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Poly-victimization and trajectories of binge drinking from adolescence to young adulthood among serious juvenile offenders

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ABSTRACT

Background: Justice involved youth exposed to multiple forms of victimization (i.e., poly-victimization) may be at risk for long term substance use problems and difficulty in self-regulation, placing them at higher risk of long-term problematic behaviors. This study empirically identifies victimization classifications in a sample of justice involved youth and how long-term binge drinking is related to victimization experiences. We further sought to understand how self-regulatory abilities such as impulse control and emotion regulation effect emergent profiles and binge drinking trajectories.
Methods: Based on a sample of 1354 justice involved youth from 15 to 25 years old, classes of victimization were extracted. Emergent classes were examined in relationship to their binge drinking trajectories using latent growth models. Finally, self-regulation was examined as a predictor of binge drinking trajectories across emergent classes.
Results: The analyses indicated three classes of victimization: poly-victimized, indirectly victimized, and lowly victimized. Latent growth models revealed that the poly-victimized class had significantly steeper growth in binge drinking as compared to the indirect and low victimized patterns. Impulse and emotional regulation both significantly decelerated binge drinking only for the indirect victimization group.
Conclusions: Findings highlight the need to focus on poly-victimization in understanding binge drinking trajectories as well as the role impulse control and emotional regulation play among justice involved youth. Findings are discussed through the lens of adolescent development, coping strategies, and early traumatic experiences.

1. Introduction

Recent estimates suggest nearly 90% of justice involved youth are exposed to at least one form of violence each year, with the majority encountering multiple forms of victimization (Abram et al., 2004; Finkelhor et al., 2015). Further, justice involved youth develop substance use disorders at much higher rates than community samples (Merikangas et al., 2010; Mulvey et al., 2010) and report nearly five times higher prevalence of alcohol and drug use (Abram et al., 2004). Justice involved youth who are exposed to victimization can develop a range of behavioral and affective problems (Ng-Mak et al., 2002) including difficulties with self-regulation (e.g., impulse control and emotional regulation). Though some studies have examined the

relations between poly-victimization and substance use among delinquent samples (e.g., Ford et al., 2010; Ford et al., 2013), no study has examined the influence of self-regulation on binge drinking across patterns of poly-victimization from adolescence (12–17 years) to young adulthood (18–25 years). The aim of this study is to understand how impulse control and emotional regulation relate to victimization patterns and binge drinking trajectories among justice involved youth from adolescence through young adulthood.

Poly-victimization is defined as experiencing multiple types of victimization (Finkelhor et al., 2007) and in multiple contexts (Butcher et al., 2016). Victimization can occur through direct (i.e., personally experienced violence) or indirect encounters (i.e., witnessing violence) (Finkelhor et al., 2005). Victimization can also occur across various

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interpersonal contexts, such as with peers (i.e., bullying; Espelage and Holt, 2001), family (i.e., parental hostility; Espelage et al., 2012), and neighborhoods (e.g., exposure to commnity violence; Leventhal and Brooks-Gunn, 2000). Poly-victimization is widely recognized as a separate classification of violence exposure (Finkelhor et al., 2007; Turner et al., 2010), and it has been shown to account for more variance beyond single victimization types when predicting adverse behavioral symptoms (Finkelhor et al., 2007).

Studies examining the consequences of violence exposure have been equivocal. For example, early exposure to violence has been associated with increased problem behaviors, which may be a result of young people imitating maladaptive coping strategies (Dubow et al., 2016; Guerra et al., 2003). Conversely, other studies highlight that constant exposure to neighborhood violence can lead to a desensitizing and a "psychological numbing" effect, resulting in lower problem behaviors (Ng-Mak et al., 2002). Because justice involved youth can experience a wide array of victimization and develop different responses (Abram et al., 2004; Finkelhor et al., 2015), assessing exposure to only one type of victimization can lead to an underestimation of outcomes (Butcher et al., 2016). Thus, to comprehensively examine the relation of victimization to problem risk drinking, it is essential to evaluate distinct patterns of victimization.

Research on poly-victimization among justice involved youth has reaffirmed prior associations with substance use (Bender et al., 2014; Ford et al., 2010; Reid and Sullivan, 2009; Wright et al., 2013). For example, youth involved with the juvenile justice system are at increased risk for experiencing multiple forms of violence (Abram et al., 2013) and have a heightened prevalence of alcohol use (Aarons et al., 2001; Grisso and Underwood, 2004). Specifically, poly-victimization among justice involved youth has been associated with both concurrent (Bender et al., 2014; Ford et al., 2010) and long-term (Wright et al., 2013) substance use problems. Others have found reciprocal relationships between delinquent behavior and early or sustained binge drinking over the life course among justice involved youth (Jennings et al., 2015). Recently, research has found variation in binge alcohol use among justice involved youth, across race and ethnicity (Vaughn et al., 2017). Specifically, non-Hispanic white and Hispanic youth offenders show rapid increases during early adolescent phase with African-American youth showing steady rates of binge drinking (Vaughn et al., 2017). Given the immense economic burden associated with binge drinking (Sacks et al., 2015), it is necessary to study long term predictors of binge drinking. Prior research has shown a link between victimization and substance use in delinquent samples (e.g., Ford et al., 2010, 2013), yet few studies have considered contextualizing distinct victimization classes in relation to binge drinking longitudinally. Furthermore, most of these extant studies are primarily cross-sectional, descriptive of the victimization classes, or do not have continuous measurement of substance use, which leaves a gap in the progress of binge drinking over vital periods of development. Unfortunately, these studies inherently do not investigate the development of substance use for juvenile delinquents exposed to early victimization nor do they accurately portray their trajectories of substance use among patterns of poly-victimization.

Among justice involved youth exposed to victimization, the ability to self-regulate impulsive behaviors and adverse emotions is critical to attenuating long-term problematic alcohol use (D'Andrea et al., 2012; Gottfredson and Hirschi, 1990). Early encounters of victimization may result in a dysregulated stress-response system, leading justice involved youth to be more susceptible to self-regulation problems (Davis et al., 2017). Taking the self-control strengths model into consideration, self-regulation is viewed as a finite resource and, once depleted, results in an inability to further regulate behavioral impulses and/or adverse emotions when exposed to additional stressors (Baumeister, 2003; Muraven and Baumeister, 2000). Thus, when youth experience repeated victimizations, the required level of coping and self-regulatory processes that aid in decision making are depleted, leaving youth

vulnerable to impulsive decision making and emotional dysregulation. Conversely, there are individuals with inherently diminished self-regulatory abilities (e.g., lower impulse control, emotional regulation), and this may become more problematic when it comes to long-term behaviors such as binge drinking. According to Gottfredson and Hirschi's (1990) theory of criminal behavior, those who have established poor (or low) self-control in childhood have trouble resisting immediately gratifying actions throughout adolescence and adulthood. A lack of self-control may be a significant predictor of criminal behavior and also of alcohol use (Zavala and Kurtz, 2017).

In the present study, we examine a sample of juvenile justice involved youth from adolescence to young adulthood to determine the effect of multiple violence exposures on the development of binge drinking. Similar to Butcher et al. (2016), we examine poly-victimization across multiple social contexts (e.g., where the victimization occurs) and types of victimization (e.g., witness or victim). However, this study addresses a gap in the literature by evaluating how distinct victimization classes relate to developmental trajectories of binge drinking, as well as determining how impulse control and emotional regulation influence these trajectories. Among victimized youth, elucidating self-regulatory processes that may act as risk (e.g., acceleration) or protective (e.g., deceleration) factors in binge drinking trajectories has theoretical and clinical relevance. This is especially true with recent evidence pointing toward a focus on protective factors that aid in mitigating long term problem behaviors such as violence and substance use among justice involved youth (see Ttofi et al., 2016). Understanding protective, or resilience, factors among chronically victimized youth in analogues behaviors (i.e., binge drinking) may aid our current understanding of potential avenues for prevention interventions. Similar to prior studies, we hypothesize (H1) two or more profiles of poly-victimization will emerge. Additionally, we hypothesize (H2) that those with high levels of victimization will exhibit higher rates and growth of binge drinking relative to those with lower violence exposure. Lastly, we hypothesize (H3) that patterns of poly-victimization and their associations with trajectories of binge drinking are differentiated by impulse control and emotional regulation.

2. Method

2.1. Participants

Data were obtained from the *Pathways to Desistance Study* (Mulvey et al., 2004), a longitudinal study of serious juvenile offenders ($N = 1,354$). Enrollment criterion stipulated that participants had to be an adjudicated delinquent or found guilty of a serious offense. Data were collected at two sites (Philadelphia, PA and Phoenix, AZ) over a seven-year period with bi-annual assessments during the first three years and annual assessments during the last four years. Participants were between the ages of 14–18 and 21–25 at baseline and study completion, respectively. Written informed consent and assent was obtained from all participants entered into the study. The overall retention rate was 89.5%. Participant characteristics can be found in Table 1.

2.2. Procedures

We used baseline data to complete our latent class analysis of poly-victimization. Thus, data collected prospectively was used to test our research questions regarding trajectories of binge drinking. We used an accelerated, longitudinal cohort design to examine developmental growth in binge drinking. To this end, we ensured time was spaced evenly to include seven time points spaced one year apart. Because cohorts (e.g., 14–18 year olds) at baseline may differ on our outcome of interest, we estimated a hierarchical linear model to test the cohort by time interaction. Results revealed no difference between cohorts, thus an accelerated, longitudinal format is appropriate (see supplemental materials).

Table 1
Baseline characteristics and comparisons across classes.

	Total Sample (N = 1,354) M (SD) or n (%)	Poly- Vict 646 (48%)	Indirect- Vict 369 (27%)	Low- vict 339 (25%)	Significant differences
Demographics					
Age, in years	16.0 (1.14)	16.2(0.07)	16.0 (0.09)	15.8 (0.07)	No Sig.
Male *n* (%)	1170 (86.4)	.12 (.02)[a]	.07 (.02)[a]	0.24 (0.03)[a]	1 > 2, 3 > 2
White *n* (%)	274 (20.0)				
Black *n* (%)	561 (41.0)				
Hispanic *n* (%)	454 (34.0)				
Other *n* (%)	65 (4.80)				
Family					
Mothers education	4.30 (1.06)	4.19 (0.06)	4.43 (0.06)	4.31 (0.07)	2 > 1
Father drug problem *n* (%)	487 (45.9)	.63 (.03)	.43 (.04)	0.24 (0.30)	1 > 2, 1 > 3, 2 > 3
Mother drug problem *n* (%)	364 (28.3)	.42 (.03)	.20 (.03)	0.19 (.03)	1 > 2, 1 > 3
Parental hostility	1.58 (0.04)				
Substance Use					
Binge drinking	2.34 (2.24)	3.47 (0.16)	1.66 (0.14)	1.57 (0.10)	1 > 2, 1 > 3
Cannabis use	4.18 (3.42)	5.64 (0.23)	3.52 (0.24)	2.95 (0.18)	1 > 2, 1 > 3, 2 > 3
Alcohol Depend(*n* %)[b]	132 (10.1)	.22 (.02)	.03 (.02)	.019 (.01)	1 > 2, 1 > 3
Drug Depend *n* (%)[b]	204 (15.7)	.34 (.03)	.28 (.03)	.131 (.02)	1 > 3, 2 > 3
Drug or alcohol treatment *n* (%)	285 (21.1)	.40 (.03)	.06 (.02)	.129 (.02)	1 > 2, 1 > 3, 3 > 2
Self-regulation and victimization					
Impulse control	2.96 (0.95)	2.53 (0.05)	3.19 (0.05)	3.24 (.04)	2 > 1, 3 > 1
Emotional regulation	2.76 (0.66)	2.60 (0.03)	2.87 (0.05)	2.74 (.03)	2 > 1, 3 > 1, 2 > 3
Bullying Victim *n* (%)	452 (33.4)				
ETV – witness *n* (%)	970 (71.6)				
ETV – victim *n* (%)	909 (67.1)				

Notes: PTSD = post-traumatic stress disorder; ETV = exposure to violence. Mothers education responses ranged from 1 to 6. 1 = graduate degree, 2 = college degree, 3 = business or trade school/some college,4 = high school diploma, 5 = some high school, 6 = high school or less. Response ranges for binge drinking and cannabis use range from 1 (not at all) to 9 (everyday).
The "significant difference" column represents Wald chi-square tests across each group. Depicted are the results of these tests such that one group is significantly higher (>) on the specific construct. 1 corresponds to the poly-victimization group; 2 corresponds to the indirect victimization group; and 3 corresponds to the low group.
Ranges: Binge drinking (1.0–9.0); Cannabis use (1.0–9.0); Impulse control (1.0–5.0); Emotional regulation (1.0–4.0);
   [a] means are for female as reference group.
   [b] Substance use diagnosis derived from the Composite International Diagnostic Interview.

2.3. Measures

2.3.1. Poly-victimization

Four separate measures assessed poly-victimization: bullying victimization, parental hostility, direct victimization, and indirect victimization. Consistent with prior studies that conceptualized indicators of poly-victimization (Butcher et al., 2016; Finkelhor et al., 2007) we used cut-off scores of experiencing each type of victimization at least once, therefore youth have an opportunity to endorse more than one type of victimization from more than one context. All victimization items were assessed at baseline and referred to past year.

Bullying victimization was measured using two single item indicators that asked participants *"were you ever picked on by a bully?"* and *"how often were you bullied?"* We then created a dichotomous indicator which indicated being bullied or not (1 = 1 or more times, 0 = less than one time). When parental/caregiver data were available we used both reports to determine cut-off points.

Parental hostility was derived from the Quality of Parental Relationships Inventory (Conger et al., 1994), which contains 42 items assessing maternal and paternal relationship. Two subscales were used to create the parental hostility measure: *maternal hostility* and *paternal hostility*. An example items for maternal or paternal hostility is *"How often does your mother/father throw things at you?"* Participants responded on a 4 point-Likert scale ranging from 1 *"Never"* to 4 *"Always."* Both maternal and paternal subscales were combined (mean) to create a single parental hostility measure. A dichotomous indicator was created to indicate if the adolescent had experienced one or more incidents of parental hostility. The parental hostility measure had good internal consistency (α = 0.86).

We used the 13 item Exposure to Violence Inventory (Selner-O'Hagan et al., 1998) to assess if the adolescent had experienced (direct) or had observed (indirect) violence. When parent/caregiver report was available, we used the mean of the adolescent and parental report of exposure to violence. An example item from the victim subscale is *"Have you been chased where you thought you might be seriously hurt?"* and from the witness subscale is *"have you seen someone else being raped, or any other type of sexual attack?"* The witness and victim subscales were dichotomized to indicate if the youth had been a victim or witnessed violence on one or more occasions.

2.3.2. Binge drinking

Binge drinking was assessed with a single item that asked participants, *"in the past 12 months how often have you had 5 or more drinks at a time?"* Participants responded to a 10-point scale ranging from 1 (*"never"*) to 9 (*"daily"*).

2.3.3. Self-regulation

We used the impulse control subscale at baseline from the Weinberg Adjustment Inventory (Farrell et al., 1992; Weinberger and Schwartz, 1990). Participants (and parents/caregiver when available) responded on a 5- point Likert scale ranging from "*False*" to "*True.*" Higher scores indicate more impulse control. An example item is '*I say the first thing that comes into my mind without thinking enough about it.*' When parental/caregiver report was available, we used the mean of self-report and parent report. The impulse control subscale had good internal consistency α = 0.84. Emotion regulation was assessed using the Children's Emotion Regulation Scale (Walden et al., 1992) from the baseline assessment. Participants and parents/caregivers responded on a 4-point

Table 2
Model fit indices for latent class analysis.

No. of classes	-2LL	AIC	BIC	aBIC	Entropy	LMR p-value	BLRT p-value
1	9245.96	9261.96	9303.65	9278.24	–	–	–
2	6596.42	6618.42	6675.74	6640.79	0.78	.001	.001
3	**6529.06**	**6565.06**	**6658.86**	**6604.68**	**.76**	**.007**	**.001**
4	6510.33	6560.33	6690.60	6611.18	0.64	.455	.060

Note: −2LL = negative 2 log likelihood; AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; aBIC = sample size adjusted Bayesian Information Criteria; LMR = Lo-Mendell-Rubin test; BLRT = Bootstrapped log-likelihood ratio test.

Likert scale ranging from "*Not at all like me*" to "*Really like me.*" Scores were averaged between parent/caregiver and self-report. Higher scores indicate better ability to regulate emotions. An example item is "*I know things to do to make myself happier.*" The emotional regulation subscale had good internal consistency in this sample α = 0.81.

2.4. Analytic plan

To assess poly-victimization in our sample, we conducted a latent class analysis (LCA) using baseline data and the manual three-step approach (Asparouhov and Muthén, 2014; Nylund-Gibson et al., 2014; Vermunt, 2010) using *Mplus* version 7.4 (Muthén and Muthén, 1998). We used the four categorical indicators of victimization: parental hostility, bullying victimization, exposure to violence- victim and exposure to violence- witness to determine victimization classes.

To determine the best fitting solution, we estimated separate models that fit one to five latent class solutions. To assess which model best fit the data, we considered several indicators including: negative two log likelihood (-2LL), Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC), the sample size adjusted Bayesian Information Criteria (aBIC), the Lo-Mendell-Rubin adjusted likelihood ratio test (LMRT), and the bootstrapped likelihood ratio test (BLRT). The –2LL, AIC, BIC, and aBIC are all log likelihood measures for which lower values indicate better fit (Nylund et al., 2007).

To assess trajectories of binge drinking across emergent classes of victimization, we estimated latent growth models of binge drinking within each class. Binge drinking trajectories were assessed using prospective (after baseline) data. In all models, gender, race, and time spent in the community (e.g., proportion of time not in a jail, detention center, or other facility) were controlled. Instead of constraining growth to be linear or quadratic, we allowed *Mplus* to freely estimate the growth trajectory over time to ensure we were able to capture the

functional form of the data. We used −2LL ratio tests to determine if random or fixed intercepts and slopes were needed in each class for binge drinking. Results revealed a model with random intercepts and fixed slopes within each class best fit the data. To assess if intercepts and slopes were significantly different from each other across classes, we used the 'MODEL TEST' function in *Mplus*.

To measure the effect of self-regulatory mechanisms, we assessed concurrent effect on class membership and the effect of impulse control and emotional regulation on binge drinking growth trajectories (prospective). To do this, we used a three-step approach to examine differences across classes (concurrent) and whether impulse control and emotional regulation aid in explaining latent growth differences across emergent classes (prospective).

Missing data were minimal (~9.5% across all waves). We utilized full-information maximum likelihood (FIML) estimator in *Mplus* for all analyses.

3. Results

3.1. LCA results

Results from our model fitting for poly-victimization LCA are presented in Table 2. The lowest BIC, aBIC, and AIC were found for the three-class solution and the first non-significant LMR and BLRT values were found in the four-class solution, suggesting the three-class model was preferable.

Fig. 1 presents the item probability plot that was used to interpret and label the three emergent classes. The high class (labeled "poly-victimization") had the highest probability of experiencing bullying victimization (50%), exposure to violence victimization (99%), and parental hostility (75%). The poly-victimization class represented 48% (*n* = 646) of the sample. The middle class (labeled "indirect victimization") had the highest probability of witnessing at least two violent acts (100%), and remained relatively high on exposure to violence victimization (68%). The indirect-victimization group represented 27% (*n* = 369) of the sample. The lowest class (labeled "low-victimization") had the lowest probability of experiencing bullying victimization (27%), exposure to violence victimization (22%), witnessing violence (19%), and parental hostility (34%). The low-victimization group represented 25% (*n* = 339) of the sample.

3.2. Class variation

Results can be found in Table 1. Briefly, in terms of self-regulation constructs, the poly-victimization classes had significantly lower
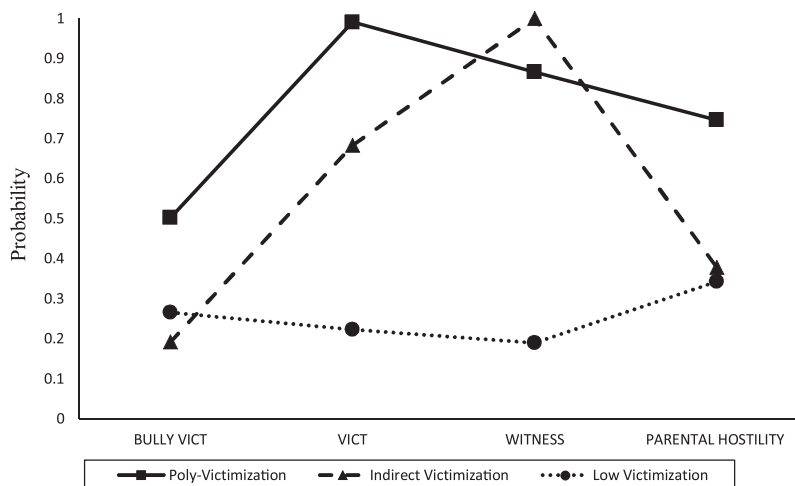

Fig. 1. Item probability plot for victimization classes.
Note: Bully vict = bullying victimization; Vict = victim of exposure to violence; Witness = witness of violence.

impulse control compared to the indirect-victimization ($\chi^2 = 68.2$, $df = 1$, $p = .001$) and the low-victimization classes ($\chi^2 = 118.0$, $df = 1$, $p = .001$). The indirect victimization class evinced better emotional regulation than the poly-victimization class ($\chi^2 = 12.9$, $df = 1$, $p = .001$) and the low victimization class ($\chi^2 = 3.80$, $df = 1$, $p = .05$). Aside from emotional regulation, no differences existed between the indirect and low victimization classes.

3.3. Latent growth models

Across all three classes, both the intercept (α) and slopes (μ) were tested to see if they were significantly different from each other (see Fig. 2). Results indicated that the poly-victimization group had significantly higher binge drinking at age 15 ($\alpha = 2.06$, $p = .001$) compared to both the indirect victimization group ($\alpha = 1.21$, $p = .001$; Wald $\chi^2 = 9.86$, $df = 1$, $p = .002$) and the low victimization group ($\alpha = 1.25$, $p = .001$; Wald $\chi^2 = 8.62$, $df = 1$, $p = $). Similar results were found for growth in binge drinking, such that the poly-victimization group had a steeper growth trajectory ($\mu = 2.57$, $p = .018$) than both the indirect (.374, $p = .019$; Wald $\chi^2 = 4.46$, $df = 1$, $p = .035$) and low victimization groups ($\mu = .405$, $p = .027$; Wald $\chi^2 = 4.36$, $df = 1$, $p = .037$). No differences emerged between the indirect and low victimization groups in terms of intercepts (Wald $\chi^2 = 0.200$, $df = 1$, $p = .655$) or slopes (Wald $\chi^2 = .045$, $df = 1$, $p = .832$).

3.4. Self-regulation predictors of growth for binge drinking

Results indicate that both impulse control ($b = -.11$, $SE = .05$, $p = .03$) and emotional regulation ($b = -.13$, $SE = .06$, $p = .04$) buffer the rate of change in binge drinking for the indirect victimization class only (see Table 3). Impulse control and emotional regulation were not significant predictors for the poly- or low victimization class.

4. Discussion

In line with our first hypothesis (H1), results indicated support for three distinct classes of victimization: *low-victimization*, *indirect victimization*, and *poly-victimization*. Interestingly, the largest proportion of youth (47%) were categorized as poly-victims, although our results are similar to other studies in terms of the number and types of emergent

Table 3
Adolescent self-regulation and Mental Health Predictors of Binge Drinking Growth Trajectories.

Variable	Estimate [95% CI]
Impulse Control	
Poly-victimization	0.07 [−0.42, 0.56]
Indirect-victimization	**−0.11 [−0.21, −0.01]**
Low-victimization	−0.15 [−0.30, 0.01]
Emotional regulation	
Poly-victimization	−0.02 [−0.91, 0.86]
Indirect-victimization	**−0.13 [−0.26, −0.03]**
Low-victimization	−0.11 [−0.30, 0.09]

Bold indicates the confidence interval does not cover 0.

classes (Butcher et al., 2016; Ford et al., 2010; Kretschmar et al., 2016). The poly-victimized class demonstrated significant differences in both initial rates of binge drinking in adolescence and acceleration of binge drinking into young adulthood relative to the indirect- and low-victimized classes. Further, we identified unique effects of impulse control and emotional regulation for youth who have multiple experiences of indirect victimization.

Our second hypothesis was partially supported. Youth in the poly-victimization class had significantly steeper growth in binge drinking over the course of 10 years than both the indirect and low victimization classes; however, the latter two classes were nearly indistinguishable in terms of binge drinking trajectories. Parallel with prior research, youth who experience current or early life violence are at risk of developing later alcohol use problems (Ford et al., 2008; Kilpatrick et al., 2003).

Our study extends past research in two important ways. First, results indicate that poly-victimization predicts higher rates of binge drinking, including an acceleration in binge drinking over the course of adolescence and young adulthood. Second, variation exists in binge drinking trajectories in terms of self- regulatory processes (H3). Specifically, higher emotion regulation and impulse control significantly mitigated growth in binge drinking for the indirect victimization class only. This was peculiar, that the indirect victimization class showed the highest levels of self-regulation, as we expected lower levels of violence exposure to be associated with the highest levels of self-regulation. It may be that theoretical models such as pathological adaptation (Ng-Mak et al., 2002) may take precedence among certain classes of
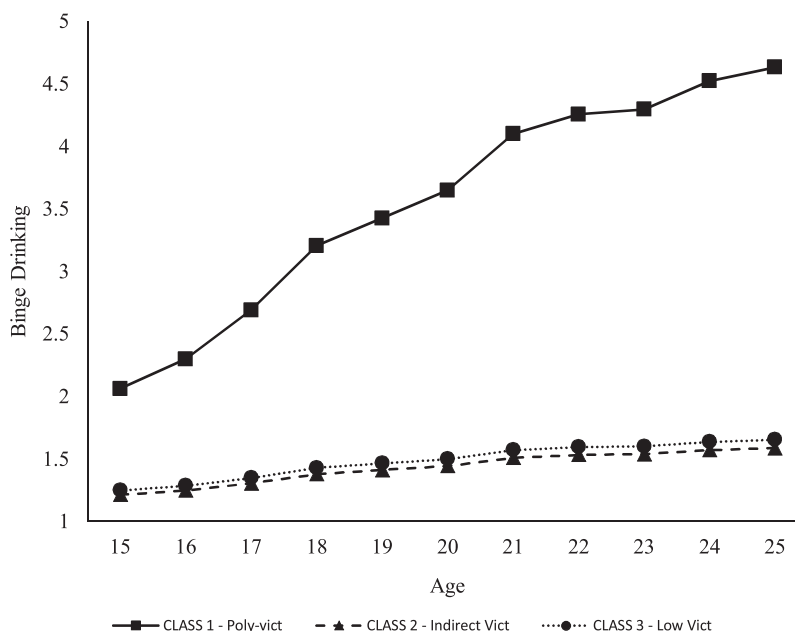

Fig. 2. Latent class latent growth model for binge drinking from 15 to 25 years old.

victimization. For example, a recent study found a curvilinear relationship between depression and exposure to community violence – indicating mental health symptoms may be dampened in light of exposure to violence (Gaylord-Harden et al., 2011). Similar results may be drawn for self-regulation processes. Taken together, it may be that the poly-victimization class is using heavy drinking to cope with early life stressors such as parental hostility, school bullying, or other forms of trauma. Conversely, youth primarily exposed to indirect victimization may be forced to develop self-regulation skills early or may be experiencing "emotional numbing." The variation that exists across victimization classes in terms of self-regulatory ability may prompt more research into resiliency of youth exposed to violence at an early age and *how* some youth develop proper self-regulation skills.

One potential explanation of our findings is the development of adaptive coping skills and the integration of emotional regulatory skills when facing adverse events. Our results suggest that youth who experience primarily indirect victimization have inherently different psychological profiles in terms of emotional regulation, impulse control, and potentially more effective coping strategies. Effective coping strategies require a distinct number of emotion-based tasks such as controlling frustration and anger, coping with fear and anxiety, as well as defending oneself in an appropriate manner (Kochenderfer-Ladd, 2004). Thus, an adaptive coping strategy would require youth to control their own emotional response to a situation (e.g., witnessing a violent act), interpret their surroundings appropriately and correctly, and minimize the immediate danger to themselves (e.g., psychological and physical danger; Dodge, 1989; Kopp, 1989). It may be that youth who are primarily indirect victims have adapted to their environment in a way that aids their ability to cope with witnessing trauma.

Development of effective prevention and intervention strategies that focus on emotion regulation and coping strategies are at the core of aiding youth who have experienced multiple traumas. Youth in the juvenile justice system are more vulnerable to violence exposure, have a much higher prevalence of drug and alcohol use, and have a higher likelihood of psychological and trauma-related problems (Kerig et al., 2016). Specifically, Davis and colleagues (2016) found that, among justice involved youth, those with a diagnosis of post-traumatic stress disorder (PTSD) had a 67% increase in the risk of entering substance use disorder treatment. Further, youth with higher emotion regulation skills decreased this risk by 15%. Thus, teaching techniques aimed at strengthening the ability to regulate emotions and to act less impulsively (e.g., mindfulness; Himelstein et al., 2015) may be a particularly efficacious intervention strategy for youth who have experienced trauma.

4.1. Limitations and conclusion

The current study is not without limitations. The current sample consisted of at-risk, justice-involved youth, which may not generalize to the population of non-justice involved youth. Time spent in the community ranged from 65% to 85% across victimization classes. Thus, our findings may not generalize to all clinical practice settings. Further, our measures of self-regulation and victimization were taken concurrently (baseline); thus the temporal order of impulse control problems and the experience of victimization cannot be determined. In light of these limitations, we were able to model growth in binge drinking over the course of 10 years and utilize a baseline construct of victimization and self-regulation to aid in explaining growth in problematic drinking. Finally, our data were primarily self-report (parent report was used to assess and self-regulation when available) when assessing victimization; therefore, reports on sensitive topics such as parental hostility or victimization experiences may be under reported (Butcher et al., 2014; Tourangeau and Yan, 2007). Alcohol use was also self-reported, which may have introduced additional biases, though self-report methods are generally reliable (Killeen et al., 2004).

Our results highlight the importance of focusing on poly-victimized

youth and the usefulness of considering multiple victimizations when trying to understand outcomes. Poly-victimized youth were at greater risk, as compared to youth in other victimization classes, for binge drinking in adolescence and accelerated binge drinking into young adulthood. Interestingly, youth in the indirect victimization class did not differ from the low risk class on binge drinking and most self-regulation and impulse control variables. Further, our study is the first to identify how impulse control and emotional regulatory skills impact the growth of binge drinking across victimization class. Findings have important implications for the development of tailored intervention and prevention programming among juvenile justice involved youth.

Contributors

Jordan Davis conceptualized the article, ran statistical analyses, and wrote the manuscript; Tara Dumas helped conceptualize the idea, helped write drafts of the paper, and reviewed the final manuscript; Benjamin Berey and Danielle Madden edited versions of the manuscript and wrote portions of the discussion; Kevin Tan helped with data analysis and aided in drafting and editing of the manuscript; Gabriel Merrin ran statistical analyses, helped write the methods and results section. All authors have read and approved of the final manuscript.

Conflict of interest

No conflict declared.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.drugalcdep.2018.01.006.

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