Perceptions and Beliefs Motivating Parental Discussions of Marijuana Use With Children

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Abstract

Background Parents can influence their children's use of marijuana and other substances through targeted parent-child discussions. Little is known about what factors motivate parents' decisions to discuss marijuana use with their children.

Purpose Guided by an elaborated prototype-willingness model, we tested hypotheses that: (a) parental perceived risk of harms and negative prototypes of youth who use marijuana positively predict worry about their child using marijuana; (b) higher perceived risk and worry predict higher intentions to discuss marijuana use with one's child; (c) negative prototypes and worry positively predict willingness to have discussions; and (d) higher intentions and willingness predicts having discussions.

Method We administered a longitudinal survey to 499 American parents of youth ages 10 to 17 assessing risk perceptions, prototypes, worry, discussion intentions, and willingness. One month later, 409 participants completed another survey assessing whether they had discussed marijuana use with their child.

Results At follow-up, 40% of participants reported having marijuana use discussions in the previous month. Structural-equation modeling revealed that perceived risks and negative prototypes positively predicted worry about their child using marijuana. Worry positively predicted intentions and willingness to discuss marijuana use with children. Worry mediated the relationship between perceived risks and intentions, but not the relationship between prototypes and willingness. Intentions positively predicted likelihood of marijuana use discussions, whereas willingness did not.

Conclusions These findings support most predictions of the adapted model and identify cognitive and affective factors that could be targeted in health communications promoting parental discussions of marijuana use with children.

Keywords Marijuana use • Risk perception • Prototypes • Worry • Intention • Willingness • Prototype-willingness model

Introduction

Marijuana is the most commonly used illicit substance by adolescents in the USA [1–3]. Among these adolescents, reported rates of marijuana use are now higher than reported rates of tobacco use [2, 4]. Although marijuana use is associated with some health benefits such as improved control over epileptic seizures [5], it has also been linked with health harms and particularly for adolescents. For instance, early onset and use of marijuana in adolescents can increase risks of psychosis [6], deficits in brain development [7, 8], cognitive and neuropsychological problems [9], and poor academic and social performance in school [10].

Parents can play an integral role in protecting their children from engaging in risky behaviors such as marijuana use [11]. Adolescents are less likely to use marijuana if their parents are involved in their daily activities, monitor
and supervise them, or strongly disapprove of their using marijuana [4, 12–14]. Parents often exert their influence through mechanisms such as parent–child discussions [15]. Decisions by parents to discuss marijuana use with their children are likely to be influenced by their perceptions and concerns about the potential consequences of marijuana use. Yet to date, little is known about parental perceptions of marijuana use, including perceived risks and worry about addiction, brain injury, memory problems, psychosis, schizophrenia, and sleep disturbances; their prototypical views of youth who use marijuana; and how these perceptions and concerns might influence their decisions to discuss marijuana use with their children. Guided by an adapted prototype–willingness model, we examined parental perceived risks and worries, social prototypes of adolescent marijuana users, and intentions and willingness as predictors of parental discussions of marijuana use with their children.

The Prototype–Willingness Model and Parental Discussions of Marijuana Use

The prototype–willingness model [16] identifies two sets of psychological processes motivating risk-related behavior. The first process, which operates on a conceptual and deliberative level, involves perceptions of risks (e.g., of marijuana use by one’s child) as primary determinants of intentions to engage in risk-altering behavior (e.g., to discuss marijuana use with one’s child). Perceived risk is defined as a subjective judgment about the likelihood of a harmful consequence of an action [17]; intention refers to a deliberate plan to perform a behavior.

The second process is more experiential and includes the elicitation of prototypes of those who engage in the risky behavior (e.g., of adolescent marijuana users). Prototypes, or stereotypical images associated with a behavior or type of individual, operate via social influence processes to affect willingness or openness to engaging in risk-altering behavior [18]. In contrast to deliberated intentions, willingness reflects more impulsive or reflexive behavioral motivations, especially in emotionally evocative situations [19].

In prior research, the prototype–willingness model typically has been used to identify intrapersonal factors guiding an individual’s engagement in risky health behaviors; e.g., cigarette smoking, alcohol use, and other forms of substance use. In the present study, we apply three conceptual elaborations of the model (see Fig. 1). First, we apply it to predict a protective behavior; that is, discussions designed to reduce risk. Just as risky behaviors are often unintended decisions that are strongly influenced by impulsive and affective motivations, so too can protective behaviors be influenced by affective drives such as willingness. Second, we use the model to predict an interpersonal behavior; that is, discussions with children about a risky behavior. Applying this adapted model could provide insights into the dual roles of conceptual, reasoned processes and experiential, reflexive processes in a protective, interpersonal behavior.

Third, our elaborated model delineates worry as an additional factor potentially involved in motivating discussions with children about marijuana use. Worry can fuel motivations to engage in health-related actions and, for protective behaviors in particular, it can be a stronger predictor than risk-related cognitions [20–23]. This proposed model suggests that both perceived risks of marijuana use by children and negative prototypes of adolescent marijuana users will be associated with greater worry about the potential consequences of their children using marijuana, and worry in turn will motivate both conceptual, deliberative intentions and experiential, reflexive willingness to engage in having discussions. Further, worry is predicted to mediate the relationships of perceived risk and prototypes with intentions and willingness.

Empirical Support for the Adapted Prototype–Willingness Model

In this section, we briefly review literature regarding the roles of risk perceptions, prototypes, worry, intentions, and willingness as predictors of health-related behaviors with an emphasis on research testing their roles in guiding use of marijuana and other risky substances. Taken together, the evidence is consistent with the proposed relationships delineated by the adapted prototype–willingness model although gaps remain in testing some of the proposed relationships and in testing the relationships within the context of parental discussions of marijuana use.

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**Fig. 1.** The adapted prototype–willingness model.
Perceived risk

Numerous theories of health behavior identify risk perceptions as primary influences of health-related behaviors, and research guided by these theories has yielded strong empirical support [20, 24–27]. Within the context of substance use, higher risk perceptions have been associated with lower levels of substance use and misuse [1, 4, 28] as well as greater intentions to engage in actions to protect against substance use [27, 29–32]. Among adolescents, higher perceived risk of harms from using marijuana is associated with lower use [1, 33] whereas those who lack concern about potential harms are more likely to engage in substance use [1, 34, 35].

Empirical evidence also supports the associations of risk perceptions with cognitive and affective factors delineated by the adapted prototype–willingness model. Greater risk perceptions are associated with higher levels of worry [36, 37] and, among adolescents, with both lower intentions and less willingness to engage in risky behaviors [19, 38, 39]. Yet although the body of prior research findings is generally consistent with the proposed roles of perceived risks of the harms of marijuana use by one’s children identified in the adapted model, the predicted roles of perceived risks in motivating parent–child discussions remain untested. Little is known about which risks parents tend to associate with marijuana use by their children.

Prototypes

Although prototypes of adolescent marijuana users held by parents have not been investigated to date, research on prototypes suggests that they could influence worry and marijuana-related behaviors as indicated by the adapted prototype–willingness model [16, 18]. For example, more favorable prototypes (e.g., of smokers as cool, rebellious, and popular) have been shown to predict greater willingness to engage in the risky behaviors (e.g., cigarette smoking [18]) and a greater likelihood to engage in the risky behaviors in the future [16, 19]. In addition, consistent with the hypothesized associations between prototypes and worry, negative prototypes of smokers predict greater worry in response to cigarette warnings [40]. Further, manipulating positive and negative prototypes through the provision of images and other messages can modify willingness, thereby indicating a causal influence [41–43].

Worry

Worry about the harmful consequences of substance use and other risky behaviors can fuel protective behavior motivations [20, 23, 44]. For example, worry about the harms of cigarette smoking elicited by cigarette warnings positively predicts discouragement from smoking [45, 46].

Worry has been demonstrated to mediate the relationship of perceived risk with protective behavior motivation [47, 48], further supporting the addition of worry as a mediating factor to the adapted prototype–willingness model. To our knowledge, research to date has not tested whether worry mediates the relationship between negative prototypes and willingness or whether parental worries about marijuana use by their children shape parent–child communications. However, parental warmth and concerns about a child’s well-being, factors potentially linked with worry, have been found to motivate efforts to deter the child from engaging in risky behaviors [49, 50].

Intentions and willingness

An important contribution of the prototype–willingness model is its delineation of the independent roles of intentions and willingness in predicting subsequent behavior. Considerable research provides support for their independent influences on risky behaviors [19, 38]. Intentions also reliably predict protective health-related behaviors [51, 52], although research on the role of willingness in driving health-protective behaviors remains limited. Yet willingness could also be influential in motivating protective behaviors, particularly in situations evoking worry and concern. For a parent who worries about marijuana use by his or her child, situations that open up opportunities for a child to use marijuana, such as the child being invited to a party where marijuana is likely to be present, could evoke spontaneous and impulsive motivations to start a discussion about marijuana use with their child.

Study Aims

This study explores the factors delineated by the adapted prototype–willingness model for parental discussions of marijuana use and tests the fit of the predictive model using a longitudinal survey of parents living in the USA who have children ages 10–17 years old. We focused on parents with children in this age group because pre-adolescence and adolescence represent developmental periods when youth increasingly spend time with friends in unsupervised settings during which they can encounter opportunities to experiment with marijuana [53]. Parents completed an initial survey with measures of the adapted prototype–willingness model factors, and they completed a follow-up survey 1 month later in which they reported whether or not they had discussed marijuana use with their children in the previous month.

We used the longitudinal survey data to (a) evaluate the descriptive characteristics of parental perceived risks of and worries about the harms of marijuana use by their children, their prototype perceptions of youth
who use marijuana, discussion intentions and willingness, and discussion behavior (Aim 1); and (b) test the adapted prototype–willingness model presented in Fig. 1 using structural equation modeling (SEM) techniques (Aim 2). Specifically, we tested hypotheses that (a) higher parental perceived risk of harms and negative prototypes of youth who use marijuana predict higher worry about the health and social harms of their child using marijuana; (b) higher perceived risk and higher worry predict higher intentions to have marijuana use discussions with one’s child; (c) more negative prototypes and higher worry predict higher levels of willingness to have marijuana use discussions with one’s child; and (d) higher intentions and willingness predict having discussions about marijuana use over the subsequent month.

Method

Participants and Procedure

The university’s institutional review board approved the study protocol. The study included participants recruited from a national website service (Amazon Mechanical Turk or MTurk) under the restrictions that they were U.S. residents (based on the ownership of a U.S. bank account) and a parent of a child of 10–17 years old. Potential participants (N = 1,000) completed an online screener survey through links that directed them to a Qualtrics survey. After providing consent, they responded to questions about whether they had children and whether their children were between the specified age range. Those meeting the inclusion criteria (n = 536) received online invitations to participate in the full study. Overall, 499 participants (93%) provided informed consent and completed the baseline survey; 409 (82%) of these participants completed the follow-up survey. Overall, parents were ~40 years of age on average and predominantly non-Hispanic White with over 60% identifying as women, college educated, employed full-time, and married; their children were ~14 years of age with just over 55% identified as male (see Table 1).

The initial survey included measures of demographic and participant characteristics, perceived risks, prototypes, worry, intentions, and willingness to engage in a discussion of marijuana use with their children. One month later, participants completed a follow-up survey that included a measure of discussion behavior. Following completion of the follow-up survey, participants received a brief explanation of the study and links to websites of national health organizations providing information about marijuana use. They received payment for their participation through MTurk ($0.02 for participation in the screener survey, $0.80 for completing the initial survey, and $0.80 for completing the follow-up survey). Data were collected from April to May 2015.

Measures

Participants were instructed to respond to the online survey in terms of their first child who was between the ages of 10 and 17 years old. The initial survey included (in order of their presentation) measures of prototypes, perceived risks, worry, intentions, willingness, and demographic characteristics. The follow-up survey also included the measure of discussion behavior. Unless otherwise noted, item ratings were averaged to generate scores. Table 1 presents the score means,
Table 2  Descriptive statistics and correlations

<table>
<thead>
<tr>
<th>Measures</th>
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<th>5</th>
<th>6</th>
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<td>Perceived risks</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Negative prototypes</td>
<td>.32**</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Worry</td>
<td>.44**</td>
<td>.45**</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>Intention</td>
<td>.15**</td>
<td>.03</td>
<td>.27**</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>Willingness</td>
<td>.13**</td>
<td>.24**</td>
<td>.22**</td>
<td>.20**</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Discussion behavior</td>
<td>.04</td>
<td>.06</td>
<td>.07</td>
<td>.39**</td>
<td>.06</td>
<td>–</td>
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<td>M</td>
<td>2.56</td>
<td>2.44</td>
<td>3.43</td>
<td>2.74</td>
<td>4.36</td>
<td>.49</td>
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<tr>
<td>SD</td>
<td>.86</td>
<td>.96</td>
<td>1.29</td>
<td>1.34</td>
<td>.84</td>
<td>.50</td>
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<tr>
<td>α</td>
<td>.49</td>
<td>.50</td>
<td>.97</td>
<td>.97</td>
<td>.73</td>
<td>–</td>
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</table>

For perceived risks, 1 = almost no chance to 5 = almost certain; negative prototypes, 1 = not at all to 5 = very much; worry, 1 = not at all worried to 5 = extremely worried; intentions, 1 = not at all to 5 = definitely; willingness, 1 = very unwilling to 5 = very willing; discussion behavior, 0 = no and 1 = yes.

**Correlation is significant at the .01 level (two-tailed).

standard deviations, and internal consistency statistics (Cronbach’s α) for all measures.

Demographic and personal characteristics

The baseline questionnaire included items measuring age, gender, race, ethnicity, marital status, employment, and education (see Table 1).

Perceived risks

The measure of perceived risks of marijuana use by one’s child was adapted from measures used to assess similar risk perceptions such as those associated with cigarette smoking [20, 45]. The measure began with the stem: “If your child was to use marijuana more than once a week, what do you think the chances are of your child?” The nine items were becoming addicted to marijuana, developing lung cancer, experiencing brain injury, developing psychosis, developing schizophrenia, becoming blind, developing memory problems, having problems with academic performance, and having sleep disturbances. Each item was rated on a scale ranging from 1 (almost no chance) to 5 (almost certain).

Prototypes

The measure of prototypes, which assesses characteristics associated with both positive and negative prototypes, was adapted from a measure used in prior research on prototypes of cigarette smokers [46, 54]. The measure began with the stem: “Please imagine the type of person around your child’s age who uses marijuana. In general, do you think that other children your child’s age who use marijuana tend to be....” The items included seven positive descriptors (adventurous, calm, cool, curious, open-minded, intelligent, and popular) and seven negative descriptors (lazy, immature, irresponsible, inconsiderate, rebellious, slacker, and troublemaker). Item ratings ranged from 1 (not at all) to 5 (very much). Positive items were reverse-coded before averaging the 14 item ratings so that higher scores reflect more negative prototypes.

Worry

Parents’ worry of marijuana use by their children was assessed with a measure adapted from measures of worry used in prior research [20, 45]. The measure included 18 items, 9 of which followed each of 2 stems: “If your child were to start smoking marijuana regularly, how worried would you be about your child...” and “If your child were to start smoking marijuana regularly, how concerned would you be about your child....” The items were the same as those used in the measure of perceived risks: becoming addicted to marijuana, developing lung cancer, experiencing brain injury, developing psychosis, developing schizophrenia, becoming blind, developing memory problems, having problems with academic performance, and having sleep disturbances. Item ratings ranged from 1 (not at all worried) to 5 (extremely worried).

Intentions

The measure of parental intentions to discuss marijuana use with their child, adapted from established measures of behavioral intentions [16, 55], included three items: “In the next four weeks, to what extent do you plan to discuss marijuana use with your child?,” “In the next four weeks, to what extent will you try to discuss marijuana use with your child?,” and “In the next four weeks, how likely is it that you will discuss marijuana use with your child?” Item ratings ranged from 1 (not at all) to 5 (definitely).

Willingness

This measure was adapted from measures used to assess similar constructs such as within the context of cigarette smoking [16]. The measure of parental willingness to discuss marijuana use with their child included the following stems: “Your child wants to attend a party in four weeks where there will be marijuana. How willing would you be to ask your child to not attend the party within the next four weeks?,” “How willing would you be to discuss marijuana use with your child the next four weeks?,” and “How willing would you be to discuss potential concerns about marijuana use with your child over the next four weeks?” Item ratings ranged from 1 (very unwilling) to 5 (very willing).

Discussion of marijuana use with child

Parents’ discussion behavior was measured with the following stem: “Since the last session four weeks ago,
did you talk about marijuana use with your child?” Participants responded with a no (0) or yes (1). If participant answered yes, they were asked in a free-response item, “If yes: briefly describe what you said to your child.” These descriptions were coded into five categories: (i) potential harms of marijuana use (e.g., told child that it is harmful to their health and well-being), (ii) discouragement from using marijuana (e.g., told child to not use marijuana), (iii) peer pressure (e.g., told child that peer pressure could influence use of marijuana), (iv) marijuana legalization (e.g., told child that marijuana is illegal in their state), and (v) positive outcomes of using marijuana (e.g., told child about benefits of using medical marijuana for some illness conditions). Two raters independently coded the responses with assessments of inter-rater reliability revealing substantial agreement ($\kappa = .82, p < .001$). Discrepancies were carefully evaluated and resolved through discussion.

**Statistical Analyses**

To address Aim 1, we conducted descriptive and correlational analyses of perceived risks, prototypes, worry, intentions, willingness, and discussion behavior using SPSS 24.0. To address Aim 2, we used Mplus 7.3 to conduct SEM to test the fit of the data with the theoretical model depicted in Fig. 1. The comparative fit index (CFI [56]), Tucker–Lewis index (TLI [57]), and root mean square error of approximation (RMSEA [58]) were used to measure fit. The model was estimated using a weighted least squares estimator for ordinal and categorical measures. After confirming a valid measurement model, we tested a structural model that included the paths indicated in Fig. 1 and associations indicated in the measurement model. Finally, to examine the mediational role of worry in the relationships of perceived risk with intentions and negative prototypes with willingness, we tested an alternative model that omitted worry to identify the coefficients of these direct paths.

**Results**

Table 3 presents the means of the items assessing parental perceived risks of harms of marijuana use. The three terms with the highest ratings overall were problems with academic performance, developing memory problems, and becoming addicted to marijuana. Table 4 presents the means of the descriptor items assessing prototypes of youth who smoke marijuana. The terms with moderate to high ratings overall, as indicated by a mean rating of 3.10 or higher with 3 as the midpoint rating, included six negative descriptors (rebellious, irresponsible, slacker, lazy, immature, and troublemaker) and only one positive descriptor (curious). The means of items assessing parental worries about the harms of marijuana use (Table 5) reveal that the potential harms inducing the greatest worry overall included the same harms for the highest ratings of perceived risk, which were problems with academic performance, becoming addicted to marijuana, and developing memory problems.

Overall, 40% of the parents reported having marijuana use discussions over the next month. Of these parents, 56% discussed the potential harms of marijuana use, 14% discouraged marijuana use, 13% focused on peer pressure, and 10% discussed marijuana legalization; only 7% of these parents discussed positive health outcomes of marijuana use. The zero-order correlations for the measures of perceived risk, prototypes, worry, intentions, willingness, and discussion (Table 2) are largely consistent with the adapted prototype–willingness model. Perceived risk exhibited positive correlations with negative prototypes, worry, intentions, and

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Parental perceived risks of harms of marijuana use</th>
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<tbody>
<tr>
<td></td>
<td>$M$</td>
</tr>
<tr>
<td>Academic performance</td>
<td>3.75</td>
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<tr>
<td>Memory problems</td>
<td>3.08</td>
</tr>
<tr>
<td>Addiction</td>
<td>2.97</td>
</tr>
<tr>
<td>Sleep disturbances</td>
<td>2.60</td>
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<tr>
<td>Lung cancer</td>
<td>2.23</td>
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<tr>
<td>Psychosis</td>
<td>1.90</td>
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<tr>
<td>Brain injury</td>
<td>1.80</td>
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<tr>
<td>Schizophrenia</td>
<td>1.73</td>
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<tr>
<td>Blind</td>
<td>1.53</td>
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</table>

1 = almost no chance; 5 = almost certain.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Prototypes of youth who smoke marijuana held by adults</th>
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<tr>
<td></td>
<td>$M$</td>
</tr>
<tr>
<td>Rebellious</td>
<td>3.91</td>
</tr>
<tr>
<td>Irresponsible</td>
<td>3.86</td>
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<tr>
<td>Slacker</td>
<td>3.75</td>
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<tr>
<td>Lazy</td>
<td>3.55</td>
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<td>Immature</td>
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<tr>
<td>Troublemaker</td>
<td>3.39</td>
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<tr>
<td>Curious</td>
<td>3.28</td>
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<tr>
<td>Inconsiderate</td>
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<tr>
<td>Open-minded</td>
<td>2.98</td>
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<tr>
<td>Calm</td>
<td>2.88</td>
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<tr>
<td>Adventurous</td>
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<tr>
<td>Popular</td>
<td>2.44</td>
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<tr>
<td>Intelligent</td>
<td>2.29</td>
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<tr>
<td>Cool</td>
<td>1.77</td>
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1 = not at all; 5 = very much.
willingness, although it did not correlate with discussion behavior. Negative prototypes were positively correlated with worry and willingness, although not with either intentions or discussion behavior. Worry correlated positively with both intentions and willingness. Intentions were positively associated with discussion behavior, but, contrary to predictions, willingness did not correlate with discussion behavior.

Figure 2 presents the results of the SEM testing the estimated model. The fit indices demonstrated a good fit with the CFI (.97), TLI (.92), and RMSEA (.07). Initially, there was a positive significant correlation between perceived risks and negative prototypes. As hypothesized, higher perceived risks of use and more negative prototypes predicted higher worry of harms of marijuana use. Also as hypothesized, higher worry predicted higher intentions and higher willingness to discuss marijuana use with their children. The direct path between perceived risk and intentions was not significant, whereas negative prototypes exhibited a significant, direct relationship with willingness. Higher intentions positively predicted marijuana use discussions 1 month later as hypothesized; contrary to hypotheses, willingness did not predict discussion behavior.

To examine the mediational role of worry in the relationships of perceived risk with intentions and negative prototypes with willingness, we re-ran the SEM without worry included in the model. For this revised model, the fit indices demonstrated a poor fit with the CFI (.73), TLI (.45), and RMSEA (.00). The findings revealed that, when worry is omitted from the model, there is a significant direct path from perceived risks to intentions ($\beta = .62, p < .001$). That this path becomes nonsignificant when worry is included in the model suggests that worry mediates the relationship between perceived risks and intentions. In contrast, the path between negative prototypes and willingness in the model without worry ($\beta = .23, p < .001$) is comparable to the path revealed in the original model in Fig. 2 ($\beta = .18, p < .001$), indicating that worry did not mediate the relationship between prototypes and willingness.

### Discussion

This study provides new evidence regarding risk perceptions, prototypes, and worries about children's use of marijuana as well as parent-child discussion motivations and behaviors in a sample of parents in the USA. This research examined these facets of parental views and discussion behaviors at a time when states are legalizing recreational and medical marijuana use and the prevalence of marijuana use among youth is on the rise [1, 2, 4]. Utilizing an adapted prototype–willingness model framework [16], the study tested how perceived risks, prototypes, worry, intentions, and willingness predict parental discussions of marijuana use with their children. The prototype–willingness model previously has been applied to identify intrapersonal factors that predict risky health behaviors, and the current study extends the applicability of the model to predict interpersonal, protective behaviors. The findings largely support the adapted model for parental discussions of marijuana use with their children, including the new addition of worry as a factor involved in the relationship between perceived risks and intentions, and behavioral intention and willingness processes.

Descriptive analyses revealed that, of the nine potential harms of marijuana use targeted by the survey items,
parents gave the highest ratings of perceived risk and worry that their child would develop problems with academic performance, addiction to marijuana, and memory problems. These ratings mirror evidence that marijuana use in adolescents is associated with poor academic performance in school, addiction, and memory problems [4, 8–10]. At follow-up, 40% of the parents reported having discussed marijuana with their child over the previous month. Parents reported that these discussions focused predominately on discouraging their child to not use marijuana. Notably, although survey completion may have triggered discussion motivations, these discussions occurred in the absence of messages encouraging parents to have these discussions or information about how to discuss marijuana use with children.

The general levels of parental concern about marijuana use by one’s children and motivations to discourage children from using marijuana observed in the present study may shift as marijuana legalization spreads and marijuana availability and use increases in communities. These changes in legislation and availability could lead parents to view marijuana use by youth as less risky and worrying, a trend that would be in line with the recent declines in perceived risks of marijuana use among youth in the USA [59]. Such changes in risk perceptions and concerns could present a barrier to children receiving advice about marijuana use from their parents. These present findings can serve as one source of potentially informative benchmarks for tracking changes in perceived risks, concerns, and parental discussions over time, particularly in studies using similar recruitment and assessment methods.

The SEM findings, which yielded patterns of relationships that were mostly in line with the adapted prototype–willingness model predictions, replicate and extend prior research in several ways. First, the independent associations of higher perceived risks and negative prototypes with higher worry about one’s child using marijuana are consistent with the previous evidence of moderate links between risk perceptions and worry [20, 23, 44] while extending past research with evidence that they hold within the context of marijuana use by one’s child. Likelihood perceptions and worry can be construed as representing cognitive and affective components of risk construal that, as demonstrated in the present study, differ in their linkages with behavioral motivations [20, 60].

The findings that worry predicted both intentions and willingness to engage in discussions of marijuana use with one’s child contribute to growing evidence that worry directly fuels motivations to engage in health-protective actions [20–22]. These findings extend prior research by showing that worry about a loved one can play a role in motivating interpersonal interactions—specifically, discussions with the loved one generally aimed at protecting him or her from potential harms of a risky behavior. In addition, the mediating role of worry in the relationship between risk perceptions and intentions extends prior research on these risk perception–intention links [39, 61]. Worry has been demonstrated to mediate the relationship of perceived risk with protective behavior motivation [47, 48], further supporting the addition of worry to the adapted prototype–willingness model. In contrast, worry did not demonstrate a mediating role between negative prototypes and willingness, suggesting a direct relationship between these two factors. The findings support further theory development and research testing whether cognitive and social influence factors such as risk perceptions and negative prototypes influence behavioral motivations through the arousal of worry [47, 48].

The finding that intentions positively predicted marijuana use discussions between parent and child 1 month later is in line with the substantial body of evidence that intentions predict health-related behaviors [62] while demonstrating these relationships within the context of interpersonal (parental) discussion behavior. In contrast, willingness did not predict future discussion behavior as hypothesized. Although willingness has been found to predict risky health behaviors [16, 19], the willingness–behavior link might not extend to the behavior of discussing marijuana use with one’s child. Further research can examine whether the willingness–behavior link holds for parental discussions of marijuana use in other contexts (e.g., when children are actually facing situations in which they might have the opportunity to use marijuana), for other protection-oriented behaviors (e.g., testing for conditions such as sexually transmitted diseases), or for interpersonal behaviors aimed at protecting another person (e.g., sharing health information with family and friends, or through social media). Alternatively, the poor predictive power of willingness could be due to a ceiling effect or a result of low variation in scores across participants. Further measure development should focus on ways to potentially enhance its sensitivity. In addition, the specific order of the measures may have influenced responses. Future research could benefit from presenting measures in random order to control for order effects.

Strengths of the present study include its focus on a largely unexplored health-related behavior, its contributions to further development of the prototype–willingness model and related health behavior theories, and the use of a longitudinal design and large sample of parents in the USA. Several study limitations require consideration when interpreting the results and point to directions for further research. First, although recruitment through MTurk yielded a relatively diverse sample of parents in the USA and MTurk samples tend to be comparable in quality to and even outperform panel and student samples [63], the recruitment yielded a sample of predominantly non-Hispanic White and well-educated
participants. The findings may therefore not be representative of parents identifying with other ethnic and racial groups or with lower educational backgrounds. These preliminary findings can be examined in subsequent studies by utilizing random samples of parents in the USA and elsewhere.

Second, we focused on parents of children ages 10–17 years old, and so the findings may not be generalizable to parents of children outside of this age range. Third, given that we used a limited timeline for assessing discussion behavior, further research is needed to test the model with a longer timeline. Future research can also include more extensive assessments of discussion dynamics such as children’s reactions to discussions and the links between parent–child discussions and subsequent marijuana use by the child. In addition, the present SEM analyses did not test whether child’s or parent’s age, gender, or other personal characteristics might moderate the associations among model factors. Secondary analyses evaluating the main and interaction effects of parents’ age, child’s age, and child’s gender on the factors within the model are currently underway in a follow-up study we are conducting on parental motivations to discuss health risk behaviors (i.e., marijuana use, unhealthy eating) with their children. Future research utilizing larger samples is needed to determine whether the model pathways vary as a function of these parent and child characteristics. Finally, given the changing landscape of marijuana legalization, future research can be directed at longitudinal, nationwide studies evaluating on whether parental motivations to discuss marijuana with their children change over time as more states legalize marijuana for recreational and medical use.

To conclude, the present study contributes new data indicating that, in a sample of Americans with preadolescents and adolescents, parents gave relatively higher ratings of perceived risk and worry that their child would develop problems with academic performance, addiction to marijuana, and memory problems if their child used marijuana. Parents also held generally negative prototypes of youth marijuana users. Further, a substantial proportion of participants reported engaging in marijuana use discussions in the month following the initial survey. Overall, the findings support most of the hypothesized relationships delineated by adapted prototype–williness model, suggesting its potential utility in understanding the factors influencing parents’ decisions to engage in discussions with their children about marijuana use.

The present findings can guide efforts to develop health communication strategies aimed at promoting parent and child discussion of the marijuana use. Parents who struggle to have conversations about marijuana and other risky substances might benefit from tools on how to have these discussions with their children. Such tools can apply the present findings to motivate discussions by describing the health and performance risks of marijuana use for youth and particularly those revealed as being of the greatest risk and concern for parents in this study. The text and images used in such communications could be evaluated in terms of how they might be conveying stereotypes of marijuana users, with consideration that positive portrayals of youth marijuana users could be associated with lower worry and, in turn, discussion motivations and behavior. Such communication tools should not only motivate discussions, however; they should also provide accurate information to clarify any misconceptions about the health risks of marijuana and suggest approaches for holding these discussions.

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Compliance with Ethical Standards All procedures performed in this study involving human participants were in accordance with the ethical standards of the UC Merced Institutional Review Board and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Authors’ Statement of Conflict of Interest and Adherence to Ethical Standards Authors Khachikian and Cameron declare that they have no conflict of interest. All procedures, including the informed consent process, were conducted in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

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