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Parent-Adolescent Relationship Characteristics and Adolescent Cannabis Use: A Growth Curve Analysis

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Abstract

Background: Adolescent cannabis misuse may be associated with serious academic, conduct, and health problems. Identifying factors associated with adolescent cannabis misuse over time may provide insight to address these factors in interventions. Parent-adolescent relationship characteristics (i.e., attachment, discipline) have been linked to adolescent cannabis misuse and may be important factors to study.

Objectives: We investigated time-varying associations between parent-adolescent relationship domains and weekly adolescent-reported cannabis misuse. We hypothesized that during times when parents reported less positive aspects of their relationship with their adolescents, adolescents would report higher levels of cannabis misuse.

Methods: Data were drawn from a community clinic treatment study for adolescents with substance use and co-occurring psychiatric disorders (n=110; average age=15.71; 57.3% male). Latent growth modeling with time-varying predictors (parent-adolescent relationship characteristics) was used to examine if the associations between adolescent cannabis misuse and relational frustration, discipline, and attachment varied across the study period (baseline, 3-, 6-, and 12-months).

Results: Weekly cannabis misuse significantly increased over time, even after accounting for parental relationship characteristics. When parents rated higher levels of relational frustration relative to their average level of frustration, adolescents reported higher cannabis misuse at all study periods except 12-month follow-up.

Conclusion: Results support the importance of considering how specific aspects of the parent-adolescent relationship, in this case elevated parental frustration, are associated with adolescent

cannabis misuse during treatment and after its completion. Findings suggest parental relationship frustration is a key factor to assess and address within individually tailored interventions for co-occurring cannabis misuse and psychiatric disorders.

Keywords

adolescents; cannabis; frustration; parenting; time-varying analyses

Introduction

Cannabis misuse in adolescence is linked to serious legal, academic, and interpersonal consequences. There was a significant increase in daily cannabis use from 2018 to 2019 amongst 8th and 10th grade adolescents (1), an alarming statistic considering 17% of individuals who initiate cannabis misuse during adolescence become addicted (2, 3). It is important to consider proximal factors that may shape adolescent cannabis misuse. First, adolescent cannabis misuse tends to co-occur with psychiatric disorders, including anxiety, depression, and disruptive behavior disorders (4–6). Second, relevant to this developmental period, parent-adolescent relationship characteristics (e.g., style, bonding, monitoring) provide a theoretical and empirical basis for understanding the broader context in which initiation and maintenance of substance use occurs (7–9). Therefore, parent-adolescent relationship factors may be associated with changes in cannabis misuse and have been important targets for youth substance use interventions (10–12).

Successful treatment for adolescent cannabis misuse is challenging, especially in the context of co-occurring psychiatric disorders. Many adolescents with co-occurring disorders have a chronic, relapsing condition that may require a different treatment approach (4, 10, 12). Treatments that include a parenting or family component to support the adolescent, reduce family conflict, and increase adaptive behaviors like rule-setting and monitoring show potential for reducing impairment (10, 13–15). Specifically, characteristics of the parent-adolescent relationship, including warmth, attachment, control, and discipline have been linked to adolescent psychopathology and problem behavior, including substance use (16–23). In the context of psychiatric disorders, parent-youth relationships can be complicated and a source of frustration and stress (24, 25). Challenging parent-youth interactions regarding control and discipline can initiate a coercive, reciprocal process, decreasing positive parenting behaviors and monitoring, and subsequently influencing adolescent externalizing behavior (11, 18, 26, 27).

Some adolescent treatment studies have found that including a parenting component reduces substance use (10, 14). For example, a study comparing Multidimensional Family Therapy (MDFT) and adolescent group therapy used latent growth curve modeling to investigate change in substance use and parenting (13). MDFT participants reported greater parental monitoring improvement than participants assigned to group treatment, and for all participants, improved monitoring was associated with a greater abstinence over the course of the year follow-up. In addition, sometimes the timing and/or amount of support for parent-adolescent relationship factors may be insufficient, especially in samples with co-occurring disorders (12). To illustrate the importance of timing, one study found parent

report of negative discipline behaviors initially improved post-treatment but then declined before improving again (28). Furthermore, these changes in negative discipline were significantly associated with adolescents' cannabis abstinence at follow-up (28).

For adolescents already using substances and engaged in treatment, research that can identify specific relational factors associated with the trajectory of misuse over the course of treatment can inform and improve the quality of adolescent cannabis misuse treatments. Furthermore, insights into the dynamic nature of the parent-adolescent relationship (i.e., whether the relationship changes as a function of time) may inform future work by highlighting specific periods of time during treatment in which parent-adolescent relationships are most closely linked with cannabis misuse. Using methods that are sensitive to changes in longitudinal associations between constructs over the course of a study, such as latent growth curve modeling (13, 29, 30), can accomplish these goals while also facilitating the investigation of (a) the overall trajectory of change, and (b) individual differences in change (31, 32).

The purpose of this study was to investigate associations between parent-reports of parent-adolescent relationship factors and the trajectory of adolescent-reported cannabis misuse in a secondary analysis of a community-based treatment study for co-occurring adolescent substance misuse and psychiatric disorders during treatment and over a 12-month follow-up period. Given that parent-adolescent relationships may be characterized by both between-person effects (i.e., some parent-adolescent dyads may have poorer relations than others) and within-person effects (i.e., parent-adolescent relationship characteristics may fluctuate over the course of time), we hypothesized adolescent cannabis misuse would be highest during times when parent-adolescent relationships are poorer, relative to their average level (i.e., within-person effects). We utilized latent growth curve modeling with time-varying predictors to model the trajectory of adolescent cannabis misuse in conjunction with changes in relationship characteristics over the course of the study. Specifically, we hypothesized: 1) adolescents would report lower cannabis misuse during times when parents reported greater quality attachment; 2) adolescents would report higher cannabis misuse when parents reported greater relational frustration; and 3) adolescents would report lower cannabis misuse when parents reported greater use of discipline.

Methods

Participants

Participants included 110 adolescents and their caregiver (hereafter referred to as "parent"). As part of a larger study, adolescents (n=111) were recruited from a community mental health clinic located in the northeastern United States. Adolescents were eligible for the study if they were enrolled in the co-occurring disorders home-based program (IOP) at the clinic and: (a) were 12–18 years of age, (b) reported alcohol and/or other substance use in the prior three months; (c) had an Axis I psychiatric disorder based on DSM-IV criteria assessed via a structured diagnostic interview, the Kiddie-Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL; 33), and (d) were English speaking. Participants were excluded from the study if they: (a) had serious psychotic symptoms (e.g., hallucinations) or a primary diagnosis of an eating

disorder or Obsessive-Compulsive Disorder, or (b) were acutely suicidal or homicidal. One participant was missing reports of past-week cannabis misuse and parent-adolescent relationship characteristics at all assessments and was excluded from the present study.

Procedure and Intervention Characteristics

All study procedures were approved by university and hospital Institutional Review Boards prior to the start of data collection. Adolescents who presented to treatment at the community mental health clinic IOP were approached to participate in the study with their parent. Families provided written consent/assent and were administered a baseline assessment battery. Families were also administered follow-up assessment batteries at 3, 6, and 12 months post-baseline. Study data were collected and managed using REDCap (Research Electronic Data Capture), a secure, web-based software platform designed to support data capture for research studies (34, 35). Families received compensation for completing assessments.

The objective of the primary study was to compare treatment as usual (TAU) to an experimental condition (EXP; see 36 for detail) for adolescents with co-occurring psychiatric and substance use disorders. In the TAU condition, therapy was eclectic and included the use of supportive therapy and basic cognitive behavioral therapy (CBT) techniques. In the EXP condition, therapists followed a family-focused CBT treatment protocol and received weekly supervision on implementation of the protocol. After the baseline assessment, families were randomly assigned to one of the two treatment conditions. Treatment was typically approved by insurance companies for 12 weeks. The current study is a secondary analysis of this data and not an examination of the main outcomes of the trial.

Measures

Demographics.—This survey assessed age, self-reported biological sex, and race/ethnicity.

Adolescent cannabis misuse.—At baseline, adolescents reported on *the number of days* they used a specific substance (e.g., cannabis, cocaine) in the past week, three, six, and 12 months. At the three follow-up visits, they were asked about past week and time since last assessment substance use. To examine data with the best recall accuracy, only past week data for each assessment point were analyzed.

Parent-adolescent relationship characteristics.—The Parenting Relationship Questionnaire for children and adolescents (PRQ-CA; 37), a 71-item parent self-report measure, assessed dimensions of the parent-adolescent relationship. The following subscales were used in this study: Attachment: parents' perceptions of closeness, empathy, and understanding they feel for their youth; Relational Frustration: parents' experience of stress and frustration around managing their youth's behavior and emotions; and Discipline Practices: parents' beliefs that following rules is important and responding to misbehavior/rule-breaking with consequences or discipline.

The PRQ was administered to parents at baseline and at 3-month, 6-month, and 12-month follow-up visits. Across baseline and follow-ups, internal consistency ranged from $\alpha = .77-.81$ for the Attachment subscale, $\alpha = .89-.93$ for Relational Frustration, and $\alpha = .82-.87$ for Discipline Practices. For participants who had at least 75% of a measure completed, we used item-level mean imputation to fill in missing items in order to create subscale scores.

Analytic Strategy

Latent growth curve models with a time-varying predictor were used to assess the trajectory of cannabis misuse over time while simultaneously estimating the effect of time-varying parent-adolescent relationship factors during the course of an intervention (32, 38, 39). This approach facilitates the estimation of a time-varying predictor (PRQ subscales) on a time-varying outcome (cannabis misuse), allowing identification of both *whether* an association exists as well as *when* that association is strongest (i.e., via occasion-specific effects on the outcome). Thus, results from this model represent the net effect of parent-adolescent relationship characteristics above and beyond the trajectory of adolescent cannabis misuse, thereby providing an overall indication of the role that parent-adolescent relationship characteristics may play in adolescent cannabis misuse while controlling for other factors that might impact cannabis misuse (i.e., time and other covariates/predictors included in the model) (38). An added advantage of this approach is the flexible disaggregation of the between and within components of the PRQ subscales and their relationship with cannabis misuse in order to distinguish between processes that are due to within-person variability (i.e., adolescents may misuse cannabis more when parents rate discipline higher/lower than they do on average) or between-person variability (i.e., some parents use discipline more than others)(31). In structural equation modeling, this is achieved by modeling a time-varying predictor with a random intercept, regressing it on the outcome's intercept to obtain a contextual effect, and estimating the time-varying associations of the predictor and outcome at each repeated assessment (39). The contextual effect represents the combined between-person and within-person effect, thereby providing an easy calculation for the between-person effect (between-person effect = contextual effect + within-person effect). In the current study, we use this approach to: 1) estimate the trajectory of adolescent cannabis misuse during the course of the intervention; 2) estimate the time-varying associations between between-person and within-person effects of parent-adolescent relationship domains and adolescent cannabis misuse during the course of intervention; and 3) assess whether the within-person effect changes over time or remains stable throughout assessment.

To assess our main hypotheses, model testing proceeded via a series of iterative steps. First, to characterize the trajectory of cannabis misuse over the course of the intervention without considering parent-adolescent relationships, we fit an unconditional latent growth model that did not account for the effects of any other predictors/covariates. Second, three separate models were fit to determine the between-/within-person associations between each PRQ subscale (Attachment, Discipline, Relational Frustration) with cannabis misuse over the duration of the study. As a preliminary step, we fit individual growth models for each PRQ subscale separately to determine whether parent-rated relationship factors changed as a function of time over the course of the intervention. If there was significant change over time

for a given PRQ domain, we included a slope parameter for PRQ in subsequent models to account for change in that domain over time. Otherwise, models proceeded using the random intercept of each domain. We then fit three models to determine whether within-person differences in PRQ are associated with adolescent cannabis misuse while controlling for between-person differences in PRQ. In these models, repeated assessments of cannabis misuse were regressed on repeated assessments of PRQ and a random intercept for PRQ was included to provide the contextual effect (see (38, 39) and Figure 1 for the hypothesized model). Finally, to assess whether the within-person effect changed over the course of follow-up, the constraints on the within-person effects for all models fit in the previous step were relaxed, allowing for occasion-specific effects (i.e., time-varying) to be estimated at each follow-up. This allowed us to determine if the observed effects were consistent across time or whether specific follow-ups evidenced stronger/weaker effects.

Several parameters were estimated to address our hypotheses, including: (a) the means and variances of two latent variables representing the cannabis misuse trajectory: the *intercept* (level of cannabis misuse at baseline), and the *slope* (rate of change in cannabis misuse over time); (b) the mean and variance of the latent variable representing the random intercept of the PRQ subscale (i.e., the contextual effect); (c) the within-person effect of PRQ and cannabis misuse (i.e., to test whether deviations from an individual's average PRQ subscale score were associated with cannabis misuse); and d) the between-person effect of PRQ and cannabis misuse (to test whether higher/lower PRQ subscale scores, relative to other individuals, are associated with cannabis misuse). For all models, time was coded with loadings that reflected months since baseline (i.e., 0, 3, 6, and 12). Given that prior work has shown higher levels of cannabis misuse among individuals with internalizing disorders (40–42), and we found significantly greater cannabis misuse at baseline ($\beta[75.13] = -2.24, p = .028$) and 3-month follow-up ($\beta[56.54] = -2.74, p = .008$) amongst those with an internalizing disorder (but not an externalizing disorder), our hypothesized models controlled for whether the adolescent had a current diagnosis of one or more of the following: major depressive episode, generalized anxiety disorder, social phobia, post-traumatic stress disorder, dysthymia. Models also adjusted for the effects of age (centered around mean age at baseline), sex, and treatment condition.

Model fit was evaluated using the χ^2 statistic, Comparative Fit Index (CFI; >0.9 indicate good fit), and Root Mean Square Error of Approximation (RMSEA; <0.08 indicate good fit) (43, 44). Data management was conducted using IBM SPSS Version 25 and Rstudio version 1.2.1335 (45) and analyses were conducted using Mplus version 7.31. Consistent with other randomized trials, full information maximum likelihood estimation was implemented under the missing at random assumption to accommodate cases with partially missing outcomes due to missed appointments, resulting in an analytic sample size of 110 (30, 46–49). At baseline, 8.18% of youth were missing cannabis misuse data. Across follow-up, 19.09% of youth were missing cannabis misuse data at the 3-month assessment, 20.00% at the 6-month follow-up, and 16.36% the 12-month follow-up.

Results

Demographics

Demographic sample characteristics are presented in Table 1. Analyses included 110 ($N_{TAU} = 49$; $N_{EXP} = 61$) adolescents who were primarily male, White/Caucasian, and had a mean age of 15.71. Over half of participants were diagnosed with Cannabis Dependence, a quarter were diagnosed with Cannabis Abuse, over 80% had two or more non-substance use psychiatric diagnoses, and 70% had an internalizing disorder. No significant differences were observed for demographic variables or substance use diagnoses across treatment conditions. There was one significant between-group difference: at baseline, TAU parents reported significantly higher levels of Relational Frustration than EXP parents ($t[85.24] = 2.19$, $p = .031$, $d = 0.44$). Table 2 presents the descriptive statistics for past-week cannabis misuse and parent-adolescent relationship characteristics.

Unconditional Model: Trajectory of Cannabis Misuse

The unconditional model (Table 3 excluding covariates and predictors) demonstrated good model fit. The intercept indicated that average cannabis misuse at baseline was 1.92 days per week. The significant intercept variance indicated that individuals vary in the amount of cannabis misuse. The significant slope indicated an overall increase in weekly cannabis misuse across follow-up, and the significant slope variance indicated that individuals varied in their rate of change. The intercept/slope covariance was not significant, suggesting there was no relationship between frequency of baseline cannabis misuse and how much they changed over time (e.g., youth with more frequent baseline cannabis misuse did not increase at a higher rate than youth with less frequent cannabis misuse, and vice versa). After adjusting for treatment condition, age, sex, and internalizing disorder status, results indicated that individuals with an internalizing disorder had higher baseline cannabis misuse and that older adolescents tended to increase their cannabis misuse at a faster rate. Neither treatment condition nor sex revealed a significant relationship with cannabis misuse intercept or slope.

Time-Varying Effects of Cannabis Misuse with Parenting Domains

Preliminary models, which examined whether PRQ subscales changed as a function of time, revealed a significant decrease in Relational Frustration during the study period (slope = -0.16 , $SE = 0.053$, $p = 0.002$, variance not significant) but no significant changes in Attachment or Discipline. Thus, subsequent models for Relational Frustration incorporated a slope parameter to account for this decrease.

Conditional latent growth models incorporated the time-varying within-person and between-person effects of PRQ subscales with cannabis misuse in three separate models, adjusting for the effects of relevant covariates (Table 4). Adolescent cannabis misuse significantly increased over time, even after accounting for parent-adolescent relationship factors, treatment condition, age, internalizing disorder diagnosis, and sex. The significant slope variance indicated that the rates of change significantly varied across individuals. Between-person level associations among PRQ subscales and adolescent cannabis misuse were non-significant. Within-person estimates, however, revealed that when parents rated higher levels of Relational Frustration than they normally reported, adolescent cannabis misuse was also

higher. Follow-up analyses in which the within-person estimates were allowed to vary across assessment (i.e., occasion-specific effects) are presented in Table 5. Significant positive associations were observed between Relational Frustration and cannabis misuse for baseline, 3-, and 6-month assessments, but a non-significant association at month 12. No significant effects were observed for any of the within-person effects or time-varying associations between cannabis misuse and Attachment or Discipline.

Discussion

This study investigated time-varying associations between parent-reported relationship domains (attachment, relational frustration, and discipline) and past-week adolescent-reported cannabis misuse in a sample of adolescents with co-occurring psychiatric disorders and substance misuse. Adolescents reported high levels of cannabis misuse, which increased over the follow-up period even after accounting for treatment condition, age, sex, internalizing disorder diagnosis, and parent-adolescent relationship characteristics. There was a significant, positive effect of age on slope for cannabis misuse, such that frequency of cannabis misuse increased at a higher rate among older adolescents. This finding is consistent with other studies showing that rates of cannabis misuse increase with age (50, 51). The finding also supports the involvement of parents in treatment as early as possible in adolescence to limit harmful trajectories (52). Further, confirming the complexity involved with treating co-occurring disorders, adolescents with an internalizing disorder had higher baseline cannabis misuse.

Relational frustration was associated with adolescent cannabis misuse at the within-person, but not the between-person, level. That is, during assessments where parents reported higher levels of relational frustration than their average, youth also tended to report more frequent cannabis misuse. However, when time-varying within-person associations were examined, this effect was present at all time periods except 12-month follow-up. Furthermore, there were no between-person differences, indicating that within-person effects drive the association between relational frustration and cannabis misuse. Because we focused on disentangling between-person (differences in parent-adolescent relationship characteristics across families) and time-varying within-person effects (fluctuations in parent-adolescent relationship characteristics relative to their average values) of parent-adolescent relationship qualities and adolescent cannabis misuse, the present study cannot determine if cannabis misuse drives parental frustration, or vice versa. It is possible that parent-adolescent interactions result in reciprocal or evocative effects, representing complex and bidirectional relationships in which causality is difficult to determine (53).

To our knowledge, this is the first study to investigate the association between parent-reported relational frustration and adolescent cannabis misuse, limiting comparisons to other findings. However, perceived parental rejection which, like frustration, is negatively-valenced, has been associated with adolescent cannabis use intentions (54). Broadly, parent-adolescent processes like conflict and hostility, which can emanate from relational frustration, are associated with adolescent externalizing behaviors and maladjustment (55, 56). Parents can also be frustrated and experience stress when caring for adolescents with internalizing disorders (24). Therefore, when caring for an adolescent with both cannabis

misuse and a psychiatric disorder, it makes sense that parents would experience stress and frustration, and it is important to consider how it may impact the effectiveness of treatment both short- and long-term.

Contrary to hypotheses and prior research, we did not find an association between cannabis misuse and discipline or attachment (16, 28). Discipline is similar to the construct of parental control which, in the absence of a supportive relationship, is related to adolescent problem behavior (7, 18). Similar findings exist for parental monitoring (57). In the context of co-occurring disorders interventions, it would be useful to explore in a more qualitative manner how parents perceive the effectiveness of using discipline as a strategy to manage adolescents' problem behavior.

Our results affirm the important link between parents and youth when it comes to implementing interventions for adolescent problem behavior, especially co-occurring disorders (4, 12, 13, 15, 58, 59). Indeed, our finding of within-person effects, but not between-person, points to tailoring interventions to the dyad, given that it was in situations when parents reported higher-than-their-average frustration that adolescents also reported higher cannabis misuse (60). Dyads may benefit from a therapist normalizing the chronic nature of co-occurring disorders at the outset of treatment, explaining the link between frustration and cannabis misuse, assessing the dyad members' perceptions of how cannabis misuse affects their relationship and vice versa (61), and then developing methods to increase parental frustration tolerance. Because adolescents with internalizing disorders had higher baseline cannabis misuse, it may be helpful to assess if cannabis misuse is part of a general pattern of behavior or serves as a coping function. A benefit of our analytic approach is the focus on time-varying factors that may be differentially associated with cannabis misuse over time. Given the significant associations from baseline to 6-month follow-up, but not 12 months, devoting session time to parent-adolescent relationship factors as part of relapse prevention appears indicated. Booster sessions every few months may also be indicated. Interestingly, the within-person association between frustration and cannabis misuse was not significant at 12-month follow-up. The slope of relational frustration significantly decreased over time, and as seen in Table 2, the sample average of relational frustration was at its lowest at this time point; thus, whether parents have appropriately managed their expectations for parenting an adolescent with co-occurring disorders at that point, or whether parents have instead become disengaged is unclear, and warrants more investigation.

Strengths of the current study include focusing on a high acuity, treatment-seeking sample, including parent-report of parenting and adolescent-report of adolescent behavior (i.e., shared reporter variance does not explain results); and using latent growth modeling because it provided novel insights into the time-varying association between parental frustration and adolescent cannabis misuse. With respect to limitations, the study was conducted in a real-world setting of community clinic, thus retention of families was challenging. Moreover, because only one caregiver was assessed, predominantly mothers, it is possible some adolescents had different relationships with their other caregiver. We relied on adolescent self-reported substance use, without biological confirmation, which would have been preferable. Given the severity of the presenting problems in this sample, our findings may be

less applicable to adolescents who do not have co-occurring cannabis misuse and psychiatric problems. Not all subscales of the parenting measure were analyzed; we chose to focus on subscales that tend to be more closely associated with substance use. For example, prosocial characteristics, such as parental bonding and warmth, protect against youth problem behavior whereas parents' attempts to implement discipline without a supportive relationship are associated with coercive exchanges and relationship deterioration (7, 18). Our selection of subscales is consistent with other research (62) and limited the number of comparisons in this study. The original study was not designed to disentangle causal effects between parent-adolescent relationships and substance use, and follow-up assessments were unequally spaced and not proximal (complicating lagged associations). Rather, our findings focused on between-person and contemporaneous within-person associations to examine adolescent cannabis misuse following completion of intensive treatment (which occurred between 3- and 6-months in this study). Given the complex and dynamic nature of parent-adolescent relationships, future research should seek to test hypotheses regarding directionality using study designs that incorporate more intensive assessments as a means of better understanding the processes underlying cannabis misuse behavior and parent-adolescent interactions (e.g., ecological momentary assessment).

In conclusion, findings underscore the importance of considering time-varying within-person associations of parental frustration in adolescent substance use interventions both at intake, to develop a tailored treatment plan accounting for relationship concerns, and at discharge, to understand its possible effects on continued adolescent cannabis misuse. Because cannabis misuse was specifically associated with elevated relational frustration, novel interventions may consider developing methods for providing support for parents and adolescents by helping them recognize times of heightened stress and frustration and proactively identifying problem-solving strategies.

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Figure 1.

Hypothesized path model for the time-varying association between adolescent-reported cannabis misuse and parent-reported parenting domains (38). Covariates are included in the analyses but excluded here for simplicity. CM: number of days past-week cannabis misuse; PRQ: Parenting Relationship Questionnaire; BL=baseline; 3 m 6 m 12 m = 3-, 6-, 12-month follow-up, respectively.

Table 1**Demographics and Psychiatric Diagnoses**

Variable	<i>M</i>	<i>SD</i>
Adolescent Age (range 13–18)	15.71	1.18
Parent Age (range 31–74)	42.24	8.11
	<i>N</i>	%
Adolescent Biological Sex		
Male	63	57.3%
Female	47	42.7%
Parent Biological Sex		
Male	17	15.5%
Female	93	84.5%
Adolescent Race		
Black/African American	12	10.9%
Multiracial	13	11.8%
White/Caucasian	78	70.9%
Other	3	2.7%
Adolescent Hispanic/Latino/a	33	30.0%
Presence of Adolescent Psychiatric Diagnoses		
Cannabis Abuse	27	24.5%
Cannabis Dependence	67	60.9%
Current Major Depressive Episode	64	58.2%
Current Dysthymia	4	3.6%
Bipolar Disorder	1	0.9%
Generalized Anxiety Disorder	37	33.6%
Social Anxiety Disorder	22	20.0%
Attention Deficit Hyperactivity Disorder	60	54.5%
Oppositional Defiant Disorder	71	64.5%
Conduct Disorder	62	56.4%
Alcohol Abuse	21	19.1%
Alcohol Dependence	17	15.5%

Variable	M	SD
Other Substance Abuse	4	3.6%
Other Substance Dependence	15	13.6%
Post-Traumatic Stress Disorder	22	20.0%
Number of Current Co-Occurring Non-Substance Use Adolescent Psychiatric Diagnoses		
None	5	4.5%
One	13	11.8%
Two	21	19.1%
Three	25	22.7%
Four	21	19.1%
Five to Seven	23	20.9%

Note. M = mean; SD = standard deviation.

Age was unknown for one parent. Race was unknown for four adolescents; Hispanic/Latino/a status was unknown for three adolescents; status of cannabis abuse/dependence was unknown for one adolescent; status of attention-deficit/hyperactivity disorder was unknown for one adolescent; status of oppositional defiant disorder was unknown for two adolescents; status of conduct disorder was unknown for one adolescent; status of alcohol abuse and dependence and “other substance” abuse and dependence was unknown for one adolescent; number of diagnoses missing for two adolescents. There were no significant differences across treatment condition for any above variable.

Means (Standard Deviations) of Adolescent Cannabis Misuse (CM) and Parent-Reported Parenting Relationship Questionnaire (PRQ) Subscales Across Follow-Up

Table 2

Time point	Past-week CM	PRQ Attachment subscale	PRQ Discipline Practices subscale	PRQ Relational Frustration subscale
Baseline	1.92 (2.53)	18.10 (4.69)	15.40 (5.39)	15.92 (7.14)
3-month	2.17 (2.70)	17.44 (4.63)	15.65 (4.95)	14.64 (6.31)
6-month	2.63 (2.84)	17.55 (4.73)	15.58 (5.07)	14.14 (5.68)
12-month	3.13 (2.95)	17.85 (4.69)	15.54 (5.27)	13.89 (6.69)

Note. Cannabis misuse is measured as the number of use days in the prior week. PRQ Attachment subscale scores can range from 0–33. PRQ Discipline Practices subscale scores can range from 0–27. PRQ Relational Frustration subscale scores can range from 0–36. Higher scores indicate more of that domain.

For past week CM, the number of reports missing at each time point are: 9 (baseline), 21 (3-month), 22 (6-month), and 18 (12-month). For PRQ, the number of reports missing at each time point are: 2 (baseline), 17 (3-month), 22 (6-month), and 21 (12-month).

Table 3

Unstandardized Parameter Estimates (Standard Error [SE]) from Growth Model for Cannabis Misuse (n=108).

Parameter	Unconditional Model		Conditional Model		Conditional Model with Covariates	
	Est(SE)	p	Est(SE)	p	Est(SE)	p
CM Intercept	1.92 (0.23)	<0.001	2.02 (0.36)	<0.001	1.32 (0.53)	0.012
CM Slope	0.10 (0.03)	0.002	0.10 (0.05)	0.032	0.20 (0.07)	0.003
CM Intercept Variance	3.38 (0.83)	<0.001	3.36 (0.83)	<0.001	2.83 (0.78)	<0.001
CM Slope Variance	0.05 (0.02)	0.008	0.05 (0.02)	0.011	0.03 (0.02)	0.064
Correlation: Intercept CM, Slope CM	-0.18 (0.10)	0.060	-0.18 (0.10)	0.066	-0.14 (0.09)	0.120
Error Variance CM: Baseline	3.40 (0.87)	<0.001	3.46 (0.89)	<0.001	3.73 (0.90)	<0.001
Error Variance CM: Month 3	3.83 (0.76)	<0.001	3.79 (0.76)	<0.001	3.60 (0.72)	<0.001
Error Variance CM: Month 6	4.35 (0.83)	<0.001	4.30 (0.82)	<0.001	4.11 (0.78)	<0.001
Error Variance CM: Month 12	2.66 (1.50)	0.077	2.80 (1.53)	0.068	3.50 (1.48)	0.018
CM Intercept on Treatment Condition	--	--	-0.19 (0.48)	0.694	-0.14 (0.47)	0.760
CM Intercept on Age	--	--	--	--	0.04 (0.20)	0.828
CM Intercept on Sex	--	--	--	--	-0.68 (0.46)	0.141
CM Intercept on Internalizing Disorder	--	--	--	--	1.38 (0.51)	0.007
CM Slope on Treatment Condition	--	--	-0.01 (0.06)	0.823	-0.04 (0.06)	0.462
CM Slope on Age	--	--	--	--	0.08 (0.03)	0.002
CM Slope on Sex	--	--	--	--	-0.04 (0.06)	0.513
CM Slope on Internalizing Disorder	--	--	--	--	-0.10 (0.07)	0.123

Note. CM= number of days past-week cannabis misuse.

Model fit as follows: Unconditional Model $\chi^2 = 7.91$ (5), $p = 0.161$, CFI = 0.95, RMSEA = 0.07 [<0.01 , 0.17]; Conditional Model $\chi^2 = 12.55$ (7), $p = 0.084$, CFI = 0.91, RMSEA = 0.09 [<0.01 , 0.16]; Conditional Model with Covariates $\chi^2 = 15.22$ (13), $p = 0.294$, CFI = 0.97, RMSEA = 0.04 [<0.01 , 0.11]

Table 4

Unstandardized Parameter Estimates (Standard Error [SE]) from Growth Models (n=110).

Parameter	Attachment		Relational Frustration		Discipline	
	Est(SE)	p	Est(SE)	p	Est(SE)	p
CM Intercept	-0.07 (1.31)	0.958	1.20 (0.94)	0.202	0.62 (1.16)	0.594
CM Slope	0.20 (0.07)	0.003	0.23 (0.07)	0.001	0.22 (0.07)	0.001
CM Intercept Variance	2.51 (0.77)	0.001	2.65 (0.76)	<0.001	2.82 (0.78)	<0.001
CM Slope Variance	0.03 (0.02)	0.089	0.02 (0.02)	0.182	0.03 (0.02)	0.062
PRQ Intercept	17.68 (0.38)	<0.001	15.29 (0.59)	<0.001	15.44 (0.42)	<0.001
PRQ Intercept Variance	12.66 (2.19)	<0.001	25.70 (4.17)	<0.001	15.72 (2.62)	<0.001
PRQ Slope *	--	--	-0.16 (0.05)	0.002	--	--
Correlation: Intercept CM, Slope CM	-0.09 (0.09)	0.293	-0.11 (0.09)	0.228	-0.13 (0.09)	0.140
Correlation: Intercept PRQ, Slope CM	-0.25 (0.12)	0.029	0.10 (0.16)	0.534	-0.19 (0.13)	0.134
Error Variance CM: Baseline	3.91 (0.91)	<0.001	3.61 (0.89)	<0.001	3.80 (0.91)	<0.001
Error Variance CM: Month 3	3.62 (0.73)	<0.001	3.59 (0.73)	<0.001	3.53 (0.72)	<0.001
Error Variance CM: Month 6	4.22 (0.80)	<0.001	3.84 (0.75)	<0.001	4.08 (0.78)	<0.001
Error Variance CM: Month 12	3.28 (1.43)	0.022	4.19 (1.48)	0.005	3.45 (1.47)	0.019
Error Variance PRQ: Baseline	12.42 (2.14)	<0.001	21.74 (3.73)	<0.001	13.96 (2.44)	<0.001
Error Variance PRQ: Month 3	10.65 (1.97)	<0.001	11.94 (2.54)	<0.001	9.72 (1.91)	<0.001
Error Variance PRQ: Month 6	8.46 (1.73)	<0.001	9.93 (2.26)	<0.001	8.13 (1.72)	<0.001
Error Variance PRQ: Month 12	7.65 (1.62)	<0.001	17.76 (3.34)	<0.001	10.55 (2.07)	<0.001
CM Intercept on Treatment Condition	-0.14 (0.46)	0.762	<0.01 (0.46)	0.999	-0.15 (0.47)	0.756
CM Intercept on Age	0.07 (0.19)	0.723	0.01 (0.20)	0.947	0.05 (0.20)	0.802
CM Intercept on Sex	-0.79 (0.46)	0.085	-0.62 (0.46)	0.183	-0.63 (0.47)	0.177
CM Intercept on Internalizing Disorder	1.38 (0.50)	0.006	1.30 (0.51)	0.010	1.40 (0.51)	0.006
CM Slope on Treatment Condition	-0.04 (0.06)	0.453	-0.06 (0.06)	0.290	-0.05 (0.06)	0.435
CM Slope on Age	0.08 (0.03)	0.002	0.09 (0.03)	0.001	0.08 (0.03)	0.002
CM Slope on Sex	-0.01 (0.06)	0.805	-0.04 (0.06)	0.498	-0.06 (0.06)	0.356
CM Slope on Internalizing Disorder	-0.10 (0.06)	0.097	-0.10 (0.06)	0.132	-0.11 (0.07)	0.096
CM on PRQ						
Contextual effect	0.14 (0.08)	0.088	-0.11 (0.06)	0.093	0.04 (0.08)	0.618

Parameter	Attachment		Relational Frustration		Discipline	
	Est(SE)	p	Est(SE)	p	Est(SE)	p
Within-person effect	-0.06 (0.04)	0.162	0.11 (0.03)	0.001	<0.01 (0.04)	0.916
Between-person effect	0.08 (0.07)	0.238	<0.01 (0.05)	0.943	0.04 (0.06)	0.492

Note. PRQ=Parenting Relationship Questionnaire. CM= number of days past-week cannabis misuse.

Model fit as follows: Attachment, $\chi^2 = 61.79$ (50), $p = 0.122$, CFI = 0.95, RMSEA = 0.05 [<0.01 , 0.08]; Relational Frustration, $\chi^2 = 75.09$ (49), $p = 0.010$, CFI = 0.91, RMSEA = 0.07 [0.04, 0.10]; Discipline Practices, $\chi^2 = 40.36$ (50), $p = 0.833$, CFI = 1.00, RMSEA = <0.01 [<0.01 , 0.04].

* Slope parameter was only included for PRQ subscales that demonstrated significant change over time.

Table 5

Unstandardized Parameter Estimates (Standard Error [SE]) from Follow-up Models Examining Within-person Time-varying Associations between Cannabis Misuse (CM) and Parenting Relationship Questionnaire (PRQ) subscales (n=110).

Assessment	Attachment		Relational Frustration		Discipline	
	Est(SE)	p	Est(SE)	p	Est(SE)	p
Baseline: CM on PRQ	-0.01 (0.06)	0.892	0.12 (0.05)	0.012	0.02 (0.06)	0.759
Month 3: CM on PRQ	-0.06 (0.05)	0.236	0.13 (0.04)	0.001	0.01 (0.05)	0.775
Month 6: CM on PRQ	-0.09 (0.05)	0.078	0.13 (0.04)	0.001	<0.01 (0.05)	0.994
Month 12: CM on PRQ	-0.19 (0.11)	0.073	0.10 (0.07)	0.147	-0.03 (0.09)	0.764