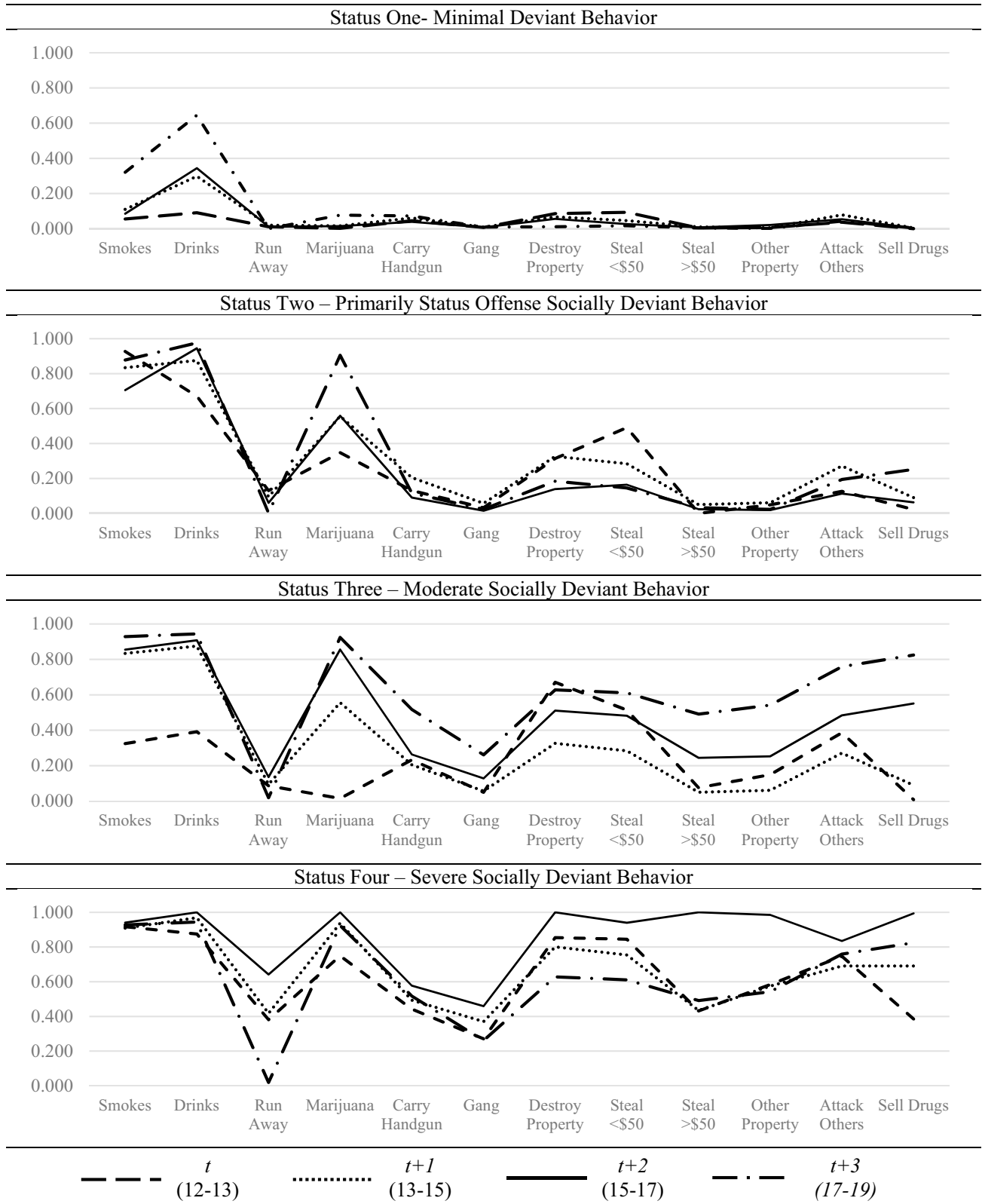
The indicator probabilities for Status One, non-deviant, suggests that members of this status participate in very little SDB. In fact, with the exception of smoking and drinking, in every measurement except two ($\rho_{s<50}^t | S_1, LC_{\text{minimal-deviance}} = 0.081$; $\rho_{dprop}^{t+1} | S_2, LC_{\text{minimal-deviance}} = 0.052$) the probability is less than $p = 0.05$ for any member in the status to report participation in a measured SDB. Furthermore, Status One ($\delta_{s1} = 1984$; $\delta_{s2} = 1127$; $\delta_{s3} = 775$; $\delta_{s4} = 445$), also maintained the largest overall proportion of youth throughout the adolescence period, however by the time youth were 17–19 (time $t + 4$), the proportion of youth in this status was only 22.43% of the original level.

Status Two: Primarily Status Offense Socially Deviant Behavior

The members of Status Two ($\delta_{s1} = 137$; $\delta_{s2} = 823$; $\delta_{s3} = 1159$; $\delta_{s4} = 1640$) can primarily be designated as statutory offenders due to their propensity to smoke ($\rho_{smoke}^t | S_1, LC_{\text{status}} = 0.949$; $\rho_{smoke}^{t+1} | S_2, LC_{\text{status}} = 0.787$; $\rho_{smoke}^{t+2} | S_3, LC_{\text{status}} = 0.487$; $\rho_{smoke}^{t+3} | S_4, LC_{\text{status}} = 0.560$) and drink ($\rho_{drink}^t | S_1, LC_{\text{status}} = 0.597$; $\rho_{drink}^{t+1} | S_2, LC_{\text{status}} = 0.906$; $\rho_{drink}^{t+2} | S_3, LC_{\text{status}} = 0.788$; $\rho_{drink}^{t+3} | S_4, LC_{\text{status}} = 0.800$) throughout the adolescent period. Although the probability for stealing property valued at less than \$50 at age 12 & 13 ($\rho_{s<50}^t | S_2, LC_{\text{status}} = 0.457$) and marijuana use after age thirteen ($\rho_{mari}^t | S_2, LC_{\text{status}} = 0.348$; $\rho_{mari}^{t+1} | S_2, LC_{\text{status}} = 0.559$; $\rho_{mari}^{t+2} | S_2, LC_{\text{status}} = 0.559$; $\rho_{mari}^{t+3} | S_2, LC = 0.905$) is elevated, results suggest that youth in this status have very low probabilities in participating in other types of SDB. Additionally, Status Two began with the lowest proportion of members at t ($\delta_{s1} = 137$; 3.83%), yet contained the largest proportion by $t + 3$ ($\delta_{s4} = 1640$; 45.81%). Although transitions from other statuses into Status Two occurred at higher probabilities throughout adolescence, during $t + 2$ $t + 3$ AY were most likely to transition to Status Two ($\tau_{s4} | S_3, LC_{\text{minimal-deviance}} = 0.240$; $\tau_{s4} | S_3, LC_{\text{moderate-deviance}} = 0.170$; $\tau_{s4} | S_3, LC_{\text{severe-deviance}} = 0.541$), while concurrently remaining in the status ($\tau_{s4} | S_3, LC_{\text{status}} = 0.971$) rather than transitioning out of the status.

Status Three: Moderate Socially Deviant Behavior

Members of Status Three—Moderate SDB participate in varying SDB dependent on age and severity type. For example, the probability of participating in SDB is relatively low at ages 12–13 (with the exception of damaging property [$\rho_{dprop}^t | S_1, LC_{\text{moderate-deviance}} = 0.628$] and stealing property less than \$50 in value [$\rho_{s<50}^t | S_1, LC_{\text{moderate-deviance}} = 0.482$]) as compared to when youth are older than thirteen years old. After the age thirteen, AY in Status Three maintain



Note: Ages at time of measurement are consolidated and parenthesized

Fig. 1 Indicator probabilities by status for specific behaviors. Ages at time of measurement are consolidated and parenthesized

very high probabilities to smoke cigarettes ($\rho_{smoke}^{t+1}|S_2,LC_{moderate-deviance} = 0.908$; $\rho_{smoke}^{t+2}|S_3,LC_{moderate-deviance} = 0.908$; $\rho_{smoke}^{t+3}|S_4,LC_{moderate-deviance} = 0.928$), drink ($\rho_{drink}^{t+1}|S_2,LC_{moderate-deviance} = 0.875$; $\rho_{drink}^{t+2}|S_3,LC_{moderate-deviance} = 0.908$; $\rho_{drink}^{t+3}|S_4,LC_{moderate-deviance} = 0.944$) and smoke marijuana ($\rho_{mari}^{t+1}|S_2,LC_{moderate-deviance} = 0.556$; $\rho_{mari}^{t+2}|S_3,LC_{moderate-deviance} = .856$; $\rho_{mari}^{t+3}|S_4,LC_{moderate-deviance} = 0.924$). Participation in all other SDB vary in probability throughout the adolescent development period, where probabilities of participating in SDB in the highest rates occur when AY are seventeen years old or older. It should be noted that Status Three began with the second largest proportion of AY ($\delta_{s3}^t = 1192$; 33.31%), yet concluded with the smallest proportion of members ($\delta_{s3}^{t+3} = 61$; 1.70%).

Status Four: Severe Socially Deviant Behavior

Members of Status Four—Severe SDB have high probabilities in participating in all measured SDB except gang membership ($\rho_{gang}^t|S_1,LC_{severe-deviance} = 0.419$; $\rho_{gang}^{t+1}|S_2,LC_{severe-deviance} = 0.422$; $\rho_{gang}^{t+2}|S_3,LC_{severe-deviance} = 0.375$; $\rho_{gang}^{t+3}|S_4,LC_{severe-deviance} = 0.337$) and running away at $t + 3$ ($\rho_{run}^{t+3}|S_1,LC_{severe-deviance} = 0.026$). The proportion of members within the status fluctuated only slightly from the beginning to end of adolescence, however from ages 12–17 the status more than doubled in size, while shedding half the members from $t + 2$ $t + 3$ ($\delta_{s1} = 166$; $\delta_{s2} = 440$; $\delta_{s3} = 348$; $\delta_{s4} = 175$). Transition probabilities for members of Status Four remained fairly high throughout adolescence, ($\tau_{s2}|S_1,LC_{severe-deviance} = 0.854$; $\tau_{s3}|S_2,LC_{severe-deviance} = 0.768$; $\tau_{s4}|S_3,LC_{severe-deviance} = 0.630$), where youth aged 17 or older were most likely to transition to less severe SDB status.

Status Proportions

Figure 2: *Status Proportions* describes the number of members within each status at every point of the analysis. The x-axis of the figure includes the analyzed timepoints of the model, ($t =$ ages 12–13, $t + 1 =$ ages 13–15, $t + 2 =$ ages

Table 4 Transition probabilities among statuses

	Status			
	Minimal	Statutory	Moderate	Severe
Transition probabilities $t \ t + 1$				
Status one—minimal	.702	.165	.093	.039
Status two—statutory	.015	.901	.000	.075
Status three—moderate	.104	.291	.297	.309
Status four—severe	.036	.201	.091	.672
Transition probabilities $t + 1 \ t + 2$				
Status one—minimal	.739	.225	.025	.012
Status two—statutory	.039	.888	.000	.073
Status three—moderate	.249	.399	.169	.186
Status four—severe	.010	.363	.028	.599
Transition probabilities $t + 2 \ t + 3$				
Status one—minimal	.790	.209	.000	.001
Status two—statutory	.021	.951	.000	.028
Status three—moderate	.254	.254	.381	.111
Status four—severe	.020	.488	.007	.485

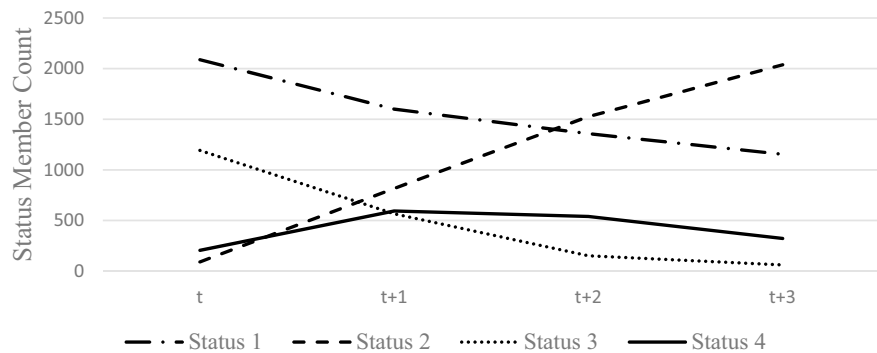
$N = 3578$; The unconditional model is unrestricted by stratified covariates

15–17, and $t + 3 =$ ages 17–19), and the y-axis is used to describes the member count. Finally, the various lines represent the four statuses used within the study. For example, the solid line represents Status Four – Severe SDB, and at measurement t status membership included 96 youth, peaked at $t + 1$ ($\delta_{s4}^{t+1} = 313$) members, and then regressed to 116 members by the conclusion of the analysis. This figure also describes trends in membership proportions. For example, Status Two—Primarily Status Offense started out with the least members, yet concluded with the most members, while all other statuses declined in membership after $t + 1$.

Transition Probabilities

Table 4: *Transition Probabilities Among Statuses* provides the probabilities of transitioning between statuses at each

Fig. 2 Status proportions. $N = 3578$



Note: $N = 3578$

measured timepoint. The first observation of note is that the probability to remain in the previous status is relatively high throughout adolescence, with the exception of Status Three—Moderate SDB. Members of Status Three have the greatest probabilities to change SDB participation characteristics and transition to a different status. Similar to Status Three, Status Four also has elevated likelihoods to transition to different statuses. For example, at $t + 1$ the probability to remain in Status Four is $p = 0.672$, whereas the probability to transition from Status Four to Status Two is $p = 0.201$. An additional observation of note is that youth who participate in primarily statutory offenses are most likely to continue participating in the same SDB, thus unlikely to transition to a different status ($p_{t+t+1} = 0.702$; $p_{t+t+2} = 0.739$; $p_{t+2t+3} = 0.790$).

Discussion

Most youth participate in some form of SDB during adolescence (Jolliffe et al., 2017), which occurs in a predictable relationship between age and crime (Kim & Bushway, 2018; Thornberry, 2018). Although some research suggests that adolescent perpetrated SDB continues to escalate in severity through adulthood (DeCamp et al., 2018; Kopak & Hoffmann, 2014; Kopak et al., 2014; Loeber et al., 1998), most evidence suggests that adolescent youth only participate SDB during a limited timeframe (Brame & Piquero, 2003; Kim & Bushway, 2018; Stolzenberg & D'Alessio, 2008). Yet, because more recent research has suggested the relationship between age and SDB is changing (Kim & Bushway, 2018; Walters, 2018), providing a more holistic description of youth participation in SDB becomes important. Therefore, the overall goal of this study was to more accurately identify and describe patterns of adolescent perpetrated SDB as they occur across adolescence. To accomplish this goal, four research questions were developed to: (1) empirically identify subgroups of SDB based on the characteristics of the behaviors inclusive of the class, (2) describe how the characteristics of the behavior changes during adolescence for each status, (3) describe how the proportions of AY change among the statuses during adolescence and (4) describe the likelihood of AY remaining or changing among the groups during adolescence.

Because the severity of a specific SDB varies by the harm or potential harm to self, others and/or the community (Ramchand et al., 2009), the first goal of this study was to explore if reported SDB could be separated into mutually exclusive groups, or latent statuses, based on observed characteristics inclusive of specific statuses. To meet this goal, the following research question was posed: What latent statuses of SDB are identifiable, based on the characteristics of the behaviors that are inclusive for each unique status? Results

of the analysis suggests that four unique statuses of SDB are identifiable based on the characteristics of the behaviors: Status One—Minimal SDB, Status Two—Primarily Status Offense SDB, Status Three—Moderate SDB, and Status Four—Severe SDB.

By examining the characteristics of the observed behaviors within each status, the identified statuses may also be differentiated by severity (Ramchand et al., 2009). For example, within Status One—Minimal SDB, members are very unlikely to harm themselves, others or the community when considering the specific types of SDB that are inclusive within the class. On the other hand, the observed characteristics of Status Three—Moderate SDB and Status Four—Severe SDB often include behaviors that victimize others, which includes assault and theft.

Because research suggests that participation in SDB will change in severity over time (DeCamp et al., 2018; Kopak & Hoffmann, 2014; Kopak et al., 2014; Loeber et al., 1998), the second goal of this study was to describe how the characteristics of observed SDB changed within identified statuses across the adolescent development period. To meet this goal, the following research question was posed: How do the social deviant behavior characteristics of the identified latent statuses change during the course of adolescent development? Results suggest that the characteristics of SDB for each status changes during adolescence. For example, within every status the likelihood of consuming alcohol, smoking cigarettes and/or smoking marijuana continually increases as youth age, while behaviors that harmed others, such as theft and assault, were most likely to be prevalent during mid-adolescence.

The last goal of this study was to describe the proportions of AY within each status during the measured timepoints, as well as to describe the likelihood of remaining or transitioning among the identified statuses of SDB. To meet this goal, the following research questions were posed: (1) How do adolescent youth proportions differ among the statuses throughout adolescence? (2) What are the probabilities of adolescent youth remaining or transitioning among latent statuses, dependent on previous status membership throughout adolescence?

Overall, results suggest that most AY will participate in some form of SDB, which is consistent with previous research regarding AY participation in SDB (Jolliffe et al., 2017). Contrary to research that suggests participation in SDB will escalate in severity (DeCamp et al., 2018; Kopak & Hoffmann, 2014; Kopak et al., 2014; Loeber et al., 1998), results within this sample suggest that participation in SDBs that victimize others through theft or assault was highest at age 12 & 13, reduced by approximately half during ages 13–15 and slowly declined thereafter. Thus, these results suggest that AY continually transitioned to statuses characterized by less severe SDB throughout adolescence,

with the exception of Status Four—Severe SDB at $t + 1$, which was the only point where AY transitioned to a more severe status. In fact, the transitional pattern of Status Four was the only status to closely match previous research of the age-crime relationship, where AY began to engage in SDB at ages 10–14, peak in their participation in SDB at ages 16–17, and begin to desist from SDB throughout early adulthood (Brame & Piquero, 2003; Kim & Bushway, 2018; Stolzenberg & D'Alessio, 2008).

Unlike previous age-crime research (Brame & Piquero, 2003; Stolzenberg & D'Alessio, 2008), overall participation in SDB of any type actually increased across adolescence if consuming alcohol, cigarettes and marijuana are included within the model. In fact, Status Two—Primarily Status Offense SDB, contained a higher proportion of AY at $t + 3$ than all other statuses combined, yet for many of these members smoking cigarettes would no longer be considered illegal, or an SDB, once the participant was 18 years old.

When considering movement among statuses, the most consistent finding of this study was that AY were most likely to remain within a status between measurements, however transitions from Status Three and Four to less harmful statuses were the most frequent. In particular, most AY transitioned into Status Two – Primarily Status Offense SDB where smoking cigarettes, drinking alcohol and marijuana use was the dominant SDB. Overall, findings suggest that although most AY participate in some form of SDB during adolescence, yet they are continually transitioning to less severe participation in SDB during the entire adolescent period.

Implications for Social Work Research and Practice

Overall, findings of these analyses were incongruent with other age-crime relationship research (Kim & Bushway, 2018; Thornberry, 2018) or severity escalation research (DeCamp et al., 2018; Kopak & Hoffmann, 2014; Kopak et al., 2014). Specifically, AY within this study were found to continually reduce the likelihood in participating in SDB that harmed others throughout adolescence, while concurrently increasing participation in SDBs that included smoking cigarettes, drinking alcohol and/or consuming marijuana. Thus, when considering future research of AY involved SDB, a dichotomy occurs: to include status offenses and/or marijuana consumption as a predictor of adult offending or not. If social work research chooses to include status offenses and/or marijuana consumption as a predictor of future offending, then results from this study suggest there will always be a very high correlation between these SDBs and any other SDB examined. Yet conversely, these results would also suggest there is theoretical correlation between status offenses and/or marijuana consumption and adult non-offending.

Whether including status offenses or not within the age-crime relationship, describing the simple proportion or rates of AY participating in SDB limits the explanation of how AY participate in SDB. Results of these analyses suggest that AY participate in SDB differently, and these differences can be defined by the characteristics of the behaviors they engage in. This differentiation is important because of the harm, or potential to harm, that is associated with the behavior. While any SDB is potentially harmful (Ramchand et al., 2009), results from these analyses suggests that when AY are aged 12–13 they are more likely to cause harm through theft or assault, yet desist thereafter. Therefore, future studies of adolescent involved SDB should consider differentiating SDB by severity and/or harm to self, others or the community.

Although these findings suggest that AY are most probable to participate in harmful behaviors between 12–13, they also suggest that social workers also have the largest opportunity to insert interventional techniques to prevent escalations in harmful behavior during the same time period. Results suggest that AY are participating in moderate SDB at very high levels at this time, yet results concurrently suggest members of the moderate SDB status have the highest likelihood of transitioning to other statuses throughout the entire adolescent developmental period. In fact, between ages 12–15, there is approximately equal chance of participating in less harmful SDB, maintaining the same level of SDB or escalating the severity of SDB participation. After age 15, the probability of escalating the severity becomes less, however the probability remains higher than any other status. By identifying factors that affect transitions from Status Three to less severe types of SDB, social workers could potentially develop interventions that promote less harmful behaviors to self, others and the community.

Limitations

Although this study contributes to the literature by empirically describing the relationships between SDB, SDB severity and passage of time in further detail, this study is not without limitations. For example, this study used a non-experimental design, thus the most that could be concluded about the findings is whether the data contradicted or did not contradict the models used to answer the research questions. Applicability of interpretation is further hampered in that the study uses data from 1997 to 2003, which is more than two-decades old.

Threats to the validity and accuracy of this study include both instrumentation and modeling techniques. The instrumentation represents a threat to validity in that observations were self-reported by participants and do not represent a full range of SDB. Furthermore, the instrumentation also represents a threat to accuracy as the SDB indicators used

in the survey are subject to qualitative review regarding the operationalization of severity. The model also represents a threat to validity and accuracy due to the nature of repeated measure study design, as well as analytic fitting of the final model, which requires qualitative descriptions of severity for identified subgroups within the sample.

Conclusion

Research has identified that AY participate in SDB at increased rates during adolescence, and that the characteristics of their participation also varies during this period. Specifically, there is a correlation between age and crime that can be described by the changing rates of SDB participation by AY, these behaviors will vary by the harm caused to self, others and the community through the severity of the behavior. Unfortunately, any participation in SDB has the potential to inflict detrimental, life-long consequences, particularly when AY participate in more serious types of SDB. During the adolescent period, AY become aware of their physiological transformation to adulthood and their growing sense of self, yet they are simultaneously aware of the lack of autonomy afforded by parents and other social institutions within society. As a result, many AY will participate in SDB during the adolescent period as an expression autonomous function from parental and adult oversight. Therefore, the purpose of this research was to identify patterned juvenile perpetrated socially delinquent behaviors as they occur over the adolescent development period.

Using the National Longitudinal Survey of Youth, 1997, a latent transition analysis was used to examine patterns of self-reported, SDB among a sample of AY across the adolescent development period. The analysis incorporated four points of measurement starting with beginning adolescence (ages 12 & 13), followed by early adolescence (ages 13–15), mid adolescence (ages 15–17), and late adolescence (ages 17–19). SDB was measured using twelve indicators that ranged from statutory offenses, to potentially felonious behavior.

Results of these analyses consistently found subgroups of AY that were based on the types of SDB that they participated in. The harm posed to self, others or the community ranged from very little among members of Status One—Minimal Deviant Behavior, to potentially very severe harm perpetrated by members of Status Four—Severe SDB. Consistent with the developmental research, findings from this study suggest that most AY participate in SDB, with AY participating in statutory offenses in the highest frequency.

Contrary to prior age-crime relationship research, however, results from these analyses suggested that AY were either static in their rates of SDB participation or the rates of SDB participation continually decreased during the entire

period, depending on the incorporation of status offenses when analyzing results. When examining severity within the statuses, results from these analyses also suggested that AY aged 13–15 maintained the highest propensity to participate in behaviors that victimized others. Transitions occurring between subgroups primarily consisted of AY moving from groups that participated in more severe behavior to less severe behavior.

Future research using findings from this study should examine how AY participating in moderate SDB transition among statuses. Results indicated that members of this status were most likely to transition to other statuses. By identifying what influences AY to transition among statuses, targeted interventions that facilitate transitions from more severe SDB to less severe SDB could be developed. Through targeted interventions that reduce SDB severity, harm caused by AY to others and the community are potentially lessened, while concurrently improving later-life outcomes for AY that participate in socially deviant behavior.

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