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ORIGINAL ARTICLE



Disruption of Transitions in High-Risk Substance Use from Adolescence to Young Adulthood: School, Employment, and Romantic Relationship Factors

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ABSTRACT

Background: Few studies have examined social-contextual moderators of substance use transitions from adolescence to young adulthood. A better understanding of the extent to which school, employment, and romantic relationships can disrupt high-risk use patterns could inform strategies for substance use prevention and treatment.

Objective: The current study examines the extent school, employment, and relationship factors can disrupt transition in high-risk substance use patterns from adolescence to young adulthood.

Method: Data were collected biennially from 662 youth in six assessments across ten years (2003–2013). Using latent transition analysis (LTA) that examined transition in substance use classes, we examined school, employment, and relationship moderators of use transitions.

Results: Few differences were found during adolescence with the most significant findings occurring in the transition from adolescence to young adulthood. Examining the transitions from adolescence to young adulthood (W4 to W6), we found evidence that school, employment, and relationship status disrupted problematic substance use patterns, such that, individuals that indicated entering school, working full-time, or getting married or entering a relationship were more likely to transition to a low-risk substance use class than remain in the high-risk class.

Conclusions/Importance: Findings underscore the importance of school completion, obtaining stable career employment, and quality relationship to help reduce high-risk substance use patterns leading into young adulthood. Prevention and intervention efforts should consider the diverse needs of youth and be prepared to provide a wide range of services that include educational opportunities and career development if they want to reduce high-risk substance use patterns.

KEYWORDS

substance use classes;
school; employment;
romantic relationships;
latent transition analysis

The types and amounts of substances used in adolescence are strongly associated with young adult use patterns (Merrin & Leadbeater, 2018; Moss, Chen, & Yi, 2014; Nelson, Van Ryzin, & Dishion, 2015). In addition, the initiation of polysubstance use in adolescence is associated with several negative adult outcomes (Connor, Gullo, White, & Kelly, 2014; Morley, Lynskey, Moran, Borschmann, & Winstock, 2015; Nelson et al., 2015). However, there is considerable heterogeneity in substance use patterns (i.e. the number and amounts of substance used) and in transitions between them (i.e. changes in use patterns over time). While studies find three to four substance use classes (i.e. single-, co-, and poly-use; for review see Tomczyk, Isensee, & Hanewinkel, 2016) and strong stability between adjacent time points (Chung, Kim, Hipwell, & Stepp, 2013; Lanza, Patrick, & Maggs, 2010; Merrin, Thompson, & Leadbeater, 2018; Mistry et al., 2015), few studies have examined social-contextual moderators of substance use transitions from adolescence to young adulthood. A better understanding of the extent to which social factors (i.e. school, employment, and romantic relationships) can disrupt high-risk use patterns

(i.e. polysubstance use) could inform strategies for substance use prevention and treatment. The current study examines when and to what extent school, employment, and romantic relationship factors can disrupt high-risk substance use patterns across ten years from adolescence to young adulthood.

School, employment, and romantic relationship factors

Although several risk and protective factors have been identified that are associated with high-risk substance use behaviors across various social-ecological domains (e.g. individual, family, peer, school, community); school enrollment, employment, and romantic relationships are salient protective factors for reducing problematic patterns of substance use (for review see Stone, Becker, Huber, & Catalano, 2012). Studies have found that substance use behaviors during adolescence is associated with lower educational attainment (Horwood et al., 2010), employment (Hara, Huang, Weiss, & Hser, 2013; Rivera, Casal, Currais, & Rungo, 2013), and income (Thompson, Leadbeater, Ames, & Merrin, 2019) which may result in a lack of necessary skills to acquire

meaningful employment leading into adulthood. The developmental period from adolescence to young adulthood provides social contextual opportunities that may be leveraged to disrupt risky substance use patterns. Involvement with conventional or normative social institutions and people such as higher education, meaningful employment, and positive romantic relationships which characterize this transition (Arnett, 2019) are arguably incompatible with risky substance use behaviors and may promote decreases in substance use behaviors. For example, although college enrollment is associated with elevated and fluctuating drinking patterns (Hingson, Zha, & Smyth, 2017; Merline, Jager, & Schulenberg, 2008); school factors such as positive attitudes toward school and academic success are protective factors for substance use behaviors. Mistry and colleagues (2015) examined family and school moderators of substance use transitions across three time points and found that positive school attitudes moderated substance use transitions such that more positive school attitudes were associated with lower probability of transitioning to the co-use or poly-use classes compared to non-users. Employment can also be protective but may also increase risk depending on the developmental timing (e.g. adolescence, young adulthood) and the type and quality of employment (i.e. full-time, low wage, good pay; Mortimer, 2010). For example, greater work intensity during adolescence is associated with increased substance use, substance use related negative consequences and exposure to coworkers who are involved in risk behaviors in adolescence (Kingston & Rose, 2015; Osilla et al., 2013). Romantic relationships, like marriage, have also been found to be associated with decreases in substance use behaviors as an adult (Bachman et al., 2014; Fleming, White, & Catalano, 2010; Heinz, Wu, Witkiewitz, Epstein, & Preston, 2009); while other studies have found increases in substance use with the termination of romantic relationship and changing partners (Fleming, White, Oesterle, Haggerty, & Catalano, 2010). Taken together, there is a large body of empirical research that finds education, employment, and romantic relationship factors are protective against problematic substance using behaviors. However, developmental timing of education, employment, and romantic relationships may influence the protective effects of these factors. Events that occur “off-time” (i.e. earlier or later than the majority) like working full-time in adolescence or part-time as an adult may act as a risk factor because they do not align with developmental norms and expectations. Similarly, romantic relationships that occur very early during adolescence are considered “off-time” and associated with abnormal developmental trajectories (e.g. teen pregnancy), various adverse outcomes (e.g. substance use), and internalizing and externalizing problems (Graber, 2013). The transition from adolescence to young adulthood is a sensitive period filled with considerable instability and change, and engagement in conventional institutions and people during this time like enrolling in secondary education, full-time employment, or being in a committed relationship may help mitigate high-risk substance use behaviors (i.e. polysubstance use) leading into adulthood.

The period of life from adolescence to young adulthood is characterized by greater freedom, shifting roles, transitions in social context, and, typically, increased substance use behaviors of which have strong continuity leading into adulthood (Arnett, 2019). However, this developmental period also provides an opportunity to disrupt problematic patterns of substance use stemming from adolescence by engaging individuals with social institutions and people like school, employment, romantic relationships that are incompatible with risky substance use behaviors. Taking on adult roles assumes key developmental tasks will be accomplished including school completion, establishing career employment, and marriage and meaningful romantic relationships. Most people will successfully transition into adult roles; however, some will fail to achieve these developmental tasks and may be at greater risk of negative outcomes as an adult, including substance use disorders and dependence, financial instability, lack of meaningful relationships, adverse mental and physical health, and criminal behavior (Salmela-Aro, 2009; Schulenberg, Bryant, & O’malley, 2004). A better understanding of when and to what extent school, employment, and romantic relationships are most protective or pose a risk in the transition from adolescence to young adulthood can inform substance use prevention and intervention strategies.

Summary

This study adds to the literature by examining the extent to which school, employment, and romantic relationship factors can disrupt problematic patterns of substance use (i.e. polysubstance use) in a sample of youth followed a decade from adolescence (ages 12 – 18) to young adulthood (ages 22 – 29). Specifically, we examine the extent to which school, employment, and romantic relationship factors can disrupt transitions among high-risk use classes at various developmental time points in the transition from adolescence to young adulthood. Our past research with the sample identified three substance use classes (alcohol-dominant, co-use of alcohol and marijuana, and poly-use) and strong stability in transition across ten years (see Merrin et al., 2018). The current study extends this work by examining the effects of social context (i.e. enrollment in school, full-time employment, and romantic relationships) on transitions in high-risk substance use classes. A better understanding of how these developmentally salient protective factors may disrupt use transition can inform prevention and intervention efforts. We address the following research questions: (1) To what extent do school, employment, and romantic relationship factors moderate the transition of substance use classes over time? And, (2) at what time during adolescence and young adulthood are school, employment, and romantic relationship factors most protective against high-risk use classes? We expect that school, employment, and romantic relationship factors will disrupt high-risk use patterns such that engagement with these conventional institutions or people will decrease the number of substances used (e.g. the backward transition from poly-use to alcohol-dominant).

Further, we expect the school, employment, and romantic relationship factors to be more protective during the transition from adolescence to young adulthood when roles are shifting, and adult expectations are assumed.

Method

Participants and procedures

Data are from the Victoria Healthy Youth Survey (V-HYS), a 10-year study that followed randomly recruited youth biennially for six assessments (see Leadbeater et al., 2012 for details). Youth were ages 12 to 18 at baseline (W1; $N=662$; 48% male $M_{\text{age}} = 15.5$, $SD=1.9$) and 22 to 29 at the final wave (W6; $N=478$; 45% male; $M_{\text{age}} = 25.8$, $SD=2.0$). Retention rates were good across waves (70% – 87). Active consent was obtained from youth, and the parent or guardian for youth under age 18, for participation at each wave, and youth were given a gift certificate at each interview as an incentive. A trained interviewer administered the survey individually in the individual's home or another private location. To enhance privacy, the portion of the V-HYS questionnaire dealing with drug and alcohol use was self-administered and placed in a sealed envelope not accessible to the interviewer. The university's research ethics board approved the research protocol.

Measures

Demographic

Sex, age, and socioeconomic status (SES) were used as predictors of each class over time. Males were the reference group. Age in years was used as the measurement for age. The Hollingshead Occupational Status Scale was used to assess parent SES (Bornstein, Hahn, Suwalsky, & Haynes, 2003). Using a 9-point scale, youth reported on their parent's occupation and the highest level of occupational prestige for either parent was used as the measure of SES.

Cigarette use

The cigarette item assessed the number of cigarettes smoked in the past week. Response items include, 0 = none, 1 = 1 per week, 2 = less than half a pack, 3 = less than a full pack, 4 = more than a full pack.

Heavy episodic drinking

Heavy episodic drinking (HED) was assessed with the item, "How often you had five or more drinks on one occasion in the past year." Response options ranged from 0 = never, 1 = a few times a year, 2 = a few times a month, 3 = once a week, and 4 = more than once a week. The definition of a standard drink was provided: "When we use the word 'drink', it means: 1) one glass, bottle or can of beer, 2) one glass of wine or a wine cooler, or 3) one drink or cocktail with liquor" (see Evans-Polce, Vasilenko, & Lanza, 2015).

Marijuana use

The frequency of marijuana use over the past year was assessed. Response items ranged from 0 = never, 1 = a few times per year, 2 = a few times per month, 3 = once a week, and 4 = more than once a week.

Illicit drug use

Youth were asked how often they used each of the following six illicit drugs in the past year: hallucinogens, amphetamines, club drugs, inhalants, cocaine, and heroin as 0 = never, 1 = a few times a year, 2 = a few times a month, 3 = once a week, and 4 = more than once a week. Due to low use rates across the six illicit drug types, we combined drug types into one dichotomized variable that captured whether adolescents had used any illicit drug over the past year.

School

One item assessed whether participants were currently enrolled in school. Response options were 0 = no, 1 = Yes, middle/high school, 2 = Yes, post-secondary institution (university, community college, business school, trade or vocational school). The item was dichotomized to assess whether the youth was currently enrolled in either type of academic setting.

Employment

Youth were asked whether they were currently in employed and categorized into 0 = not employed and employed part-time (0; < 30 h per week) and 1 = employed full-time (≥ 30 h per week). To capture entry into full-time employment, this variable was collapsed to 0 = not employed/part-time employment and 1 = full-time employment.

Romantic relationships

Two items assessed relationship status. Youth were asked whether they were currently dating anyone, and response options included 0 = no, 1 = yes. Also, the last three waves (Wave 4–6) participants were asked whether they were married, and response options included 0 = no, 1 = yes.

Analysis plans

We examined school, employment, and romantic relationship as moderators of transitions between substance use classes from adolescence to young adulthood. Previously published work used Latent Class Analysis (LCA) to establish three classes of substance use based on individuals' cigarette use, heavy episodic drinking (HED), marijuana use, and illicit drugs use and used Latent Transition Analysis (LTA) to examine transitions between the use classes across ten years from adolescence to young adulthood (see Merrin et al., 2018). We identified three substance use classes at each assessment that included an "alcohol-dominant" class (63% at W1 and 43% at W6) that had the lowest probabilities of use for all substances; a "co-use of alcohol and marijuana" class (referred to as "co-use," 26% at W1 and 27% at

Table 1. Frequencies and Proportions of Each Substance Use Class from Wave 1 to Wave 6.

Classes	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
Alcohol-Dominant	416 (.63)	301 (.52)	201 (.37)	186 (.41)	221 (.48)	204 (.43)
Co-Use	171 (.26)	185 (.32)	205 (.38)	137 (.30)	121 (.26)	127 (.27)
Poly-Use	75 (.11)	91 (.16)	132 (.25)	134 (.29)	118 (.26)	145 (.30)
N	662	577	538	457	460	476

Table 2. Frequency and Percent of School, Work, and Relationship Variables from Wave 1 to Wave 6.

Variables	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
Enrolled in School						
Not Enrolled	35 (5.3%)	110 (19.1%)	162 (30%)	73 (15.9%)	50 (10.8%)	57 (12.1%)
Currently Enrolled	627 (94.7%)	468 (80.9%)	377 (70%)	386 (84.1%)	413 (89.2%)	416 (87.9%)
Employment						
Unemployed/Part-Time	NA	473 (81.8%)	363 (67.3%)	244 (53.2%)	214 (46.2%)	176 (36.8%)
Full-Time Employment	NA	105 (18.2%)	176 (32.7%)	215 (46.8%)	249 (53.8%)	302 (63.2%)
Relationship Status						
Not Dating	514 (77.6%)	364 (63%)	289 (53.7%)	179 (39%)	162 (35%)	141 (29.7%)
Dating	148 (22.4%)	214 (37%)	249 (46.3%)	280 (61%)	301 (65%)	334 (70.3%)
Marriage Status						
Not Married	NA	NA	NA	336 (73.2%)	302 (65.2%)	265 (79.3%)
Married	NA	NA	NA	123 (26.8%)	161 (34.8%)	69 (20.7%)

Note. "NA" indicates that the question was not assessed at the specified wave.

W6) had high probabilities of HED and marijuana use, but low probability of tobacco or illicit drug use, and a "poly-use" class (11% at W1 and 30% at W6) had the highest probabilities across all substances. See Table 1 for frequencies and proportions for each use class over time. We then examined transition probabilities between each wave and also from W1 to all waves (e.g. W1 to W3, W1 to W4, etc.) using LTA (Lanza et al., 2010; Lanza & Cooper, 2016; Nylund-Gibson, Grimm, Quirk, & Furlong, 2014). We found strong stability between adjacent waves; however, over larger periods (e.g. W1 to W6) we found that approximately half of the adolescents transitioned to another use class, with a higher propensity to transition to higher-risk use classes (see Merrin et al., 2018).

Building on past work, the current study used the previously established classes and transitions to examine school, employment, and romantic relationship moderators of the transitions between substance use classes from adolescence (12–18) to young adulthood (22–29). Specifically, we examined school, employment, and romantic relationship moderators of substance use transitions in three LTA models (one for each domain). Each model controlled for sex, SES, and time-varying effects of the respective school, employment, or romantic relationship variables examined. To reduce potential bias due to missing data and non-normality, all models were run using Full Information Maximum Likelihood (FIML) with the robust Maximum Likelihood estimator (MLR) in Mplus 7.4 (Muthén & Muthén, 2012).

Results

Descriptive statistics

Frequencies and percentages of the sample for school enrollment, employment, and romantic relationship status variables over time (W1 - W6) are presented in Table 2. Most youth (95%) were enrolled in school at W1 (i.e. ages 12–18) and ranged from 70% (W3) to 89% (W6) thereafter. Full-

time employment status grew steadily over time, ranging from 18% at W2 (i.e. ages 14–20) to 63% at W6 (i.e. ages 22–29). The number of participants dating also grew steadily across the six waves, ranging from 22% (W1) to 70% (W6). Marriage status was assessed at the last three time points and varied across waves (27%, 35%, 21%, respectively across W4–W6).

Demographic, school, employment, and romantic relationship predictors of substance use classes from adolescence to young adulthood

We first examined demographic, school, employment, and romantic relationship predictors of the substance use classes from W1 to W6. Estimates, standard errors, and odds ratios (OR) are presented in Table 3. Females had higher odds of being in the alcohol-dominant class compared to the poly- and co-use classes at each wave except for W2 and for the co-use class at W3. Age differences between classes were limited to W1 and W2, when older youth reported higher odds of being in the co-use ($OR = 1.87$) and poly-use (W1 $OR = 1.83$ and W2 $OR = 1.48$) classes. SES was not a significant predictor of class membership. School enrollment was associated with lower odds of being in the poly-use class at W2 ($OR = 0.44$) and W5 ($OR = 0.31$) compared to the alcohol-dominant class. Working full-time was associated with higher odds of being in the poly-use class compared to the alcohol-dominant class at W2 ($OR = 2.32$), W3 ($OR = 2.16$), and W4 ($OR = 2.02$). Dating was associated with higher odds of being in the co- and poly-use classes compared to alcohol-dominant class across the first three waves (see Table 3). Romantic relationship was also associated with higher odds of being in the co-use class at W5 ($OR = 2.02$) and lower odds of being in the poly-use class at W6 ($OR = 0.50$) compared to the alcohol-dominant class. During young adulthood (W4 - W6; ages 18–28), marriage was associated with lower odds of being in the co- ($OR = 0.37$, 0.38) and poly-use ($OR = 0.33$, 0.09) classes compared to the

Table 3. Estimates, Standard Errors, and Odds Ratios of Demographic, School, Work, and Relationship Variables Predicting Substance Use Classes from Wave 1 to Wave 6.

	Co-Use		Poly-Use	
	Est. (SE)	Odds Ratio	Est. (SE)	Odds Ratio
Wave 1 (Ages 12 – 18)				
Sex	–0.53* (.25)	0.59	–0.66* (.30)	0.52
Socioeconomic Status	0.02 (.07)	1.02	–0.12 (.09)	0.89
Age	0.62*** (.10)	1.87	0.61*** (.11)	1.83
Enrolled in School	0.83 (.57)	2.29	0.25 (.56)	1.28
Employed	0.45 (.40)	1.56	0.99 (.54)	2.69
In a Romantic Relationship	1.05*** (.31)	2.85	1.27*** (.34)	3.56
Wave 2 (Ages 14 – 20)				
Sex	–0.35 (.23)	0.71	–0.37 (.28)	0.69
Socioeconomic Status	–0.10 (.07)	0.90	–0.12 (.08)	0.89
Age	0.39*** (.07)	1.48	0.14 (.09)	1.15
Enrolled in School	–0.07 (.37)	0.94	–0.82* (.42)	0.44
Employed Full-Time	–0.20 (.38)	0.82	0.84* (.43)	2.32
In a Romantic Relationship	0.55* (.25)	1.74	1.26*** (.28)	3.53
Wave 3 (Ages 16 – 22)				
Sex	–0.68* (.21)	0.51	–0.58* (.25)	0.56
Socioeconomic Status	0.05 (.08)	1.06	0.00 (.08)	1.00
Age	0.03 (.07)	1.02	–0.02 (.07)	0.98
Enrolled in School	–0.17 (.35)	0.85	–0.56 (.33)	0.57
Employed Full-Time	0.41 (.35)	1.50	0.77* (.32)	2.16
In a Romantic Relationship	0.91*** (.27)	2.47	0.68** (.25)	1.97
Wave 4 (Ages 18 – 24)				
Sex	–0.32 (.48)	0.72	–0.86* (.38)	0.42
Socioeconomic Status	–0.30 (.19)	0.74	–0.17 (.16)	0.85
Age	–0.24 (.17)	0.79	–0.18 (.13)	0.84
Enrolled in School	–0.06 (.70)	1.06	–0.80 (.58)	0.45
Employed Full-Time	0.63 (.44)	1.44	0.70* (.37)	2.02
In a Romantic Relationship	0.42 (.55)	1.53	0.45 (.45)	1.56
Married	–0.61 (.51)	0.54	–0.82* (.44)	0.44
Wave 5 (Ages 20 – 26)				
Sex	–0.44* (.30)	0.65	–1.04*** (.27)	0.35
Socioeconomic Status	–0.07 (.08)	0.94	–0.02 (.08)	1.02
Age	–0.04 (.08)	0.97	–0.05 (.07)	0.96
Enrolled in School	–0.43 (.52)	0.65	–1.18** (.43)	0.31
Employed Full-Time	0.27 (.29)	1.30	0.32 (.28)	1.38
In a Romantic Relationship	0.70* (.36)	2.02	0.47 (.33)	1.60
Married	–1.00** (.37)	0.37	–1.10** (.37)	0.33
Wave 6 (Ages 22 – 28)				
Sex	–0.89* (.37)	0.41	–1.04** (.30)	0.35
Socioeconomic Status	–0.19 (.12)	0.82	–0.05 (.09)	0.95
Age	0.11 (.09)	1.11	–0.03 (.08)	1.00
Enrolled in School	1.40 (1.25)	4.01	–0.33 (.35)	0.72
Employed Full-Time	–0.48 (.34)	0.62	–0.07 (.32)	0.93
In a Romantic Relationship	–0.05 (.39)	0.95	–0.71* (.33)	0.50
Married	–0.96* (.50)	0.38	–2.46*** (.71)	0.09

Note. Alcohol-Dominant is the reference class. Males are the reference group for the sex variable. The 'Employed' variable at W1 only refers to working 5 or more hours per week.

* $p < .05$, ** $p < .01$, *** $p < .001$.

alcohol-dominant class, except for the co-use class at W4. We also tested differences between the co- and poly-use classes; however, only four significant differences were found such that full-time employment and dating at W2 were both associated with higher odds of being in the poly-use class compared to the co-use class, and school enrollment at W2 and being married at wave 6 were associated with lower odds of being in the poly-use class compared to the co-use class.

Predicting transitions in substance use classes from adolescence to young adulthood

We examined school, employment, and romantic relationship variables as moderators of transitions in use classes separately from W1 to W6 to determine whether school, employment, and romantic relationship status could disrupt

high-risk patterns of substance use in the transition from adolescence to young adulthood. It should be noted that several moderators could not be estimated due to low coverage at specific waves (e.g. entering a marriage from waves 5 to 6). Substance use transitions between adjacent waves were highly stable across classes, as such, we did not have the power to estimate some effects.

Transitions in adolescence

Three moderations were significant across adolescence (i.e. W1 to W4; see Table 4). From W1 to W2, co-users were less likely to transition to the poly-users class (compared to alcohol-dominant) if they entered a romantic relationship ($b = -14.60$, $SE = 2.43$). Similarly, poly-users were less likely to remain in the poly-users class across this transition if they entered a romantic relationship during this time ($b = -3.36$, $SE = 1.29$).

Table 4. Estimated Betas and Standard Errors of School, Work, and Relationship Factors Moderating Transitions among Substance Use Classes Across Adolescence (Wave 1 to Wave 4).

	Wave 1 to Wave 2		Wave 2 to Wave 3		Wave 3 to Wave 4	
	Co-use	Poly-use	Co-use	Poly-use	Co-use	Poly-use
Alcohol-Dominant						
Enrolled in School	NA	NA	0.37 (0.92)	–	–0.64 (1.09)	–0.98 (7.95)
Employed Full-Time	NA	NA	–1.67 (1.78)	–	1.77* (0.82)	–
In a Romantic Relationship	0.09 (0.83)	–0.72 (1.30)	0.02 (0.66)	–	0.53 (1.40)	2.54 (6.47)
Co-use						
Enrolled in School	NA	NA	1.21 (3.17)	1.10 (3.30)	0.12 (1.25)	–1.03 (1.08)
Employed Full-Time	NA	NA	–2.36 (2.37)	–3.95 (9.04)	–1.98 (1.00)	–1.23 (0.96)
In a Romantic Relationship	–	–14.60*** (2.43)	–0.51 (1.63)	–0.36 (1.63)	–1.53 (1.16)	–1.27 (1.33)
Poly-use						
Enrolled in School	NA	NA	–	1.02 (13.98)	3.17 (1.88)	1.42 (1.53)
Employed Full-Time	NA	NA	–	3.32 (8.78)	–0.97 (2.24)	–0.86 (1.63)
In a Romantic Relationship	–	–3.36** (1.29)	–	–	–1.81 (7.60)	–0.61 (8.39)

Note: School, work, and relationship transitioned were examined in separate models. All models control for sex and socio-economic status. The “NA” indicates that the value was not estimated and – indicates a value could not be estimated by the model due to low variance.

Table 5. Estimated Betas and Standard Errors of School, Work, and Relationship Factors Moderating Transitions among Substance Use Classes Across Young Adulthood (Wave 4 to Wave 6).

	Wave 4 to Wave 5		Wave 5 to Wave 6	
	Co-use	Poly-use	Co-use	Poly-use
Alcohol-Dominant				
Enrolled in School	–0.64 (2.23)	–0.97 (2.26)	–	–
Employed Full-Time	–0.31 (2.72)	–	9.04*** (2.11)	–
In a Romantic Relationship	–0.06 (3.34)	–	–22.54*** (1.49)	–
Married	–	1.10 (2.15)	–	–13.46*** (3.22)
Co-use				
Enrolled in School	1.26 (1.85)	0.30 (2.22)	–8.22 (12.29)	–9.54 (12.15)
Employed Full-Time	0.67 (1.48)	0.43 (2.23)	–	–5.50*** (0.86)
In a Romantic Relationship	0.93 (2.15)	0.22 (3.66)	–	–10.08*** (1.26)
Married	0.50 (1.04)	2.50 (3.78)	–	–6.51*** (1.39)
Poly-use				
Enrolled in School	–23.64*** (2.34)	–12.18*** (1.44)	–	–19.77*** (1.78)
Employed Full-Time	–11.43*** (2.17)	1.31 (1.28)	3.85 (16.70)	1.90 (15.45)
In a Romantic Relationship	–	–25.11*** (4.16)	–	–
Married	–	0.27 (2.33)	–	–24.32*** (5.85)

Note: School, work, and relationship transitioned were examined separately. All models control for Sex and Socio-economic status. “–” indicates a value could not be estimated by the model due to low variance.

Transitions in young adulthood

Examining the transitions from adolescence to young adulthood (W4 to W6), we found more evidence that school, employment, and romantic relationship status acted as disrupters of problematic substance use patterns (see Table 5). The poly-use class was less likely to remain in the poly-use class from W4 to W5 and from W5 to W6 if they enrolled in school during these transitions ($b = -12.18$, $SE = 1.44$ and $b = -19.77$, $SE = 1.78$, respectively). Further, poly-users were more likely to transition to the alcohol-dominant class (compared to co-use) if they enrolled in school from W4 to W5 (poly- to co-use estimate: $b = -23.64$, $SE = 2.34$ where alcohol-dominant is the reference). Similarly, poly-users were more likely to transition to the alcohol-dominant class (compared to co-use) if they entered full-time employment from W4 to W5 ($b = -11.43$, $SE = 2.17$). Poly-users were less likely to remain poly-users if they entered a romantic relationship between W4 and W5, or got married from W5 to W6. Regarding romantic relationships, dating ($b = -25.11$, $SE = 4.16$) was associated with a higher likelihood of transitioning from the poly-use class at W4 to the alcohol-dominant class at W5 compared to the poly-use class, and similarly marriage ($b = -24.32$, $SE = 5.85$) was associated with a higher likelihood of transitioning from the poly-use

class at W5 to the alcohol-dominant class at W6 compared to the poly-use class.

Co-users were more likely to transition to the alcohol-dominant class compared to the poly-use class from W5 to W6 if they entered full-time employment ($b = -5.50$, $SE = 0.86$), a romantic relationship ($b = -10.08$, $SE = 1.26$), or got married ($b = -6.51$, $SE = 1.39$) in this time. Consistent with these findings, participants in the alcohol-dominant class were less likely to transition to higher use class (i.e. remain in the alcohol-dominant class) if they entered a romantic relationship ($b = -22.54$, $SE = 1.49$) or got married ($b = -13.46$, $SE = 3.22$) from W5 to W6. In contrast, entering full-time employment ($b = 9.04$, $SE = 2.11$) was associated with transitioning from the alcohol-dominant to the co-use class from W5 to W6.

Taken together, these findings show that school enrollment, full-time employment, romantic relationships, and being married can all act to disrupt the transition to problematic patterns of substance use leading into adulthood. School, employment, and relationship variables predicted transitions to use less substance at subsequent waves particularly during the transition to young adulthood (W4 to W6; ages 18 to 29) when youth are expected to take on normative adult roles like starting a career, getting married, and having children.

Discussion

Prior work identified four substances use classes (alcohol-dominate, co-use, poly-use) and found high class stability across adjacent time points. The current study extended this work by examining the extent to which school, employment, and romantic relationship factors disrupted transitions in stable patterns of substance use across six waves from adolescence (12–18 years of age) to young adulthood (22–28 years of age). Findings indicated that school, employment, and romantic relationship are important protective factors that predicted transitions to lower risk use classes (i.e. alcohol dominate) during this critical developmental period that is typically characterized by greater instability and substance use behavior (Arnett, 2019).

While most adolescence will successfully complete and assume young adult roles like school graduation, obtaining career employment, and getting married and establishing a family, some struggle to accomplish critical developmental tasks during this transition period which can lead to increases in substance use and antisocial behavior (Salmela-Aro, 2009; Schulenberg, Bryant, & O'Malley, 2004). In line with prior research, our findings showed that entering education or training program or obtaining full-time employment predicted the transition from high-risk substance use classes (i.e. poly-use, co-use) to lower risk classes (i.e. alcohol-dominant) in the transition from adolescence to young adulthood. The term Not in Employment, Education, or Training (NEET; Henderson, Hawke, & Chaim, 2017) has been used to describe individuals who struggle with the transition from school or training to sustained employment and have been found to be associated with substance use and mental health problems (Baggio et al., 2014; Fergusson, McLeod, & Horwood, 2014). Efforts that create education and employment opportunities for NEET youth can assist them in developing the necessary skills and experience to achieve adult milestones like continued employment which is associated with lower risk substance use patterns. For example, more opportunities to engage in education, training, and employment opportunities for youth with high-risk substance use patterns may find success. NEET youth have missed normative opportunities to engage in education which in turn affects employment opportunities later in life, efforts that seek to reengage youth in education, training, and career development can help individuals obtain continued employment leading into adulthood.

Findings also showed that marriage and romantic relationships were associated with transitions to lower use classes. Marriage has been known to be associated with improved health and lower risk behavior for several decades (Ross, Hill, & Mirowsky, 2016). Our findings further support previous research by relating marriage and romantic relationships to reductions in types and amounts of substances used leading into adulthood. The protective nature of marriage and romantic relationships may be due to the norms and expectations surrounding the meaning of marriage compared to being single. Further, partners can monitor behavior and act as a social control for risk behaviors like problematic patterns of substance use. Our findings

underscore the importance of marriage and romantic relationship for reducing high-risk use patterns leading into young adulthood.

Limitations

The study had several limitations that should be noted. To begin, most of the participants were White youth, and more studies are needed that include more diverse samples that would generalize to more people. All data were self-report and subject to reporter bias and repeated measure bias. However, we took multiple steps to minimize reporting due to social desirability by using private locations and the stability in reports at each wave was high suggesting the self-reports are reliable. Most importantly, the high stability in the transitions between adjacent waves coupled with the limited sample size ($N=662$) made it difficult to examine the school, employment, and relationship factors at each time point. As such, given this lack of power, findings should be interpreted with caution. While the findings are robust such that school, work, and relationship factors all acted as consistent protective factors, future studies should include larger samples of adolescence to confirm the current findings further.

Conclusions

We investigated whether school, employment, and romantic relationships could disrupt high-risk substance use patterns in the transition from adolescence to young adulthood. Our findings underscore the importance of school completion, obtaining stable career employment, and getting married and starting a family to reduce high-risk substance use patterns leading into young adulthood. Education, employment, and romantic relationships are essential pillars in establishing a healthy and productive life. Prevention and intervention efforts need to consider the diverse needs of youth and be prepared to provide a wide range of services that include educational opportunities and career development if they want to reduce high-risk substance use patterns.

Declarations of interest

The authors report no conflict of interest.

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