Pathways from Parental Knowledge and Warmth to Adolescent Marijuana Use: An Extension to the Theory of Planned Behavior

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Abstract Despite research indicating that effective parenting plays an important protective role in adolescent risk behaviors, few studies have applied theory to examine this link with marijuana use, especially with national data. In the current study ($N=2,141$), we hypothesized that parental knowledge (of adolescent activities and whereabouts) and parental warmth are antecedents of adolescents' marijuana beliefs—attitudes, subjective norms, and perceived behavioral control—as posited by the Theory of Planned Behavior (TPB; Ajzen 1991). These three types of beliefs were hypothesized to predict marijuana intention, which in turn was hypothesized to predict marijuana consumption. Results of confirmatory factor analyses corroborated the psychometric properties of the two-factor parenting structure as well as the five-factor structure of the TPB. Further, the proposed integrative predictive framework, estimated with a latent structural equation model, was largely supported. Parental knowledge inversely predicted pro-marijuana attitudes, subjective norms, and perceived behavioral control; parental warmth inversely predicted pro-marijuana attitudes and subjective norms, ps<.001. Marijuana intention ($p<.001$), but not perceived behavioral control, predicted marijuana use 1 year later. In households with high parental knowledge, parental warmth also was perceived to be high ($r=.54$, $p<.001$). Owing to the analysis of nationally representative data, results are generalizable to the United States population of adolescents 12–18 years of age.

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Traditionally it has been assumed that at the onset of adolescence, parents begin to play a less important role and peer influences become more potent social forces in guiding adolescents' behavior (Steinberg & Silverberg 1986). Many theories have supported this supposition (e.g., Erikson 1959). As a result of this conventional understanding, the contextual role played by parents in the drug perceptions and behaviors of adolescents is largely understudied, especially in comparison to the considerable number of investigations that have focused on peer influences (Allen et al. 2003; Bogenschneider et al. 1998). The purpose of the present research is to examine whether, and to what extent, parental knowledge and parental warmth uniquely contribute to the marijuana-related beliefs of adolescent children aged 12–18 years. The pathways from these two parenting dimensions on adolescent marijuana use are examined in an extension to the Theory of Planned Behavior (TPB; Ajzen 1991).

Adolescents are at a critical biological and hormonal transitioning period from childhood to adulthood. Along with challenges faced in adapting to and coping with these changes, adolescents become more willing to undertake novel experiences (Turner 1996). Engaging in risky behaviors is entirely consistent with these tendencies, and as a result, adolescents become increasingly more susceptible to myriad high-risk behaviors, including sexual experimentation (Toscano 2006), physical inactivity (Koezuka et al. 2006), eating disorders (von Soest and Wichstrom 2006) and criminal activity (Brame et al. 2004). Another high risk behavior especially prevalent among adolescents is substance use. Recent national data from the Monitoring the Future project (Johnson et al. 2007) indicates that nearly half

(48.2%) of all high school seniors have tried at least one illicit drug (vs. 40.7% in 1992). In fact, 15.7% of 8th graders, 31.8% of 10th graders, and 42.3% of 12th graders have experimented with marijuana, the most widely used illicit drug among adolescents. Licit substance use also is alarming, as 24.6% of 8th graders, 36.1% of 10th graders, and 47.1% of 12th graders have tried cigarettes; and 40.5% of 8th graders, 61.5% of 10th graders, and 72.7% of 12th graders have consumed alcohol. Experimentation with both illicit and licit substances appears to be part and parcel of many adolescents' developmental trajectories. However, adolescents are not entirely alone during this period (Siegel et al. 2008)—parents are still very much a component of their interpersonal world.

On the one hand, parents may be somewhat ignorant of their teenager's problems. In a nationally representative study, the National Center on Addiction and Substance Abuse (2007) found that adolescents reported substance use (24%) as their primary concern—a concern more common than social pressures (19%), academic pressures (16%), and crime and violence (5%). In marked contrast, only 11% of parents (less than half that of their children) viewed substances as their adolescents' most important concern. The striking discrepancy between adolescents' and parents' perceptions underscores the fact that parents might not be fully knowledgeable of the challenges faced by their offspring. On the other hand, parents may not be entirely disconnected from their children's problems and may seek to positively sway their drug attitudes and beliefs (Allen et al. 2003). This is evidenced by research indicating that parents are especially concerned about substance misuse of their adolescents (Cavanaugh et al. 1993). Taken together, previous research indicates that parents serve a vital function in that they may decrease, or even increase, the likelihood of whether their adolescent children engage in substance use (Crano et al. 2008; Ramirez et al. 2004).

Parenting Knowledge and Warmth

Parental knowledge and warmth are two parental factors that may curtail the risky behaviors of adolescents. Parental knowledge has been conceptualized most recently as parental awareness of the activities and whereabouts of the child (Courter et al. 2005; Stattin and Kerr 2000). Research on children's and parents' self-reports has shown that poor parental knowledge is related to child outcomes of external maladjustment such as delinquency and problems at school, and internal maladjustment such as depressed mood, low self-esteem, and greater failure expectations (Kerr and Stattin 2000). The extent to which parents are nurturing and accepting of their offspring, parental warmth, is the affective quality of the parent-child relationship (Maccoby and Martin 1983). Poor parental warmth is

associated with child outcomes of emotional distress (Operario et al. 2006), the inability to express positive emotions appropriately (Davidov and Grusec 2006), and psychological maladjustment (Suchman et al. 2007). Not much research has examined the relationship between these two parenting practices, particularly their joint explanatory function in reducing drug beliefs and behaviors.

Theory of Planned Behavior

Purposive beliefs held by adolescents motivate whether they contemplate or even engage in risky activities. The Theory of Reasoned Action (TRA; Ajzen and Fishbein 1980) and Theory of Planned Behavior (TPB; Ajzen 1991) were developed to understand the linkages between beliefs and behavior. The TRA proposes that attitudes (expected belief outcomes associated with the target behavior) and subjective norms (the extent to which one believes important others approve of the behavior) are responsible for one's intentions (action tendency) to engage in a behavior. Intention, in turn, is postulated to predict behavior. In a revision to the TRA, the TPB added the construct of perceived behavioral control (beliefs regarding self-efficacy or ability to overcome obstacles in enacting the target behavior), which is posited to be predictive of both intentions and behavior.

Perceived behavioral control makes a difference in the predictive utility of these two theories when the act in question is not completely under volitional control (Ajzen and Cote 2008; Madden et al. 1992). Another theoretical difference is that the intentions construct is fully mediating in the TRA, but only partially mediating in the TPB—in the latter, perceived behavioral control also may directly predict behavior. Lending support to the predictive utility of the TPB is a meta-analytic review of 185 empirical studies that have applied the theory, including studies on adolescent substance use, which determined that the average variance explained by attitudes, subjective norms, and perceived behavioral control on intentions is 39%, and the average variance accounted by perceived behavioral control and intentions on behavior is 27% (Armitage and Conner 2001). Overall, the review concluded that the TPB was more predictive than the TRA. As such, we adopted the TPB for the present study.

Present Study and Hypotheses

The current research is designed to investigate whether adolescents' beliefs about marijuana are influenced by parenting factors, particularly parental knowledge and warmth. McHale et al. (2003) suggested that via parenting

practices, parents construct their children's psychosocial environment by transmitting and instilling their own values. Thus, the quality of the parent-adolescent relationship may help determine adolescents' psychological dispositions and cognitive resilience to resist drugs. Different parenting practices have been associated at varying degrees with adolescent attitudes, subjective norms, and perceived behavioral control toward tobacco (Harakeh et al. 2004). Williams and Hine (2002) found that permissive parenting was linked to attitudes and subjective norms in favor of alcohol consumption among adolescents. As suggested by such past research on tobacco and alcohol, we propose that parental influences may serve as antecedents to TPB belief constructs regarding marijuana. Given that marijuana use is associated with potentially serious legal, health, and social consequences, preventative parenting might be especially crucial. In the present study, designed to extend the TPB, we hypothesize that high parental knowledge and high parental warmth each should negatively predict adolescents' pro-marijuana beliefs (attitudes, subjective norms, and perceived behavioral control). Conversely phrased, low parental knowledge and low parental warmth should positively predict pro-marijuana beliefs (across the same TPB belief constructs). Consistent with the theoretical tenets of the TPB, attitudes, subjective norms, and perceived behavioral control are hypothesized to predict intentions; in turn, perceived behavioral control and intentions are hypothesized to predict behavior.

In summary, we argue that effective parenting serves as a protective barrier to adolescent marijuana use, but poor parenting serves as a risk factor. As such, the quality of the parent-adolescent relationship, as measured with parental knowledge and warmth (from the child's perspective), is posited to play an important role in adolescents' usage of marijuana. We expect the pathways from parenting to adolescent marijuana use to be mediated via adolescent marijuana beliefs. As such, we incorporate parental knowledge and warmth as antecedents to the TPB, using a weighted, nationally representative dataset to test our hypotheses, which thereby will allow for widely generalizable findings.

Method

Design and Procedure

Measures for this secondary analysis were obtained from the restricted version of the National Survey of Parents and Youth, which was conducted to evaluate the National Youth Anti-Drug Media Campaign (NIDA 2006). Respondents were selected using a complex sampling design that incorporated clustering and stratification. Two sampling frames were used to derive a list of dwelling units that were screened. The primary frame was a list of households compiled for an earlier nationally representative survey on adult literacy. The second frame was a permit list of housing units constructed between January 1990 and December 1998, ensuring that dwellings built after the original frame was developed would be sample-eligible. Units selected from these frames were identified for eligibility in a face-to-face screening of a scientifically selected random sample of 81,000 household units within 90 geographic areas (primary sampling units) throughout the United States.

During the screening process by trained interviewers, a household unit was deemed eligible to participate if it contained children of a specified age, as predetermined by the stratification of households based on age groups. Youth 12 to 13 years of age were over-sampled relative to the older respondents. The probability of selection also depended on the respondent's age and that of any siblings living in the household. Once determined to be eligible, the interviewer obtained verbal and written consent from the selected youth, and his or her parent or guardian, prior to proceeding with the interview. Non-sensitive data (e.g., demographic information) were collected via computer-assisted personal interview. Sensitive data (e.g., substance use beliefs and behaviors) were collected via audio computer-assisted self-interview, allowing respondents to privately self-administer the questionnaire using a head-phone and a touch-sensitive computer screen.

The data used in our analyses were collected in two rounds from the same individuals. At Time 1, participants were interviewed during the period of July 2002 to June 2003. Time 2 interviews were conducted during July 2003 to June 2004. Interviews were separated by approximately 1 year ($M = .98$, $SD = .33$). The follow-up conditional retention rate between these two rounds was 93.0%, defined as the product of (a) proportion of Time 1 respondents who completed the Time 2 interview and (b) proportion of eligible respondents at Time 2. Respondents remained eligible at Time 2 if they did not become older than 18. Respondents received $20 for each completed interview. The sample used in our study consisted of 2,141 participants who completed surveys from both rounds. Respondents ranged in age from 12 to 18 years old ($M = 14.49$, $SD = 1.71$). Demographic characteristics are presented in Table 1.

To obtain national parameter estimates, longitudinal general sampling weights, available in the dataset, were applied to the data in a procedure described by Kaplan and Ferguson (1999) and supported by the EQS 6.1 modeling software (Bentler 2001). The weighting procedure corrected for point estimates by adjusting for oversampling, participant attrition from Time 1 to Time 2, and other sampling artifacts.

Table 1 Demographic characteristics

Variable	%
Gender	
Male	51.5
Female	48.5
Race	
White	66.4
Black/African American	15.7
Hispanic	14.7
Asian/Other	3.2
Family income	
Under $25,000	24.1
$25,000–$49,999	31.8
$50,000–$74,999	21.8
$75,000 and over	22.3

Measures

Parenting

Higher scores on the parenting constructs represent more positive parenting. Both parenting constructs were assessed at Time 1.

Parental knowledge ($\alpha = .76$, $r = .61$) Two items assessed this construct: (a) "In general, how often does at least one of your {parents/caregivers} know what you are doing when you are away from home?" (b) "In general, how often does at least one of your {parents/caregivers} have a pretty good idea of your plans for the coming day?" Response options ranged from 1 (*never or almost never*) to 5 (*always or almost always*).

Parental warmth ($\alpha = .82$, $r = .69$) The following indicators tap this construct: "Think about the last 30 days. How true are the following statements for you?" (a) "I really enjoyed being with my {parents/caregivers}." (b) "There was a feeling of togetherness in our family." Items were anchored by 1 (*never or almost never true*) and 5 (*always or almost always true*).

Theory of Planned Behavior

Higher scores on the Theory of Planned Behavior constructs reflect greater support for marijuana use. All five theory-relevant constructs were assessed. All constructs were assessed at Time 1, except behavior, which was assessed at Time 2.

Attitudes ($\alpha = .92$) This construct was defined as the evaluation of expected outcomes due to marijuana consumption. "How likely is it that the following would happen to you if you used marijuana nearly every month for the next 12 months?" (a) "Damage my brain." (b) "Mess up my life." (c) "Do worse in school." (d) "Be acting against my moral beliefs." (e) "Lose my ambition." Items were scored from 1 (*very likely*) to 5 (*very unlikely*).

Subjective norms ($\alpha = .70$) Perceived approval of marijuana use by important others was assessed with three questions: (a) "How do you think most people important to you would feel about you using marijuana nearly every month for the next 12 months?" (b) "How do you think your close friends would feel about you using marijuana nearly every month for the next 12 months?" (c) "How do you think your {parents/caregivers} would feel about you using marijuana nearly every month for the next 12 months?" Response options ranged from 1 (*strongly disapprove*) to 5 (*strongly approve*).

Perceived behavioral control ($\alpha = .91$) This construct assessed respondents' lack of self-efficacy to resist marijuana. "How sure are you that you can say no to marijuana, if you really wanted to if:" (a) "You are at a party where most people are using it?" (b) "A very close friend suggests you use it?" (c) "You are home alone and feeling sad or bored?" (d) "You are on school property and someone offers it?" (e) "You are hanging out a friend's house whose parents aren't home?" Responses were scored from 1 (*completely sure I can say no*) to 5 (*not at all sure I can say no*).

Intentions ($\alpha = .88$, $r = .81$) Behavioral intentions to use marijuana in the future were measured with two items: (a) "How likely is it that you will use marijuana, even once or twice, over the next 12 months?" (b) "How likely is it that you will use marijuana nearly every month for the next 12 months?" Response options ranged from 1 (*I definitely will not*) to 4 (*I definitely will*). Due to the skip pattern, those who provided a response of 2, 3, or 4 to the first item were then asked the second item. To ensure that all participants were included, those who provided a value of 1 to the first item were also coded as 1 for the second item. The reliability coefficient was calculated on the basis of this scaling process.

Behavior ($\alpha = .95$, $r = .91$) Assessed at Time 2, behavior was operationalized via two items measuring recency and frequency of marijuana use: (a) "How long has it been since you last used marijuana?" (b) "During the last 12 months, how many occasions have you used marijuana?" A skip pattern ("Have you ever, even once, used marijuana?") led up to these questions. Thus, to include all participants, recency was scaled from 1 (*never*) to 4 (*during the last 30 days*) and frequency was scaled from 1 (*0 occasions*) to 4 (*10 or more occasions*).

Analytic Plan

Overview

Bentler's (2001) EQS 6.1, using maximum likelihood estimation, was used to specify the models. A three-step analytic approach was undertaken. First, the psychometric properties of the parenting dimensions of knowledge and warmth were evaluated with a confirmatory factor analysis (CFA). Then, a second CFA was estimated to evaluate the structure of the TPB. If the conceptual structure of each model was separately supported, we proceeded with a unifying latent structural equation model in which the parenting factors predicted factors from the TPB. The correlation matrix along with the means and standard deviations of the measured variables is displayed in Table 2.

Statistical Assumptions

Consistent with a latent modeling approach, measurement error and disturbance terms were estimated. The total number of parameters estimated is 9 in the Parenting CFA, 44 in the Theory of Planned Behavior CFA, and 57 in the integrative framework. As such, the sample size to parameter ratio well exceeded the 10 to 1 recommended guideline for all models (Kline 1998). Skewness ($M=1.74$, $SD=1.59$) and kurtosis ($M=4.82$, $SD=8.10$) levels for most variables were within reasonable limits; however, as is the typically the case with research examining deviant behaviors, some variables departed from normality. Thus, we interpreted robust statistics offered by the program, considered the most appropriate method for handling non-normal data (Satorra and Bentler 1994).

Model Evaluation Criteria

We evaluated overall fit between the underlying covariance matrix and hypothesized models with several tests. A non-significant chi-square test, leading to non-rejection of the model, would suggest a good approximation of the data. We also assessed the chi-square to degrees of freedom ratio, whereby a ratio of less than five is considered acceptable by some (Bollen 1989), although others suggest that a ratio below three demonstrates better fit (Kline 1998). However, chi-square based tests are sensitive to model rejection when sample size is large (Bollen 1989).

Other commonly reported indices, such as the Comparative Fit Index (CFI), Incremental Fit Index (IFI), and the Non-normed Fit Index (NNFI) were interpreted as well. These comparative approaches to overall model evaluation typically range from 0 to 1, with higher values indicating better fit (Ullman and Bentler 2003). For the Root Mean Square Error of Approximation (RMSEA), a residual-based index, values larger than .10 indicate a poor fitting model (Browne and Cudeck 1993).

After evaluating the overall adequacy of each of the three models, their specific components were judged (Anderson and Gerbing 1988). The measurement component, defined as the factor loadings, was examined to determine whether items were representative of their respective factors (convergent validity). The structural component, defined as the inter-factor correlations, was examined to determine whether factors were conceptually distinct within each CFA model (discriminant validity), and predictive as hypothesized within the integrative model (predictive validity).

Results

Parenting Knowledge and Warmth Factor Structure

Results from the parental knowledge and warmth CFA, displayed in Fig. 1, suggest that the factor structure was psychometrically sound, $X^2(1)=.11$, ns, $X^2/df=.11$, with the following fit indices: CFI = 1.00, IFI = 1.00, NNFI = 1.00. RMSEA value was .00, with a 90% confidence interval of .00 to .04. The remaining single degree of freedom used to test goodness of fit may be partially responsible for the high overall fit. Closer inspection indicated that all factor loadings were statistically significant. Further, the correlation between parental knowledge and parental warmth was statistically significant, $r=.54$, $p<.001$, supporting the view that in families where parents were more knowledgeable of the activities and whereabouts of their children, correspondingly greater feelings of warmth were exhibited. To assess whether parental knowledge and parental warmth were conceptually distinct, their correlation was constrained to be equal to 1. Results revealed that this constraint was not viable and, therefore, the constructs were deemed statistically dissimilar, $p<.001$.

### Theory of Planned Behavior Factor Structure

As presented in Fig. 2, the five-factor structure of the TPB was satisfactory, $X^2(109)=352.64$, $p<.001$, $X^2/df=3.24$, with the following fit indices: CFI = .96, IFI = .96, NNFI = .96. RMSEA was .032, with a 90% confidence interval of .029 to .036. The factor loadings for all constructs—attitudes, subjective norms, perceived behavioral control, intentions, and behavior—were statistically significant. For inter-factor pairs, correlations ranged in magnitude from .21 to .66 and were all statistically significant, $ps<.001$. To evaluate the multi-dimensionality of the five constructs within the TPB, the correlation between each factor pair was constrained to

Table 2 Correlation matrix of measured variables

Item	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21
V1. Know what you are doing	–																				
V2. Idea of plans for coming day	.61	–																			
V3. Enjoyed being with parents	.35	.34	–																		
V4. Feeling of togetherness in family	.35	.35	.69	–																	
V5. Damage my brain	−.21	−.14	−.14	−.16	–																
V6. Mess up my life	−.26	−.18	−.16	−.18	.69	–															
V7. Do worse in school	−.25	−.18	−.19	−.20	.62	.81	–														
V8. Acting against moral beliefs	−.29	−.24	−.20	−.23	.54	.70	.72	–													
V9. Lose my ambition	−.26	−.21	−.21	−.24	.61	.77	.76	.74	–												
V10. People important	−.20	−.19	−.13	−.16	.22	.29	.30	.29	.27	–											
V11. Close friends	−.29	−.26	−.24	−.24	.27	.35	.39	.38	.40	.48	–										
V12. Parents	−.19	−.09	−.08	−.14	.18	.22	.24	.27	.23	.47	.35	–									
V13. At a party	−.19	−.14	−.13	−.15	.17	.19	.15	.17	.17	.09	.20	.03	–								
V14. Close friend suggests	−.21	−.18	−.15	−.15	.20	.22	.18	.20	.20	.13	.21	.06	.77	–							
V15. Home alone	−.19	−.16	−.12	−.13	.17	.23	.26	.28	.23	.15	.23	.13	.59	.64	–						
V16. School property	−.16	−.14	−.05	−.07	.15	.16	.15	.18	.12	.10	.10	.10	.57	.62	.64	–					
V17. Friend's house	−.20	−.17	−.14	−.15	.21	.27	.26	.26	.25	.16	.26	.10	.73	.80	.70	.69	–				
V18. Once or twice	−.23	−.19	−.21	−.21	.24	.44	.44	.42	.44	.32	.54	.23	.23	.25	.33	.15	.38	–			
V19. Nearly every month	−.18	−.16	−.15	−.15	.20	.39	.41	.39	.38	.26	.45	.23	.16	.19	.35	.14	.32	.81	–		
V20. Recency	−.23	−.21	−.20	−.18	.19	.33	.37	.36	.36	.33	.49	.19	.12	.16	.25	.08	.22	.60	.52	–	
V21. Frequency	−.21	−.19	−.20	−.18	.18	.32	.36	.36	.35	.30	.46	.20	.11	.14	.23	.08	.21	.60	.54	.91	–
Mean	4.09	3.71	3.63	3.48	1.82	1.80	1.78	1.92	2.09	1.27	1.79	1.12	1.50	1.50	1.36	1.23	1.47	1.38	1.19	1.51	1.38
SD	1.23	1.27	1.24	1.29	1.21	1.23	1.18	1.25	1.27	0.65	1.01	0.50	0.99	1.00	0.96	0.79	1.01	0.76	0.58	0.98	0.87

Correlations above /.07/ are statistically significant at $p<.001$
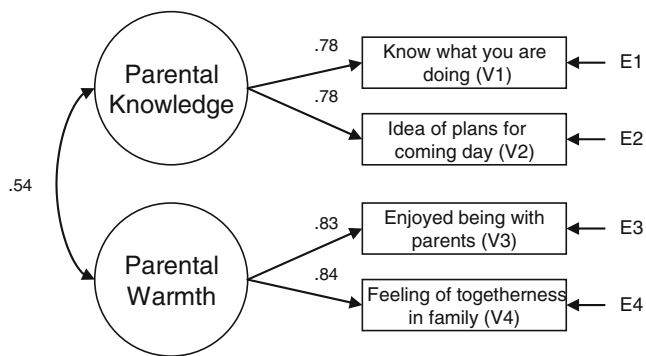
Note. All paths are statistically significant, $p < .001$.

Paths represent standardized coefficients. E = error.

Fig. 1 Confirmatory factor analysis of parental knowledge and warmth

be equal to 1. These tests of constraints indicated that we should reject the null hypothesis that these five constructs were statistically identical, all pairs $p<.001$.

Parental Knowledge and Warmth Predicting Theory of Planned Behavior

Given that the factor structure of each framework was corroborated, we then estimated the integrative predictive framework. Model specification proceeded as follows: Parental knowledge and warmth were allowed to correlate with one another. Next, both parenting dimensions were specified to predict attitudes, subjective norms, and perceived behavioral control. These three constructs of the TPB were allowed to predict intentions, which in turn was specified to be predictive of behavior. Perceived behavioral control also was set to predict behavior. Consistent with the TPB, attitudes, subjective norms, and perceived behavioral control were hypothesized to freely correlate with each other. When specifying structural equation models, it is not possible to directly covary endogenous factors. As a proxy, the disturbance terms of these three belief constructs were correlated.

As depicted in Fig. 3, the hypothesized integrative model was a good fit, $X^2(174)=498.83$, $p<.001$, $X^2/df=2.87$, with the following fit indices: CFI = .97, IFI = .97, NNFI = .96. RMSEA was .030, with a 90% confidence interval of .027 to .033. With respect to the measurement component, all factor loadings were statistically significant, $p<.001$. Due to diagrammatic clarity, space limitations, and because they are highly similar in strength to the factor loadings produced by the CFAs, factor loadings are not presented (Fig. 3). A Pearson correlation test between loadings from the integrative framework and those from the CFAs indicated a strong, almost perfect, correspondence, $r=.995$, $p<.001$.

In the structural component, all hypothesized inter-factor linkages were supported, except the paths between parental

warmth and perceived behavioral control, and between perceived behavioral control and behavior. The hypothesized correlated disturbance terms were statistically significant ($ps<.001$) and as follows: attitudes and subjective norms ($r=.45$), attitudes and perceived behavioral control ($r=.22$), subjective norms and perceived behavioral control ($r=.20$).

Additional analyses tested for the total indirect effects from each of the parenting factors to intentions as well as behavior, via the hypothesized intermediate processes (Fig. 3). Results reveal that the indirect effect on intentions was statistically significant from parental knowledge ($p<.001$) and parental warmth ($p<.001$). The indirect effect on behavior also was statistically significant from parental knowledge ($p<.001$) and parental warmth ($p<.001$).

Discussion

This study examined parental knowledge and warmth and the TPB in an integrative predictive framework, providing a more comprehensive view of the complex and multi-faceted problem of adolescent marijuana use. Our research demonstrated that these constructs may serve supplementary roles in illuminating the mediating pathways by which parenting practices impinge upon adolescent marijuana use. The fact that our study showed consistent linkages from parenting to adolescent beliefs suggests that parents are not irrelevant when it comes to marijuana use among these young adults. The majority of our hypotheses were supported. The two-factor parenting structure and the five-factor TPB structure each demonstrated valid psychometric properties. Estimation of the integrative paradigm corroborated that high parental knowledge predicted lower pro-marijuana attitudes, subjective norms, and perceived behavioral control; high parental warmth predicted lower pro-marijuana attitudes and subjective norms.

The results of this study contribute to the parenting literature by reconciling the concurrence and relative contribution of parental knowledge and warmth in the context of adolescent marijuana-related beliefs. After statistically controlling for one another, we found that both parenting factors, by and large, independently contributed to the model. As the standardized coefficients from parental knowledge were greater in magnitude than those from parental warmth, our results suggest that parental knowledge plays a more instrumental force in attenuating adolescent marijuana beliefs. Past research has sought to determine the underlying source of parental knowledge. In their large-scale study of 14-year olds, Stattin and Kerr (2000) discovered that parental knowledge is derived from the child's disclosure of his or her own activities and whereabouts and that this was the most important source of

Fig. 2 Confirmatory factor analysis of Theory of Planned Behavior constructs
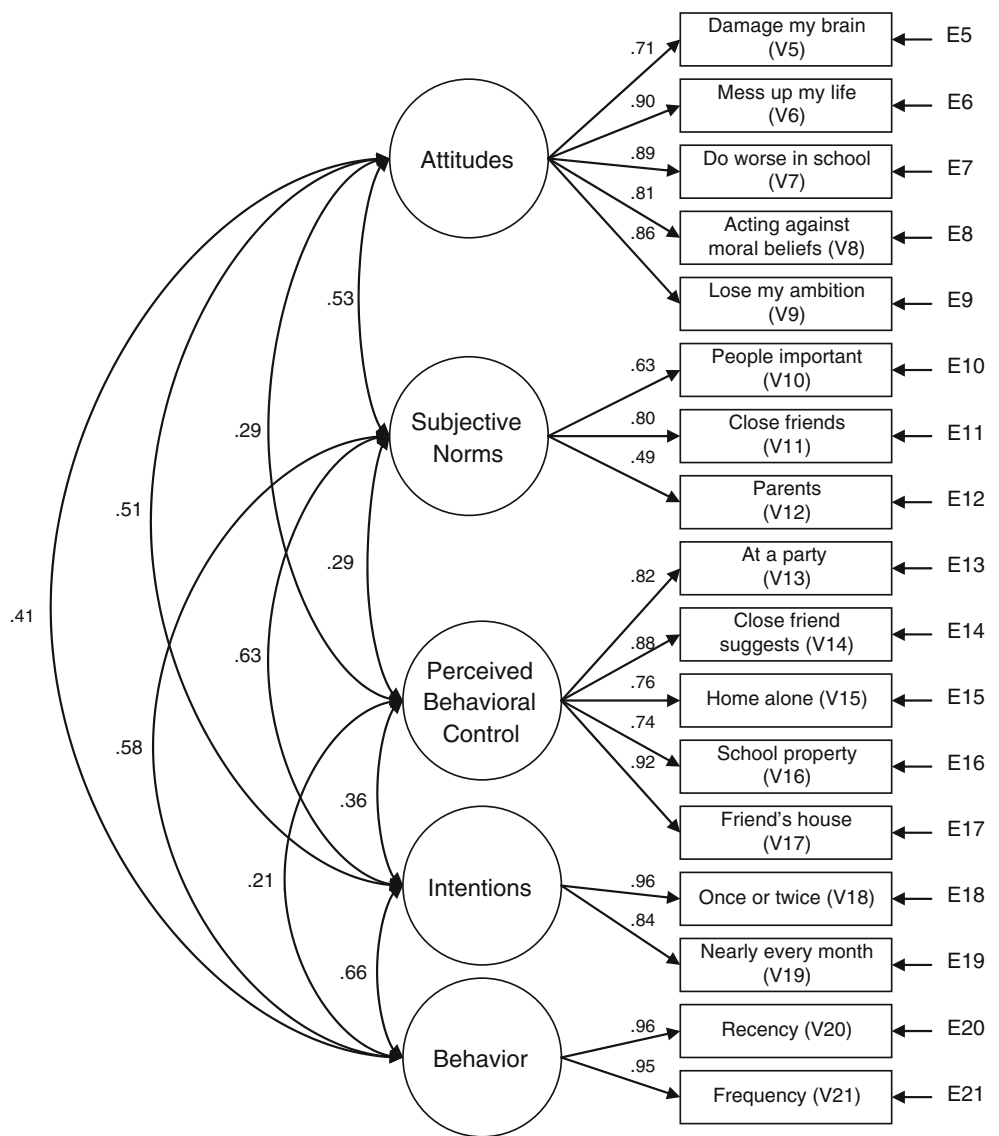
Note. All paths are statistically significant, *p* < .001. Paths represent standardized coefficients. E = error.

the parental knowledge construct, even after statistically controlling for the child's perceptions of parental solicitation of information and parental control of the child.

The correlation between parental knowledge and warmth (*r*=.54, *p*<.001) warrants closer scrutiny. This positive association helps to disentangle the relation between these two factors. It underscores the fact that adolescents do not necessarily develop negative or unloving feelings toward parents who are knowledgeable about their activities—an aspect of parenting that adolescents are thought to view negatively, as an infringement on their privacy. Instead, the opposite was discovered. Our findings suggest that parental knowledge of the child's activities and whereabouts typically is tied to feelings of family enjoyment

and togetherness. This point bears emphasis: Parental knowledge of the child's activities and whereabouts does not compromise the child's perceptions of parent-child warmth.

Analyses also revealed that the link between parental warmth and perceived behavioral control was untenable. In other words, positive familial affect might be insufficient to ensure that children develop the self-efficacy skills necessary to refuse marijuana when offered, thereby making parental knowledge a more pivotal protective factor. Also contrary to hypotheses, perceived behavioral control did not directly predict marijuana use behavior. It is important to note that the TPB allows for a direct relationship between behavioral control and behavior in contexts where behav-

Fig. 3 Parental knowledge and warmth predicting Theory of Planned Behavior constructs
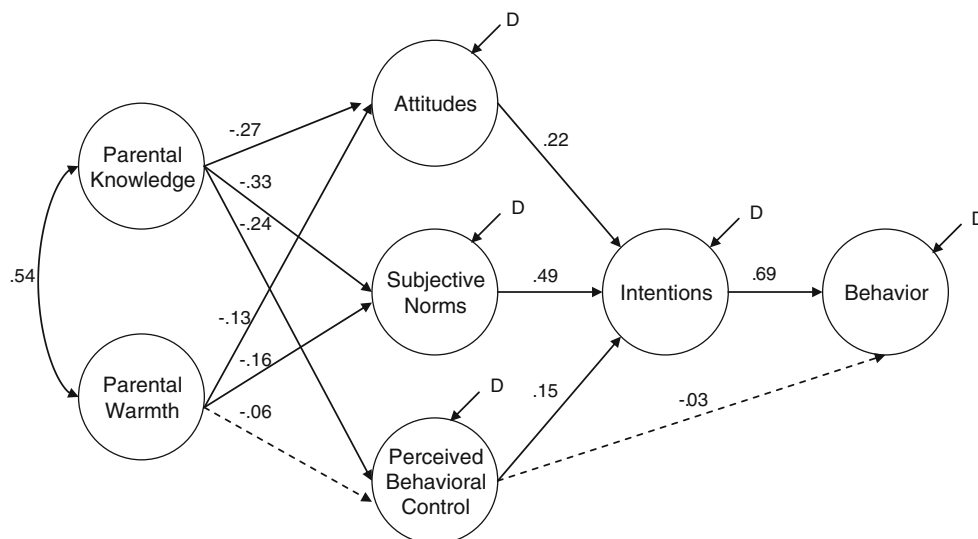
Note. Solid paths are statistically significant, *p*s < .001. Paths represent standardized coefficients. D = disturbance. For clarity, not displayed are factor loadings of the latent factors; and correlations among the disturbance terms of attitudes, subjective norms, and perceived behavioral control, *p*s < .001.

ioral constraints accurately reflect actual control over a behavior (Ajzen and Madden 1986). As Ajzen (1988) notes: "In many instances, the performance of a behavior depends not only on motivation to do so but also on adequate control over the behavior in question. It follows that perceived behavioral control can help predict goal attainment independent of behavioral intention to the extent that it reflects actual control with some degree of accuracy" (pg. 134). This proposition was formally tested in a series of studies conducted by Sheeran and colleagues (2003), who developed a proxy measure of actual control administered after the enactment of a desired behavior. Results of their studies indicate that perceived behavioral control is indeed directly related to behavior when perceived behavior control is an accurate reflection of actual control over the behavior in question. This helps clarify prior findings indicating that the perceived behavioral control-behavior link is not always tenable (Notani 1998). In the context of the current study, it appears that perceived behavioral control may not reflect actual control over marijuana use among adolescents.

Limitations

The findings of this study should be interpreted in light of a number of limitations. Although we considered various theoretical constructs associated with marijuana use, other unmeasured factors associated with the parent (e.g., parental discipline) or the child (e.g., sensation seeking) also may predict marijuana beliefs. As our study examined participants aged 12-18 years, it is unknown whether results

from our integrative framework may be applied to other age groups. Consequently, we can only surmise that parental factors may have a stronger link with beliefs for younger children than for adolescents, possibly because younger children spend more time with their parents (Turner 1996). Also, the parenting dimensions in this study were compiled from adolescent self-reports. This is consistent with the majority of research in the area: As it is their perception that is most crucial in determining their own behavior, the quality of parent-child relationship is usually defined from the perspective of the child. Despite being a more ambitious undertaking, future research may endeavor to use trained coders who observe interactions between children and their parents (e.g., Davidov and Grusec 2006, for parental warmth)

Conclusions

In conclusion, we believe these results deserve close consideration. As our review of the literature suggests, the present research is likely one of the few to apply nationally representative data to assess the TPB, as well as correlates of parenting and the TPB constructs. Also noteworthy is that a rather large sample was used for this endeavor. Future research should address other concerns, including whether parental knowledge and warmth have preventative influences on adolescent decision-making skills in other domains besides marijuana use. Researchers should seek to determine whether the results of this study might be applicable to other drugs like methamphetamine and cocaine, as

parenting may play an important role in mitigating the consumption of these harder drugs as well. Nonetheless, it is plausible that parental knowledge and warmth may have differential effects depending on the type of behavior under consideration.

From a prevention standpoint, an important implication of our findings in terms of child-rearing is that the attenuating effects of parental knowledge on pro-marijuana beliefs is stronger than that of the effects of living in a warm household. To optimally curtail pro-marijuana perceptions, it is preferable that parents possess and develop both types of child-rearing skills. A powerful application of our results is that interventions targeting marijuana use should provide information to parents on how they could be more knowledgeable about their children's whereabouts (perhaps through encouraging their offspring to more willingly confide in them), while at the same time promoting and maintaining interactions that produce feelings of family unity and warmth (see Ramirez et al. 2004). By offering such guidance to parents, their offspring may feel less compelled to substitute dangerous substances to fulfill emotional needs. Rather than youth seeking highs from drugs, their parents should seek to become high on parental knowledge and warmth.

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