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Parental-Adolescent Drug Use Discussions: Physiological Responses and Associated Outcomes

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Abstract

Purpose—Although talking to youth about drugs is often recommended to parents, we know little about how parents actually discuss drugs with their children in the moment and how parental advice is linked to youth arousal and substance use. This study examined observed parental drug use advice and parenting behaviors during parent-adolescent drug use discussions and associations with adolescent physiological responses and substance use.

Methods—Fifty eight 12–17 year olds and their primary caregivers participated in a laboratory session in which parents and youth discussed the topic of alcohol and/or drug use for ten minutes. This discussion was videotaped and coded for drug use advice (rules against drug use, information on drug use consequences, scenarios/learning advice [discussing drug use scenarios and what the child has learned about drugs]) and general parenting behaviors (parental warmth/support, negative/critical parenting). Before, during, and after the discussions, adolescents' heart rate, blood pressure, and salivary cortisol levels were assessed.

Results—Parental discussion of scenarios/learning was associated with lower adolescent blood pressure responses to the discussions and lower likelihood of substance use. Parental discussion of rules against drug use was associated with higher heart rate and blood pressure responses, and greater likelihood of substance use. Criticism/negative parenting was associated with higher cortisol responses and greater likelihood of substance use at a trend level.

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Conclusions—Parenting characterized by greater discussion of drug use scenarios, and less stating of rules against drug use and criticism may make youth feel more comfortable and be linked to lower substance use.

Implications and Contributions—This study observed family discussions about drug use. Parents who discussed drug use scenarios had adolescents who felt more comfortable and were less likely to use substances. In contrast, parents who stated rules against drug use had adolescents who were less comfortable and more likely to use drugs.

Keywords

Adolescence; Substance Use; Parenting; Parent-Adolescent Interactions; Drug Use Discussions; Cortisol

Introduction

Adolescence is a risk period for the development of substance use disorders.¹ National data indicate that one month rates of alcohol, cigarette, and illicit drug use increase from 7–14% in 8th grade to 14–29% in 10th grade to 24–41% in 12th grade.² Adolescent alcohol and drug use are associated with academic problems, impaired driving, violent behaviors, and risky sex^{3,4} and substance use in adolescence predicts substance use disorders and antisocial activities in adulthood.⁵ As a way to prevent adolescent substance use, numerous public service announcements and prevention programs recommend that parents talk to their teens about drugs.^{6–8} However, there is a lack of observational research on *how* parents talk to youth about drugs and on youth's physiological responses in the moment to drug use discussions.

The few studies exploring associations between parent-adolescent drug use discussions and adolescent substance use have used parent-report questionnaires. These studies find that perceived rules against substance use, openness in discussing drugs, and frequent substance use communication are associated with lower substance use in early and middle adolescence.^{9–12} In addition, providing information about drug use consequences has been theorized to prevent substance use.¹³ In contrast, studies suggest that negative/critical parenting in parent-adolescent interactions increases youth substance use risk, potentially because hostile parenting reduces parent-youth bonding.¹⁴ In sum, questionnaire studies suggest that discussions incorporating parental rules against drug use, information about drug consequences, and low negative/critical parenting are linked to lower adolescent substance use. There are very few observational studies of parent-adolescent drug use discussions. Those that exist are descriptive (e.g., one study found that mothers were more likely to ask questions about drugs than lecturing or discussing consequences¹⁵) and do not examine links between parental advice and youth substance use.

In addition to observing drug use discussions, the present study also examined youth physiological reactivity. It is important to examine physiological reactivity because, while a moderate level of physiological arousal may facilitate youths' attention to parents, overly high reactivity reflects negative emotion and discomfort¹⁶, which may be a risk for substance use. Indeed, three studies found links between high physiological and emotional

reactivity to parent-adolescent interactions and youth substance use.^{17, 18, 19} Feeling overly-aroused by family discussions may lead youth to avoid discussions, leading to decreased parental monitoring, increased contact with risky peers, and substance use. In addition, youth's high arousal may lead them to use substances to regulate arousal and their substance use may exacerbate reactivity,²⁰ which may lead to negatively charged interactions with parents.

Given the importance of physiological arousal, it would be useful to understand what drug use advice and parenting behaviors in drug use discussions are associated with high reactivity. There have been no studies of this. Related studies find that low parental warmth and high negative and angry parenting in other family interactions are associated with youth's higher blood pressure, cortisol, and anger reactivity.^{18, 21} Thus, low parental warmth and high negative parenting in drug use discussions may be linked to higher reactivity-but little is known about drug use advice and reactivity.

Here we present a laboratory study examining observed parental drug use advice and parenting behaviors in parent-adolescent drug use discussions as they relate to adolescents' elevated cardiovascular (HR, BP), and HPA axis (cortisol) reactivity and substance use. We examined three types of drug use advice. Based on self-report studies¹⁰, we examined: 1. Rules against alcohol or drug use, and 2. Information about negative consequences of alcohol or drug use. Based on it occurring in our study, we examined: 3. Scenario/learning advice, including discussions about drug scenarios and what the child learned about drugs at school. Based on prior research^{14, 22}, we examined two parenting behaviors: 1. warmth and 2. negative/critical parenting. We hypothesized that greater warmth and lower negative/critical parenting would be associated with lower physiological reactivity and explored associations between parental advice and reactivity. We hypothesized that greater rules against drug use, information about consequences, scenario/learning advice, and warmth, and lower negative/critical parenting would be associated with lower substance use likelihood.

Methods

Participants

Participants were 58 12–17 year olds and their parents. The sample was recruited through mailings to representative households in a small city in the Northeastern U.S. Demographic information is shown in Table 1.

Procedures

Adolescents attended three sessions for a study of stress and risk behaviors. In the first, youth completed questionnaires assessing substance use. In the second, adolescents completed breathalyzer and urine screens and an EEG study. In the third, the focus of this report, adolescents and one parent completed a conflict discussion and a drug use discussion, during which parental advice and adolescent physiological reactivity was measured. The study was described to families, informed consent and assent were obtained, and the protocol was approved by the university's IRB.

Drug Use Discussion Session

Discussion sessions were scheduled at 4:00 p.m. to control for diurnal variation in cortisol. Youth refrained from eating during the session, were asked to refrain from alcohol or drug use before the session, and menstruating girls were scheduled during days 5–10 of their cycle to control for effects on physiology.

Upon arriving at the lab, adolescents and parents went to separate rooms, were seated in comfortable chairs, and met with separate research assistants who introduced the session, stating, “We are studying how parents and adolescents talk about everyday topics and about drug use.” At 4pm, there was a 25-minute adaptation/relaxation period. A BP cuff was placed on each participant’s preferred arm and a pulse sensor on a finger. Participants listened to two 5-minute relaxation tapes. At 4:25 p.m., pre-task HR, BP, and salivary cortisol measurements were collected.

At 4:30 p.m., the parent was brought into the adolescent’s room and seated next to him/her. The parent and adolescent had the drug use discussion for 10 minutes and discussed a conflict topic for 10 minutes, with discussion order randomly assigned (Note: there were no order effects on physiological responses). During the discussions, HR was recorded every 30 seconds. The discussions were videotaped. Between the two discussions, parent and adolescent HR and BP were assessed. After the discussions, parents returned to their rooms and measures of HR, BP, and salivary cortisol were taken post-task and then every 15 minutes through a 60 minute recovery period.

Drug use discussion—The drug use discussion was based on prior research.¹⁵ Parents and youth were asked to “discuss the topic of using alcohol, tobacco, marijuana, or any other drug for 10 minutes.” If the family finished early, they were asked to keep talking.

Measures

Observed parenting behavior—Parenting during the drug use discussions was coded using a system (Author Citation, 2010), based on the parenting literature.²³ Parental warmth/support (e.g., appears to listen to the youth) and negative/critical parenting (e.g., mocks youth) were coded (see Supplemental Table 1). Coders were trained for 10 hours until they achieved 85% agreement. Coders observed the discussions in person and rated each parenting behavior on a scale from 1–5 (“none present” to “high level”), based on parents’ facial expressions, behaviors, tone of voice, and content of speech. Twenty one of the interactions (36%) were double-coded and checked for inter-rater reliability. Reliability was adequate; intra-class correlation coefficients (ICC’s) = .68 for warmth and .85 for negative/critical parenting.

Observed drug use advice—Parental drug use advice was coded from videotapes using a micro-analytic system (Author Citation, 2012), based on past observational and self-report research.^{12, 15} Coders were trained for 20 hours until they achieved 85% agreement. Coders identified each parent speech turn (every time the parent spoke) and coded it for: 1. *Rules against alcohol or drug use*, including rules to abstain from drug use generally or until the youth is older (ex: “I expect that you will not drink until you are 21”), 2. *Scenarios/learning*

advice, including discussion of drug use scenarios (ex: “If your friends offered you drugs, what would you do?”) and discussion of what the youth learned in school (ex: “What do your teachers tell you about drinking?”), and 3. *Information about negative consequences* of drug or alcohol use (ex: “Your uncle got lung cancer from smoking.”) (see Supplementary Table 2).

Each speech turn could be coded with more than one code. Thirteen of the videotapes (22%) were double-coded and checked for inter-rater reliability. Reliability was good, with ICCs = .98 for Rules against drug use, .76 for Scenario/learning advice, and .77 for Information about consequences. Analyses used the frequency of each type of advice divided by the total number of speech turns multiplied by 100, to give a percentage score that controlled for number of speech turns.²⁴

Adolescent cardiovascular response—A Dinamap 120 Patient Monitor with a pulse sensor was used to assess BP and HR.

Adolescent HPA axis response—Salivary cortisol levels were measured as a marker of HPA axis activation. Saliva was collected using a cotton swab which participants placed between their tongue and cheek for 2 minutes until saturated. Saliva samples were assayed in duplicate using standard radioimmunoassay kits with no modifications (intra-assay coefficients of variation from 3.0 to 5.1%).

Adolescent substance use—Lifetime substance use was assessed with a combination of: 1. self-report on the Youth Risk Behavior Survey²⁵, 2. urine screens for opiates, cocaine, THC, PCP barbiturates, ethyl glucuronide, and cotinine, 3. alcohol breathalyzer, and 4. CO breath test. Youth were considered substance users if they endorsed lifetime use of any substance (including tobacco, alcohol, marijuana, and other drugs) on the YRBS or if they had a positive urine or breath test at the second study session.

To facilitate youth reporting substance use honestly, adolescents were told that their responses to substance use questions would not be shared with parents (except in cases of imminent risk of death) and a Certificate of Confidentiality was obtained to protect confidentiality of reported illegal behaviors.

Missing data—Cortisol difference scores were missing for four youth. These subjects are excluded from analyses involving cortisol. There was no other missing data.

Data Analysis Plan

Drug use discussion response scores—We created scores to represent physiological responses or “reactivity” to the drug use discussion for each physiological index (HR, BP, cortisol). Response variables were calculated as the score at the time point (or average of time points) during or after the discussion when the physiological measure was at peak elevation (i.e., before recovery) minus the pre-task score. This change from baseline approach is commonly used to capture reactivity.²⁶ HR reactivity was calculated as the average HR during the last 8 minutes of the drug use discussion (families were just settling into the discussion in the first two minutes) minus pre-task HR. BP response was calculated

as BP immediately following the drug use discussion minus pre-task BP. Thus, HR and BP were examined during or immediately after the drug use discussion and are specific to this discussion.

Cortisol response was calculated as the average cortisol level at 15 and 30 minutes post-discussions minus pre-task. Cortisol was measured 15 and 30 minutes post-discussions because salivary cortisol levels increase about 15–20 minutes after events. Unfortunately, because of this, it was not possible to isolate cortisol responses specific to the drug discussion, so cortisol reactivity in these analyses indexes response to drug use and conflict discussions. We retained the analysis despite this, given that it is important to understand associations between drug use advice and youth's arousal during family interactions in general.

Substance use scores—Analyses examined substance use as a yes/no variable for lifetime substance use. We collapsed alcohol, tobacco, marijuana and all other substances into one variable because most youth who used one substance also used other substance(s) (which is typical for adolescents). We used a categorical substance use variable because substance use severity variables were skewed, with 41.4% of youth scoring a 0.

Main analyses—Regressions tested hypotheses predicting youth physiological responses from parental advice and parenting and logistic regressions tested hypotheses predicting youth substance use from parental advice and parenting.

Covariates—We considered sex, race, and age group (early vs. middle adolescence) as potential covariates if they were associated with the independent or dependent variables in the regression. Only age group was associated with scenario/learning advice (early adolescents > middle adolescents) and with substance use (middle adolescents more likely to be substance users). We conducted the regression for scenario/learning predicting substance use controlling for age group. In this analysis, age group was not a significant predictor and so it was left out of the final model presented below.

Potential mediation—If a parenting or parental advice variable showed a significant association with a physiological response and with substance use, the association between that response variable and substance use was tested to determine whether the response variable could be a mediator.

Results

Data Inspection

Correlations among variables are presented in Table 2. Data were examined for normality. Parental rules against drug use and information about consequences each had one outlier (> 3 SDs above the mean). HR, BP, and cortisol responses had 1, 2, and 2 outliers, respectively. Outliers were set to be equal to the next highest value in the dataset, following ^{27, 28}. Rules against drug use, scenario/learning advice, and negative/critical parenting were skewed and so square root transformations were used.

Description of Discussions

Ninety eight percent of parents and adolescents talked about alcohol, 82% tobacco, and 93% other drugs. Nineteen adolescents and 28 parents admitted to substance use during the discussion.

Parental Advice and Parenting: Associations with Adolescent Physiological Responses

Rules against drug use—Higher levels of parental rules against drug use was associated with *greater* systolic and diastolic BP responses to the parent-adolescent drug use discussion (for SBP: Model $R^2 = .08$, $\beta = .28$, $t [56] = 2.12$, $p = .04$; for DBP: Model $R^2 = .09$, $\beta = .30$, $t [56] = 2.33$, $p = .02$). Rules against drug use was also associated with *greater* HR responses, Model $R^2 = .07$, $\beta = .26$, $t [56] = 2.02$, $p = .048$. Rules against drug use was not associated with cortisol responses.

Scenario and learning advice—Parental scenario and learning advice was associated with lower systolic and diastolic BP responses to the parent-adolescent drug use discussion (For SBP: Model $R^2 = .11$, $\beta = -.33$, $t [56] = -2.61$, $p = .01$; for DBP: Model $R^2 = .07$, $\beta = -.26$, $t [56] = -1.99$, $p = .05$). Scenario and learning advice was not associated with HR or cortisol responses.

Information about consequences—Information provided on negative consequences of drugs was not significantly associated with adolescent HR, BP, or cortisol responses.

Negative/critical parenting—Negative/critical parenting behavior in the drug use discussion was associated with greater adolescent cortisol responses, Model $R^2 = .08$, $\beta = .29$, $t (53) = 2.15$, $p = .04$.

Supportive parenting—Supportive parenting in the discussion was not significantly associated with HR, BP, or cortisol responses.

Parental Advice and Parenting: Associations with Adolescent Substance Use

Rules against drug use—Greater parental statements of rules against alcohol or drug use were associated with *greater* likelihood of adolescent substance use, Model Cox and Snell $R^2 = .10$, $\text{Exp}(B) = 2.40$ (95% CI = 1.11 – 5.20), $p = .03$. This indicates that for every 1 point increase in parents' statements of rules against drugs (which ranged from 1 to 10.05), adolescents were 1.30 times more likely to be a substance user.

Scenario and learning advice—Parental scenario and learning-focused advice was significantly associated with *lower* likelihood of substance use, Model Cox and Snell $R^2 = .12$, $\text{Exp}(B) = .59$ (95% CI = .39 – .89), $p = .01$. This indicates that for every 1 point decrease in the scenario and learning advice score (which ranged from 1 to 10.05), adolescents were 1.69 times more likely to be a substance user.

Information about consequences—Information on consequences was not associated with adolescent substance use.

Negative/critical parenting—Negative/critical parenting behavior in the parent-adolescent drug use discussion was not significantly associated with substance use, although there was a non-significant trend for greater negative parenting to be associated with greater likelihood of substance use, Model Cox and Snell $R^2 = .05$, Exp(B) = 10.84 (95% CI = .66 – 178.90), $p < .10$.

Warm/Supportive parenting—Supportive parenting in the discussion was not associated with adolescent substance use.

Mediation

For significant or trend-level associations between parenting variables and both physiological responses and substance use, the association between the physiological responses and substance use were tested. These associations were not significant and so mediation was not further investigated.

Discussion

The current study examined how observed parental drug use advice and parenting relates to adolescent physiological reactivity and current substance use. To our knowledge, this is the first study of its kind using observational and physiological measures, which can supplement questionnaire-based studies. Findings suggested that youth had a higher likelihood of substance use and were more highly physiologically aroused if their parents presented rules against substance use or displayed negative/critical parenting. However, discussing drug use scenarios and asking what adolescents have learned about drugs was related to a lower likelihood of substance use and lower physiological arousal in youth.

Unexpectedly, hearing parents present many rules against drug use was associated with youth's heightened physiological arousal (at least in HR and BP) and substance use. This is counter to findings from parent-report studies, which suggest that firm rules against drug use are associated with reduced substance use.^{11, 13} It may be that parents' *attitudes* against drug use are helpful for youth, but that during drug use discussions presenting a long list of rules may threaten youth, leading to high physiological arousal, an indicator of emotional discomfort.¹⁶ This discomfort may lead youth to avoid parents, leading to less parental supervision, association with deviant peers, and greater opportunities for substance use—although, notably, physiological reactivity was not linked to substance use in the present study.²⁹ Excessive focus on rules may also close off discussion about substances, leading youth to be less likely to take in helpful information from parents.

However, given that our findings are cross-sectional we cannot determine direction of effects. Youth who are using substances (or whose parents suspect substance use) may elicit greater rule-setting from parents and may feel particularly aroused by hearing limits about drug use. However, not all forms of drug use advice were linked to arousal in youth— for example greater scenario/learning advice was not linked to greater arousal. Thus, it is not just parents' addressing the topic that is arousing, it is specific to a focus on rules.

Findings suggest that discussing drug use scenarios or asking youth what they have learned at school is associated with youth's lower physiological arousal/discomfort and likelihood of substance use. This style of advice is open-ended and may elicit more active participation from youth- and active participation in problem-solving has been linked to lower adolescent substance use.³⁰ Our findings suggest that active participation is also related to lower physiological arousal. It is also possible that families that use open-ended communication in drug use discussions use them in other interactions, further reducing youth risk. Of course, non-using youth may have elicited more scenario discussion from parents because they were more open to hearing about scenarios, given that they did not use substances. Interestingly, discussions of consequences of drugs were *not* related to youth's physiological arousal or to their substance use. Adolescents are less concerned about the future and less able to predict future consequences than adults³¹ and thus youth may not be affected by information about consequences.

As predicted, higher levels of negative/critical parenting behaviors in the drug use discussions were linked with heightened cortisol arousal and showed a trend-level association with substance use. Parenting that is overly harsh can contribute to a stressful emotional exchange, accounting for youth's greater cortisol reactivity to family interactions. This is consistent with previous questionnaire-based findings that parental hostility predicts substance use^{14,32}, and extends this to parenting during drug use discussions.

Limitations/future directions

Future longitudinal studies are needed to examine whether parental advice leads to increases in substance use or whether substance users elicit different parental advice. In addition, our study was limited to a small community sample and thus generalizations are limited; in particular we examined mostly mother-child pairs, not allowing examination of parent gender effects. Conducting micro-analytic moment-to-moment analysis of observed parental advice is time-intensive work that limits the number of subjects.

Conclusions

This study provides initial evidence that particular types of parental advice about drug use can be observed and linked to youths' physiological arousal and substance use. Specifically, stating rules against drug use and using negative/critical parenting behaviors during parent-adolescent conversations about substance use may increase adolescents' discomfort and be associated with substance use. In contrast, engaging youth in discussing hypothetical drug use scenarios or what they are learning in school about drugs may reduce youth's discomfort and prevent substance use. If our findings are shown in future longitudinal studies to predict future substance use, this suggests that interventions should encourage parents to discuss scenarios rather than focus on criticism and rules against drug use.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1**Demographics and adolescent substance use information**

<u>Child Sex:</u> Number (%) male	26 (44.8%)
<u>Child Age:</u> Mean (SD)	15.12 (1.62)
<u>Child Race:</u> Number (%)	
White	40 (69%)
Hispanic	8 (13.8%)
African American	5 (8.6%)
Asian	2 (3.4%)
American-Indian/Native Alaskan	2 (3.4%)
Other	1 (1.7%)
<u>Caregiver Type:</u> Number (%)	
Biological mothers	52 (89.7%)
Biological fathers	6 (10.3%)
<u>Marital Status of Parent:</u> Number (%) ^a	
Married	46 (82.1%)
Separated/divorced	5 (8.9%)
Single	4 (7.1%)
Widowed	1 (1.8%)
<u>Family Income:</u> Number (%) in each level	
< \$15,000/year	1 (1.7%)
\$15,000–24,000/year	1 (1.7%)
\$25,000–34,000/year	4 (6.9%)
\$35,000–44,000/year	4 (6.9%)
\$45,000–59,000/year	3 (5.2%)
\$60,000–74,000/year	10 (17.2%)
> \$75,000/year	26 (44.8%)
Don't know	2 (3.4%)
Not reported	7 (12.1%)
<u>Parent Current or Past Substance Use Problems:</u> Number (%) ^b	7 (13.0%)
# (%) Alcohol Problem	4 (3.7%)
# (%) Tobacco Problem	3 (5.6%)
# (%) Other Drug Problem	1 (1.9%)
<u>Parent Substance Use, Past 30 days:</u> Number (%) Used	39 (67.2%)
# (%) Used Alcohol	35 (60.3%)
# (%) Used Tobacco	10 (17.2%)
# (%) Used Marijuana	1 (1.7%)
# (%) Used Other Drugs	2 (3.4%)
<u>Adolescent Substance Use:</u> Number (%) Used	34 (58.6%)
# (%) Used Alcohol	30 (51.7%)
# (%) Used Tobacco	14 (24.1%)
# (%) Used Marijuana	12 (20.7%)

(%) Used Opiates

1 (1.7%)

^a Marital status was missing for 2 families.

^b Parental substance use problem data was missing for 4 families. Parental substance use problems and parental past 30 day use were based on parent-report.

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Table 2

Correlations among main variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Rules to Abstain	–									
2. Scenario/Learning Advice	-.23	–								
3. Information about Consequences	.18	-.25	–							
4. Parental Support	-.01	.17	-.13	–						
5. Negative/Critical Parenting	.03	-.24	-.00	-.23	–					
6. HR Response	.23	-.07	-.07	.02	-.18	–				
7. SBP Response	.30*	-.29*	-.12	-.03	.08	.10	–			
8. DBP Response	.30*	-.20	.01	-.03	.07	.12	.60**	–		
9. Cortisol Response	-.02	-.07	-.02	-.07	.28*	.05	.18	.03	–	
10. Substance Use	.31*	-.35**	.09	-.10	.22	.04	.19	.25	.19	–

* Correlation is significant at the 0.05 level.

** Correlation is significant at the 0.01 level.