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Maltreatment, attachment, and substance use in adolescence: Direct and indirect pathways



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HIGHLIGHTS

- Psychological maltreatment was related to cigarette, alcohol, and marijuana use.
- Physical maltreatment was related to cigarette and marijuana use.
- Maltreatment was associated with attachment avoidance and attachment anxiety.
- Only attachment avoidance predicted substance use.
- Attachment avoidance mediated maltreatment and cigarette and alcohol use.

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ABSTRACT

Past research indicates that maltreatment increases risk for adolescent substance use; however, research is limited on how attachment between adolescents and their parents influences this relationship. The present study examined psychological and physical maltreatment, attachment avoidance and attachment anxiety, and substance use (i.e., cigarettes, alcohol, marijuana, and 'other drugs') among adolescents between the ages of 12 and 18 ($N = 737$; 59.3% female; $M_{age} = 14.69$, $SD = 1.46$). Psychological maltreatment was significantly related to cigarettes, alcohol, and marijuana use, and physical maltreatment was related to cigarette and marijuana use. Exposure to both forms of maltreatment was also associated with increased attachment avoidance and attachment anxiety, but only attachment avoidance predicted substance use. Indirect paths indicated that attachment avoidance mediated the relationship between psychological maltreatment and cigarette ($B = 0.14$, CI [0.001, 0.314]) and alcohol use ($B = 0.09$, CI [0.011, 0.188]). Attachment avoidance also mediated the relationship between physical maltreatment and cigarette ($B = 0.15$, CI [0.031, 0.311]) and alcohol use ($B = 0.09$, CI [0.027, 0.185]). No significant mediated effects for attachment anxiety emerged. Attachment avoidance may increase risk for substance use because youth have a lower rate of disclosing their activities to their parents, and do not seek or accept their guidance. Instead, they may turn to peers who also engage in substance use as a source of support. Interventions designed to increase parent-teen attachment security and decrease attachment avoidance may be particularly useful in reducing risk for substance use.

1. Introduction

Adolescence is a developmental period marked by profound social and neurobiological change in which autonomy takes precedence and risk taking behaviors increase. For many youth this includes experimentation with substances (Sánchez-Queija, Oliva, Parra, & Camacho, 2016; Van Ryzin, Fosco, & Dishion, 2012). For example, the United States National Survey on Drug Use (2016) indicated that 17.6–55.6% of youth in grades 8–12 reported alcohol use in the past year. Marijuana use was reported by 9.4–35.6% of youth in grades 8–12, and street drug

use was reported by 5–14% of youth in these grades. The Canadian Student Tobacco, Alcohol and Drugs Survey (2016) indicated 39.5% of students in grades 7–12 (13–18 years of age) reported alcohol use in the past 12 months and 16.5% of students in these grades reported marijuana use. Although less prevalent, 2% of students in these grades reported cocaine use and 2.4% reported ecstasy use. Additionally, 6% of American students and 3.4% of Canadian students have identified themselves as current cigarette smokers. Identifying malleable risk factors associated with adolescent substance use is essential to the development of effective prevention and risk reduction interventions.

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1.1. The role of maltreatment on substance use

Child maltreatment increases risk for impairment across the lifespan, and is particularly virulent in relation to risk for substance use (Gabrielli, Jackson, Huffhines, & Stone, 2018; Greger, Myhre, Klöckner, & Jozefiak, 2017). For example, physical maltreatment in childhood has been shown to increase binge drinking and other illicit substance use in adolescence (Casanueva, Stambaugh, Urato, Fraser, & Williams, 2014; Snyder & Smith, 2015). Psychological or emotional maltreatment appears to have equivalent, if not greater, negative developmental consequences than other forms of maltreatment (Cecil, Viding, Fearon, Glaser, & McCrory, 2017; Mills et al., 2013; Vahl, Van Damme, Doreleijers, Vermeiren, & Colins, 2016) and psychological maltreatment has been linked to an increase in adolescent drinking behaviors (Hamburger, Leeb, & Swahn, 2008), and other illegal drug use (Moran, Vuchinich, & Hall, 2004). Additionally, both physical and psychological maltreatment in childhood has been shown to increase adolescent cigarette and marijuana use (Harrison, Fulkerson, & Beebe, 1997; Kristman-Valente, Brown, & Herrenkohl, 2013; Mason, Russo, Chmelka, Herrenkohl, & Herrenkohl, 2017). The impact of child maltreatment, particularly psychological maltreatment, can last a lifetime when it comes to risk for substance use and mental health problems. Researchers have found that childhood psychological maltreatment predicted several mental disorders in adulthood, including alcohol abuse and dependence, even after controlling for other forms of maltreatment (i.e., physical and sexual) and dysfunctional family history (Taillieu, Brownridge, Sareen, & Afifi, 2016).

1.2. Maltreatment and attachment

Attachment may be especially significant in relation to substance use given its role in affect regulation (Beckes, IJzerman, & Tops, 2015). The quality of parent-child attachment is powerfully shaped by experiences of maltreatment (Oshri, Sutton, Clay-Warner, & Miller, 2015). According to Bowlby (1982/1969), internal working models or attachment representations emerge over time from the pattern of parent-child interactions and determine how children access and make use of others when distressed. This, in turn, shapes development of self-regulatory competences. Not only does research consistently show a robust relationship between child maltreatment and a propensity to insecure parent-child attachment (Shiakou, 2012; Sutton, 2018), longitudinal studies demonstrate that chronic maltreatment across multiple developmental periods especially elevates the risk of insecure attachment states of mind in adulthood (Raby, Labella, Martin, Carlson, & Roisman, 2017). Research examining whether different types of maltreatment are associated with specific attachment insecurity patterns has produced equivocal findings. For example, whereas physical maltreatment has been associated with attachment avoidance (Unger & De Luca, 2014), psychological maltreatment has been linked to attachment anxiety (Finzi, Ram, Har-Even, Shnit, & Weizman, 2001). Conversely, other research shows that psychological abuse may lead to attachment avoidance and physical abuse may lead to attachment anxiety (Widom, Czaja, Kozakowski, & Chauhan, 2018). Thus, the specificity of relationships between types of maltreatment and types of attachment insecurity remains unclear, and further research is needed.

1.3. The role of attachment security on substance use

Research shows that securely attached children are better able to identify, label, and regulate their emotions compared with insecurely attached children (Brumariu, 2015; Mikulincer & Shaver, 2018). Consistent with this view, McLaughlin, Campbell, and McColgan (2016) argue that attachment security with parents may protect children from substance use. Past studies confirm that attachment insecurity with caregivers increases the risk for substance use (Lindberg & Zeid, 2017; Schindler & Bröning, 2015), and associated problems with emotional,

relational, and academic functioning (Branstetter & Furman, 2013). Most importantly, there is strong evidence that attachment problems predate the onset or increased use of substances. Fairbairn et al.'s (2018) extensive meta-analysis of 665 effect sizes, representing approximately 56,000 participants from 34 samples, revealed evidence of the “temporal precedence” of attachment, indicating that attachment insecurity precedes increases in substance use and this endures across time.

1.4. The present study

Although research has shown that exposure to parental maltreatment increases risk for adolescent substance use, few studies have examined how the quality of attachment between adolescents and their parents influences this relationship. A recent study found that maltreatment was not directly related to adolescent substance use but indirectly predicted increased substance use through poor parent relationship quality (Yoon, Kobulsky, Yoon, & Kim, 2017). However, this study did not differentiate between the effects of attachment security, attachment avoidance and attachment anxiety. The present study was designed to examine the unique roles of different forms of maltreatment (psychological versus physical) and different aspects of attachment (attachment insecurity, attachment avoidance and attachment anxiety) in relation to adolescent substance use. Given the importance of attachment as a regulatory mechanism, we predicted that parent-teen attachment would mediate the relationship between maltreatment and the substance use (see Fig. 1).

2. Method

2.1. Participants and procedures

Participants were a subsample of teens drawn from a large-scale evaluation of an attachment-based parent program for caregivers of at risk teens (Connect; Moretti, Pasalich, & O'Donnell, 2017), utilizing youth self-report data obtained from the pre-treatment evaluation protocol. Caregivers were referred by urban and rural community mental health agencies, schools and hospitals due to serious concerns about their teen's mental health and behavioral functioning. Of 737 teens who participated, only those ages 12 to 18 were included ($N = 528$; 59.3% female; $M_{age} = 14.69$, $SD = 1.46$). Of the sample that reported ethnicity ($n = 378$), over half of the sample identified as Caucasian (65.3%). The remaining sample identified as Asian (6.6%), Aboriginal (8.7%), and other (e.g., mixed race, Hispanic; 19.2%).

At the time of the study, 85.9% of youth were living with their biological parents, 5.3% were in foster care or group homes, and 8.8% were living with other relatives or elsewhere. In total, 10.5% of the sample had been in foster care at some point in their life ranging from one to six placements.¹ Some youth were involved with youth justice including having previously been charged (4.4%), have a conviction (1.5%), or currently on probation (2.8%). Caregiver education levels ($n = 371$) ranged from partial or full completion of high school (32.1%), to partial or full completion of college/university (62.6%), or post-graduate education (5.3%). Exclusion criteria included the presence of a major mental illness (e.g., schizophrenia) or low IQ as reported by the parent. All research protocols and procedures received approval from the University Office of Research Ethics and parental consent and youth assent were collected.

¹ Analyses were repeated with just those youth ($N = 438$; 59.1% female; $M_{age} = 14.67$, $SD = 1.47$) living with biological parents and findings remained consistent.

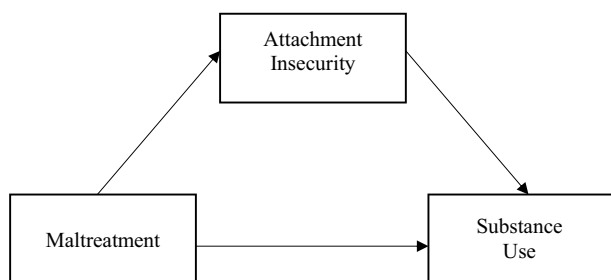


Fig. 1. Mediation model of the association between adolescent maltreatment and substance use frequency by attachment insecurity.

2.2. Measures

2.2.1. Maltreatment

Psychological and physical maltreatment was measured with the Revised Conflict Tactics Scale (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Variants of this measure have been widely used to assess child maltreatment (e.g., Compier-de Block et al., 2017). Youth reported the experiences of psychological (9-items; e.g., “Insulted, put down or called names [for example, name calling such as stupid, lazy, or worthless]”) and physical (7-items; e.g., “Pushed or shoved”) maltreatment in their relationships with their caregiver in the past six months. Each item was rated on a 4-point scale (1 ‘never’ to 4 ‘always’). Internal consistency was good for psychological ($\alpha = 0.88$) and physical ($\alpha = 0.88$) maltreatment.

2.2.2. Attachment

The Adolescent – Parent Attachment Inventory (APAI; Moretti & Obsuth, 2009) is a 36-item measure of adolescent parent attachment adapted from the Experiences in Close Relationships (Brennan, Clark, & Shaver, 1998). Consistent with the ECR and other self-report measures of attachment, two super-ordinate factors tapping attachment anxiety and attachment avoidance have been confirmed (Moretti & Obsuth, 2009; Moretti, Obsuth, Craig, & Bartolo, 2015; Steiger, Moretti, & Obsuth, 2009). The present study adopted a modified version with 16 items to assess attachment anxiety (7-items; e.g., “I worry about being abandoned by my parent”) and attachment avoidance (9-items; e.g., “I usually discuss my problems and concerns with my parent”, reverse scored), drawing on those with the highest factor loadings in prior research. Youth reported on their relationship with their parent over the past 6 months on a 7-point scale (1 ‘strongly disagree’ to 7 ‘strongly agree’). Internal consistency was good to excellent for avoidant ($\alpha = 0.90$), anxious ($\alpha = 0.84$), and total insecure ($\alpha = 0.86$) attachment.

2.2.3. Substance use

Substance use was measured with the Tobacco, Alcohol, and Drugs Survey-Version 3, a 57-item instrument based on measures from the National Longitudinal Study of Adolescent Health (Bureau of Labor Statistics, US Department of Labor, 2011). The present study included four items with youth reporting on their frequency of cigarette smoking, alcohol consumption, marijuana smoking, and use of other drugs (e.g., cocaine, heroin, ecstasy) over the past 30 days. Youth reported the number of days in the past month each substance was used in terms of the following categories: were rated on a 7-point scale (0 ‘0 days’; 1 ‘1–2 days’; 2 ‘3–5 days’; 3 ‘6–9 days’; 4 ‘10–19 days’; 5 ‘20–29 days’; 6 ‘all 30 days’).

2.3. Statistical analyses

Mediation sequential regression analyses were conducted to examine whether attachment insecurity, attachment avoidance, or attachment anxiety mediates the relationship between psychological and/

or physical maltreatment and the frequency of substance (cigarettes, alcohol, marijuana, other drugs) use with the PROCESS macro developed using 10,000 bootstrapped samples. Analyses were run separately for attachment insecurity, attachment avoidance, and attachment anxiety, and for alcohol, cigarettes, marijuana, and other drugs. Subsequently, avoidant and anxious models were computed controlling for the other form of attachment to estimate unique effects attributed to specific types of attachment. Each model examined direct and indirect effects between all study variables controlling for covariates when estimating all possible paths (Hayes, Preacher, & Myers, 2011). Gender differences are reported in relationships between maltreatment, attachment and substance use, and gender was tested as a moderator of mediation in our model. Age was included as a covariate.

3. Results

3.1. Descriptive data

The majority of youth (89.6%) reported experiences of psychological maltreatment within the past six months; in contrast 52.2% of youth reported experiences of physical maltreatment during this time. Of these, most youth reported between 1 and 5 experiences of psychological maltreatment (70.6%) and physical (90.4%); however, 29.4% reported 6–10 experiences of psychological maltreatment and 9.6% reported this rate of physical maltreatment.

A substantial proportion of youth reported substance use within the past 30 days: cigarettes, 22.1%; alcohol, 24.5%; marijuana, 25.6%; other drugs, 6.1%. Of these, most reported between 1 and 9 days of substance use in the past 30 days: cigarettes, 9.4%; alcohol, 22.7%; marijuana, 13.8%; other drugs, 5.1%. A minority reported between 10 and 30 days of substance use: cigarettes, 12.7%; alcohol, 1.8%; marijuana use, 11.8%; other drugs, 1.0%.

3.2. Relationship of maltreatment to substance use

Means and standard deviations of main study variables and correlations for the full sample are presented in Table 1. Consistent with past research, psychological maltreatment was significantly correlated with the frequency of cigarettes, alcohol, and marijuana use, but not ‘other drug’ use. These relationships were comparable across gender. In contrast, physical maltreatment was only significantly correlated with use of cigarettes and marijuana, but not alcohol and ‘other drug’ use. These relationships were varied somewhat across gender: physical maltreatment was significantly related only to cigarette and marijuana use among girls; and cigarettes and ‘other drug’ use among boys.

3.3. Relationship of maltreatment to attachment

Consistent with prior research, we found that psychological and physical maltreatment were significantly correlated with attachment insecurity, and more specifically with both attachment avoidance and attachment anxiety. Whereas psychological maltreatment was more strongly correlated with attachment avoidance than attachment anxiety ($z = 2.930$, $p = .002$), there were no significant differences between attachment avoidance and attachment anxiety for physical maltreatment ($z = 0.699$, $p = .252$). These relationships were also significant across gender; however, psychological aggression was more strongly correlated with attachment anxiety for girls than boys ($z = 3.050$, $p = .001$; $z = 1.245$, $p = .107$, respectively).

3.4. Relationship of attachment to substance use

Finally, attachment insecurity and attachment avoidance, but not attachment anxiety, were significantly correlated with frequency of all substance use types. These relationships were significant and

Table 1
Descriptive statistics and correlations between study variables for the full sample.

Variable	1	2	3	4	5	6	7	8	9
1. Psychological maltreatment	1								
2. Physical maltreatment	0.71***	1							
3. Attachment insecurity	0.43***	0.30***	1						
4. Attachment avoidance	0.40***	0.25***	0.86***	1					
5. Attachment anxiety	0.24***	0.22***	0.66***	0.18***	1				
6. Cigarettes	0.20***	0.16***	0.17***	0.20***	0.02	1			
7. Alcohol	0.16***	0.08	0.17***	0.21***	0.01	0.61***	1		
8. Marijuana	0.18***	0.12***	0.14**	0.16***	0.03	0.51***	0.52***	1	
9. Other drugs	0.06	0.06	0.10*	0.12*	0.01	0.30***	0.35***	0.23**	1
Descriptives									
M	1.71	1.27	3.35	3.87	2.68	0.83	0.47	0.86	0.13
SD	0.60	0.44	1.10	1.50	1.30	1.82	0.98	1.76	0.63
Range	1.00–4.00	1.00–3.86	1.00–6.81	1.00–6.89	1.00–7.00	0.00–6.00	0.00–6.00	0.00–6.00	0.00–6.00

*** $p < .001$.

** $p < .01$.

* $p < .05$.

comparable across gender with the exception that attachment insecurity was significantly associated with use of cigarettes, alcohol, and marijuana use among girls, but only alcohol use among boys.

3.5. Does attachment mediate the relationship between maltreatment and substance use?

Although relatively few gender differences emerged, we first tested whether sex was a moderator of the mediation effects tested in our model. No significant effect emerged to indicate this was the case. Thus, a simplified model was used testing the mediation model in the full sample.

3.5.1. Psychological maltreatment

Table 2 presents total, direct, and indirect effects of psychological maltreatment on frequency of substance use as mediated by attachment insecurity, attachment avoidance and attachment anxiety. Consistent with zero order correlations, psychological maltreatment was significantly associated with cigarette use, alcohol consumption, and marijuana use, but not ‘other drug’ use. Psychological maltreatment was also significantly associated with attachment insecurity, attachment avoidance, and attachment anxiety. However, the model did not show that attachment insecurity was associated with any substance use, and thus, no significant indirect effects were observed.

In contrast, attachment avoidance was associated with cigarette use and alcohol consumption, and mediated the effect between psychological maltreatment and these substances (see Figs. 2–3). Attachment avoidance was not associated with marijuana use and ‘other drug’ use, and thus, there were no significant indirect effects were observed. Attachment anxiety was not associated with any substance use, and thus, there were no significant indirect effects with attachment anxiety and psychological maltreatment and substance use.

3.5.2. Physical maltreatment

Table 3 presents total, direct, and indirect effects of physical maltreatment on frequency of substance use as mediated by attachment insecurity, attachment avoidance and attachment anxiety. Physical maltreatment was significantly associated with cigarette use, alcohol consumption, marijuana use, and ‘other drug’ use. Physical maltreatment was also significantly associated with attachment insecurity, attachment avoidance, and attachment anxiety. However, attachment insecurity was not associated with any substance use, and thus, no significant indirect effects were observed. In contrast, attachment avoidance was associated with cigarette use and alcohol consumption, and mediated the effect between physical maltreatment and these substances (see Figs. 4–5). Attachment avoidance was not associated

with marijuana use and ‘other drug’ use, and thus, no indirect effects were observed. Attachment anxiety was not associated with any substance use, and thus, there were no significant indirect effects with attachment anxiety and physical maltreatment and substance use.

3.6. Unique effects of attachment avoidance vs. attachment anxiety

Finally, we assessed unique relationships between attachment avoidance versus attachment anxiety on substance use (see Table 4). We controlled the relationship between these two dimensions of attachment insecurity in our final analysis. As predicted, attachment avoidance mediated the relationship between psychological maltreatment on cigarette and alcohol use even after controlling for attachment anxiety and age. Further, attachment avoidance mediated the relationship between physical maltreatment on cigarette and alcohol use even after controlling for anxious attachment and age. No significant effects emerged for attachment anxiety in these analyses, pointing to the unique importance of attachment avoidance in relation to substance use.

4. Discussion

The present study examined the relationship between psychological and physical maltreatment during adolescence, attachment insecurity, and substance use among vulnerable youth. Consistent with prior research, adolescents reporting greater psychological maltreatment in their relationships with their primary caregivers were significantly more likely to use cigarettes, alcohol, and marijuana. Similarly, adolescents reporting greater physical maltreatment were significantly more likely to use cigarettes and marijuana. It is well known that adversity, and especially maltreatment, is robustly related to later-life substance use (Gabrielli et al., 2018; Greger et al., 2017). Past studies have focused predominately on childhood experiences of maltreatment. Our findings extend this literature by demonstrating that maltreatment during adolescence is also associated with substance use. We also found that maltreatment experiences were related to attachment insecurity. Specifically, psychological and physical maltreatment were significantly correlated with attachment avoidance and attachment anxiety.

4.1. Attachment and substance use

Results from bivariate associations showed that youth reporting higher levels of attachment insecurity were significantly more likely to report use of cigarettes, alcohol, marijuana and other drugs. These findings are consistent with prior research showing that insecurity

Table 2
Total, direct, and indirect effects of psychological maltreatment on substance use.

Model	B (SE)	95% CI	p	R ²	I/T
Attachment insecurity					
Cigarettes					
Total	0.494(0.147)	0.205, 0.783	0.001	0.061	
Direct	0.404(0.163)	0.084, 0.725	0.014	0.065	
Indirect	0.090(0.066)	-0.037, 0.223			0.182
Alcohol					
Total	0.242(0.082)	0.081, 0.403	0.003	0.089	
Direct	0.200(0.091)	0.022, 0.379	0.028	0.091	
Indirect	0.041(0.039)	-0.029, 0.124			0.169
Marijuana					
Total	0.538(0.141)	0.261, 0.816	0.000	0.069	
Direct	0.539(0.156)	0.232, 0.846	0.001	0.069	
Indirect	0.000(0.069)	-0.135, 0.140			0.000
Other drugs					
Total	0.077(0.056)	-0.033, 0.186	0.168	0.010	
Direct	0.055(0.062)	-0.066, 0.176	0.371	0.012	
Indirect	0.022(0.017)	-0.008, 0.059			0.286
Attachment avoidance					
Cigarettes					
Total	0.494(0.147)	0.205, 0.783	0.001	0.061	
Direct	0.350(0.162)	0.032, 0.668	0.031	0.071	
Indirect	0.144 (0.079)	0.001, 0.314			0.291
Alcohol					
Total	0.242(0.082)	0.081, 0.403	0.003	0.089	
Direct	0.156(0.090)	-0.021, 0.332	0.084	0.101	
Indirect	0.086(0.045)	0.011, 0.188			0.356
Marijuana					
Total	0.538(0.141)	0.261, 0.816	0.000	0.069	
Direct	0.489(0.155)	0.184, 0.794	0.002	0.070	
Indirect	0.050(0.075)	-0.086, 0.207			0.093
Other drugs					
Total	0.077(0.056)	-0.033, 0.186	0.168	0.010	
Direct	0.041(0.061)	-0.080, 0.161	0.507	0.015	
Indirect	0.036(0.025)	-0.011, 0.087			0.468
Attachment anxiety					
Cigarettes					
Total	0.494(0.147)	0.205, 0.783	0.001	0.061	
Direct	0.513(0.151)	0.217, 0.810	0.001	0.062	
Indirect	-0.019(0.033)	-0.098, 0.039			0.038
Alcohol					
Total	0.242(0.082)	0.081, 0.403	0.003	0.089	
Direct	0.264(0.084)	0.099, 0.429	0.002	0.092	
Indirect	-0.022(0.019)	-0.067, 0.011			0.091
Marijuana					
Total	0.538(0.141)	0.261, 0.816	0.000	0.069	
Direct	0.573(0.145)	0.289, 0.857	0.000	0.071	
Indirect	-0.035(0.033)	-0.112, 0.020			0.065
Other drugs					
Total	0.077(0.056)	-0.033, 0.186	0.168	0.010	
Direct	0.083(0.057)	-0.029, 0.195	0.148	0.010	
Indirect	-0.006(0.012)	-0.031, 0.019			0.078

Note. I/T = indirect effect/total effect.

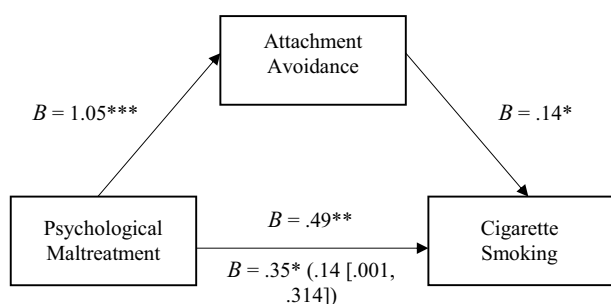


Fig. 2. Mediation of the association between psychological maltreatment and cigarette smoking by attachment avoidance. ****p* < .001; ***p* < .01; **p* < .05.

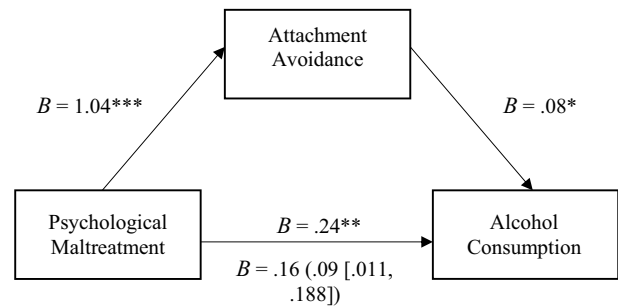


Fig. 3. Mediation of the association between psychological maltreatment and alcohol consumption by attachment avoidance. ****p* < .001; ***p* < .01; **p* < .05.

Table 3
Total, direct, and indirect effects of physical maltreatment on substance use.

Model	B (SE)	95% CI	p	R ²	I/T
Attachment insecurity					
Cigarettes					
Total	0.629(0.199)	0.237, 1.021	0.002	0.058	
Direct	0.517(0.210)	0.105, 0.929	0.014	0.068	
Indirect	0.112(0.065)	-0.006, 0.250			0.178
Alcohol					
Total	0.270(0.111)	0.051, 0.489	0.016	0.082	
Direct	0.213(0.117)	-0.017, 0.443	0.069	0.088	
Indirect	0.057(0.037)	-0.008, 0.136			0.211
Marijuana					
Total	0.619(0.190)	0.245, 0.993	0.001	0.059	
Direct	0.579(0.201)	0.184, 0.973	0.004	0.060	
Indirect	0.041(0.065)	-0.084, 0.172			0.066
Other drugs					
Total	0.192(0.075)	0.045, 0.339	0.011	0.022	
Direct	0.178(0.079)	0.023, 0.333	0.025	0.023	
Indirect	0.014(0.017)	-0.018, 0.050			0.073
Attachment avoidance					
Cigarettes					
Total	0.629(0.199)	0.237, 1.021	0.002	0.058	
Direct	0.480(0.206)	0.075, 0.886	0.020	0.073	
Indirect	0.149(0.071)	0.031, 0.311			0.237
Alcohol					
Total	0.270(0.111)	0.051, 0.489	0.016	0.082	
Direct	0.180(0.115)	-0.046, 0.406	0.119	0.100	
Indirect	0.090(0.040)	0.027, 0.185			0.333
Marijuana					
Total	0.619(0.190)	0.245, 0.993	0.001	0.059	
Direct	0.539(0.198)	0.150, 0.928	0.007	0.064	
Indirect	0.080(0.067)	-0.029, 0.233			0.129
Other drugs					
Total	0.192(0.075)	0.045, 0.339	0.011	0.022	
Direct	0.166(0.078)	0.012, 0.319	0.034	0.025	
Indirect	0.026(0.022)	-0.014, 0.076			0.135
Attachment anxiety					
Cigarettes					
Total	0.629(0.199)	0.237, 1.021	0.002	0.058	
Direct	0.649(0.204)	0.249, 1.050	0.002	0.058	
Indirect	-0.020(0.042)	-0.107, 0.061			0.032
Alcohol					
Total	0.270(0.111)	0.051, 0.489	0.016	0.082	
Direct	0.294(0.114)	0.070, 0.517	0.010	0.085	
Indirect	-0.024(0.023)	-0.074, 0.018			0.089
Marijuana					
Total	0.619(0.190)	0.245, 0.993	0.001	0.059	
Direct	0.654(0.194)	0.281, 1.036	0.001	0.061	
Indirect	-0.034(0.037)	-0.116, 0.033			0.055
Other drugs					
Total	0.192(0.075)	0.045, 0.339	0.011	0.022	
Direct	0.202(0.076)	0.052, 0.353	0.008	0.022	
Indirect	-0.010(0.023)	-0.042, 0.015			0.052

Note. I/T = indirect effect/total effect.

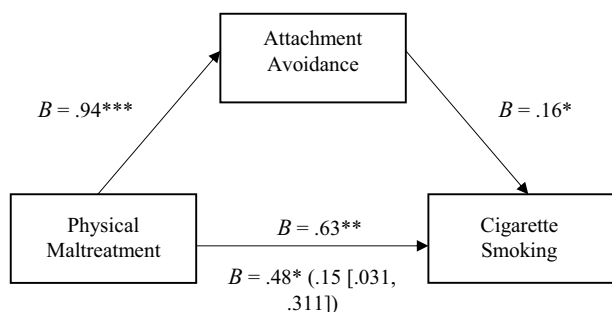


Fig. 4. Mediation of the association between physical maltreatment and cigarette smoking by attachment avoidance. *** $p < .001$; ** $p < .01$; * $p < .05$.

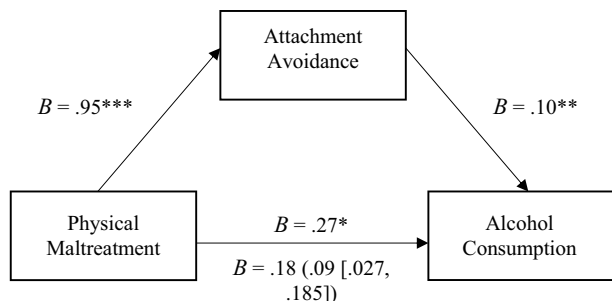


Fig. 5. Mediation of the association between physical maltreatment and alcohol consumption by attachment avoidance. *** $p < .001$; ** $p < .01$; * $p < .05$.

within the adolescent-parent relationship is related to higher levels of substance use (Lindberg & Zeid, 2017; Schindler & Bröning, 2015). We also found that attachment avoidance was significantly related to the use of cigarettes, alcohol, marijuana, and other drugs. In contrast, attachment anxiety was not associated with increased substance use. These findings are consistent with prior research (e.g., Fairbairn et al., 2018; Schindler & Bröning, 2015) linking attachment avoidance, rather than attachment anxiety, to substance use.

4.2. Attachment mediates the effect of maltreatment on substance use

We also found some evidence that attachment insecurity mediated the relationship between maltreatment and substance use. Physical and psychological maltreatment was associated with attachment insecurity, and more specifically attachment avoidance, which indirectly increased adolescent cigarette and alcohol use. However, this pathway was not significant for marijuana or other drugs, nor was mediation observed for attachment anxiety. These findings extend past research (Lindberg & Zeid, 2017) with adult samples and reveal the differential role of attachment avoidance versus attachment anxiety in relation to substance use.

Insecure attachment derails the development of adaptive affect regulation (Mikulincer & Shaver, 2018), and increases risk for psychological and behavioral problems in adolescents. In addition, teens that experience maltreatment and develop insecure attachment may precociously turn from parents to peers who share similar problems for support to meet their attachment needs (Folger & Wright, 2013; Oldfield, Humphrey, & Hebron, 2016; Sierra Hernandez & Moretti, in press). In turn, affiliation with delinquent peers is a known risk factor for adolescent substance use (Kliewer et al., 2018; Van Ryzin & Dishion, 2014).

Attachment avoidance may be especially important in relation to adolescent substance use. It is characterized by a reluctance to disclose or discuss personal experiences or concerns with attachment figures. This reflects a basic lack of trust in the availability and/or sensitivity of attachment figures to provide understanding and support. We found

Table 4

Total, direct, and indirect effects of psychological maltreatment on substance use with simultaneous entry of attachment avoidance and attachment anxiety.

Model	B (SE)	95% CI	p	R ²	I/T
Psychological maltreatment					
Cigarettes					
Total	0.494(0.147)	0.205, 0.783	0.001	0.061	
Direct	0.371(0.164)	0.049, 0.692	0.024	0.073	
Indirect – avoidance	0.153(0.083)	0.003, 0.330			0.310
Indirect – anxiety	−0.029(0.036)	−0.115, 0.032			0.059
Alcohol					
Total	0.242(0.082)	0.081, 0.403	0.003	0.089	
Direct	0.176(0.091)	−0.002, 0.354	0.053	0.107	
Indirect – avoidance	0.095(0.047)	0.015, 0.199			0.393
Indirect – anxiety	−0.029(0.021)	−0.079, 0.006			0.120
Marijuana					
Total	0.538(0.141)	0.261, 0.816	0.000	0.069	
Direct	0.517(0.157)	0.208, 0.825	0.001	0.074	
Indirect – avoidance	0.061(0.077)	−0.079, 0.225			0.113
Indirect – anxiety	−0.039(0.090)	−0.119, 0.018			0.072
Other drugs					
Total	0.077(0.056)	−0.033, 0.186	0.168	0.010	
Direct	0.047(0.062)	−0.075, 0.169	0.451	0.016	
Indirect – avoidance	0.038(0.027)	−0.014, 0.095			0.494
Indirect – anxiety	−0.009(0.014)	−0.037, 0.018			0.117
Physical maltreatment					
Cigarettes					
Total	0.629(0.199)	0.237, 1.021	0.002	0.058	
Direct	0.510(0.209)	0.100, 0.920	0.015	0.076	
Indirect – avoidance	0.158(0.075)	0.035, 0.334			0.251
Indirect – anxiety	−0.039(0.045)	−0.139, 0.044			0.062
Alcohol					
Total	0.270(0.111)	0.051, 0.489	0.016	0.082	
Direct	0.206(0.116)	−0.022, 0.435	0.076	0.106	
Indirect – avoidance	0.099(0.043)	0.031, 0.201			0.367
Indirect – anxiety	−0.036(0.025)	−0.092, 0.008			0.133
Marijuana					
Total	0.619(0.190)	0.245, 0.993	0.001	0.059	
Direct	0.573(0.200)	0.180, 0.967	0.004	0.068	
Indirect – avoidance	0.092(0.070)	−0.022, 0.255			0.149
Indirect – anxiety	−0.046(0.039)	−0.134, 0.023			0.074
Other drugs					
Total	0.192(0.075)	0.045, 0.339	0.011	0.022	
Direct	0.176(0.079)	0.021, 0.331	0.026	0.027	
Indirect – avoidance	0.030(0.025)	−0.015, 0.086			0.156
Indirect – anxiety	−0.014(0.016)	−0.050, 0.014			0.073

Note. I/T = indirect effect/total effect.

that teens reporting psychological maltreatment in their relationships with parents were particularly prone to report high levels of attachment avoidance and exposure to psychological maltreatment was exceedingly common in our sample (89.6%). Psychological maltreatment, in conjunction with attachment avoidance, likely curtails teens' disclosures to their parents about their activities and peer relationships. As a result, parental monitoring and control – a critical driver of adolescent risk behaviors and substance use in particular – may be greatly diminished. Conversely, the hallmark of attachment anxiety is high levels of approach, disclosure and the need for reassurance from attachment figures. This is unlikely restrict parental monitoring and guidance; however, it may curtail exploration during adolescence and the development of age-appropriate social skills.

4.3. Limitations and future directions

Several limitations are noteworthy in tempering the interpretation of our findings. First, we relied on youth self-report information. Evidence suggests that youth are in an advantageous position to report on many domains of their behavior including their use of substances (Abar, Jackson, Colby, & Barnett, 2015; Chen, Ho, Lee, Wu, & Gau, 2017). Nonetheless, self-report measures are inherently limited in

assessing other aspects of functioning such as attachment related behaviors. Ideally, future research will also include interview and/or observational methods to assess attachment. Second, we focused on adolescents' experiences of maltreatment within the past six months as this is particularly relevant in terms of concurrent adolescent substance use; however, earlier and cumulative maltreatment experiences are also important in predicting substance use trajectories. Further, it is important to include that other forms of adverse adolescent experiences, such as stressful life events, victimization and bullying by peers, as these have been shown to increase use (e.g., Maniglio, 2015). Third, we did not assess whether substance use was associated with impairment of functioning nor did we evaluate the contexts in which substances were consumed (alone or with others). Assessing these components of use would expand our understanding of the relationship between maltreatment, attachment, and substance use patterns. Fourth, prospective research is required to better understand the long term and transactional role of attachment as a mediator of the relationship between maltreatment and substance use, and future research should also examine objective observational or multi-informant measures of attachment. Finally, although past research confirms the importance of attachment security in mitigating risk for substance use among adolescents from diverse samples (Branstetter, Furman, & Cottrell, 2009; Schindler et al., 2005), future studies should directly compare the fit of these models across typically developing and at-risk samples of adolescents.

4.4. Conclusion

These limitations notwithstanding, the current findings underscore the deleterious impact of maltreatment during adolescence and highlight the importance of parent-teen relationship attachment as a risk factor and possible mediator in the relationship between maltreatment and substance use. Attachment based parent interventions have been recognized as essential to preventing or mitigating the effects of child maltreatment (Cyr & Alink, 2017), yet the bulk of child maltreatment prevention and treatment is focused predominantly on the early years (Mikton & Butchart, 2009). The rates of exposure to emotional and physical maltreatment among teens in this clinical sample are concerning and call for greater attention to the prevention of maltreatment during adolescence. In addition, recently developed attachment-based interventions for teens and their parents hold considerable promise in reducing risk for substance use among teens (Krauthamer Ewing, Levy, Scott, & Diamond, 2017; Moretti et al., 2017) with emerging evidence of reducing risk for alcohol use in typically developing teens (Giannotta, Ortega, & Stattin, 2013).

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