Family Problem-Solving and its Relationship to Adolescent Risk-Taking Behavior

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Adolescence is a time of many rapid transitions characterized by various physical, physiological, social, emotional, cognitive and behavioral changes (Sarracino & Innamorati, 2012). With the occurrence of these changes comes exploration and experimentation with a wide range of risk-taking behaviors. According to theorists (Bell & Bell, 1993), risk-taking is a normal, even essential, part of adolescent development.

Not all risk-taking is inherently negative, in fact it has been argued that a certain amount of eustress is necessary to build self-confidence and provide reinforcement for taking initiative during adolescence (Baumrind, 1987). What differentiates developmentally appropriate risk-taking from negative risk-taking is that the latter is dangerous with little or no chance of secondary gain. For the purpose of the current study, risk-taking is defined as engagement in behaviors in which the outcomes remain uncertain, with the possibility of an identifiable negative health outcome (Irwin, 1993). The term risk-taking behavior has been used to theoretically link a number of potentially health-damaging behaviors, such as substance abuse, risky sexual behavior, reckless vehicle use and delinquency (Igra & Irwin, 1996). For example, substance use is positively correlated with delinquency (Hawkins & Monahan, 2009).

Early to late adolescence is marked by increased participation in behaviors such as substance use and delinquency. For instance, between the ages of 12 and 25, adolescents have been found to initiate involvement in a number of health-risk behaviors including alcohol and drug use and delinquency (DiClemente, Santelli, & Crosby, 2009). In 2016, 58.2% of the nation's 12^{th} graders reported using alcohol in the last year,

compared to 21% of 8th graders; 21.3% of 12th graders reported having smoked marijuana in the past month compared to 6.5% of 8th graders (NIDA, 2016).

Parents are major socializing agents of children (Chassin, Curran, Hussong, & Colder, 1996; Pequegnat & Szapocznik, 2000) and have been found to promote protective qualities in the development and maintenance of problem behaviors (Hawkins, Catalano, & Miller, 1992). In fact, risk-taking behaviors, such as underage drinking, tobacco use, and risky sexual behavior, have been found to be related to a number of parenting behaviors (Cleveland, Gibbons, Gerrard, Pomery, & Brody, 2005; Cohen, Richardson, & Labree, 1994). For example, close parent-adolescent relationships have been found to be a protective factor against the development of delinquent behavior (Harris, Furstenberg, & Marmer, 1998). Parental warmth has been found to be negatively associated with adolescent risk-taking, including alcohol use (Mogro-Wilson, 2008) and positively associated with the family's ability to solve problems together (Vuchinich, Wood, & Vuchinich, 1994).

While a warm, close relationship between parents and adolescents seems to protect against risk-taking behavior, few studies have examined how specific aspects of family relationships relate to adolescent risk-taking behavior. One such factor is family problem-solving. Family problem-solving is the family's ability to resolve problems in order to maintain effective family functioning (Miller, Ryan, Keitner, Bishop, & Epstein, 2000). By having a close, warm relationship with their adolescent, parents may positively influence their adolescent's development by creating a context for open parent-adolescent communication and trust, and fostering family problem-solving abilities.

The purpose of this study was to examine how perceptions of problem-solving within the family effect the relationship between attachment and adolescent risk-taking behavior. Examining this relationship will allow family researchers to better understand whether specific efforts such as family focused prevention programs that emphasize problem solving could yield preventative qualities during adolescence.

Literature Review

Family Problem-Solving and Adolescent Risk-Taking

Problem-solving abilities in adolescents have been found to be associated with risk-taking behaviors including substance abuse (Botvin, Malgady, Griffin, Scheier, & Epstein,1998). It has been hypothesized that adolescents with greater problem-solving abilities will be able to respond more adaptively and appropriately to situations where externalizing behavior is one way to respond, compared to adolescents with poor problem-solving abilities (Jaffee & D'Zurilla, 2003). It has also been assumed that parents who are better at problem-solving will be better able to deal with their child's externalizing behaviors and help their children successfully solve problems in the real world (Jaffee & D'Zurilla, 2003). Based on previous research on individual problem-solving and risk-taking, a number of experts have called for family interventions for treating and preventing adolescent behavioral problems that focus on problem-solving training for youth and parents (Montemayor, 1986; Robin & Foster, 1989).

Given the research on parenting and individual level problem-solving influences on risk-taking, it is plausible, that family level problem-solving may also influence adolescent risk-taking behavior. Family problem-solving is unique from individual problem-solving in that it facilitates effective interaction between multiple members of a

family in order to solve challenges (Ahmadi, Azad-Marzabadi, Ashrafi, & Raiisi, 2007). With regard to risk-taking, family problem-solving might take the form of positive problem-solving communication between parents and youth, which may result in a reduction in adolescent engagement in risk-taking behavior. There is some empirical support for the investigation of family problem-solving, although limited. For instance, parental warmth has been found to be positively associated with family problem-solving in a sample of at-risk (i.e., families with a child at risk for conduct disorder), referred (i.e., families with a preadolescent child referred for treatment of behavior problems), and comparison families (Vuchinich, Wood, & Vuchinich, 1994), which suggests that having a close, warm relationship with a caregiver may provide context for developing family problem-solving skills, which may affect engagement in risk-taking. Due to the dearth of empirical literature on the relationship between family problem-solving and adolescent risk-taking, theoretical concepts are needed. The application of attachment theory and theory of planned behavior (TPB) provides some guidance for hypothesizing the relationship and implications that extend from the results.

Attachment to Parents and Risk-Raking Behavior

According to Bowlby (1980), a secure attachment of a child is established through constant, loving, supportive, and available behavior of a parent or other caretaker. Attachment is defined as an affectional bond that develops between a child and their primary caregiver that is the foundation for further healthy development (Bowlby, 1969/1982). A major tenet of attachment theory is that a strong emotional and physical attachment to at least one primary caregiver is critical to development (Cassidy & Shaver, 2008). Specifically, during adolescence, attachment security is related to the adolescent's

perception that a parent is responsive and available, open to communication, and a reliable source of help and comfort during times of need (Kerns, Klepac, & Cole, 1996). Attachment to parents is thought to have a role in both internalizing and externalizing problem behaviors during adolescence. A study by Cooper, Shaver and Collins (1998) examined individual differences in attachment styles (i.e., secure, anxious, avoidant-ambivalent) as predictors of adjustment in a sample of adolescents aged 13 to 19 years old. Based on attachment theory (Bowlby, 1946, 1970), Cooper and colleagues (1998) hypothesized that adolescents' attachment style would be related to a range of risky or problematic behaviors, including drug and alcohol use, and delinquency. Results showed that after controlling for gender, race, and age, attachment style accounted for a significant increase in explained variance in the extent and nature of adolescent substance use. Specifically, adolescents with insecure attachment to parents reported higher levels of drug involvement than their securely attached counterparts.

It has been posited that attachment security may be related to the quality of communication between adolescents and their parent and peers (Cassidy, 2001). When attempting to solve conflicts with their parents, securely attached youth tend to engage in useful discussions, display relational competence, and flexible working models of the relationship. As a result, youth with secure attachment to parents develop the skills necessary to regulate their emotions and manage their impulses (Grossmann, Grossmann, Kindler, & Zimmermann, 2008). On the other hand, insecure parent-child dyads are more likely to display problem-solving difficulties, withdraw from disagreements and/or become hostile and oppressive (Allen, 2008).

The protective effect of parental attachment security is thought to be related to the development of appropriate self-regulation abilities of adolescents. Adolescents who have a secure attachment to their parents are more likely to display self-regulation abilities such as self-control and adaptive coping strategies (Kobak, Cole, Ferenz-Gillies, Fleming, & Gamble, 1993). It is thought that youth who feel securely attached to their parents are more likely to feel comfortable going to their parents for guidance when they face a problem or need support. They may be more likely to communicate with their parent about social problems they face (e.g., pressure from peers to engage in substance use), as well as discuss problem-solving strategies for addressing such pressures.

Overall, research suggests that adolescents who report having a secure relationship with parents, that is close and accepting, have been found to display fewer conduct problems (Sarracino & Innamorati, 2012) and are less likely to engage in externalizing problems, substance use, and risky sexual activity (Allen, Moore, Kuperminc, & Bell 1998; Cooper et al., 1998). In contrast, research has shown that insecurely attached adolescents are more prone than securely attached adolescents to extreme relational dysfunction, decreased social competence, and as a result, are more likely to engage in risk-taking behaviors (Allen, Hauser, & Borman-Spurrell, 1996; Boyer, 2006).

Parenting and risk-taking. A number of studies have looked at parenting behaviors beyond attachment and their relationship to risk-taking behaviors. A study by Lac, Alvaro, Crano, and Siegel (2009) used secondary data analysis to examine whether and to what extent adolescents' beliefs about marijuana were influenced by two parenting factors; parental knowledge and parental warmth. It has been suggested that parents

construct their children's psychosocial environment by transmitting and instilling their own values (McHale, Dariotis, & Kauh, 2003), therefore, the quality of the relationship between parent and adolescent may be helpful in determining an adolescents' ability to resist drugs. Pathways from parenting to adolescent marijuana use were expected to be mediated by adolescent marijuana beliefs. Results revealed consistent linkages from parenting practices to adolescent beliefs suggesting that parents do play a role in influencing marijuana use among adolescents. High parental knowledge was significantly predictive of lower pro-marijuana attitudes, subjective norms, and perceived behavioral control, while parental warmth significantly predicted lower pro-marijuana attitudes and subjective norms.

Although parenting behaviors have been examined in relation to adolescent risk-taking, adolescent behaviors may also influence their risk-taking behavior. It may be that family context, influences adolescent risk-taking as well. For instance, family context, in the form of problem-solving at the family level, may be related to risk-taking. The theory of planned behavior provides grounding for the examination of family problem-solving ability in relation to adolescent risk-taking behavior.

Theory of Planned Behavior and Problem-Solving

The theory of planned behavior (TPB) is an extension of the theory of reasoned action (TRA) and is used to predict and explain behavior within specific contexts (Ajzen, 1991). A primary assumption of TPB is that specific behavioral intentions are the direct determinants of behaviors (Ajzen & Fishbein, 1980). For example, an adolescent's underage drinking is a direct function of the adolescent's intention to use alcohol. According to the theory, human action is guided by three beliefs: behavioral beliefs,

normative beliefs, and control beliefs. The combination of these beliefs result in one's behavioral intention. The more positive the attitude about the behavior, the more positive the subjective norm, the greater degree of social pressure to comply with normative expectations, and the greater the perceived control, the stronger the behavioral intention to perform a particular behavior (Ajzen, 1991). In addition, TPB postulates that perceived behavior control may directly predict behavior. Within TPB, two forms of perceived control may be considered in relation to risk-taking (Petraitis, Flay, & Miller, 1995). The first relates to a person's beliefs in their ability to successfully perform or engage in a risk-taking behavior. According to TPB, some adolescents engage in risk-taking such as underage drinking partly because they know where to get alcohol and how to use it. For example, knowing how to mix alcoholic drinks in order to mask unpleasant tastes might encourage underage drinking. The second type of perceived control characterizes youths' beliefs in their abilities to resist social pressures to engage in risk-taking behavior.

TPB can be utilized to examine and understand problem-solving skills and how they relate to risk-taking behaviors in adolescents. Specifically, problem-solving and risk-taking would be considered sets of behaviors. The degree to which different family members (e.g., adolescent, parent) engage in problem-solving behaviors can be predicted by examining that individuals' perceived control and, or behavioral intentions to engage in problem-solving behavior. If family members have positive attitudes and subjective norms regarding engaging in problem-solving behavior they will have stronger behavioral intentions to engage in problem-solving behavior. The relationship between problem-solving behavior and risk-taking behavior can also be examined. Not all adolescents have plans to engage in risk-taking behaviors, however having the skills

needed to refuse pressure to participate in risk-taking may contribute to adolescent risk-taking engagement. Specifically, if an adolescent has strong beliefs in their abilities to resist social pressures to engage in risk-taking due to high problem-solving abilities learned within their family, they may be less likely to engage in such behaviors. Furthermore, if youth have more positive normative beliefs that problem-solving behavior is the appropriate way to deal with pressures to engage in risk-taking behavior, based on the perceived expectations of their parents, they may be more likely to have greater behavioral intentions to engage in problem-solving behavior as a way to respond to pressure to engage in risk-taking behavior. A concern, however, with TPB is that it only includes the role of proximal cognitive factors (Harakeh et al., 2004).

Parent-based expansion of TPB and family problem-solving. Although TPB has provides utility for understanding risk-taking behavior, its focus is on the individual level. Within TPB, a person's beliefs are considered proximal factors. It has been argued that including parental factors as distal factors within the TPB model would allow for a more thorough prediction of experimental substance use (Petraitis et al., 1995). Distal factors including parenting practices (e.g., parent-child relationship quality, psychological control, parental knowledge) are posited to affect substance use via proximal, cognitive factors (Harakeh et al., 2004). For example, Harakeh et al. (2004) found that parental factors as distal factors (i.e., parent-child relationship quality, parental knowledge) affected adolescents' smoking behavior indirectly by affecting smoking related cognitions which in turn affect smoking behavior.

The parent-based expansion of the TPB (PETPB; Hutchinson & Wood, 2007) is a conceptual framework that proves useful within the context of the current study. The

framework was developed to better incorporate parental influences on adolescent behavior, thus furthering the utility of the TPB for understanding adolescent risk behavior. Within the PETPB, the adolescent is nested within multilevel systems which include the family, community and larger society (Hutchinson & Wood, 2007). Within this model, family is considered one of the most important influences on risk-related behaviors such as risk-related sexual behaviors. External influences on risk-taking behavior, such as parent-teen communication, are posited to be mediated through behavioral control, and normative beliefs. It may be that greater attachment with a caregiver creates an environment that fosters family problem-solving ability which in turns affects adolescents' behavioral intentions and, or direct engagement in risk-taking behavior.

Despite its utility, no studies have used PETPB to examine the role of family problem-solving on adolescent risk-taking behavior. Combined with attachment theory, the PETPB can be applied to the current study by examining how specific family-level distal factors (i.e., attachment, family problem-solving) influence adolescent risk-taking behavior.

While family level interventions focused on problem-solving training may provide quality treatment and prevention efforts for families and adolescents with behavioral problems, to my knowledge, no research has been done to examine family problem-solving and its relationship to adolescent risk-taking behavior. While studies have examined attachment and a number of other parenting practices (e.g., Barfield-Cottledge, 2015; Iglesias, Fernandez del Rio, Calafat, & Fernandez-Hermida, 2014) associated with risk-taking behaviors (e.g., substance use), other parent and child related

constructs could be used to predict adolescent risk-taking behavior. Specifically, attachment could be examined in order to understand how attachment influences the problem-solving abilities of families. In turn, family problem-solving ability could be examined so as to understand how family problem-solving ability influences adolescents' intention to engage, and, or their direct engagement in risk-taking behavior. Furthermore, no studies have examined how family-problem solving ability may influence the relationship between attachment and adolescent risk-taking behavior. The current study contributes to the existing literature by being the first to use PETPB to examine the mediating effect of family problem-solving ability on the relationship between attachment and adolescent risk-taking behavior. Results of the study will provide valuable information about problem-solving within families that may be used to develop prevention efforts aimed at increasing family problem-solving abilities.

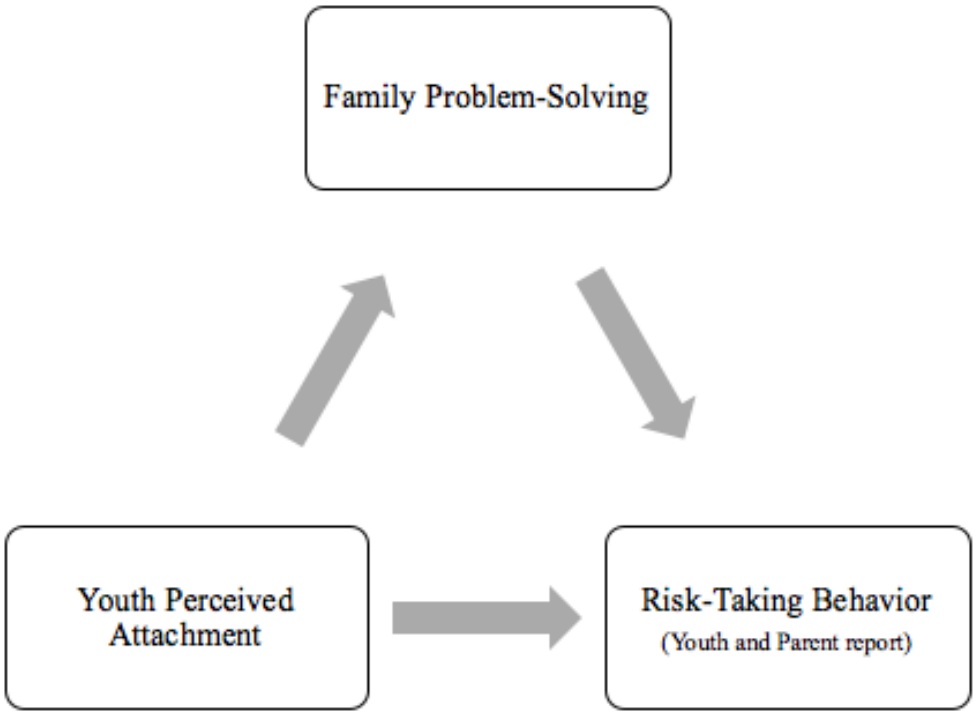

Figure 1. Conceptual model for the effects of attachment and family problem-solving ability on adolescent risk-taking behavior. Two constructs make up family problem-solving; parent reported conduct problems, and youth reported delinquency.

Purpose

The central purpose of the current study is to enhance family and prevention scientists' understanding of the role family problem-solving abilities play on adolescents' risk-taking behavior. In this study we explore parents' and adolescents' perceptions of their families' problem-solving abilities and whether it mediates the relationship between attachment and risk-taking behavior of the adolescent. Investigating these relationships will provide valuable information about the importance of family problem-solving abilities on influencing risk-taking behavior during adolescence.

Hypotheses

The current study will examine the following hypotheses (1) youth perceptions of attachment with their caregiver will be negatively associated with both parent and youth reported adolescent's risk-taking behavior, (2) youth perceived attachment will be positively associated with family problem-solving ability (3) family problem-solving ability will be negatively associated with both parent and youth reported adolescent risk-taking behavior, and (4) family problem-solving ability will mediate the effect of youth perceived attachment on youth and parent reports of adolescent risk-taking behavior.

Method

A sample of parents and youth from the Campus Connections Project at Colorado State University was used for the current study. The larger Campus Connections Project was conducted after obtaining Institutional Review Board approval through Colorado State University. This secondary data analysis study was conducted after obtaining

approval from the Institutional Review Board of the University of Minnesota.

Participants

Two-hundred-seventy-two youth and 270 parents/guardians originally provided consent, but two youth withdrew consent, thus the sample size for the current study is *N*=540. Youth ranged in age from 10-18 years (*M*= 14.09, *SD*= 1.75). Two youth did not have data on their age. Of the sample, 107 youth participants were female (40%) and 163 were male (60%). The majority of the youth in the sample (66.7%) described themselves as White, 30.7% described themselves as Hispanic, 8.1% as American Indian or Alaska Native, 7% as Black or African American, 6.3% as other, and 1.5% as Asian. Two youth did not report on their race/ethnicity. Because respondents were able to check all options that applied to them, some participants identified with multiple racial and ethnic groups, thus the frequencies do not equal 100%.

The parent participant group was comprised of 195 (72.2%) females, 41 (15.2%) males, and 34 (12.6%) who did not disclose. The average age of parents was 43.51 years (*SD* =9.53), ranging from 24-75 years. Of the parent participant group, 33 (12.2%) did not disclose their race/ethnicity. Of those who did, (70%) described themselves as White (Caucasian/non-Hispanic), 26.2% as Hispanic, 4.6% as American Indian or Alaska Native, 3% as Black, 2.5% as Mixed, 1.3% as Asian, and .8% as Hawaiian. Similar to youth, the categories are non-exclusive and participants could identify with multiple racial and ethnic groups.

Procedure

Participants for the study were obtained as part of a larger study of Campus Connections (Weiler, Haddock, Henry, Zimmerman, Krafchick, & Youngblade, 2015;

Weiler, Haddock, Zimmerman, Krafchick, Henry, & Rudisill, 2013), a 12-week after-school mentoring program for at-risk youth. For the purposes of the larger study, youth were referred by community agencies in Northern Colorado to Campus Connections. To be eligible to participate, adolescents had to be between 11-18 years old (youth who were 10 years old at the intake were eligible to participate as long as they turned 11 by the program start), and experiencing at least one risk factor as indicated on the individual and environmental risk assessment (Herrera, DuBois, & Grossman, 2013). Assent and informed consent were obtained from youth and at least one parent/guardian at an intake appointment with Campus Connections. Data for the current study included baseline data from all participants sampled at the start of the Fall 2015 and Spring 2016. Youth and their parent(s)/guardian(s) completed the baseline survey via Qualtrics, an online survey system, prior to any involvement in the intervention. Youth and parent(s)/guardian(s) were each compensated $10 for completing the baseline survey. The survey took approximately 30 minutes to complete. A subset of measures was identified for the current study.

Demographics

Youth. Youth age was calculated using three items: month mentee was born, year mentee was born, and date of the baseline survey. Specifically, month mentee was born and year mentee was born were combined and then subtracted from date of the baseline survey. Youth gender was obtained using a single item: "What is your gender?" Respondents chose one option: "Male" or "Female." Youth provided information about their race or ethnicity using the item: "What is your race and ethnicity?" Participants chose all options that applied to them from a list of racial and ethnic groups: "American

Indian or Alaska Native," "Asian," "Black/African American," "Hispanic/Latino," "Native Hawaiian or Other Pacific Islander," "White," or "Mixed."

Parents. Parent gender was obtained using a single item: "What is your gender?" Respondents chose one option: "Male," "Female," or "Transgender." Parent age was calculated by subtracting one item: "What year were you born?" from the year the data were collected (i.e., 2016 minus 1946). Parents provided information about their race or ethnicity using the item: "What is your race and ethnicity?" Participants chose all options that applied to them from a list of racial and ethnic groups: "American Indian or Alaska Native," "Asian," "Black/African American," "Hispanic/Latino," "Native Hawaiian or Other Pacific Islander," "White," or "Mixed."

Attachment

Attachment with youth's caregiver was measured using the 15-item Inventory of Parent and Peer Attachment-Short Form (IPPA-Short Form; Gifford-Smith, 2000). Youth were asked to rate the extent to which they believed each item was true about the person or people who care for them on a 3-point scale (1=Not true, 2=Sometimes true, 3=Always true), with higher scores indicating greater perceived attachment. Of the original 15 IPPA items, one was dropped from the scale due to its sensitive nature (i.e., scared at home with parents). The final IPPA scale included items such as "my parent(s) accept me" and "I talk to my parent(s) about my problems". Cronbach's alpha for attachment was .89.

Family Problem-solving

Youth and parent perceptions of family problem-solving was measured using the problem-solving subscale of the McMaster Family Assessment Device (Epstein,

Baldwin, & Bishop, 1983). Youth and parents were both asked to rate each item on a 4-point scale (1=Strongly Disagree to 4=Strongly Agree). The problem-solving subscale is comprised of 5 items such as "we try to think of different ways to solve problems." Cronbach's alpha for youth report of family problem-solving was .87. Cronbach's alpha for parent report was .83. Because the participants being studied were members of the same family, the observations were not independent. In order to account for this, youth and parent reports were averaged to create a composite score of family problem-solving for our analyses.

Risk-taking behavior

Risk-taking was reported by youth and parents.

Youth. Risk-taking behavior was measured using the 10-item Delinquent Behavior Scale (Elliott, Huizinga, & Ageton, 1985). Youth reported on their own risk-taking behavior by indicating how many days in the last month they had engaged in a number of delinquent activities (e.g., got drunk, smoked marijuana, took something from a store without paying for it). Respondents answered each item on a slider scale (respondents drag a bar to indicate their response preference level) ranging from 0 (0 days) to 30 (30 days). The Delinquent Behavior Scale was found to be reliable (α=.85). Because little is known about the relationships between family problem-solving, attachment, and adolescent risk-taking behavior, we chose to examine the breadth of engagement in risk-taking behavior, rather than parse out specific risk-taking behaviors that may be mediated by family problem-solving. Following previous research (Garrido, Weiler, & Taussig, 2017), three dichotomous risk-taking categories (substance use, violence, and general delinquency) were constructed and summed. Four items were used

to assess substance use: *drank alcohol, got drunk, used marijuana, smoked cigarettes*; one item was used to measure violence: *hit someone or got into a physical fight*; and, five items were used to assess general delinquency: *spray paint on place you're not supposed to, damaged property, snuck into someplace without paying, took something from a store without paying, stole something (other than from a store).* The sum of the three categorical variables represents total engagement in risk-taking behavior, with 0 representing no risk-taking behaviors and 3 representing engagement in risk-taking behaviors across all the three categories.

Parents. Parent-report of risk-taking behavior was assessed via the 5-item conduct problems subscale of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). Parents were asked to rate the extent to which they believed each item was true of their child's behavior over the last six months on a 3-point scale (1=Not true, 2=Somewhat true, 3=Certainly true). Items included behaviors such as "steals from home, school or elsewhere," and "often lies or cheats." Cronbach's alpha was .76.

Data Analysis

Before testing study hypotheses, preliminary data analyses were conducted, examining the relationships among study variables (see Tables 1, 2 and 3), checking for missing data, and checking the normality of study variables. Missing data for youth demographic information ranged from 0.0% to 0.7% (2 missing cases), missing data for family problem-solving ranged from 1.5% (4 missing cases for youth) to 12.2% (33 missing cases for parents), missing data for youth report of attachment included 15 missing cases (5.6%), and missing data for risk-taking items (youth reported delinquent behavior and parent reported conduct problems) ranged from 0.4% (1 missing case for

parents) to 4.8% (13 missing cases for youth). Due to the high percentage of missing data on parent report of family problem-solving, multiple imputation was conducted so as to replace each missing value with a set of plausible values that represent the uncertainty about the correct value to impute (Rubin, 1987). All of the study variables were normally distributed.

Control variables were also selected for analysis. Previous research suggests there are age and gender difference on risk-taking (Chassin, 2008; IOM & NRC, 2011). Overall, rates of substance use tend to be higher for males than for females (Barnes, Welte, Hoffman, & Tidwell, 2009; Cotto, Davis, Dowling, Elcano, Staton, & Weiss, 2010), and for most adolescents, substance use is reduced or stopped in early young adulthood (IOM & NRC, 2011), therefore, age and gender were entered as control variables. Race/ethnicity was also entered as a control variable as research has shown that racial/ethnic differences in risk-taking exist (Barnes et al., 2009). For instance, African Americans youth tend to have lower rates of alcohol use, and cigarette use, than White youth (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016). Prior to analysis, race/ethnicity was recoded to form a dichotomous minority/non-minority variable.

To test the hypotheses, two mediation analyses were conducted to assess if family problem-solving ability mediated the relationship between attachment and risk-taking behavior (i.e., parent report and youth report). Traditionally, mediation analysis has been guided by the Barron and Kenny causal steps approach (1986). While a majority of previously published mediation analyses follow the causal steps approach, it has become less popular due to criticism from a number of quantitative methodologists (Hayes, 2009, 2012; MacKinnon, Fairchild, & Fritz, 2007) who argue that the causal steps approach

fails to formally quantify the indirect effect, nor does it require any inferential test (Hayes, 2012). Furthermore, a true mediational relationship may exist even if some of the relationships are not found (MacKinnon, Fairchild, & Fritz, 2007). Because the causal steps approach is logically inferred rather than empirically derived (Hayes, 2009) the method has low power in detecting indirect effects. For these reasons, the Hayes approach was employed in this study. Rather than following the causal steps approach to mediation, the Hayes approach to simple mediation generates the mediation model simultaneously using the PROCESS macro in SPSS. Bias-corrected confidence intervals for the indirect effect are also generated using 5,000 bootstrap samples. Bootstrapping is run automatically by PROCESS in order to generate an empirically derived representation of the sampling distribution for the indirect effect. This empirical representation is then used to generate bias-corrected bootstrap confidence intervals for interpreting the indirect effect.

For both mediation models, ordinary least squares path analysis was run. Within the PROCESS macro, "Model 4" was selected in order to test mediation. For the first model, parent report of risk-taking behavior was selected as the outcome variable, attachment was selected as the independent variable, and family problem-solving was selected as the mediator variable. Age, gender, and race were selected as covariates. For the second model, youth report of risk-taking behavior was selected as the outcome variable, attachment was selected as the independent variable, and family problem-solving was selected as the mediator variable. Age, gender, and race were selected as covariates. For each model, control variables (i.e., age, gender, race), attachment, and family problem-solving were simultaneously entered and regressed on the dependent

variable (i.e., parent-reported conduct problems, youth-reported delinquent behavior). In addition, 5,000 bias-corrected bootstrap samples were requested in the PROCESS macro.

Results

Correlations

Table 2 shows the correlations among family problem-solving, attachment, parent and youth report of risk-taking, and youth age. Results indicated a positive correlation between family problem-solving and attachment ($r = .547$, $p < .01$). Family problem-solving was negatively associated with both parent and youth report of risk-taking behavior ($r = -.163$, $p < .01$; $r = -.203$, $p < .01$), such that greater family problem-solving was associated with lower report of risk-taking by both parents and youth. Attachment was also negatively correlated with parent and youth report of risk-taking ($r = -.144$, $p < .05$; $r = -.298$, $p < .01$). Furthermore, attachment was significantly correlated with youth age ($r = -.174$, $p < .01$).

Two independent-samples t-tests were conducted to compare family problem-solving, attachment, parent and youth report of risk-taking, and youth age scores for male and female youth and for white and minority youth. There was a significant difference in the family problem-solving scores for males ($M = 2.99$, $SD = .411$) and females ($M = 2.83$, $SD = .452$); t (268) = -3.13, $p < .01$). There was also a significant difference in attachment scores for males ($M = 2.46$, $SD = .370$) and females ($M = 2.24$, $SD = .45$); t (199.4) = -4.20, $p < .01$). These results suggest that gender has an effect on both family problem-solving ability and perceived attachment. As predicted, results indicated that males ($M = 1.68$, $SD = .522$) scored higher on parent report of risk-taking than females ($M = 1.56$, $SD = .427$; t (253.11) = -2.08, $p < .05$). No significant differences in family

problem-solving, attachment, risk-taking, or youth age scores between white and minority youth were found.

Simple mediation analysis 1: **Parent-reported risk-taking**

Simple mediation analysis using ordinary least squares regression was conducted to investigate the mediating effect of family problem-solving ability on the relationship between attachment and parent-report of adolescent risk-taking, after controlling for age, gender, and race/ethnicity. Control variables (i.e., youth age, gender, race/ethnicity), attachment, family problem-solving ability, and parent-reported risk-taking behavior were simultaneously entered for the simple mediation model. Results indicated that the direct paths (a and $c^{'}$) were statistically significant (see Figure 2 and Table 4). Attachment was a significant predictor of parent-reported risk-taking behavior, b = -.222, SE = .090, p <.05, 95% CI = -.397, -.047, thus providing evidence to support hypothesis 1. Attachment was also a significant predictor of family problem-solving ability, b = .572, SE = .059, p <.001, 95% CI = .455, .688, providing support for hypothesis 2. Family problem-solving ability, however, was not a significant predictor of parent-reported risk-taking, b = -.135, SE = .081, p = .097, 95% CI = -.294, -.024 after controlling for age, gender, and race/ethnicity, thus offering no support for hypothesis 3. We tested the indirect effect using bootstrapping procedures (Hayes, 2013). That is, we requested the PROCESS macro to repeatedly sample from the data set and estimate the indirect effect in each resampled data set. This process was repeated 5,000 times and an empirical estimate of the sampling distribution of *ab* was built and used to construct confidence intervals for the indirect effect. Unstandardized indirect effects were computed for each of 5,000 bootstrapped samples, and the bias-corrected bootstrap confidence interval for the

indirect effect (*ab* = -.077) included zero (-.169 to .008), thus, the indirect effect was not statistically significant. We did not find evidence to support hypothesis 4 that the relationship between attachment and parent-report of risk-taking behavior was mediated by family problem-solving ability.

Simple mediation analysis 2: Youth reported risk-taking

In the second model, ordinary least squares regression was conducted to investigate the mediating effect of family problem-solving ability on the relationship between attachment and youth report of adolescent risk-taking behavior, after controlling for age, gender, and race/ethnicity. Control variables (i.e., youth age, gender, race/ethnicity), attachment, family problem-solving ability, and youth-reported risk-taking behavior, were simultaneously entered for the ordinary least squares regression model. Results suggested that two of the three direct paths (a and $c^{'}$) were statistically significant (see Figure 2 and Table 5). Attachment was a significant predictor of youth-reported risk-taking behavior, b = -.690, SE = .171, p <.001, 95% CI = -1.03, -.353 (Figure 2) providing support for hypothesis 1. Attachment was also a significant predictor of family problem-solving ability, b = .590, SE = .060, p <.001, 95% CI = .471, .709, thus providing evidence to support hypothesis 2, however, family problem-solving ability was not a significant predictor of youth-reported risk-taking behavior b = -.096, SE = .154, p = .53, 95% CI = -.40, .208, after controlling for age, gender, and race/ethnicity. The bootstrap confidence intervals derived from 5,000 samples indicated that the indirect effect coefficient was not significant, b = -.057, SE = .104, 95% CI = -.263, .146. Thus, the results do not support the hypothesis that the relationship between attachment and youth-reported risk-taking behavior was mediated by family problem-solving ability.

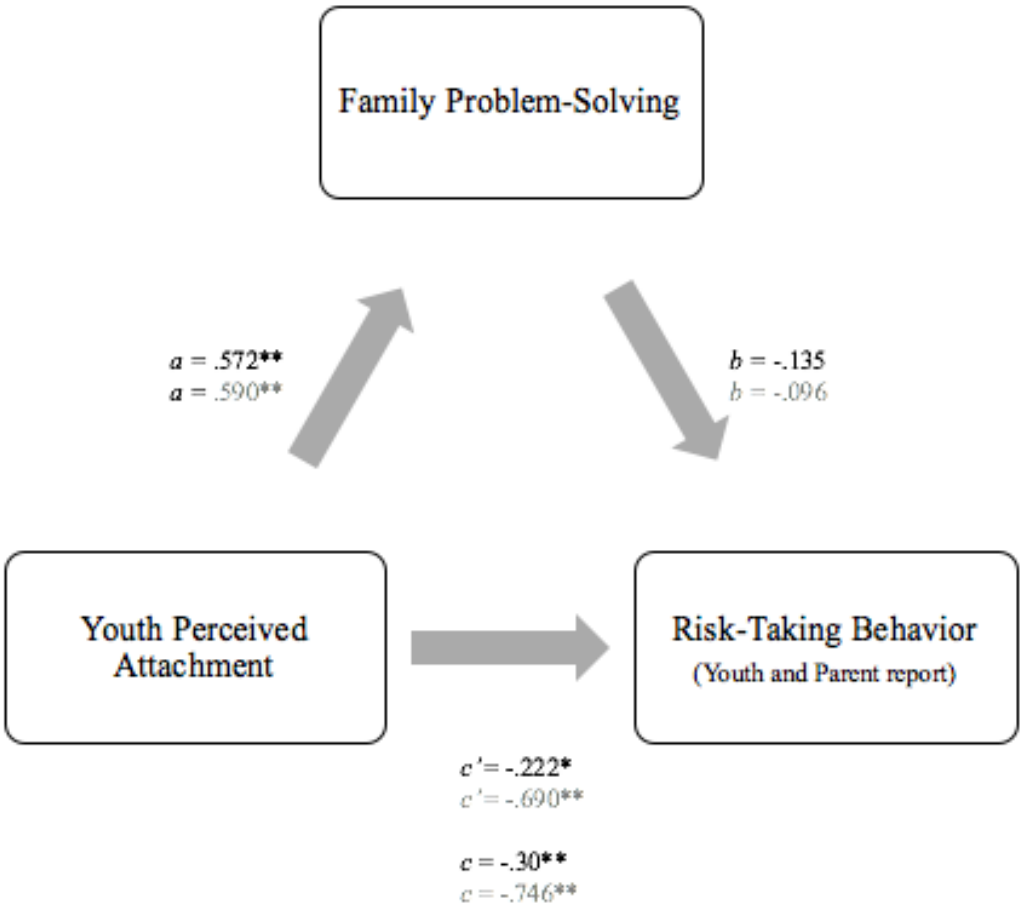

Figure 2. Mediation model for the effects of attachment and family problem-solving ability on adolescent risk-taking behavior. Coefficients for youth model in grey; coefficients for parent model in black.
* $p < .05$, ** $p < .001$.

Discussion

This study sought to examine the mediating effect of family problem-solving ability on the relationship between attachment and adolescent risk-taking behavior. The current study was guided by Bowlby's (1969/1982) theory of attachment and the parent-based expansion of the theory of planned behavior (PETPB; Hutchinson & Wood, 2007). Consistent with the proposed theoretical assumptions, adolescents with greater attachment to their caregivers reported higher levels of family problem-solving abilities, and lower levels of reported risk-taking by both parents and youth. These findings also

align with previous empirical studies (e.g., Barfield-Cottledge, 2015; Hamme-Peterson, Buser, & Westburg, 2010), and provide evidence of the association between attachment and family problem solving, and between attachment and adolescent risk-taking behavior.

Our hypothesis that family problem-solving ability would be negatively associated with adolescent risk-taking behavior, however, was not supported and our hypothesis that family problem-solving ability would mediate the effect of youth perceived attachment on youth and parent perceptions of adolescent risk-taking behavior was not supported. Interestingly, although family problem solving and risk-taking behavior were significantly related in the bivariate correlations, the relationship was not significant after taking into account age, gender, and race/ethnicity. Based on the results of the independent samples *t*-test comparing adolescent males and females, it appears males, in the current sample perceive greater attachment with their caregivers than females. In addition, higher composite family problem-solving scores were found for adolescent males than females in the present sample. It appears that gender differences in attachment and family problem-solving exist, therefore, it is plausible that the effect of family problem-solving on the relationship between attachment and risk-taking depends on whether the youth is male or female. Another explanation for the lack of support for the mediating effect of family problem-solving could be that family problem-solving ability looks different for single-parent families compared to two parent families. Research suggests that difficulties related to family functioning exist for single-parent families (Moore & Vandivere, 2000). Many single-parent families have been found to have difficulties related to their family structure, such as lack of parental supervision, and less parental time to carry out parenting tasks (Cooney & Mortimer, 1999). In general,

single-parent families have lower socioeconomic status (SES) than two-parent families (Amato, 2000). Single parents have additional obligations such as spending more time away from the home working to support their family thus, single-parent families spend less time together (Kendig & Bianchi, 2008). It may be that without a partner, it is harder for single parents to provide the time and attention toward fostering family problem-solving abilities that youth in two-parent homes receive. Further examination of the family structure differences in the relationships between attachment, family problem-solving, and adolescent risk-taking should be be conducted.

Because PETPB suggests the role of attitudes and beliefs about risk-taking behavior is influenced by parent-child interactions, it may be that family problem solving ability does not affect engagement, per se, but rather one's attitudes and beliefs about the behavior. Future research is needed to discern these relationships. It could also be, that during adolescence, attachment to a caregiver is such a strong predictor of risk-taking, that it masks any effect family problem-solving might have on risk-taking. Family problem solving, in this sample, was not the mechanism by which attachment affects risk-taking behavior, yet the mechanism may include other family-level processes, such as through family affective responsiveness. Further exploration of family-level processes may provide a clearer understanding of the mechanism by which attachment affects risk-taking.

Family problem-solving may still be important for a number of reasons, including facilitating effective interactions between parent and child. Family problem-solving has also been found to be associated with the development of mastery (i.e., the sense of having control over the forces that affects one's life) during adolescence (Conger,

Williams, Little, Masyn, & Shebloski, 2009). In relation to PETPB, parents may influence their children's risk-taking behavior by fostering constructive family problem-solving skills that promote mastery in the form of greater perceived control. When youth perceive greater control due to higher problem-solving skills, they may be more likely to appropriately respond to pressures to engage in risk-taking behavior. Still in accordance with PETPB, it may be that family problem-solving does not mediate the relationship between attachment and risk-taking but that it mediates the relationship between adolescents' perceived control beliefs and their intentions to engage in risk-taking behavior.

It may also be that family problem-solving ability effects the strength of (i.e., moderates) the relationship between attachment and adolescent risk-taking behavior rather than explains the relationship between attachment and risk-taking. It is important to explore alternative ways family problem-solving influences parent and adolescent perceptions of adolescent risk-taking behaviors. It may prove useful to examine family problem-solving as a moderator of the relationship between attachment and risk-taking behavior. It may be that when families have greater problem-solving abilities, the strength of the relationship between attachment and risk-taking behavior is greater than when families have less problem-solving abilities.

Limitations

Several limitations of the current study deserve note. First, because data were gathered, from one public, Western University, the findings have limited generalizability beyond the present sample. Future research involving adolescents and caregivers with more racial/ethnic diversity is needed before making claims of generalizability. While the

present sample represented a somewhat diverse population, one-third (33.3%) identified with ethnic groups other than Caucasian, the sample overall was considerably smaller in size than previous studies examining distal PETPB factors of adolescent risk-taking (Harakeh et al., 2004; Lac et al., 2008). By examining the relationships between attachment, family problem-solving, and risk-taking behavior using larger, more diverse samples, differences in the level of mediation family problem-solving had on the effect of attachment on risk-taking behavior may potentially be identified. Second, while including both parent and youth reports of adolescent risk-taking behavior allowed us to more thoroughly examine the varying role of family problem-solving on influencing the relationship between attachment and risk-taking, the reliance on self-report of parents and adolescents subjects our results to recall bias and requires that caution be taken when interpreting the results. It may be that youth were reluctant to reveal the actual extent of their risk-taking behavior for fear that their parents would find out or that they would get into trouble, and that caregivers underreported reported their child's risk-taking involvement due to inaccuracy of memory, or general lack of knowledge. Third, although conducting secondary data analyses provided ease of data availability, limitations surrounding the use of secondary data were present. Study variables were limited to variables currently included in the data set. Due to the limit in available variables, varying concepts were used to measure risk-taking behavior for parent and youth reports. For instance, parent report of risk-taking examined more general and violence related behavioral problems (e.g., stealing, fighting) while youth report of risk-taking included a wider range of risk-taking behaviors (i.e., substance use, general delinquency, violence). Furthermore, youth report of risk-taking was recoded so as to measure the extent of

engagement in any risk-taking, rather than examining the depth of risk-taking youth engaged in. It may be that family problem-solving has an influence on some types of risk-taking behavior more than others. For instance, family problem-solving may be more effective in protecting against more general types of delinquent behavior and less against substance use related risk-taking. Additionally, because adolescent substance use has been linked to a number of factors (e.g., coping, peer pressure) it may be that these other factors have more of an effect on influencing substance use related risk-taking than family problem-solving at this developmental stage. Further research should be conducted in order to gain a more extensive understanding of these relationships so as to parse out specific aspects of adolescent risk-taking that might be effected by family problem-solving. Another major limitation related to the use of secondary data was that no measures of youths' behavioral, normative, and control beliefs or behavioral intentions were available. Without the ability to measure these constructs we cannot know with certainty that attachment influenced youths' beliefs and subsequent intentions and engagement risk-taking behavior. Lastly, because attachment was based on the youths' reports only, results may not reflect a complete representation of the attachment relationship.

Implications and Future Directions

In the present study, a relationship was found between parent-child attachment and adolescent risk-taking behavior. This relationship found between attachment and risk-taking provides empirical support for the recommendation that prevention efforts for adolescent risk-taking behavior should include family-level approaches. Specifically, in prevention campaigns, parents should be informed of the benefits of having a secure,

close, relationship with their child. Promoting warm, supportive bonds between parents and youth may aid families in preventing youth engagement in wide range of risk-taking behavior by contributing to adolescents' development of perceived confidence in their ability to resist social pressures to engage in risk-taking behavior. In addition to attachment, future studies should examine other family-level factors that might influence adolescent risk-taking via direct and indirect pathways. While family problem-solving did not significantly mediate the relationship between attachment and risk-taking, other family-level behaviors may prove useful for helping families prevent risk-taking during adolescence. It may be that other constructs related to attachment such as parent-child communication, parental monitoring, and family affective responsiveness are mechanisms by which attachment affects risk-taking.

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Table 1

Descriptive Statistics of Family Problem-Solving, Attachment and Risk-Taking Measures

Variable	Min	Max	*M*	*Mdn*	*SD*	*Skewness*	*Kurtosis*
Family problem-solving	1.2	4.0	2.93	2.9	.43	-.305	.778
Attachment	1.2	3.0	2.37	2.43	.41	-.64	-.136
Risk-taking(Youth)	0.0	3.0	.650	0.0	.92	1.23	.384
Risk-taking(Parent)	1.0	3.0	1.63	1.6	.49	.519	-.564

Table 2

Correlations Among Key Study Variables

Variables	1	2	3	4	5
1. Family problem-solving	-	.547**	-.203**	-.163**	-.077
2. Attachment	-	-	-.298**	-.144*	-.174**
3. Risk-taking(Youth)	-	-	-	.301**	.095
4. Risk-taking(Parent)	-	-	-	-	-.103
5. Youth age	-	-	-	-	-

*$p \leq .05$, **$p \leq .01$.

Table 3

Family Problem-Solving, Attachment, Risk-taking, and Age Means for Adolescent Males and Females

	Gender			
Variable	Females	Males	*t*	*df*
Family problem-solving	2.83 (.452)	2.99 (.411)	-3.13**	268
Attachment	2.24 (.45)	2.46 (.370)	-4.20**	199.4
Risk-taking (Youth)	.647 (.884)	.652 (.951)	-.046	255
Risk-taking (Parent)	1.56 (.427)	1.68 (.522)	-2.08*	253.11
Youth age	14.06 (1.77)	14.11 (1.75)	-.24	266

Note. Standard deviations appear in parenthesis below means.
*=$p \leq .05$, **=$p \leq .01$.

Table 4

Family Problem-Solving, Attachment, Risk-taking, and Age Means for White and Minority Adolescents

	Race/ethnicity			
Variable	White	Minority	*t*	*df*
Family problem-solving	2.91 (.434)	2.94 (.433)	-.693	266
Attachment	2.31 (.427)	2.41 (.393)	-1.95	253
Risk-taking (Youth)	.664 (.877)	.633 (.978)	.267	255
Risk-taking (Parent)	1.63 (.473)	1.64 (.511)	-.115	266
Youth age	14.27 (1.77)	13.88 (1.72)	-1.82	266

Note. Standard deviations appear in parenthesis below means.
*=$p \leq .05$, **=$p \leq .01$.

Table 5

Simultaneous Ordinary Least Squares Path Analysis Summary for Family Problem-Solving and Attachment Predicting Parent-reported Risk-taking (*N* = 270)

Variable	*B*	*SE B*	*t*	*p*	95% CI
Family problem-solving	-.135	.081	-1.67	.097	-.294, .024
Attachment	-.222	.089	-2.50	<.05	-.396, -.047

Table 6

Simultaneous Ordinary Least Squares Path Analysis Summary for Family Problem-Solving and Attachment Predicting Youth-reported Risk-taking (*N* = 270)

Variable	*B*	*SE B*	*t*	*p*	95% CI
Family problem-solving	-.096	.154	-.621	.535	-.40, .208
Attachment	-.690	.171	-4.04	<.001	-1.03, -.353

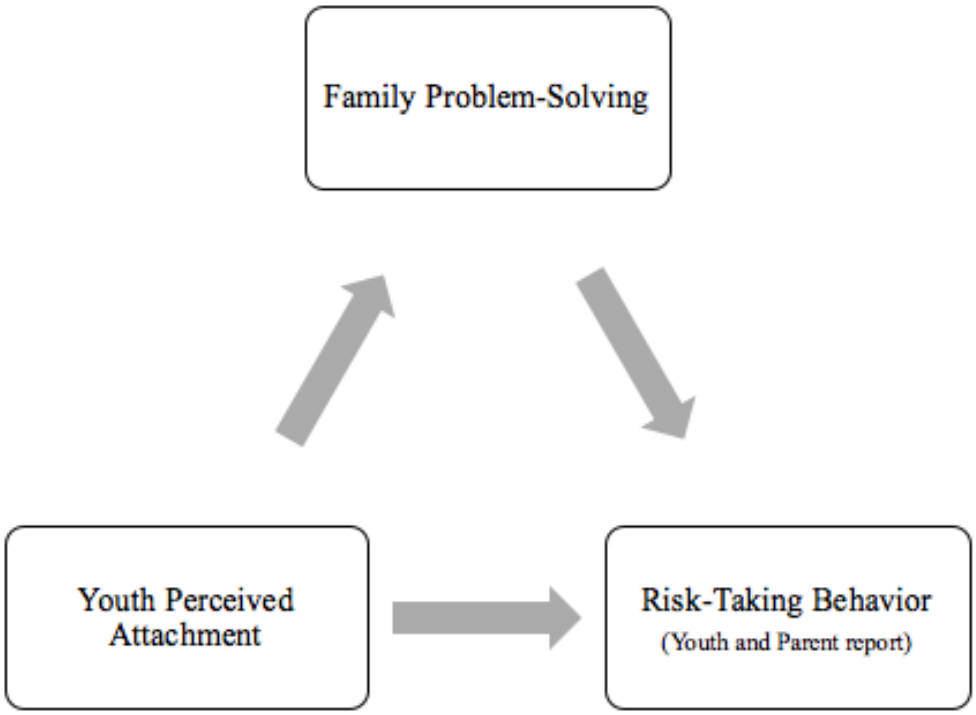

Figure 1. Conceptual model for the effects of attachment and family problem-solving ability on adolescent risk-taking behavior. Two constructs make up family problem-solving; parent reported conduct problems, and youth reported delinquency.

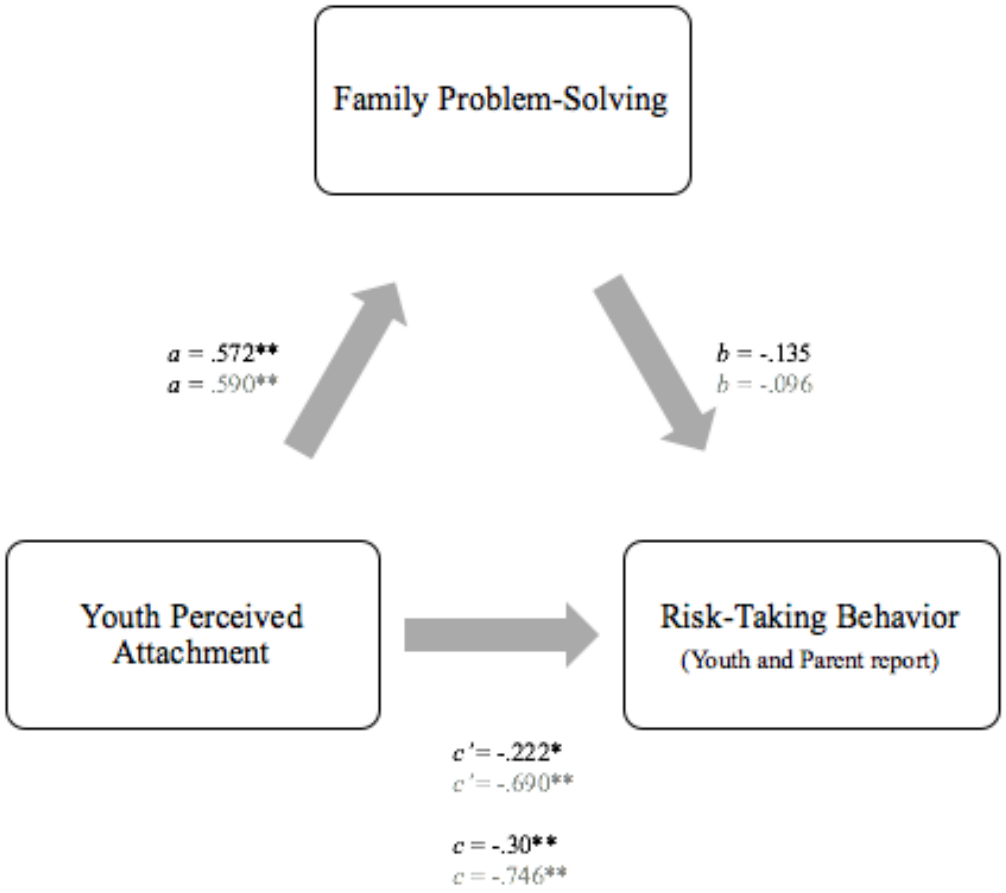

Figure 2. Mediation model for the effects of attachment and family problem-solving ability on adolescent risk-taking behavior. Coefficients for youth model in grey; coefficients for parent model in black.
** p <.05, **p <.001.*