Parent and Adolescent Reports of Parental Monitoring and Sources of Parental Knowledge are Linked to Cannabis Use and Symptom Development in Adolescents

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ABSTRACT

Objective. Greater discrepancies between parent and adolescent reports of parenting behaviors are associated with poorer adolescent functioning. The present research aims to build from the existing literature by examining unique parent and adolescent perceptions of parental monitoring and distinct sources of parental knowledge (i.e, parental solicitation, parental control, child disclosure) and their association with adolescent cannabis and alcohol use and disorder symptoms using cross-sectional data. **Method.** Parent-adolescent dyads ($N = 132$) were recruited from the community and the family court system. Adolescents were ages 12 to 18 (40.2% female; 68.2% White, 18.2% Hispanic). Parents and adolescents completed a questionnaire assessing the four domains of parenting behaviors. Adolescents' substance-use behaviors and related disorder symptoms were assessed via adolescent self-report and semi-structured interviews. **Results.** Parental ratings of distinct parenting behaviors were higher (more favorable) than their child's reports, as shown in prior studies. Parent-reported parenting behaviors were uniquely related to cannabis use, over and above adolescent reports and the adolescent's age. With regard to report discrepancies, interactive effects of parent and adolescent perceptions of parental control were not statistically significant in our analysis after correcting for multiple tests. **Conclusions.** While most research relating parental monitoring to adolescent cannabis use relies solely on adolescent perceptions, our study suggests a unique role of parent perceptions for cannabis use and disorder symptoms, respectively. Findings support the importance of considering unique parent and adolescent perceptions of what parents know, as well as how they know it, to understand early cannabis use and problem development.

Key words: = parental monitoring, sources of knowledge, informant discrepancies, cannabis, adolescents

Adolescence is the developmental period most strongly associated with the initiation and escalation of cannabis use (Johnston et al., 2020) and the development of cannabis use disorder (CUD) (Volkow et al., 2021). Parental monitoring, or knowledge of the child's activities, whereabouts, and relationships, is associated with delayed initiation and levels of cannabis use (Lac & Crano, 2009; Neiderhiser et al., 2013) and substance-related problems (Branstetter & Furman, 2013). Indeed, interventions designed to delay or prevent adolescent substance-use problems often target monitoring as a key aspect of the parent-child relationship (Dishion et al., 2003; Kobak et al., 2017; Kuntsche & Kuntsche, 2016). Further, the degree of parent-adolescent disagreement in perceptions of monitoring is an indicator of poor relationship quality that is linked to adolescent alcohol use (Abar et al., 2015), cigarette smoking (Sartor et al., 2020), composite measures of substance-use initiation (Lippold et al., 2011), and composite measures of delinquent behaviors (Hou

et al., 2018; Reynolds et al., 2011). The present analysis aims to build on prior work by testing unique relations of adolescent and parent perceptions of specific parental-monitoring constructs with the adolescent's likelihood of having used cannabis and meeting one or more symptom for CUD.

Parental monitoring reflects both parental knowledge of their adolescent's actions and relationships, but also how parents learn about their adolescent's behavior (Dishion & McMahon, 1998; Kerr & Stattin, 2000). Sources of parental knowledge include parental control (i.e., setting rules to control adolescent behavior), parental solicitation (i.e., engaging with the adolescent or other parents to gain information), and child disclosure (i.e., adolescent's sharing or concealing of information). Parental control and solicitation are active, parent-initiated efforts to know the activities of their child, whereas child disclosure relies on the child to self-initiate sharing information. An expanding literature suggests that parental knowledge largely depends on adolescents' spontaneous and willing disclosure of activities, friendships, and whereabouts, rather than on parents' "monitoring" of them (Hou et al., 2018; Kapetanovic et al., 2019; Kerr & Stattin, 2000; Racz & McMahon, 2011; Stattin & Kerr, 2000). Thus, the distinction of parent-driven, active efforts to secure knowledge (i.e., solicitation and control) from child-driven processes (i.e., voluntary disclosure) is important for understanding which aspects of "monitoring" are protective against adolescent cannabis use and problem development.

Meta-analytic reviews demonstrate the protective role of adolescent perceptions of specific aspects of parental monitoring in relation to adolescent cannabis use (Lac & Crano, 2009), and the role of monitoring, broadly defined as parental knowledge, in relation to adolescent alcohol-use frequency/quantity and alcohol-related problems (Yap et al., 2017). Adolescent perceptions of parental monitoring, also broadly defined as knowledge, are prospectively linked to cannabis-use initiation (Bohnert et al., 2012; Epstein et al., 2017), and a range of alcohol-use behaviors and related problems (Yap et al., 2017). Yet, effect sizes for both cannabis and alcohol-related risks are modest, and substantial heterogeneity across studies limits accurate understanding of the effects of specific parental monitoring constructs (Lac &

Crano, 2009; Yap et al., 2017). Factors contributing to heterogeneity of prior studies include use of conceptually broad and nonspecific measures of parental monitoring, as well as substance-use outcomes that vary in severity. Whereas studies evaluating monitoring effects on alcohol outcomes include frequency of intoxication, drunkenness, binge drinking, heavy drinking, level of use, escalation of use, alcohol-related problems, and severe and problematic use (Yap et al., 2017), studies of cannabis outcomes are primarily limited to less severe outcomes, such as lifetime use or recent use frequency (Bohnert et al., 2012; Epstein et al., 2017; Lac & Crano, 2009). At least one exception, however, identified a protective effect of adolescent-reported parental monitoring for a combined outcome assessing past-month frequency of negative consequences related to alcohol and other drug use (Branstetter & Furman, 2013).

Another gap in existing work assessing perceived parental monitoring, particularly in studies examining cannabis use, is that parent reports of monitoring are not assessed (Bohnert et al., 2012; Epstein et al., 2017; Keogh-Clark et al., 2021; Lac & Crano, 2009). Including both adolescents and parents as informants is important because: (1) obtaining parent and adolescent reports of parenting behaviors is standard practice in clinical settings, and (2) parent and adolescent reports of parenting behaviors often demonstrate small correlations that are thought to reflect clinically relevant information (De Los Reyes et al., 2019, 2022). Greater disagreement between parent and adolescent reports of parenting behaviors is linked to a wide range of problematic behavioral, academic, and mental health outcomes (de Los Reyes, 2011; Hou et al., 2018), including symptoms of depression, anxiety, and conduct disorder (Maurizi et al., 2012). Such discrepancies may reflect differences in perceptions, contexts (e.g., an adolescent does not observe all the times, locations, and strategies a parent uses to monitor their behavior), or underlying relationship and communication deficits (Lee et al., 2019). In fact, recent work suggests that one mechanism through which prevention interventions may reduce adolescent substance use is by decreasing discrepancies between parent and adolescent reports of parenting behaviors (Lee et al., 2019).

Understanding how parental monitoring relates to cannabis use and CUD development is

further complicated by the use of aggregated outcomes that combine cannabis with other substances (Branstetter & Furman, 2013; Neiderhiser et al., 2013) and other "norm-breaking" behaviors (e.g., theft, vandalism, bullying, physical fights) (Kerr & Stattin, 2000; Stattin & Kerr, 2000; Voisin et al., 2012). Separating cannabis from other outcomes is important, in part, because attitudes towards cannabis and laws regulating cannabis use differ from those for alcohol or other drugs. For example, if youth view cannabis use as less harmful and more socially acceptable than other substances, it may foster child disclosure. Further, the frequency of use and the ease with which use is concealed is different for cannabis, alcohol, and other substances. For example, among adolescents who engage in substance use regularly, cannabis and nicotine use may occur daily or multiple times per day, whereas adolescent alcohol use tends to be sporadic, opportunistic, and contextually limited (e.g., on weekends, unsupervised, with peers) (Jackson, 2019; Johnston et al., 2020). Differences between use patterns and perceived harms of use may suggest that some parenting behaviors will be more effective than others for certain substances. For example, parental control may be effective for restricting alcohol use by reducing access to certain peers or unsupervised time, whereas child disclosure may be particularly relevant for cannabis use.

To our knowledge, few studies have explicitly examined the *unique* contribution of parent and adolescent perceptions of parental monitoring to risk for adolescent cannabis use (Cottrell et al., 2003; Rusby et al., 2018). Two studies showed nonsignificant (Cottrell et al., 2003) or modest (Rusby et al., 2018) correlations between adolescent and parent reports of monitoring, defined broadly as parental knowledge, suggesting parent-adolescent disagreement in perceptions of parental knowledge. Cottrell and colleagues (2003) showed that both parent and adolescent (ages 12 to 16) reports of lower monitoring related to adolescent alcohol use in the past six months. Only adolescent reports related to cannabis use in the past six months, however, and only adolescent-reported lower monitoring uniquely related to alcohol and cannabis use over parent-reported monitoring (Cottrell et al., 2003). In a prospective study, Rusby and colleagues (2018) also showed that both parent and adolescent (ages 13 to 14)

reports of lower monitoring predicted onset of alcohol use, binge drinking, and cannabis use one year later. Only adolescent-reported lower monitoring, however, uniquely predicted cannabis use onset over parent-reported monitoring, adolescent and parent reports of the parent-child relationship, and parent substance use (Rusby et al., 2018).

Prior studies provide essential foundational work relating adolescent and parent perceptions of parental monitoring, broadly defined as knowledge, with adolescent cannabis use (Cottrell et al., 2003; Rusby et al., 2018), upon which the present work aims to build. Extant studies have focused on younger adolescents and onset of cannabis use; whether these associations generalize to a broader age range of youth and to other cannabis-related outcomes remains unknown. This is an important question given that risk for cannabis use (Johnston et al., 2020) and CUD onset (Han et al., 2019; Volkow et al., 2021) markedly increases as adolescents age. In addition, most studies assess only self-reported, adolescent perceptions of monitoring without exploring parent perceptions (Cutrín et al., 2021; Lac & Crano, 2009; Marceau et al., 2020; Neiderhiser et al., 2013; Rusby et al., 2018), and most examine parental monitoring operationalized strictly as knowledge (what parents know), absent of sources of this knowledge (how they know it) (Cottrell et al., 2003; Cutrín et al., 2021; Neiderhiser et al., 2013; Rusby et al., 2018). This is a significant limitation given that parents' active efforts to secure knowledge (e.g., solicitation and control) are modifiable parenting behaviors that increase knowledge directly and through promoting child disclosure to prevent adolescent substance-use problems (Hernandez et al., 2015; Jiménez-Iglesias et al., 2012; Soenens et al., 2006). Moreover, prior work has demonstrated distinctive relations of specific monitoring and source-of-knowledge domains in pre- to early adolescence when evaluating parent-adolescent report discrepancies and alcohol use (Abar et al., 2015), as well as aggregated deliquency outcomes that include trying cannabis (Kerr & Stattin, 2000; Stattin & Kerr, 2000) and driving while high (Bouffard & Armstrong, 2021). It is possible that parent and adolescent contributions to monitoring and sources of knowledge differ as adolescents increase use frequency and develop problems, and parent and adolescent perceptions of these practices may have

unique importance for understanding use and disorder development.

The current study leveraged cross-sectional data from a larger investigation (Miranda et al., 2010, 2013) to fill gaps in understanding how specific parent- and adolescent-reported parental monitoring domains relate to whether an adolescent had ever used cannabis and whether they met criteria for one or more CUD symptoms in the past year. Our goal was to build on prior cannabis research by studying a broader age range of youth, ages 12 to 18 years, examining indices of lifetime use and problem development, and testing unique relations of parent and adolescent reports across four key domains: parental monitoring (knowledge), parental solicitation, parental control, and child disclosure. Prior work has focused on these domains as related to likelihood of any cannabis use (Cottrell et al., 2003; Rusby et al., 2018), a range of alcohol-related outcomes (Abar et al., 2015), and delinquency (Kerr & Stattin, 2000; Stattin & Kerr, 2000). This investigation is the first to explore unique parent and adolescent associations with an early indicator of risk of developing one or more CUD symptoms. We hypothesized that parent reports of parenting would, on average, be higher (more favorable) than adolescent reports of the same parenting practices, as widely demonstrated by prior literature (Maurizi et al., 2012; Reidler & Swenson, 2012; Reynolds et al., 2011). We also expected the "pure" parental knowledge domain and child disclosure to relate more strongly to cannabis use and symptoms, as suggested by seminal papers (Kerr & Stattin, 2000; Stattin & Kerr, 2000) and meta-analyses of adolescent cannabis use (Lac & Crano, 2009) and alcohol-related behaviors and problems (Yap et al., 2017).

Our analysis also included past-year consumption of two or more alcoholic drinks in one sitting and likelihood of meeting criteria for one or more AUD symptoms in the past year. It was difficult to speculate whether parent or adolescent reports of monitoring domains would matter more when it came to adolescent-reported cannabis and alcohol outcomes. Whereas studies of outcomes specific to cannabis use tend to favor adolescent reports (Cottrell et al., 2003; Rusby et al., 2018), a recent prospective study showed added value for parent reports of parental knowledge, but not parental control, when predicting a composite measure of property offending, which included

driving while drunk or high (Bouffard & Armstrong, 2021). This study sampled older adolescents (ages 14 to 18) than previous work and utilized a more severe and broad delinquency outcome (Bouffard & Armstrong, 2021). A prospective study of younger adolescents found unique effects of parent-reported control when examining a more severe alcohol-related outcome, i.e., ever drunk, but generally found that adolescent, but not parent reports of monitoring predicted likelihood of ever having a drink of alcohol (Abar et al., 2015). Taken together, these studies may suggest unique effects of parent-reported monitoring for older adolescents and more severe substance-related outcomes. Given the limited body of work examining unique associations of adolescent and parent perceptions of distinct monitoring domains, however, no a-priori hypotheses were forwarded with respect to differences in parental monitoring-substance use associations by substance type. Our analysis includes alcohol outcomes to draw out any distinctions between alcohol and cannabis in the same adolescent sample and to extend the age range of prior work from pre- to early adolescence to later adolescence (ages 12 to 18).

METHODS

Participants

Participants were 132 adolescent-parent dyads from a larger study (n = 253) that sought to examine how differences in decision making and reactions to emotional situations are associated with adolescent problem behaviors, including alcohol and other substance use (Miranda et al., 2010, 2013) . Adolescents were recruited from the community and the family court system. Eligible youth (age 12-19 years) had no history of traumatic brain injury, hearing difficulties, or suicidal ideation or psychotic symptoms. A negative urine toxicology screen for alcohol, amphetamines, barbiturates, benzodiazepines, cocaine, and opiates was also required on the day of assessment. Parent data, most commonly provided by the youth's mother (91.3% of cases), was collected for 49.2% of participants. The current study included all participants with complete adolescent-parent dyadic data. Adolescents were ages 12 to 18 years (*M* = 14.5; 40.2% female; 68.2% White, 18.2% Hispanic) and accompanied caregivers were

primarily biological or adoptive mothers (Mothers = 86.4%; 8.3% fathers; 2.3% both parents; 1.5% biological aunt; 0.8% grandmother).

Procedure

Data were collected in Rhode Island from April 2005 through August 2007. Cannabis has been legal medically in Rhode Island since 2006 for various health conditions. State-licensed dispensaries were approved in 2009. A cannabis decriminalization law did not go into effect in Rhode Island until 2013. At the time of data collection, 1 in 4 Rhode Island high school students reported cannabis use in the past month, and that prevalence has not changed over time (Rhode Island Department of Health, 2016).

Interested youth called the lab to learn more about the primary study and to complete a brief telephone screening to determine initial eligibility. Individuals who passed the initial screening and did not endorse exclusionary criteria received an invitation to complete an in-person screening and, if applicable, obtain written informed consent or assent. Parents/legal guardians were required to provide permission for youth younger than age 18 years; assent was obtained from minors. Youth who were eligible participated in the half-day assessment session, which included completion of self-report, paper-and-pencil measures and a semi-structured clinical interview. One parent/legal guardian for each participant was invited to participate and complete semi-structured interviews and self-report assessments about their adolescent's psychiatric functioning and developmental history, but caregiver involvement was not required. With this approach, youth whose parents/legal guardians were unavailable or unwilling could still participate in the study. The university Institutional Review Board approved all study procedures.

Measures

Demographics. Adolescent participants reported information regarding race (68.2% White; 22.7% African American; 9.1% other), ethnicity (81.8% Non-Hispanic), gender (59.8 male) and age (12.1% twelve years old; 15.2% thirteen years old; 23.5% fourteen years old; 24.2% fifteen years old; 14.4% sixteen years old; 7.6% seventeen years old; 3.0% eighteen years old).

Alcohol and cannabis use disorder symptoms. Psychiatric diagnoses, including substance use disorders, were attained using the Kiddie Schedule for Affective Disorders for School-Age Children (KSADS; Kaufman et al., 1997), a clinician administered semi-structured interview based on *Diagnostic and Statistical Manual of Mental Disorders* criteria (4th ed.; DSM-IV-TR; American Psychiatric Association, 2000). Adolescents were interviewed separately from parents and diagnoses were based on adolescent reports. Interviewers underwent systematic training and achieved a high level of inter-rater reliability (kappa > 0.90). Symptoms were coded according to severity (0= not present, 1= subthreshold, 2= clinical threshold). For each criterion, adolescents that met threshold were coded as having that AUD or CUD symptom criteria met, and coding was verified through case consensus involving two licensed clinical psychologists. Due to low base rates of meeting clinical DSM-IV-TR diagnoses of alcohol abuse or dependence, participants were classified as to whether they met at least one symptom of AUD. We used the same approach for CUD.

Alcohol use. Alcohol use was measured as a single item from an introductory section to the K-SADS section on AUD. The item asked, "Have you drank 2 drinks in 1 sitting within the last year." Responses were coded as yes or no.

Cannabis use. Cannabis use was measured from a prior drug use checklist from the K-SADS. Participants were asked, "Have you used any of the drugs on this list before, even if you have only tried them once. Which ones have you used?" Cannabis use was coded either yes or no, thus identifying a broad range of youth who may be at risk for problematic cannabis use.

Parental monitoring. Parents and adolescents separately completed the Parental Monitoring Questionnaire (PMQ; Kerr & Stattin, 2000), a 9-item questionnaire assessing parental knowledge of child activities. Parent and adolescent versions of the PMQ shared identical content with minor changes in wording to reflect the parent/adolescent perspective. For example, adolescents responded to "Do your parents…: know what you do during your free time? …know who you have as friends during your free time?", whereas parents responded to "Do you…: know what your child does during his or her free time? …know who your child has as friends during his or her free time?" Responses were indicated with 5-point Likert scales (1 = *No, never*;

2 = *Some of the time*; 3 = *About half the time*; 4 = *More than half, but not always*; 5 = *Yes, always*). Response averages were calculated separately for parent and adolescent reports.

Sources of parental knowledge. Parents and adolescents also separately completed the Sources of Parental Knowledge Scales (Kerr & Stattin, 2000), which assessed parental solicitation (5 items), parental control (3 items), and child disclosure (4 items). Similar to the parental monitoring scale, parent and adolescent versions were identical in content other than wording referring to whose perspective was being assessed. Parental solicitation, parental control, and child disclosure were developed by (Kerr & Stattin, 2000). These variables add information about parents' own efforts to find out what their children are doing as well as a child's willingness to divulge this information spontaneously. Example items from these scales in the adolescent versions are: "How often do you need to ask your parents before you can decide with your friends what you will do on a Saturday evening?" (Parental Control), "During the past month, how often have your parents started a conversation with you about your free time?" (Parental Solicitation), and "If you are out at night, when you get home, how often do you tell your parents what you have done that evening?" (Child Disclosure). One child disclosure item, "How often do you hide from your parents about what you do during nights and weekends?" was reverse coded. Parent and adolescent response averages were calculated separately for each scale.

Analytic Plan

First, dependent samples *t* tests evaluated differences in average raw scores of parent and adolescent reports of parental monitoring, parental solicitation, parental control and child disclosure. Point-biserial correlations related raw scores of these variables and age with binary substance-use outcomes (i.e., drank two drinks in past year, ever used cannabis, 1+ symptoms of AUD, 1+ symptoms of CUD). Other covariate relations for nominal variables with binary substance-use variables used the Phi coefficient (i.e., gender, ethnicity) and Cramer's V (race). Only covariates with significant relations to outcomes were retained in subsequent models.

Next, sets of logistic regression models tested whether parent and adolescent perceptions of parental monitoring and sources of knowledge (i.e., parental solicitation, parental control, and child disclosure) uniquely related to substance-use outcomes. Parent and adolescent scale scores were standardized (z-scores) prior to model entry. Domains of parental behaviors were analyzed in separate models (Abar et al., 2015). All models include covariates in a first step. In Model 1, a second step included parent and adolescent standardized scores. Inclusion of both parent and adolescent reports in the same model allows the following interpretation: (1) parent score main effects indicate the influence of parents' reports of parenting behaviors, accounting for or apart from (subtracting) the influence of adolescents' reports, and (2) adolescent score main effects indicate the influence of adolescents' reports of parenting behaviors, accounting for or apart from (subtracting) the influence of parents' reports. Of note, prior research (e.g., Abar et al., 2015) also tested models including discrepancy (i.e., difference) scores and either parent or adolescent standardized scores. Such models have statistical and conceptual limitations (Cronbach & Furby, 1970; Edwards, 1994, 2001) and are mathematically equivalent to including standardized parent and adolescent scores simultaneously in the same model, and thus, difference scores were not tested (Laird, 2020).

Following current recommendations (Laird & de Los Reyes, 2013; Laird, 2020), we also modeled discrepant parent-adolescent perceptions by examining interactive effects of parent and adolescent reports. Model 2 included the interactive effects of parent and adolescent standardized scores. This moderation approach provides a statistical test of whether adding informant discrepancies to the model provides unique information above and beyond Model 1 (Laird & Weems, 2011). For all models, we applied a Bonferroni correction to account for testing effects for two substance-use outcomes, with the adjusted *p*-value threshold for significance = .025.

RESULTS

Descriptive Information and Bivariate Associations

Of the 132 adolescent participants, 22 (16.7%) consumed two drinks in one sitting within the last year. Thirty-eight (28.8%) reported ever trying cannabis, of whom 22 (57.9%) used more than once

a month. Using DSM-IV-TR criteria, 12 (9.1%) met criteria for one or more CUD symptom and 8 (6.1%) met criteria for one or more AUD symptom. The average number of criteria endorsed among participants who met criteria for at least one symptom was as follows: CUD $M = 3.25$ (SD = 1.71), AUD $M = 1.63$ (SD = 1.06).

Consistent with hypotheses and prior research, parents reported significantly higher average (more favorable) parenting behaviors than adolescents (parental monitoring: $M_{diff} = 0.17$, SD = 0.84, $t(131) = 2.28$, $p < .024$; parental solicitation: $M_{diff} = 0.61$, SD = 1.01, $t(131) = 6.92$, $p < .001$; parental control: $M_{diff} = 0.70$, SD = 1.03, $t(130) = 7.76$, $p < .001$; child disclosure: $M_{diff} = 0.26$, SD = 0.91, $t(127) = 3.24$, $p < .001$).

Bivariate correlations of parent and adolescent reports of parenting behaviors are shown in Table 1. Parent reports were interrelated, rs from .26 to .71, ps < .004. Adolescent reports were also interrelated, rs from .45 to .71, ps < .001. Parent and adolescent reports of the same monitoring domain were modestly related for parental monitoring, $r = .30$, $p = .001$, parental solicitation, $r = .24$, $p = .005$, and child disclosure, $r = .43$, $p < .001$, suggesting some lack of agreement among reporters. Parent and adolescent reports of parental control were not significantly related, $r = .16$, $p = .061$. Of note, between-reporter correlations of the same domain generally demonstrated lower agreement than within-reporter correlations of unique domains. Adolescent reports of solicitation were also not related to parent reports of monitoring, $r = .11$, $p = .192$, or control, $r = -.14$, $p = .101$. Likewise, adolescent-reported child disclosure was not related to parent-reported control, $r = -.01$, $p = .905$.

Bivariate relations of cannabis and alcohol variables with covariates (i.e., gender, age, race of adolescent, ethnicity of adolescent) and parent and adolescent raw scores are shown in Table 2. Of the putative covariates, only the adolescent's age significantly related to cannabis and alcohol use and problem development, rs from .23 to .46, ps < .010. The adolescent's gender, racial identity, and ethnic identity were not significantly related to these outcomes (see Table 2). With regard to parenting behaviors, adolescent-reported parental monitoring, parental control, and child disclosure, was negatively related to adolescent use of cannabis and alcohol use and one or more CUD/AUD symptom(s). Adolescent reported solicitation was only negatively related to AUD symptom

development, $r = -.18$, $p = .046$, but not cannabis-use outcomes or past-year alcohol use, rs from $-.08$ to $-.13$ ps $\geq .158$. With a slightly different pattern, parent-reported monitoring and child disclosure were generally negatively related to these substance-use outcomes (see Table 2). For control, however, parent reports demonstrated negative relations to cannabis outcomes, but not alcohol outcomes (see Table 2). Parent-reported solicitation was only negatively related to lifetime cannabis use, $r = -.37$, $p < .001$, but not cannabis problem development or alcohol outcomes, rs from 0.02 to -0.14, ps $\geq .112$.

Unique Parent and Adolescent Report Relations to Cannabis Use and Symptoms

Of putative covariates, only age was significantly related to substance-use outcomes in bivariate analyses, and thus, it was the only covariate retained in logistic regression models (see Tables 3 and 4, Step 1). Alone, age explained from 11 to 22% of the variance in cannabis use and problem development (Pseudo R^2 values from .11 to .22). Specifically, each one-year increase in age was associated with more than doubled odds of having ever used cannabis, OR = 2.72, $p < .001$, or meeting one or more CUD symptoms in the past year, OR = 2.24, $p = .014$.

Step 2, Models A and B are age-adjusted models testing individual effects of adolescent- and parent-reported parenting variables separately for each of the four parenting domains. Step 3 tested unique effects of parent- and adolescent-reported parenting variables. Models including both adolescent and parent reports of monitoring explained from 13 to 43% of the variance in cannabis outcomes, reflecting an increase in Pseudo R^2 values from .02 to .21 (i.e., 2 to 21%) over age-only models. Parent-reported higher levels of monitoring, solicitation, and child disclosure all related to reduced odds of the adolescent having ever tried cannabis, ORs = 0.33, 0.48, and 0.41, respectively, ps < .025, over and above adolescent-reported parenting behaviors and the adolescent's age. These odds ratios suggest that each one-unit increase in parent-reported positive parenting practices was associated with from a 52 to 67% reduction in the odds of adolescents' engagement in cannabis use.

Table 1. *Means (Standard Deviations) and Pearson Correlations among Parent and Adolescent Reports of Parenting Behaviors*

	1	2	3	4	5	6	7	8
1. Parental Monitoring (Parent)	4.09(.68)							
2. Parental control (parent)	.41***	4.80(.47)						
3. Parent solicitation (parent)	.57***	.31***	3.81(.76)					
4. Child disclosure (parent)	.71***	.26**	.53***	3.83(.82)				
5. Parental monitoring (adolescent)	.30**	.14	.24**	.38***	3.93(.74)			
6. Parental control (adolescent)	.32***	.16	.30***	.33***	.51***	4.10(1.00)		
7. Parental solicitation (adolescent)	.11	− .14	.24**	.24**	.46***	.45***	3.20(.88)	
8. Child disclosure (adolescent)	.29**	− .01	.24**	.43***	.71***	.51***	.50***	3.57(.87)

Note: $p<.01$**, $p<.001$***

Table 2. *Bivariate Relations of Focal Variables and Covariates with Alcohol and Cannabis Use and Disorder Symptoms*

	Lifetime Cannabis Use	One or more CUD symptoms	Past-Year Alcohol Use	One or more AUD symptoms
Gender[a]	− 0.01	0.06	0.09	0.05
Age[b]	0.40***	0.23*	0.46***	0.27**
Race of Adolescent[c]	0.07	0.10	0.07	0.04
Ethnicity of Adolescent[a]	− 0.08	− 0.08	− 0.16	− 0.04
Parental Monitoring (parent)[b]	− 0.48***	− 0.17*	− 0.24**	− 0.16
Parental Solicitation (parent)[b]	− 0.37***	− 0.14	− 0.09	0.02
Parental Control (parent)[b]	− 0.29**	− 0.20*	− 0.10	− 0.16
Child disclosure (parent)[b]	− 0.42***	− 0.22*	− 0.32***	− 0.33***
Parental Monitoring (adolescent)[b]	− 0.23**	− 0.26**	− 0.25**	− 0.21*
Parental Solicitation (adolescent)[b]	− 0.12	− 0.08	− 0.09	− 0.19*
Parental Control (adolescent)[b]	− 0.31***	− 0.23**	− 0.22*	− 0.19*
Child disclosure (adolescent)[b]	− 0.32***	− 0.17*	− 0.31***	− 0.29*

Note: CUD = cannabis use disorder; AUD = alcohol use disorder. $p<.05$*, $p<.01$**, $p<.001$***. [a]Phi coefficient. [b]Point-biserial correlation. [c]Cramer's V, with race recoded as 0 = White, 1 = Black or African American, 2 = Other.

Table 3. *Odds ratios (95% Confidence Intervals) from a Series of Logistic Regression Analyses Relating Parental Monitoring and Sources of Knowledge to Lifetime Cannabis Use and Past-Year Disorder Symptoms*

	Parental Monitoring	Parental Solicitation	Parental Control	Child Disclosure
		Lifetime Cannabis Use		
Step 1: All Models				
Age	2.72*** (1.70, 4.34)	2.72*** (1.70, 4.34)	2.72*** (1.70, 4.34)	2.72*** (1.70, 4.34)
Step 2—Model A				
Adolescent report	0.68 (0.44, 1.03)	0.77 (0.50, 1.17)	0.63* (0.42, 0.94)	0.56* (0.35, 0.88)
Step 2—Model B				
Parent report	0.32*** (0.19, 0.54)	0.47** (0.30, 0.74)	0.63† (0.40, 0.98)	0.37*** (0.23, 0.62)
Step 3				
Adolescent report	0.79 (0.50, 1.26)	0.92 (0.58, 1.45)	0.64† (0.42, 0.98)	0.73 (0.44, 1.23)
Parent report	0.33*** (0.19, 0.56)	0.48** (0.30, 0.76)	0.64† (0.42,0.99)	0.41*** (0.24,0.70)
		One or more Cannabis Use Disorder symptom		
Step 1: All Models				
Age	2.24* (1.18, 4.26)	2.24* (1.18, 4.26)	2.24* (1.18, 4.26)	2.24* (1.18, 4.26)
Step 2—Model A				
Adolescent report	0.47* (0.25, 0.87)	0.76 (0.39, 1.46)	0.60 (0.35, 1.03)	0.65 (0.35, 1.21)
Step 2—Model B				
Parent report	0.65 (0.38, 1.14)	0.71 (0.39, 1.30)	0.72 (0.47, 1.11)	0.53† (0.28, 0.99)
Step 3				
Adolescent report	0.48† (0.26, 0.92)	0.83 (0.42, 1.65)	0.62 (0.36, 1.08)	0.83 (0.42,1.66)
Parent report	0.71 (0.34, 1.29)	0.75 (0.40, 1.41)	0.75 (0.48, 1.18)	0.57 (0.28, 1.13)

Note. All independent variables were standardized prior to model entry. A Bonferroni correction for Type I error for tests of two outcomes requires $p < .025$. †$p < .05$, *$p < .025$, **$p < .01$, ***$p < .001$.

Table 4. *Odds ratios (95% Confidence Intervals) from a Series of Logistic Regression Analyses Relating Parental Monitoring and Sources of Knowledge to Past-year Alcohol Use and Disorder Symptoms*

	Parental Monitoring	Parental Solicitation	Parental Control	Child Disclosure
		Past-year Alcohol Use		
Step 1: All Models				
Age	4.60*** (2.36, 8.97)	4.60*** (2.36, 8.97)	4.60*** (2.36, 8.97)	4.60*** (2.36, 8.97)
Step 2—Model A				
Adolescent report	0.55† (0.32, 0.94)	0.78 (0.44, 1.37)	0.77 (0.47, 1.24)	0.47* (0.26, 0.85)
Step 2—Model B				
Parent report	0.59† (0.35, 0.99)	1.03 (0.59, 1.77)	1.02 (0.65, 1.61)	0.41** (0.22, 0.75)
Step 3				
Adolescent report	0.56† (0.32, 0.99)	0.75 (0.41, 1.37)	0.76 (0.47, 1.24)	0.59 (0.32, 1.12)
Parent report	0.60 (0.34, 1.04)	1.11 (0.62, 1.97)	1.07 (0.66, 1.73)	0.50† (0.26, 0.95)
		One or more Alcohol Use Disorder symptom		
Step 1: All Models				
Age	3.44* (1.46, 8.09)	3.44* (1.46, 8.09)	3.44* (1.46, 8.09)	3.44* (1.46, 8.09)
Step 2—Model A				
Adolescent report	0.49 (0.23, 1.03)	0.34† (0.11, 0.98)	0.63 (0.32, 1.22)	0.31** (0.13, 0.74)
Step 2—Model B				
Parent report	0.63 (0.32, 1.24)	1.53 (0.63, 3.74)	0.78 (0.47, 1.29)	0.21** (0.08, 0.58)
Step 3				
Adolescent report	0.51 (0.23, 1.09)	0.23* (0.07, 0.78)	0.66 (0.33, 1.29)	0.46 (0.18, 1.19)
Parent report	0.67 (0.33, 1.39)	2.49 (0.86, 7.20)	0.82 (0.47, 1.41)	0.27* (0.09, 0.79)

Note. All independent variables were standardized prior to model entry. A Bonferroni correction for Type I error for tests of two outcomes requires $p < .025$. †$p < .05$, *$p < .025$, **$p < .01$, ***$p < .001$.

Parent-reported parental control was not significantly related to reduced odds of using cannabis after correcting for multiple outcome tests, $p = .047$. Adolescent perceptions of the same parenting behaviors were not related to engagement in cannabis use, over and above parent reports and the adolescent's age. Neither parent nor adolescent reports of parenting domains uniquely related to odds of meeting one or more CUD symptoms (see Table 3, Step 3). Adolescent-reported parental monitoring, which reflects parental knowledge alone and not sources of knowledge, was related to CUD symptoms in an age-adjusted model, OR = 0.47, $p = .017$, but not significantly related to CUD symptoms after accounting for parent reports and correcting for multiple tests, $p = .026$.

In a final step, interactive effects of parent and adolescent reports were added to evaluate whether explicitly modeling the combination of patterns of informant discrepancies (e.g., high parent report, low adolescent report) provides additional information over models testing unique associations. No interactive effects of parent and adolescent perceptions of monitoring domains were significant after a stringent Bonferroni correction for multiple tests, $ps \geq .027$.

Unique Parent and Adolescent Report Relations to Alcohol Use Outcomes

Of all outcomes, age was most influential for reports of past-year alcohol use, with the likelihood of an adolescent reporting having two drinks in one sitting more than quadrupling for each one-year increase in age, OR = 4.60, $p < .001$. Models including adolescent and parent reports of monitoring explained from 24 to 49% of the variance in alcohol outcomes, reflecting an increase in Pseudo R^2 values from .01 to .29 (i.e., 1 to 29%) over age alone (see Table 4).

Adolescent-reported parental monitoring and parental solicitation outperformed parent perceptions of these same behaviors in relation to past-year alcohol use, OR = .56, $p = .045$, and alcohol-related problem development, OR = .23, $p = .018$, respectively. Although not statistically significant, parent-reported solicitation was actually related to greater odds of meeting one or more AUD symptoms when also considering adolescent perceptions and the adolescent's age, OR = 2.49, $p = .092$. Parent-reported control was

marginally related to lower odds of past-year alcohol use, OR = .50, $p = .034$, and significantly related to lower odds of problem development, OR = 0.27, $p = .017$. Interactive effects of parent and adolescent reports were not significant.

DISCUSSION

Parental knowledge of their child's whereabouts, activities, or relationships, i.e., parental monitoring, is linked to lower risk for adolescent cannabis use (e.g.. Bohnert et al., 2012; Epstein et al., 2017; Lac & Crano, 2009), as well as alcohol use and early indices of alcohol problems (Yap et al., 2017). Although disagreement in parent and adolescent reports of parenting behaviors are the rule, rather than the exception (de Los Reyes, 2011; Korelitz & Garber, 2016), evaluations of the influence of monitoring on substance-use outcomes primarily focus on adolescent perceptions of parental knowledge. Exceptions for cannabis are limited to studies of unique effects of parent- and adolescent-reported parental knowledge on cannabis-use onset or frequency (Branstetter & Furman, 2013; Cottrell et al., 2003; Rusby et al., 2018), without attention to sources of that knowledge (i.e., active parent efforts of solicitation and control, or child disclosure), or cannabis-specific outcomes. Prior work for other related risk domains also focuses on the pre- to early adolescent years (Abar et al., 2015; Kerr & Stattin, 2000; Lippold et al., 2011; Stattin & Kerr, 2000). The present cross-sectional analysis builds from prior literature to understand how specific parent- and adolescent-reported parental monitoring domains uniquely relate to cannabis and alcohol use and the likelihood of meeting one or more disorder symptom in adolescents (ages 12 to 18). Overall, a meaningful percentage of variance in cannabis and alcohol use outcomes was explained by accounting for parent and adolescent reports of parental monitoring and sources of knowledge parenting behaviors.

A main contribution of this work was examining both "pure" parental monitoring knowledge, but also sources of that knowledge, for understanding adolescent cannabis use and an early index of problem development. Sources of knowledge include active parenting strategies (i.e., solicitation and control) and aspects of "parental" monitoring (i.e., child disclosure) which rely on the child's behavior rather than the parents' (Kerr & Stattin, 2000; Stattin & Kerr, 2000). Prior literature suggests that

parental knowledge may actually stem from the child's disclosure (or concealing) of their behavior (Stattin & Kerr, 2000) and that greater fluctuations in adolescent-reported child disclosure over time are predictive of cannabis use initiation (Marceau et al., 2020). In our analysis, lower parent reports of parental knowledge and child disclosure were most consistently related to cannabis and alcohol use and problem development. This is fitting with prior meta-analyses indicating that parental monitoring is most predictive of cannabis (Lac & Crano, 2009) and alcohol (Yap et al., 2017) outcomes when characterized as parental knowledge.

Findings from the present study suggest that parent reports of their child's disclosure may be particularly relevant for adolescent cannabis use. If youth can conceal their cannabis use from parents through less conspicuous modalities of administration, such as edibles or vaping (Miech et al., 2020), protective "monitoring" effects may be contingent on parents acquiring information from their adolescents (i.e., through disclosure). Relatedly, in a longitudinal examination of these constructs, decreases in youth-reported child disclosure over time were predictive of cannabis initiation (Marceau et al., 2020). These findings highlight the importance of obtaining both adolescent and parent reports of parental knowledge and sources of knowledge. Replication of the potentially important role of parent-reported child disclosure on adolescent cannabis use is critical, as prior work has relied on adolescent self-reports and predominantly assessed parental monitoring but not sources of knowledge (Bohnert et al., 2012; Epstein et al., 2017; Lac & Crano, 2009). Additionally, correlations with substance-use outcomes suggested that parental solicitation is a less useful strategy for curtailing adolescent substance use (and avoiding related problems) than the adolescent's free, willing disclosure (or concealing) of their activities, as noted in a seminal paper (Kerr & Stattin, 2000). Indeed, Marceau and colleagues (2020) paradoxically found that higher consistency in child reports of parental solicitation efforts over time were related to cannabis initiation; the authors posited that associations between lability in parental solicitation and lower risk of cannabis initiation over time could be conceptualized clinically as a parent's ability to skillfully modulate levels of parental solicitation as needed, rather than inconsistent parenting (Marceau et al., 2020).

Disagreement in parent and adolescent perceptions of parenting behaviors is long-recognized as a meaningful construct for understanding adolescent functioning (Achenbach et al., 1987; De Reyes & Kazdin, 2005; Guion et al., 2009). As expected, parental ratings of the parents' behaviors were higher (more favorable) as compared to adolescent reports. Parent and adolescent perceptions of the same parental monitoring knowledge and source-of-knowledge domains were also only modestly correlated, suggesting disagreement between reporters. Notably, parent and adolescent reports of parental control were not correlated, which is the same pattern observed by Abar and colleagues' study of pre- to early adolescence sipping, drinking, and drunkenness (Abar et al., 2015). Although prior literature suggests that greater disagreement in parent and adolescent perceptions relates to greater risk of adverse outcomes (de Los Reyes, 2011; Lippold et al., 2011), interactive effects of parent and adolescent perceptions were not statistically significant in our analysis after correcting for multiple tests.

With regard to unique effects of informant reports, where many were found for cannabis, few were observed for alcohol, and tended to favor both parent and adolescent reports, depending on the parental monitoring domain. For cannabis, parent reports tended to provide unique information for understanding lifetime cannabis use, but not problem development, over adolescent reports and the adolescent's age. These findings are in contrast with extant studies of pre- to early adolescent cannabis use (Cottrell et al., 2003; Rusby et al., 2018) and alcohol use (Abar et al., 2015). Our lack of unique influences of parent and adolescent reports for alcohol may be due to relative low base rates of drinking and AUD symptoms in our sample, and so these findings should be interpreted with caution. One possible explanation for the greater influence of parent-reported behaviors on lifetime cannabis use frequency, rather than CUD symptoms, is that the predictive utility of parent and adolescent reports may differ depending on the specific cannabis use behavior assessed. Parents' knowledge of whether their adolescent has ever used cannabis may be more accurate than their knowledge of their degree of frequent or problem use (Piehler et al., 2020). Regardless of the specific explanation for the findings in the current study, the results highlight the need for further research to understand the

predictive ability of discrepant parent and adolescent reports more fully. Future research should consider more extensive testing of parent-adolescent discrepancies in parenting in relation to a range of cannabis use behaviors, such as age of initiation, frequency of use, quantity of use, and cannabis-related problems.

Limitations

Additional limitations of this study should be acknowledged. Perhaps most problematic is that these data were only collected at one time. While our disaggregation of distinct parenting domains and focus on cannabis-use outcomes do move the field forward, our cross-sectional design limits the ability for predictive assumptions to be made. Additionally, while aspects of the sample, such as the broader age range, make it more generalizable, the limited number of adolescent-reported disorder symptoms may have restricted our ability to find effects, particularly for alcohol-related problem development. Future work should study a larger sample size at multiple time points to make more substantial predictive conclusions. Larger samples would also facilitate alternative approaches to modeling parent-adolescent discrepancies. Recent work suggests using both variable-centered (e.g., interactions or polynomial regressions) and person-centered analytic techniques (e.g., latent profile analysis) to examine parent-adolescent discrepancies (De Los Reyes et al., 2019). Future work with sufficiently large samples could employ both of these analytic strategies to obtain a more nuanced understanding of parent-adolescent discrepancies and their associations with adolescent cannabis use. Finally, as with many studies of parenting behaviors, we had a much higher number of mother parental reporters compared to father reporters. Future studies may consider balancing parent recruitment on the basis of the parent's gender. Information from fathers could provide an additional perspective on this topic.

Conclusions

Disaggregating the broad parental monitoring construct is one method of resolving inconsistencies in prior literature describing relations with adolescent substance-use outcomes (Lac & Crano, 2009; Yap et al., 2017). Future studies of parental monitoring should consider both what parents know, as well as how they know it, from the perspective of parents and youth, to better understand adolescent substance use and disorder development. Our study provides a meaningful step toward isolating the components of parental monitoring and sources of knowledge that most strongly relate to adolescent cannabis use and the development of disorder symptoms. We built on prior cannabis research by studying a broader age range of youth (ages 12 to 18 years) and evaluating one potential early index of cannabis-related harms. Future research should aim to study a larger sample of adolescents to capture a larger proportion who develop CUD symptoms and also follow these adolescents over time to study predictive relations. Findings suggest that parent-reported monitoring is a unique feature to consider in conjunction with adolescent perceived parenting, and point to targeting parent perceptions of parental monitoring and sources of parental knowledge (especially child disclosure) in adolescent substance use prevention/intervention programs.

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