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Parents' Cannabis-Related Attitudes and Emerging Adult Offspring Cannabis Use: Testing the Mediating Effect of Perceived Parental Approval

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Abstract

Background: Contrary to parental alcohol use and expectancies work, little is known about how parent's cannabis use (CU) and expectancies influence offspring CU. This is a notable gap in the literature given increasing acceptability and use of cannabis, especially among emerging adults (EA). Moreover, limited work has tested mechanisms of transmission of risk from these parent factors. This study addresses these gaps by testing prospective associations of parental CU and expectancies with offspring CU and CU problems, and perceived parental approval of offspring CU as a potential mediator.

Method: A community sample of 314 EA and caregiver dyads completed three annual assessments (mean age = 19.13). The sample was 54% female and majority White/ non-Hispanic (76%). Caregivers reported on their cannabis expectancies and use, and EA reported on their CU, CU-related problems, and perceived parental approval of CU.

Results: Longitudinal structural equation modeling supported a mediated pathway such that high parental positive cannabis expectancies were associated with perceived parental approval of CU, which in turn, predicted increases in EA CU and CU problems. Parental negative expectancies had a significant indirect effect but in the opposite direction. Indirect effects were found above and beyond parental CU, which was not associated with offspring CU.

Conclusions: This is the first study to test prospective indirect effects of parental cannabis expectancies on offspring CU. Findings suggest parents' attitudes, even in the absence of parental use, confer risk for offspring use by shaping perceived acceptance of CU, suggesting parental expectancies as targets for parent-based CU interventions.

Keywords

Emerging adult; cannabis; marijuana; parent expectancies; parent approval

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Introduction

Late adolescence and emerging adulthood have been identified as particularly risky periods for elevated cannabis use (Arnett, 2005; Tucker et al., 2005). Given recent movement toward decriminalization, legalization, and medicinal applications, cannabis use is becoming increasingly ubiquitous among older adolescents and emerging adults in the U.S. (Budney et al., 2007; Chen et al., 2017; Pearson et al., 2017). Approximately 1 in 5 emerging adults (ages 18–25) report past month cannabis use and 6% of 12th graders used cannabis daily (NIDA, 2018). Also of concern is that cannabis use is associated with a number of hazardous outcomes, including lost future employment and income opportunities, poor physical health, and increased risk for deleterious mental health conditions (Fergusson & Horwood, 1997; Fergusson et al., 2005; Hayatbakhsh et al., 2007; Pearson, 2019). The increasing prevalence and negative outcomes underscore the public health significance of cannabis use and the need to understand etiological pathways to use and develop effective interventions. Moreover, recent data show non-college attending emerging adults to be at elevated risk for cannabis use – a population often overlooked in cannabis research. Indeed, from 2014 to 2017, daily cannabis use in this population doubled, from approximately 6 to 13% - a number almost three times higher than prevalence estimates for college-attending emerging adults (NIDA, 2018). Taken together, these data indicate understanding cannabis use in community samples is a public health priority.

Family socialization theories suggest that the family is an important context where youth learn about drug and alcohol use (Vakalahi, 2001; Yap et al., 2017), and parents in particular are recognized as an important influence on offspring cannabis use (Duncan et al., 1995; Hill et al., 2018; Zaharakis, 2015). Notably, many studies find that parents influence substance behaviors not only in childhood and early adolescence, but well into late adolescence and emerging adulthood, even as emerging adults are spending less time at home (e.g. Abar, 2012; Mares et al., 2012; Napper et al., 2015, 2016; Wood et al., 2004). For this reason, a number of cannabis interventions for adolescents and emerging adults have involved parents (Grossbard et al., 2010), but with only mixed success (Dennis et al., 2004; Piehler & Winters, 2015; Smeerdijk et al., 2012; Stanger et al., 2015; Winters et al., 2014). A clearer understanding of parental influences on CU may help to bolster intervention efficacy.

Parents' attitudes toward substances (i.e. outcome expectancies) have been identified as a key etiological risk factor during adolescence and early adulthood (Campbell & Oei, 2010). Specifically, parents' own cannabis outcome expectancies, or anticipated positive and negative outcomes from using cannabis, may convey approval or disapproval of cannabis, which then influences offspring cannabis use. Abundant research on alcohol use has demonstrated that parents transmit expectancies and perceptions of approval about drinking to their children, which in turn, influences adolescent and emerging adult alcohol use and consequences (e.g. Abar et al., 2009; Campbell & Oei, 2010; LaBrie et al., 2010b; Wood et al., 2004). Yet, the literature on parental attitudes toward cannabis and the influence that such attitudes may have on cannabis outcomes across adolescence and into young adulthood has been strikingly sparse. To our knowledge, there have been no studies on how parental cannabis outcomes expectancies might be transmitted to offspring, subsequently influencing cannabis use and use-related problems. The absence of such data is a notable gap in the

literature as perceptions of cannabis use risks among emerging adults are the lowest since 1980 (Johnston et al., 2019) and shifts in the legality of cannabis may impact how parents socialize offspring to cannabis (e.g. Mason et al., 2015). The present study aims to address this gap by testing the prospective effect of parental cannabis expectancies on offspring use and use-related problems, positing perceived parental approval (i.e. parental injunctive norms) as a mediator of this association.

Parent cannabis use and expectancies

Social and cognitive learning theories posit that information from the social environment influences late adolescent and emerging adult substance use through multiple pathways including (1) adolescents imitate – or model – behavior and (2) they receive direct or vicarious reinforcement for their behavior from important role models (Akers, 1977; Akers & Cochran, 1985; Bandura, 1986). Specifically, offspring of parents who exhibit pro-cannabis behaviors and attitudes, (i.e. using cannabis and having positive attitudes toward it) may wish to model parent's behavior, be more likely to adopt their parent's positive attitudes toward cannabis, or view parental attitudes and behaviors as approval of their own use. With regard to modeling behavior, parents serve as salient role models, as well as a proximal source of information regarding substance use behavior, including cannabis use (Petraitis et al., 1995). Supporting this are studies showing parental cannabis use to be associated with early and late adolescent and emerging adult cannabis use (Andrews et al., 1997; Bailey et al., 2016; Epstein et al., 2020; Hill et al., 2018; Madras et al., 2019; Miller et al., 2013). Taken together, these studies provide evidence of a direct parent-offspring cannabis associations. We extend this literature by testing an indirect process from parent to offspring cannabis use: operating through perceptions of parental approval.

In addition to explicitly modeling substance behavior, parents also convey attitudes toward substances, which in turn may shape the substance behavior of offspring. Parental attitudes about cannabis may also play an important role in socializing youth and emerging adults about cannabis. Cannabis use has lower prevalence than other drugs such as alcohol, and many parents themselves may not be cannabis users (Epstein et al., 2018). Thus, absent behavioral modeling of use, attitudes may be a primary means by which parents influence their offspring with regard to cannabis. Campbell and Oei (2010) proposed a model for how parental alcohol expectancies may shape offspring drinking behavior. They posit that parents' alcohol expectancies indirectly influence offspring drinking through offspring's alcohol-related cognitions. Consistent with this model, some work suggests that parent alcohol expectancies pose risk for increased offspring drinking (Johnson et al., 1990; Zhang et al., 1997) and that parents and offspring share similar alcohol beliefs (Donovan et al., 2009; Shen et al., 2001), with some exceptions (Handley & Chassin, 2009). Yet these studies and the Campbell and Oei (2010) model have solely focused on alcohol expectancies. We propose that parental attitudes about cannabis may operate in a similar way, thus representing an important etiological influence on cannabis use in young adults. To our knowledge, no studies have examined the transmission of risk from parental cannabis outcome expectancies to offspring cannabis use and it is important to understand how parental attitudes might impact emerging adult cannabis use. One possibility is that parent

cannabis expectancies, like parental use, may lead to the perception that parents approve of use, which in turn, may encourage offspring use (i.e. reinforcement).

Perceived parental approval of emerging adult cannabis use

Parents convey approval or disapproval of substance use, either consciously or not (Petraitis et al., 1995). Given that parents are important role models, their approval/disapproval has reinforcing value and consequently is a robust predictor of offspring cannabis use, across both early adolescence and into emerging adulthood (Bailey et al., 2016; Foster et al., 2015; Foster et al., 2016; LaBrie et al., 2010a; Napper et al., 2015). Yet, most of this work is done with college samples and is cross-sectional in nature and only one study has explicitly tested this mechanistic pathway. In this study, Kerr et al. (2015) tested whether perceptions of parental approval mediated the association between parental cannabis use in adolescence and initiation of adolescent offspring use. They found no support for mediation but two notable limitations of this study warrant consideration. First, current parental cannabis use, a potential confound of the above association, was not included as a statistical control. Second, mediation was tested using the Delta Method, which can yield low power (MacKinnon et al., 2002).

The current study

The current study extends prior work in a number of ways. First, we are the first, to our knowledge, to examine how parental cannabis outcome expectancies influence offspring use. Second, although a large body of work has examined direct parental and offspring cannabis use associations (e.g. Kosty et al., 2015; Madras et al., 2019), to our knowledge no prior work has tested these pathways from parental use (except for Kerr et al., 2015) and expectancies to offspring use with perceived approval as a mediator. We also extend the work of Kerr et al. (2015) by testing perceived approval as a mediator between current parental cannabis use and expectancies and offspring cannabis use. Another advance on prior work is that we used Monte Carlo simulations, a method that addresses the limitation of the Delta Method (Preacher & Selig, 2012). Additionally, we test these pathways in a community sample, with only half of subjects attending a traditional college. This is in contrast to the bulk of the current literature, which has largely focused on college samples (for review on drinking, see Carter et al., 2010). Lastly, in this study, we extend analyses to examine these pathways with a clinically oriented outcome – cannabis use problems. Frequent use is expected to be associated with use-related problems (Pearson, 2019) and the pathway of interest is whether the proposed pathway extends from cannabis use to cannabis use-related problems.

We hypothesized that strong parental positive expectancies would predict increased perceptions of parental approval of use, which in turn, would be associated with increased emerging adult cannabis use, and subsequently increased cannabis use problems (see Figure 1 for conceptual model). Conversely, we hypothesized that strong parental negative expectancies would be associated with low levels of perceived parental approval of use, which in turn, would be associated with low levels of emerging adult cannabis use and low levels of cannabis use problems. Parental cannabis use was expected to have a positive direct

effect on emerging adult use and problems, and also to operate through increased perceived parental approval of use.

Methods

Sample

Recruitment—The sample was recruited in Erie county, New York, which began in April 2007 and was completed in February 2009, for a longitudinal study that included nine annual assessments. Eligibility criteria required that the child be fluent in English, between the ages of 10 and 12 at the time of recruitment, have no physical or mental impairments that would preclude completion of the interview, and a caregiver was willing to participate. Only one child per household was recruited and participation rate was at 47.3%, which is consistent with other large studies requiring intensive participation (Galea & Tracy, 2007). More details about recruitment can be found in Colder et al. (2017).

Descriptives—The current paper focuses on the last three assessments when the sample was transitioning to young adulthood and when variables of interest were assessed. The sample was nearly evenly split on gender (54% female) and the average age at the last three annual assessments was 19.13 (0.99), 20.22 (1.05), and 21.26 (1.06), respectively. The sample was largely White/non-Hispanic (76%), 15% were Black/African American, 3% were Hispanic/Latino, 2% were Asian/Pacific Islander, and 4% other (mostly mixed racial/ethnic background). At Wave 7, parents who participated in the study were largely biological mothers (81%) or fathers (13%). The majority of emerging adults were from two-parent families (72%) with many parents having completed college (58%) and about half of emerging adults enrolled in a traditional college at Wave 9 (51%). The majority of our sample lived at home with their parents at Wave 7 (75%), Wave 8 (67%), and Wave 9 (61%).¹ Median family income was \$60,000, and 7% received some sort of public assistance income.

Missing data—Retention was strong with 83% ($n=314$ emerging adults), 78% ($n=295$), and 78% ($n=293$), for Waves 7–9, respectively. Of those emerging adults with data, only $n=26$, $n=32$, and $n=47$ were missing parent data at Waves 7–9, respectively. Of the Wave 1 demographic (i.e. race, gender, age, family income) and substance use (i.e. alcohol and cigarette quantity and frequency, cannabis frequency) variables tested, race (Cohen's $f = .13$), cigarette frequency (Cohen's $f = .13$), and cannabis frequency (Cohen's $f = .11$) were significantly related to missingness at Wave 7, with small effect sizes. In order to minimize the impact of missing data, full information maximum likelihood (FIML) estimation was used to estimate parameters for the any cases that provided data in Waves 7–9.

¹We tested whether cannabis-related variables differed for those currently living at home with parents versus living away from home. No variables significantly differed by living status ($F_s = 0.00–3.08$, $ps > .05$) and effect sizes were small (all $\eta^2 < .02$). One exception was Wave 7 and 9 cannabis use-related problems did significantly differ ($F_s \geq 4.72$, $ps < .05$) such that those living away from home experienced more problems but with small effect sizes (all $\eta^2 < .02$). We therefore did not expect the proposed pathways to differ substantially by living status.

Procedure

Surveys were administered online *via* Qualtrics (Qualtrics, Provo, UT). Caregivers and offspring were given the option of completing the Wave 7–9 surveys at home or in our research offices. Emerging adults also came into our research offices to complete several lab tasks, which are not of interest in the current study. Caregivers completed consent and permission for their child to participate if their child was under 18 years of age before completing surveys online or at a university research office. Emerging adults completed assent (if under 18) or consent (if over 18) before completing the surveys. If both caregiver and emerging adult completed the surveys in our research offices, they were escorted to separate rooms after consent and assent procedures. Follow-up assessments were generally completed within 2-months of the anniversary of the prior assessment (90%). Similar procedures were used across Wave 7–9 assessments. Families were compensated \$125, \$135, and \$145 at Waves 7–9, respectively, for completing surveys and tasks and were compensated \$50, \$60, and \$65 respectively for completing surveys only. All study procedures were approved by the university's Institutional Review Board (IRB).

Measures

Emerging adults

Demographics (Wave 7): Emerging adult gender (male = 1, female = 2) and age in years were measured at Wave 7.

Cannabis use (Wave 7–9): Past year cannabis use frequency was assessed at Waves 7–9 using a single item from the Monitoring the Future national survey (Johnston et al., 2019). The item asked “In the past year, how often have you used marijuana for non-medical purposes?” with response options ranging including 0 = not at all, 1 = once or twice, 2 = 1 day per month, 3 = 2 or 3 days per month, 4 = 1 day per week, 5 = 2 or 3 days per week, 6 = 4 or 5 days per week, and 7 = everyday.

Cannabis use problems (Wave 7–9): Past year cannabis use problems was assessed at Waves 7–9 using the Marijuana Consequences Questionnaire (MACQ; Simons et al., 2012). This 50-item measure asks participants to report whether they experienced a variety of problems as a result of their cannabis use (e.g. driving after using cannabis, feeling depressed or sad, neglected family, work, or school obligations). Responses options included “yes” or “no” and these responses were summed to create score of number of problems experienced in the past year. The MACQ had excellent reliability at Wave 7 (Cronbach's $\alpha = .93$), Wave 8 (Cronbach's $\alpha = .94$), and Wave 9 (Cronbach's $\alpha = .93$).

Perceived parental approval of cannabis use (Wave 7–8): Emerging adults' report of perceived parental approval was assessed at Waves 7 and 8. Two items from the Monitoring the Future national survey (Johnston et al., 2019) were utilized to assess emerging adults' perception of parental approval of their cannabis use. The two items included perceived approval of cannabis use (e.g. hashish or hash, THC, “pot,” “grass,” “weed,” or “reefer”) for non-medical purposes occasionally (less than once a week) and regularly (once a week or more) use. Participants responded on a 5-point Likert scale (“Strongly disapprove” to

“Strongly approve”). Items were averaged and yielded excellent reliability (Cronbach’s $\alpha = .92$).

Parents

Cannabis use (Wave 7).: Similar to emerging adult cannabis use, past year parental cannabis use was assessed using an item from the Monitoring the Future national survey (Johnston et al., 2012). Caregivers participating in the study also completed a collateral report on partner cannabis use (Miller & Marlatt, 1987). Response options ranged from “not at all” to “everyday.” Partner cannabis use was assessed in the same way. In order to most accurately capture the extent of parental cannabis use in the home, the maximum value between the two parents was used in our analysis.

Parental cannabis outcome expectancies (Wave 7).: Cannabis outcome expectancies were measured using the Cannabis Expectancy Questionnaire (CEQ; Connor, Gullo, Feeney, Young, 2011) which asks participants to rate what they expect to happen when using cannabis on a 1 to 5 response scale (“strongly disagree” to “strongly agree,” respectively). Items from the positive and negative outcome expectancies scales were averaged to form two scale scores. Both positive (Cronbach’s $\alpha = .94$) and negative cannabis (Cronbach’s $\alpha = .96$) expectancies had excellent reliability.

Analytic plan

Correlations were examined for descriptive purposes. Gender and age were included as statistical control variables. Due to the non-normal distributions of the cannabis use variables (see Table 1) and that cannabis use frequency and problems had a broad range of response options (Tabachnick & Fidell, 2013),² Robust Maximum Likelihood (MLR) estimation was used for the final model. Hypotheses were tested using a mediated path model in a structural equation modeling (SEM) framework (see Figure 1) using Mplus 8.2 (Muthén & Muthén, 1998–2017). Mediation pathways were tested based on prospective associations after controlling for prior levels of the mediator (perceived approval of cannabis use) and the outcome (emerging adult cannabis use) to provide some evidence for temporal precedence. Monte Carlo simulations were used to test mediational hypotheses with 100,000 replications (Preacher & Selig, 2012). The 95% CIs for testing indirect effects were generated using modified code from Selig and Preacher’s (2008) interactive tool to accommodate serial mediation. This method overcomes biased standard errors estimated with the Delta Method (MacKinnon et al., 2002; Preacher & Selig, 2012). Effect sizes for indirect effects were characterized by ν , which is an estimate of percent variance explained in the outcome by the unique contribution of the indirect effect (Lachowicz et al., 2018).

²We ran separate models, treating cannabis use and cannabis use problems as count variables. First, we specified negative binomial distributions for these variables (to accommodate zero inflation) and this model did not converge. Second, we specified them as a Poisson distribution (which does not accommodate zero inflation). This model did converge and results largely matched results obtained using MLR for continuous variables. We retained the model specifying continuous distributions and MLR estimation because count and ordinal variables with more than 5 response options adequately approximate a continuous distribution (Bürkner & Vuorre, 2019; Tabachnick & Fidell, 2013) and does not significantly bias estimates. MLR estimation also has the advantage of allowing estimation of within-time error covariances and simplifying testing mediation.

Results

Descriptive statistics

Bivariate correlations and descriptive statistics are reported in Table 1. Emerging adult cannabis use was stable over time. Perceived approval of use was also stable from Waves 7 to 8. Parental positive and negative cannabis outcome expectancies were positively related, suggesting that parents with elevated positive expectancies also maintained high negative expectancies. Positive and negative parental expectancies were significantly but modestly related to parental cannabis use. At Wave 7, 8% of parents endorsed past year cannabis use. For parents who did use cannabis, 46% ($n=11$) reported using once or twice in the past year and no parents endorsed daily use. For Waves 7–9, 50% of emerging adults reported using cannabis in the last year, with 13–16% reporting using once or twice in the past year and 7–10% reporting daily use (see Figure 2 for histograms of offspring cannabis use). For Wave 7–9 cannabis use problems, about 59% reported never experiencing any problems from cannabis use in the past year. Among cannabis users, approximately 84% endorsed at least one cannabis use-related problem.

Path analysis

Wave 7 and 8 within time error covariances were estimated for all cannabis related variables to account for cross-sectional associations. Stability paths were constrained to be equal over time (e.g. Wave 7 to Wave 8 cannabis use path constrained to be equal to Wave 8 to Wave 9 cannabis use) and nested tests supported these constraints ($ps > .10$). The final model provided excellent fit to the data (χ^2 (df) = 31.63 (29), $p = .34$; CFI = 1.00; TLI = 0.99; RMSEA = 0.02; SRMR = 0.03).

Path coefficients are reported in Table 2. Perceived approval was stable across time. Wave 7 positive and negative parental cannabis expectancies significantly predicted perceived approval. High parental positive expectancies and low parental negative expectancies were associated with elevated perceived approval of cannabis use. Surprisingly, past year parental cannabis use was not related to perceived approval but prior emerging adult cannabis use predicted increased perceptions of approval.

Prior emerging adult cannabis use, perceived parental approval of offspring cannabis use, and age prospectively predicted emerging adult cannabis use. High perceived approval and younger age at Wave 7 was related to increased cannabis use. No Wave 7 parental variables had a significant direct association with emerging adult cannabis use or problems at Wave 8 or 9.

Prior emerging adult cannabis use and cannabis use problems predicted emerging adult cannabis use consequences at Wave 9. High cannabis use was related to increased problems.

Mediation

Mediation results are reported in Table 3. Mediation results indicated that high positive parental cannabis expectancies predicted increased emerging adult cannabis use, through elevated perceived approval. Conversely, high negative parental expectancies predicted

decreased emerging adult cannabis use through low perceived approval. Indirect effects from parent cannabis expectancies and use to emerging adult cannabis use consequences were similar to the pattern of results for cannabis use. High positive parental expectancies predicted elevated emerging adult cannabis use problems, mediated by elevated perceptions of parental approval and increased emerging adult cannabis use. Conversely, negative parental expectancies yielded the opposite pattern, with high negative parental expectancies predicting low perceptions of approval, which subsequently predicted low levels of emerging adult cannabis use and then decreased cannabis use problems. Following guidelines outlined by Lackowicz et al. (2018), individual indirect effect sizes were estimated by squaring the standardized indirect effects to estimate variance explained by the indirect effect. In line with interpretations of effect sizes of percent of variance effect sizes provided by Cohen (1988) and Lackowicz et al. (2018), both positive and negative expectancies had small effect sizes on both outcomes (see Table 3). Parental cannabis use did not indirectly predict emerging adult cannabis use or cannabis use problems. Together these results suggest that high positive and low negative parental expectancies are indirectly associated with emerging adult cannabis use and cannabis use problems by conveying approving messages above and beyond parents own cannabis use.

Discussion

This is the first study to our knowledge to have tested the effect of parents' cannabis-related expectancies on offspring use. Another important innovation of this work is that we considered the mechanisms through which parental attitudes and cannabis use may confer risk for emerging adult cannabis use, especially at low levels or in the absence of parental cannabis use. Moreover, we considered a more clinically meaningful outcome – cannabis use problems. We found that parental cannabis expectancies are associated with perceived parental approval of cannabis use, and ultimately, with use itself and subsequent problems. Importantly, prior work on the effect of perceived parental approval on emerging adult cannabis use has been largely cross-sectional and done almost exclusively in college samples and the current study extended this work to test these pathways prospectively in a community sample.

The current study hypothesized that emerging adults' perceptions of parental approval of cannabis use mediated the association between parent expectancies and emerging adult use and that perceived approval and emerging adult cannabis use would mediate the association between parent expectancies and cannabis use problems. This hypothesis was supported. Positive expectancies were prospectively associated with increases in perceived parental approval of cannabis use, which subsequently predicted increased emerging adult cannabis use and ultimately elevated levels of cannabis use problems. The converse was found for negative expectancies. High negative expectancies prospectively predicted low perceived approval, which in turn, was associated with decreases in emerging adult use and subsequently low levels of cannabis use problems. Parents with expectancies supportive of cannabis use appear to be conveying approval to their offspring, which puts them at risk for more cannabis use and cannabis-related problems. In line with social and cognitive learning theories, parental attitudes that convey approval of behavior have reinforcing value (Akers, 1977; Akers & Cochran, 1985; Bandura, 1986). This likely explains why parental

expectancies were related to offspring use even when their cannabis use was not. It would seem that parents, even those who do not use cannabis, should be cautious about the cannabis-related messages they convey to offspring.

Contrary to prior work, parental cannabis use did not predict emerging adult cannabis use directly or indirectly through perceived approval (e.g. Andrews et al., 1997; Epstein et al., 2020; Hill et al., 2018; Madras et al., 2019). This is likely due to the low endorsement of use (87% of parents reported no past year use). Given the low rates of current use, most emerging adults in our community sample likely did not observe their parents using. Notably, the majority of our sample lived at home with their parents, suggesting they would be exposed to parental cannabis use. Given the low rates of use among parents, however, use was not a particularly strong driver of perceived approval in our sample.

Limitations and future directions

The current study has a number of notable strengths, including testing mediation longitudinally, testing the effect of perceived parental approval while controlling for current parental cannabis use, testing these associations in an emerging adult community sample, and being the first study to examine the effect of parental cannabis use expectancies on offspring use. Yet, the study also has limitations that warrant consideration and there are a number of potentially novel and interesting directions for future research.

First, parent cannabis use endorsement was low. Parental cannabis use at higher levels is likely a more salient influence in the family environment and past work supports this association (e.g. Epstein et al., 2020; Hill et al., 2018; Madras et al., 2019). Parental cannabis use effects may be more evident or outweigh the effect of parental expectancies in such samples. Parents who use frequently are more likely have more positive views about cannabis. Moreover, we did not assess whether emerging adults were aware of parental use. Parents expressing their attitudes but hiding their use (even infrequent use) could partially explain why we saw effects for attitudes but not use. Assessing offspring awareness of parental cannabis use and considering our proposed mediational pathways in samples with higher rates of parental use are useful directions for future research. Our sample is also largely homogenous in race (76% White) and thus, findings may not generalize to more racially and ethnically diverse populations.

The current study did not assess cannabis-specific parenting, defined as parents' efforts to socialize offspring to cannabis. Parental attitudes and perceptions of approval may be partly conveyed through socialization efforts, such as communication of harmful effects of cannabis or family rules about cannabis. Strong negative cannabis-related parental attitudes may strengthen the impact that cannabis-specific parenting has on offspring use. For example, Napper et al. (2016) found that risk communication about cannabis use (e.g. being in a car with someone driving while intoxicated) was associated with lower odds of college-aged offspring cannabis use but discussing use (e.g. availability of cannabis on campus) and permissive discussions (e.g. using cannabis responsibly) were associated with increased odds of use. These conversations may take different forms depending on parental attitudes, conveying either approval or disapproval depending on the valence of the attitude. We also

did not assess offspring approval of parental use, and this might be a useful variable to explore in future work.

Cannabis, compared to other substances like alcohol, presents a variety of unique challenges that researchers must contend with, including increasing medicinal applications and shifts in medicinal and recreational legality across states, variability in routes of administration, and difficulty in measuring quantity of use. Medicinal cannabis was legalized when we started Wave 7 data collection, but recreational use was not legalized during the duration of our study and we only measured recreational use. We also did not measure route of administration or quantity of use. Future work should consider these issues moving forward, as shifts in legality (Keyes et al., 2016; Rusby et al., 2018), route of administration (Russell et al., 2018), and quantity of use (Zeisser et al., 2012) have important implications for not only our proposed pathways but also the etiology of adolescent and emerging adult cannabis use as a whole.

Finally, the specific indirect effects detected were small. Though these effects are below traditional cutoffs for small effects (2% = small; Cohen, 1988), Lachowicz et al. (2018) note that these traditional cutoffs may not be appropriate to evaluate indirect effect sizes. Moreover, Adachi and Willoughby (2015) assert that strong stabilities of the outcome, like in the current study ($rs = .55$ to $.74$), preclude the appropriateness of characterizing longitudinal effect sizes using traditional cutoff scores. Importantly, effects were found across annual cross-lags and we may expect stronger effects across shorter intervals.

Implications

These findings have important implications for family-based substance use interventions as parents' substance-related attitudes may be an important target to reduce offspring use and related problems from use. Many treatment studies that involve parents largely focus on parenting skills (e.g. monitoring, communication, involvement, discipline; Botzet et al., 2019; Smeerdijk et al., 2012; Stanger et al., 2015; Winters et al., 2014) with mixed evidence that parental involvement improves treatment outcomes. Piehler and Winters (2015) explicitly targeted parents' cannabis attitudes, among other parenting strategies, in a brief intervention and found significantly larger reductions in adolescent cannabis use in the parent condition compared to the adolescent only condition as well as greater retention of treatment gains. Although they did not directly analyze how changes in parents' attitudes predicted treatment outcomes, this is a unique component of this intervention compared to others and our findings suggest this component may be partially driving the effect. Parents' attitudes may be particularly pertinent among community samples in which parental cannabis use is low, especially since community access to empirically supported cannabis use treatments is limited and parents are viable interventionists in this population (Budney et al., 2007). Alcohol intervention work has successfully reduced drinking through the modifying alcohol-outcome expectancies in some populations (Darkes & Goldman, 1993; Dunn et al., 2000). The current findings suggest that similar work with cannabis expectancies may be beneficial component in parent-based interventions.

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Figure 1.

Conceptual figure. *Note.* P/N-PEXP = parent-reported positive/negative cannabis expectancies; PAR-APP = emerging adult-reported perceived parental approval of cannabis use; P/EA-CU = parent-reported/emerging adult-reported cannabis use; W = wave; PROB = Problems. Solid lines are hypothesized pathways, dotted lines are other regression pathways. Model covariances and regression paths from age and gender are not shown to aid visual interpretation. All within time covariances were estimated and all Wave 8 and 9 variables were regressed onto age and gender.

Figure 2. Distributions of emerging adult past year cannabis use frequency. *Note.* The x axis assess number of days used in the past year.

Table 1.

Bivariate correlations and descriptive statistics.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. W7 Par. CU		.13	-.22 [*]	.30 [*]	.25 [*]	.06	.02	.05	.03	.03	.06	-.04	-.05
2. W7 Par. PEXP			.36 [*]	.12	.21 [*]	.11	.15	.09	.11	.11	.07	.06	-.02
3. W7 Par. NEXP				-.11	-.13	.02	.06	.02	.03	.02	.001	.07	.05
4. W7 Per. App.					.58 [*]	.48 [*]	.44 [*]	.30 [*]	.27 [*]	.28 [*]	.21 [*]	.13	-.06
5. W8 Per. App.						.39 [*]	.50 [*]	.36 [*]	.27 [*]	.33 [*]	.25 [*]	.11	-.08
6. W7 EA CU							.74 [*]	.63 [*]	.66 [*]	.57 [*]	.49 [*]	.09	-.07
7. W8 EA CU								.72 [*]	.51 [*]	.63 [*]	.53 [*]	.01	-.07
8. W9 EA CU									.42 [*]	.51 [*]	.66 [*]	-.08	-.07
9. W7 CU Prob.										.71 [*]	.60 [*]	.15	-.05
10. W8 CU Prob.											.77 [*]	.05	-.01
11. W9 CU Prob.												-.05	.01
12. W7 Age													.07
13. Gender													
Mean	0.21	2.51	2.82	1.51	1.67	1.84	1.83	1.90	6.42	6.71	6.92	19.13	0.54
SD	0.87	0.82	0.85	0.81	0.91	2.48	2.43	2.48	7.60	8.19	7.69	0.98	0.50
Skew	4.98	-0.44	-0.45	1.55	1.29	1.09	1.02	0.97	1.87	1.66	1.57	0.22	-0.15
Kurtosis	25.93	-0.57	0.30	1.67	1.06	-0.35	-0.52	-0.62	3.80	2.29	2.29	-0.26	-1.99

Note. Bolded = significant at $p < .05$;

^{*} = significant at $p < .01$; Par. = Parent; EA = Emerging adult; CU = Cannabis use; PEXP = Positive expectancies; NEXP = Negative expectancies; Per. App. = Perceived parental approval; W = Wave; Prob. = Problems.

Table 2.

Path analysis results.

Wave 7	Wave 8 EA CU			Wave 8 Par. App.			Wave 9 EA CU			Wave 9 CU Prob.		
	β	SE	α	β	SE	α	β	SE	α	β	SE	α
Par. App.	0.28 ⁺	0.12	.09	0.48 ^{**}	0.10	.43	-	-	-	-	-	-
Par. PEXP	0.06	0.09	.02	0.17 ^{**}	0.05	.15	0.06	0.09	.02	-0.03	0.29	-0.003
Par. NEXP	0.06	0.09	.02	-0.13 [*]	0.05	-.12	0.06	0.09	.02	-0.15	0.27	-.02
Par. CU	-0.10	0.09	-.04	0.10	.08	.10	-0.10	0.09	-.03	0.54	0.37	.08
EA CU	0.69 ^{**}	0.06	.70	0.06 ⁺	0.02	.16	-	-	-	-	-	-
Age	-0.16 [*]	0.06	-.07	0.05	0.05	.06	-0.16 [*]	0.06	-.06	-0.19	0.22	-.03
Gender	-0.12	0.13	-.02	-0.10	0.08	-.05	-0.12	0.13	-.02	-0.12	0.13	.04
Wave 8												
EA CU	-	-	-	-	-	-	0.69 ^{**}	0.06	.64	-0.04	0.16	-.02
Par. App.	-	-	-	-	-	-	0.28 [*]	0.12	.10	-0.43	0.36	-.06
CU Prob.	-	-	-	-	-	-	-	-	-	0.56 ^{**}	0.07	.56
Wave 9												
EA CU	-	-	-	-	-	-	-	-	-	0.93 ^{**}	0.13	.37

Note. Par. = Parent; EA. = Emerging adult; CU = Cannabis use; PEXP = Positive expectancies; NEXP = Negative expectancies; Par. App. = Perceived parental approval; W = Wave; Prob. = Problem;

⁺ = $p < .05$

^{*} = $p < .01$

^{**} = $p < .0001$.

Table 3.

Indirect effects.

Mediation pathway	A-B path	B-C path	C-D path	Indirect Effect	95% CI	ν
PE → PPA → CU	0.17 (0.05)	0.28 (0.12)	–	0.05	[0.005, 0.10]	.02%
NE → PPA → CU	–0.13 (0.05)	0.28 (0.12)	–	–0.04	[–0.080, –0.002]	.01%
PCU → PPA → CU	0.10 (0.08)	0.28 (0.12)	–	0.03	[–0.01, 0.09]	.01%
PE → PPA → CU → CU PROB	0.17 (0.05)	0.28 (0.12)	0.93 (0.13)	0.04	[0.005, 0.09]	.003%
NE → PPA → CU → CU PROB	–0.13 (0.05)	0.28 (0.12)	.93 (0.13)	–0.03	[–0.07, –0.002]	.002%
PCU → PPA → CU → CU PROB	0.10 (0.08)	0.28 (0.12)	0.93 (0.13)	–0.03	[–0.07, –0.002]	.001%

Note. A path, B path, and indirect effects are unstandardized coefficients; standard errors are in parentheses. ν = percent variance explained effect size of indirect effect; PE = Parent's positive expectancies; NE = Parent's negative Expectancies; PPA = Perceived parental approval of emerging adult cannabis use;

CU = Cannabis use; PROB = Problems.