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A Dyadic Approach to Understanding the Relationship of Maternal Knowledge of Youths' Activities to Youths' Problem Behavior Among Rural Adolescents

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Abstract

Most studies that explore parental knowledge of youths' activities utilize parents' and youths' reports separately. Using a sample of 938 rural early adolescents (53% female; 84% White), we explore congruence between mothers' and youths' perceptions of maternal knowledge and its association with youth problem behaviors (delinquency, substance use, and attitudes towards substances). Maternal overestimation of knowledge (compared to youths' ratings) was positively associated with delinquency and negatively associated with healthy drug attitudes. Significant differences in problem behaviors were found between four groups created based on mothers' and youths' level of knowledge (High Youth and Mother, High Youth/Low Mother, Low Youth/High Mother, and Low Youth and Mother). The High Youth and Mother group demonstrated less substance use and healthier drug attitudes than the Low Youth and Mother group. The Low Youth/High Mother group had significantly higher levels of substance use and delinquency than the High Youth and Mother group. Intervention implications are discussed.

Keywords

Parenting; Problem/Risky/Antisocial Behavior; Parenting Processes/Practices; Dyadic Relationships

Low levels of monitoring, defined as active parental tracking of youths' activities and active efforts from parents to solicit information from youth, have been associated with high levels of adolescents' problem behaviors, such as substance use, delinquency, and risky sexual behavior (for a review, see Crouter & Head, 2002). Yet, the field of parental monitoring has been criticized for inconsistent definitions of monitoring. Many studies actually measure parental knowledge of youths' activities, which is presumed to be the outcome of, and hence indicator of, parents' active efforts. More recent studies of monitoring suggest that it is an interactive parent-youth process: Parents gain knowledge due to their own behaviors (e.g., attempts to solicit information from youth and supervise and control youths' activities) and as a result of youths' decisions on whether or not to disclose information (Kerr, Stattin, & Burk, 2010; Soenens, Vansteenkiste, Luyckx, & Goossens, 2006; Stoolmiller, 1994). Parental monitoring may reflect a transactional process between parents and youth that has not been adequately captured by current measures and methods.

Because monitoring is an interactive process, mothers and youth may have different perceptions of parental knowledge, especially when youth do not disclose information (Smetana, Metzger, Gettman, & Campione-Barr, 2006). Parental decisions on how to provide structure and supervision may depend, in part, on whether or not they believe that they have accurate information. Further, youths' decisions on whether to engage in risky behavior may depend on the extent to which they perceive their parents may know about it. Yet, little work has explored the relationship *between* parents' and youths' perspectives on parental knowledge and youths' outcomes. This study provides a unique contribution by taking a *dyadic* approach, using reports of knowledge from mothers *and* youth to understand how congruence between parents' and youths' reports of parental knowledge are associated with adolescent problem behavior. We focus on two aspects of problem behavior: early adolescent delinquency and substance use. Because our study focuses on early adolescents, we also include measures of attitudes towards substances. Further, our study focuses on rural youth, a group that is at high risk of problem behavior (Donnermeyer, 1992; Johnston, O'Malley, Bachman, & Schulenberg, 2005) but that has been relatively understudied.

Defining parental monitoring

Measurement issues in parental monitoring are significant, as they may mask underlying processes, making it difficult to disentangle the contributions of parents' and youths' behaviors to parental knowledge. In their seminal paper, Stattin and Kerr (2000) parsed out the distinct roles of parental solicitation, control, and youth disclosure on youths' outcomes. They found that youths' decisions on which information to share with their parents was a stronger predictor of parental knowledge, youth norm-breaking, and police contact than either parental control or solicitation, even when controlling for parent-youth relationship quality (Stattin & Kerr, 2000). Youths' decisions to share information with their parents may be an important component of parental monitoring and a central mechanism by which parents gain knowledge.

In response to Stattin and Kerr's work, recent studies on monitoring have begun to incorporate measures of multiple aspects of the monitoring process. Some longitudinal studies have replicated Stattin and Kerr's original findings, highlighting the key role that youth's disclosure may play in the monitoring process, especially in the prevention of delinquency (Keijsers, Branje, Van derValk, & Meeus, 2010; Stattin, Kerr, & Burk, 2010). Other cross-sectional studies have reported that parental knowledge and disclosure serves as a mediator in the relationship between parents' and youths' monitoring behaviors and youth behavior. Thus, parents' efforts to monitor youth through behavioral control or solicitation may also be important in preventing youth delinquency and substance use, especially if these strategies lead to more knowledge or disclosure (e.g., Fletcher, Steinberg, & Williams-Weaver, 2004; Soenens et al., 2006; Vieno, Nation, Pastore, & Santinello, 2009). Children's disclosure and parents' active efforts to solicit information from youth and to set rules about youth's behavior may be linked to problem behavior, especially delinquency.

Dyadic Perceptions

Despite the interactive process underlying how parents gain knowledge, most research has focused on either parents' or youths' reports of parental knowledge. Few studies explore the distinct perspectives of parents *and* youth. Most studies use only youths' reports of parental monitoring to predict youths' outcomes, which may create a single-reporter bias, as both the predictor and the outcome are reported on by the same reporter (e.g., Fletcher, Darling, & Steinberg, 1995; Barnes, Hoffman, Welte, Farrell, & Dintcheff, 2006; Li, Stanton, & Feigelman, 2000). A few recent studies predicted youths' behaviors using parents' and youths' reports separately (Cottrell, Li, Harris, D'Alessandri, Atkins, Richardson, &

Stanton, 2003; Stattin & Kerr, 2000). In these studies, associations between youths' and parents' reports were often modest (Cottrell et al., 2003). Despite the low association, some studies found similar outcomes and patterns using parents' and youths' reports separately (e.g., Soenens, et al., 2006; Stattin & Kerr, 2000). One study suggested that youths' reports of parental monitoring were stronger predictors of youths' risky behavior than were parents' reports (Cottrell et al., 2003). Yet, using mothers' and youths' reports separately has methodological limitations and may not capture the transactional process underlying parental monitoring or account for differences in parent and youth's perceptions of knowledge.

Using both parents and youths' perspectives on parental knowledge may be informative given that parents' and youths' perceptions of parental knowledge may be markedly different particularly when youths' disclosure is minimal (Cottrell et al., 2003; Crouter & Head, 2002). It is likely that some mother-youth dyads are quite congruent in their perceptions of parental knowledge with both mothers and youth reporting either high or low rates of knowledge and communication regarding youths' activities. Based on prior research (Crouter & Head, 2002), youth in congruent dyads reporting low levels of knowledge are likely to have higher levels of substance use and delinquency than youth in congruent dyads reporting high levels of knowledge. In dyads where both mothers and youth perceive low monitoring, mothers may recognize that their attempts at monitoring are not likely to be successful and may disengage (e.g., fail to notice, respond to, and acknowledge youths' behaviors) (Patterson, DeBaryshe, & Ramsey, 1989; Dishion, Nelson, & Bullock, 2004). In addition, youth may be more likely to engage in risky behavior when they perceive that their parents will not find out about it. Thus, congruent perceptions of low levels of monitoring may be linked to higher levels of delinquency and substance use.

However, some mother-youth dyads may be incongruent in their perceptions of parental knowledge. A few studies suggest that parents may overestimate levels of their own knowledge and adolescents' disclosure (Cottrell et al., 2003; Smetana et al., 2006) and underestimate adolescents' risky behavior (Stanton et al., 2000). Such estimation biases are important, as parents' efforts to provide intensified guidance and structure for children at risk likely depend on parents' estimation of their children's problem behavior *and* the estimation of the validity of their knowledge. Incongruence between parents' and youths' reports of parental knowledge, particularly parental overestimation of their knowledge of youths' activities, may be a distinct risk factor for the development and persistence of substance use and delinquency (Feinberg, Howe, Reiss, & Hetherington, 2000). Parents who overestimate their levels of knowledge may inaccurately assume that youth are disclosing information and may provide less structure and supervision than is needed to ensure healthy development. In contrast, parents who underestimate their knowledge may believe that youth are not disclosing information, and therefore, they may be motivated to provide high amounts of structure in order to increase their awareness of youths' activities. Incongruence in perceptions of parental knowledge, where mothers report higher levels of knowledge of youth activities than youth, may be associated with higher rates of substance use and delinquency.

Although a few studies have used agreement in parental/child reports of daily activities to measure parental knowledge (Crouter, Helms-Erikson, Updegraff & McHale, 1999; Patterson & Stouthamer-Loeber, 1984), only one study to our knowledge has explored the role of different perceptions of monitoring. DeLos Reyes, Goodman, Kliewer, and Reid-Quinones (in press) found that, among youth in high violence communities, consistent discrepancies in parental monitoring may be associated with delinquency. Despite the fact that we know parental monitoring is a transactional process and parents and youth may have different perceptions of monitoring, we know little about how congruence in perceptions of

knowledge may relate to children's behavior. More studies on parental monitoring and knowledge that take a dyadic approach, integrating parents' and youths' perspectives, are needed.

Rural adolescents

There are few studies that explore the protective effect of monitoring among rural adolescents. Yet, much of the U.S. population resides in rural communities; 43% of youth live in towns with less than 25,000 people (Beeson & Strange, 2003). Rural communities have higher than average levels of poverty (Snyder and McLaughlin, 2004) and adolescents in rural communities are at elevated risk of some problem behaviors. Researchers have found that substance use is as high (Donnermeyer, 1992) or higher among youth living in rural areas than youth in urban areas (Johnston et al., 2005). In fact, at least one study found that rural youth started to use substances at an earlier age than those residing in cities (McIntosh et al., 1979). Contrary to popular conceptions, Ennett, Flewelling, Lindrooth, & Norton (1997) found higher school-level rates of alcohol and cigarette use in communities that are less crowded had more stable residents and higher attachments. Studies on delinquency have been mixed, with some authors suggesting that youth in rural areas have similar rates of delinquency as those in urban settings (Simons, Johnson, Beaman, Conger, & Whitbeck, 1996) and others suggesting that youth in urban settings may have higher rates of delinquency (Farrell, Sullivan, Esposito, Meyer, & Valois, 2005). Yet, most studies on parental monitoring have been conducted on American youth living in urban areas (e.g., Laird & Marrero, 2009; Li, Stanton, & Feigelman, 2000; Rai et al., 2003), mid size towns or suburbs (e.g., Barnes, Riefman, Farrell, & Dintcheff, 2000; Patterson & Stouthamer-Loeber, 1984; Waizenhofer, Buchanan, & Jackson-Newsom, 2004) or youth in non-U.S. settings (Kerr, Stattin, & Burk, 2010; Keijsers Frijns, Branje, & Meeus, 2009; Kiesner, Dishion, Poulin, & Pastore, 2009; Soenens et al., 2006). Despite the increased risk associated with rural areas, we know little about the monitoring process among rural adolescents.

This study

Here we conceptualize and measure parental knowledge as a dyadic process as we explore the relationship between mothers' and youths' perspectives on maternal knowledge and youth problem behavior among a sample of rural early adolescents. We address the question of whether dyads in which mothers and youth are congruent (match) or incongruent (mismatch) on reports of maternal knowledge differ on delinquency, substance use, and substance use expectancies. Our study uses data from mothers as they are often the main source of parental knowledge (Waizenhofer, Buchanan, & Jackson-Newsom, 2004). Integrating additional measures of paternal perceptions of knowledge would change the conceptual meaning of our sample to reflect only two parent families. By taking a dyadic approach, we investigate the relationship of congruence in mother-youth perceptions of parental knowledge to early adolescent delinquency and substance use.

Research suggests that problem behaviors, such as delinquency, substance use, and risky sexual behavior often co-occur and share similar risk and protective factors, leading some researchers to suggest the presence of a problem-behavior syndrome (Donovan, Jessor, & Costa, 1988; Jessor 1993). In particular, substance use and delinquency are highly related; individuals who engage in delinquent acts may also have a history of substance use (Huizinga & Jakob-Chien, 1998). Although substance use and delinquency often co-occur, there may be a subset of individuals who engage in only one of these behaviors. Furthermore, specific protective factors may have a stronger relationship with one aspect of problem behavior than another (for a review see Chassin et al., 2003). For example, Fletcher, Steinberg, and Williams-Weaver (2004) found that parental knowledge was an

important mediator between parental monitoring and substance use but not delinquency. Because of this, we explore the associations of congruence with knowledge and substance use and delinquency separately. Although substance use and delinquency likely co-occur, we analyze these problem behaviors individually in order to detect any differences in their relationship to congruent perceptions of knowledge.

We focus our study on 6th graders, during the transition to adolescence, before many youth engage in substance use and delinquency. Understanding the relationship between congruence in mothers and youths' perceptions of knowledge and youths' outcomes during the adolescent transition is essential for two reasons. First, differences in parents and youths' perceptions of knowledge may grow larger or smaller in magnitude over the adolescent period. Understanding the role of congruence in sixth grade provides a baseline for future planned longitudinal work that will enhance our understanding of how maternal knowledge of youth activities and congruence in knowledge may change over adolescence. Thus, in order to understand the development of congruence in mothers' and youths' perceptions of knowledge, we must first understand the role of congruence at the entry into adolescence.

Second, focusing our study on sixth graders provides information on early-starters of substance use and delinquency, a particular-at risk group. The timing of problem behavior is a strong predictor of the duration and severity of later problems. Youth who engage in problem behavior early have been consistently identified as being at elevated risk for later, long-term problems such as severe antisocial behavior (Patterson et al., 1989), adult criminal behavior (Moffit, 1993) and substance use addiction (Grant & Dawson, 1997) than those who initiate problem behavior later in adolescence. Early substance use may be particularly deleterious; Grant and Dawson (1997) found that the odds of adult alcohol dependence decreased by 14% and alcohol abuse by 8% each year the onset of drinking was delayed. Youth at the greatest risk for developing lifetime alcohol disorders are those who begin using substances between the ages of 11 and 14 (Dewit, Adlaf, Offord, & Ogborne, 2000). By focusing on sixth graders, this study enables us to explore the role of incongruence in mothers' and youths' perception of maternal knowledge among an at-risk group, as youth who engage in problem behaviors early are most likely to encounter long term negative consequences.

Because a minority of youth engaged in substance use before the sixth grade, we also examined the link between congruent perceptions of knowledge and substance use expectancies, a strong predictor of future substance use. Substance use expectancies, the attitudes and beliefs youth hold about substances, have been consistently linked to increased risk of future substance use and are believed to be an early indicator of risk for substance initiation. Youth who perceive drinking to have more social benefits and to be common among peers are more likely to begin to use substances than those who believe substance use has few social benefits (Callas, Flynn & Worden, 2004; Patel & Fromme, 2009). Congruence in mother-youth perceptions of parental knowledge may help delay or prevent substance use initiation by influencing the beliefs and attitudes that youth hold about substances (Hawkins, Catalano, & Miller, 1992). Including substance use expectancies enables us to explore the protective role of congruent perceptions of knowledge among youth who have not yet engaged in substance use.

Plan of analysis

We utilize two analytic strategies to understand the relation of parents' and youths' reports to three problem behaviors: substance use, delinquency, and substance use expectancies. First, we utilize a difference score approach. Using regression analysis, we explore how differences between mothers' and youths' reports on maternal knowledge predict youths' risky behavior. This approach is helpful for exploring how differences in mothers' and

youths' perceptions of maternal knowledge relate to youths' problem behavior, on average. Second, we assess if there are differences in mean levels of youths' risky behavior between four dyadic knowledge subgroups, which are formed by categorizing mothers' and youths' perceptions of monitoring as high or low. Because levels of parental knowledge generally decrease across adolescence (Keijsers et al., 2009), and research has yet to identify how much monitoring is protective at what ages, considering maternal knowledge at 6th grade *relative* to other mothers or youth may be important. Therefore, we categorize individuals into our dyadic knowledge groups based on median splits: those above the median are categorized as high, and those below the median are categorized as low.

We created four dyadic knowledge groups. In the High Youth/High Mother group, youth and mothers both reported high levels of maternal knowledge. In the High Youth/Low Mother group, youth reported high levels of maternal knowledge but mothers reported low levels of maternal knowledge. In the Low Youth/High Mother group, youth reported low levels of maternal knowledge but mothers reported high levels of maternal knowledge. In the Low Youth/Low Mother group, youth and mothers both reported low levels of maternal knowledge. Our dyadic knowledge subgroup analysis allows us to consider mean differences in youth outcomes in specific groups where mothers and youth are congruent or incongruent in their perceived levels of knowledge.

Three control variables were added to our analysis: gender, dual biological parent status and maternal education. These variables were chosen due to their association with substance use and delinquency. Being female has been consistently associated with lower risk of early youth substance use and delinquency. Family characteristics also have been tied to problem behavior; living with two biological parents and having highly educated parents may reduce the risk of youth substance use and delinquency (Griffin, Botvin, Scheier, Diaz, & Miller, 2000; Hawkins, Catalano, & Miller, 1992).

Hypotheses

We hypothesize that the degree of congruence in mothers' and youths' perceptions of maternal knowledge of youth activities will be associated with substance use, delinquency, and substance use expectancies. Prior studies that have separately used mothers' and youths' reports have found high levels of monitoring to be linked to low levels of problem behavior, such as substance use and delinquency, and low levels of monitoring to be linked to increased risk of problem behavior. Therefore, in our dyadic knowledge group-based analysis, we expect our congruent dyads to follow this trend. That is, youth in dyads who are congruent in perceptions of high knowledge (High Youth/High Mother) will have lower levels of delinquency, substance use, and higher levels of protective substance use expectancies (e.g., will perceive few benefits from using substances). In contrast, youth in dyads that are congruent in their perceptions of low knowledge (Low Youth/Low Mother) will have higher levels of delinquency, substance use and less healthy substance use expectancies. Congruent low dyads may reflect coercive patterns, where mothers, feeling their monitoring behaviors are not likely to be successful, have disengaged from parenting (Patterson et al., 1989).

We also expect that maternal overestimation of parental knowledge will be a risk factor for these risk outcomes among rural adolescents. Youth who are reporting low levels of knowledge are likely not disclosing information on their activities to their mothers. Therefore, mothers who perceive higher levels of knowledge than youth may have inaccurate perceptions, and as a result may provide less structure and supervision than may be needed. Thus, in our difference score regression analysis, we expect that greater divergence between mothers' and youths' reports, with mothers reporting higher levels of knowledge than youth will be associated with increases in youth delinquency and substance

use and decreases in healthy substance use expectancies. We also predict that youth in dyads in which mothers report lower levels of maternal knowledge than youth (Low Youth/High Mother) will have higher levels of substance use and delinquency and will perceive more benefits from using substances.

We do not expect maternal underestimation of knowledge to be associated with problem behavior. Thus, we expect dyads in which mothers report low levels of knowledge but youth report high levels of knowledge to have low rates of substance use and delinquency and healthy attitudes towards substances. In these dyads, youth are less likely to engage in problem behavior because they perceive their parents have high knowledge and are likely to find out about it.

In summary, we anticipate several groups will significant mean differences in levels of problem behavior. We expect congruent low dyads (Low Youth/ Low Mother) will have significantly higher levels of youth problem behaviors (substance use, delinquency, and less healthy attitudes towards substances) than congruent high dyads (High Youth/High Mother). We also expect that the Low Youth/High Mother will have higher levels of problem behaviors than the High Youth/High Mother. Lastly, we expect that both of the Low Youth groups will show more problem behaviors than The High Youth/Low Mother group. We expect our dyadic knowledge groups will differ from one another in levels of substance use, delinquency, and attitudes towards substances.

Method

Participants

Participants in our study were a randomly-selected subset of 938 6th graders participating in the PROSPER project (Promoting School-Community-University Partnerships to Enhance Resilience) who received in-depth in-home assessments. PROSPER is a large scale effectiveness trial of preventive interventions aimed at reducing substance use initiation among rural adolescents (Spoth, Greenberg, Bierman, & Redmond, 2004). Participants in PROSPER resided in 28 rural communities and small towns in Iowa and Pennsylvania. Initial eligibility requirements for communities considered for the studies were school district enrollment from 1,300 to 5,200, and at least 15% of the student population eligible for free or reduced-cost lunches. Communities in which over half of the residents were either employed by or attending a college or university were excluded from the study, as were communities involved in other university-affiliated prevention research projects with youth. Communities were matched on school district size and geographic location; they were randomly assigned to the partnership intervention or to the “normal programming” control condition. Based on 2000 Census reports, the population of communities ranged from 6,975 to 44,510 (For more information see Greenberg, Feinberg, & Meyer-Chilenski, 2005; Spoth, Guyll, Lillehoj, Redmond, & Greenberg, 2007).

The PROSPER project involved youth from two successive cohorts of sixth graders from the 28 project communities. Students in each of these cohorts completed in-school questionnaires. On average, 88% of all eligible students completed in-school assessments at each data collection point. In addition, families of students in the second cohort were randomly selected and recruited for participation in in-home assessments with their sixth grade child. This study utilizes data from this in-home subsample. A total of 2,267 families from the in-school assessment sample were recruited for in-home family assessments; of those recruited for the in-home sample 979 (43%) completed the in-home assessments. Targeted sample sizes for the in-home sample ranged from 30 families in the smallest community school district to 74 families in the largest district; actual sample sizes ranged from 18 to 68 families across the 28 project communities. Family recruitment included mail

and telephone contacts followed by an in-person recruitment visit. The in-home assessments included a family composition interview, written questionnaires completed independently by the youth, mother and if present, father, as well as videotaped family interaction tasks. In addition to the in-home data, we also utilized the in-home sample students' self-report of substance use initiation, delinquency, and substance use expectancies that was drawn from the in-school data collection within months of the home visit.

The current study utilizes data youth and their mothers in the in-home subsample at Wave 1 (the intervention trial pre-test), when the youth were in the fall of their 6th grade year. Of the original 979 cases in-home sample, 41 (4%) had missing data on either parents' or youths' reports of maternal knowledge. Therefore, our final sample for this analysis included 938 dyads. The demographics of our sample are as follows. The mean age of our sample is as follows: youth ($M = 11.3$ years, $SD = .49$); mothers ($M = 38.7$, $SD = 6.05$); and fathers ($M = 41.2$, $SD = 7.14$). Sixty-one percent of youth resided in Iowa and 39% lived in Pennsylvania. The average household income was \$50, 838 (in 2003) ($SD = 35,329$) and 62% of youth had parents with some post-secondary education. The average number of children in the home was three ($SD = 1.56$). Most of the youth in our sample were living in two-parent homes; 80% were living with a parent who was married and 54% were living with both biological parents. The vast majority of youth were White (84%); 6% were Hispanic, 3% African American, 2% were Native American/American Indian, 1% Asian and 4% identified as Other. Forty-seven percent of the youth in our sample were male and 53% were female.

To test for selection bias, youth in the in-home sample were compared to youth in the total sample population assessed at school (e.g., youth in the in-school sample who did and didn't participate in the in-home assessments; $N = 4,400$) on a series of demographic and behavioral outcomes. Youth in the in-home sample were not different from the general population at Wave 1 on receipt of free or reduced lunch (33.6% vs. 33.0% respectively), living with two biological parents (59.3% vs. 62.5%), race (88.6% White vs. 86.5% White), or gender (49.5% vs. 46.8% male). In addition, no differences were found between groups in substance use initiation. However, youth who received in-home assessments were less likely to engage in delinquent behavior than youth in the general population of cases ($M = .58$, $SE = .06$ vs. $M = .82$, $SE = .04$): $F(1, 27) = 18.32$, $p < .01$. Youth in the in-home sample also perceived fewer benefits from using substances ($M = 4.77$, $SE = .01$ vs. 4.71 , $SE = .02$): $F(1, 27) = 18.32$, $p < .01$). These differences suggest that the low response rate of the in-home sample may have influenced our ability to obtain a truly random sample. Although similar in most dimensions to the general population of cases, the in-home subsample may be at slightly lower risk for problem behavior.

Measures

Measures were drawn from both the PROSPER in-home and in-school data. Maternal knowledge measures were gathered from the in-home data. Because previous research suggests that youth are more likely to report substance use initiation and delinquency if asked in school, rather than home settings, we use PROSPER in-school data for our measures of youth substance use initiation and delinquency (Redmond, Schainker, Shin, & Spoth, 2007). Inter-correlations between our measures can be found in Table 1.

Maternal knowledge of youths' activities—Mothers' and youths' perceptions of maternal knowledge both were measured using comparable five-item Likert-type items [1= always, 2 = almost always, 3 = about half the time, 4= almost never, 5= never]. Mothers were asked to rate in the course of a day, how often they know (1) where their child is, (2) who their child is with when he or she is away from home, (3) how often they know when this child does something really well at school or someplace else away from home, (4) how

often they know when the child gets in trouble at school or someplace else away from home, and (5) how often they know when their child does not do things they have asked him or her to do. Youth were asked about their mothers' knowledge using the same items written from the youth perspective (e.g., "In the course of a day, how often does your mom know where you are?"). All items were coded or recoded, such that higher scores indicate higher levels of perceived maternal knowledge. The Cronbach alpha for the scale was .66 for mothers' reports and .68 for youths' reports about their mothers. The mean of the scale is 4.35 ($SD = .42$) for mothers' reports and 4.57 ($SD = .54$) for youths' reports. Each individual item in the scale was standardized. Then, the items were averaged for use in our analysis. Items were adapted from the Iowa Youth and Families Project (Conger, 1989; McMahon & Metzler, 1998; Spoth, Redmond, & Shin, 1998).

Substance use initiation—A four item index was used to measure substance use initiation. The scale summed dichotomous items that asked youth if they have ever had a drink of alcohol, ever drunk more than a few sips of alcohol, ever smoked a cigarette, or ever smoked marijuana or hashish [0 = no; 1 = yes]. Individual scores ranged from 0 to 4; 27% of youth had initiated substances at the time of the survey. The mean of the index was .37 ($SD = .68$).

Substance use expectancies—Substance use expectancies were measured using an eleven item scale about how youth perceive substance use affects their reputation with peers. Examples of the Likert scale items [1= strongly agree to 5= strongly disagree] include: "Kids who smoke have more friends", "Drinking alcohol lets you have more fun", and "Smoking marijuana makes you look cool". All items were coded so that higher scores indicate healthier attitudes and more protective substance use expectancies (e.g., youth perceive *fewer* benefits of using substances). The mean of the scale is 4.77 ($SD = .43$) and the alpha was .92.

Delinquency—Delinquency was measured with a twelve-item scale, adapted from prior research (e.g., Elliott, Huizinga, & Ageton, 1985; Elliott, Huizinga, & Menard, 1989). Examples of items include: "In the past twelve months, how often have you taken something worth less than \$25 that didn't belong to you", "... purposely damaged or destroyed property that did not belong to you", or "...carried a hidden weapon". Item scores were dichotomized to indicate whether or not the youth had engaged in deviant behavior in the past twelve months [0 = no, 1 = yes] and summed for our analysis. Individual scores ranged from 0 to 9; 30% of youth had engaged in at least one deviant activity. The mean was .59 ($SD = 1.2$) and the alpha was .69.

Control Variables

Three control variables were added to our analysis: gender [0 = female; 1 = male], dual biological parent status [0 = not living with biological parents; 1 = living with both biological parents], and maternal education [on a 1–6 scale, where 1 indicates less than high school and 6 indicates attainment of a Ph.D., M.D, J.D].

Result

Difference Scores

First, to examine the role of differences between mothers' and youths' reports of maternal knowledge, we calculated difference scores. We first standardized youths' reports of knowledge and separately, mothers' reports of knowledge. The difference score was calculated by subtracting the standardized youth report from the standardized mother report. Therefore, higher scores on the difference score will indicate greater maternal

overestimation of knowledge. We standardized the difference scores to remove any influence of systematic differences in variances between reporters (mothers and youth). Thus, standardizing scales places both mother and youth report on the same metric, with the same mean. Recent studies on informant discrepancies recommend standardizing variables before calculating differences between reporters (see De Los Reyes & Kazdin, 2005; Guion, Mrung, & Windle, 2009). The mean of the difference scores was $-.01$ ($SD = 1.29$) with a range of -5.42 to 6.34 .

Next, ordinary least squares (OLS) regression was used to predict substance use initiation, substance expectancies, and delinquency. The maternal knowledge difference score and four covariates (parental education, gender, dual biological parent status, and average level of knowledge) were included as independent variables. Only covariates that were significantly correlated with the outcome were included in each model. Parental education was significantly correlated with delinquency ($r = -.10, p < .01$) and substance use expectancies ($r = .09, p < .01$) but not substance use initiation ($r = -.02, p = .47$). Dual biological parent status was significantly correlated with all three outcomes [delinquency ($r = -.10, p < .01$), substance use initiation ($r = .16, p < .001$), substance use expectancies ($r = .19, p < .001$)]. Gender was significantly correlated with delinquency ($r = -.14, p < .001$) but not substance use initiation ($r = -.41, p = .41$) or substance use expectancies ($r = .01, p = .78$).

Researchers studying informant discrepancies recommend including level as a covariate because dyads with very high or low levels of a variable (e.g., maternal knowledge) may be more likely to have large difference scores (De Los Reyes & Kazdin, 2005). The level of knowledge was calculated as the mean of the standardized youths' and mothers' reports of maternal knowledge.

The F and R-squared values for the overall model are as follows for each outcome: substance use expectancies: $F(5, 799) = 15.49, p < .001, R^2 = .09$; substance use initiation: $F(3, 820) = 12.38, p < .001, R^2 = .04$; and delinquency $F(5, 793) = 10.12, p < .001, R^2 = .06$. Results indicate that differences between mothers' and youths' reports significantly predicted youth substance use expectancies and delinquency, but not substance use initiation. As hypothesized, higher scores on mothers' reports relative to youths' reports was associated with increases delinquency and decreases in protective substance use expectancies (e.g., youth were more likely to view substance use as beneficial)(see Table 2 for details).

Dyadic Knowledge Groups

Next, we explored differences among types of families where mothers and youth reported similar or different levels of knowledge. The correlation between youth and mother scales was low ($r = .15, p < .0001$) indicating substantial incongruence. From the full sample of 977 cases, we categorized cases by high vs. low levels of maternal knowledge and separately by high vs. low levels of youths' reports. Because it is important to consider levels of knowledge relative to other mothers or youth, we consider mothers and youth who are above the median in maternal knowledge to be "high" and those below to be "low". We created four dyadic knowledge groups. In the High Youth/High Mother group, youth and mothers both reported high levels of maternal knowledge ($n = 285$). In the High Youth/Low Mother group, youth reported high levels of maternal knowledge but mothers reported low levels of maternal knowledge ($n = 210$). In the Low Youth/High Mother group, youth reported low levels of maternal knowledge but mothers reported high levels of maternal knowledge ($n = 185$). In the Low Youth/Low Mother group, youth and mothers both reported low levels of maternal knowledge ($n = 258$).

Subgroup means and standard deviations for maternal knowledge by dyadic knowledge group were as follows. For the High Youth/High Mother Group, youth ($M = 4.95, SD = .09$) and mothers ($M = 4.67, SD = .21$); High Youth/Low Mother Group, youth ($M = 4.93, SD = .09$) and mothers ($M = 4.04, SD = .29$); Low Youth/High Mother Group, youth ($M = 4.16, SD = .52$) mothers ($M = 4.70, SD = .22$); Low Youth/Low Mother Group, youth ($M = 4.18, SD = .54$) and mothers ($M = 3.99, SD = .31$).

First, we conducted a one way ANOVA to identify group differences in covariates. We compared mean levels of dual biological parent status, parental education, and gender across all dyadic knowledge groups (see Table 3). Significant mean differences were found for parental education and gender. Post-hoc Tukey tests at the $p < .05$ level indicated that both High Youth groups had higher levels of parental education than both Low Youth groups. Significantly more girls were in the High Youth/High Mother group than were in the two Low Youth groups. No significant mean differences were found by dual biological parent status. Thus, dual biological marital status was not included as a covariate for our remaining analysis.

Next, we conducted a one-way analysis of covariance (ANCOVA) to compare mean levels of youth substance use initiation, substance use expectancies, and delinquency across dyadic knowledge groups, with only significant covariates included in each model. Significant differences were found between groups for substance use expectancies: $F(3, 836) = 5.67, p < .001$; delinquency: $F(3, 829) = 3.18, p < .05$; and substance use: $F(3, 856) = 3.41, p < .05$. (see Table 3 for adjusted means by subgroup).

We conducted post-hoc Tukey tests to explore mean differences between all of our dyadic knowledge groups. As hypothesized, youth in the Low Youth/High Mother groups and the Low Youth/Low Mother groups had high rates of delinquency and substance use and unhealthy attitudes towards substances. As we hypothesized, maternal knowledge was associated with the lowest level of substance use and delinquency and the healthiest attitudes towards substances in congruent high dyads (High Youth/High Mother).

Our results supported some of our hypothesis. Youth in the Low Youth/ Low Mother group had significantly higher levels of substance initiation and less protective substance use expectancies than youth in the High Youth/High Mother group ($p < .05$). We also found significant mean differences between the High Youth/High Mother and Low Youth/High Mother groups for substance use expectancies and delinquency, but not substance use initiation. No differences were found between the High Youth/Low Mother and the Low Youth/High mother groups for any of dependent variables (see Table 3).

Discussion

Parental knowledge of youths' activities has been identified as an important risk factor in the prevention of early adolescent problem behaviors, such as substance use and delinquency. Recent studies suggest that parental knowledge may emerge through a transactional process. Parents may gain knowledge through their own actions, such as soliciting information or supervising activities, or through youths' decisions to share information (for a review, see Crouter & Head, 2002). Yet, the interactive, dyadic process underlying parental knowledge has not been adequately portrayed in most research in this area. Many studies have found associations between parental knowledge and youth substance use and delinquency (for a review, see Crouter & Head, 2002). Yet, studies that use mothers' and youths' reports of monitoring separately do not capture differences in youths' and parents' perceptions of knowledge, which may be markedly different under conditions of minimal disclosure (Stattin & Kerr, 2000). This study contributes to the literature by taking a dyadic approach,

investigating how congruence between mother and youth perceptions of maternal knowledge is related to early adolescent risky behavior among a sample of rural adolescents. Our findings suggest that understanding *both* mothers and youths' perspectives on maternal knowledge are important when predicting youth substance use and delinquency.

Our findings confirmed some of the existing research on parental knowledge. Prior studies that have used mothers' and youths' reports separately have found that high levels of parental knowledge are linked to low levels of youth substance use, delinquency, and risky sexual behavior, whereas low levels of knowledge are linked to higher levels of these problem behaviors (Crouter & Head, 2002). In our study, higher levels of maternal knowledge were associated with positive youth outcomes, however only when *both* mothers and youth report higher levels. Youth in congruent high dyads (when both youth and mothers report higher levels of maternal knowledge) reported lower levels of substance use initiation and perceived fewer benefits from using substances than congruent low dyads (where both youth and mothers report lower levels of maternal knowledge). Shared perceptions of high levels of maternal knowledge may be protective against substance use and attitudes towards substances.

From a dyadic perspective, whether or not youth or mothers are reporting a higher level of knowledge is important. Differences in mothers' and youths' reports of maternal knowledge, particularly maternal overestimation of knowledge, were significantly associated with delinquency and substance use expectancies. As hypothesized in our regression analysis, higher mother scores than youth scores on knowledge were associated with youth perceiving more benefits to using substances and higher levels of delinquency, suggesting that the more mothers overestimate their level of knowledge, the higher the level of problem behavior. Our dyadic knowledge group-based analysis also found a similar pattern. Dyads in which *only* mothers reported higher levels of maternal knowledge but youth reported lower levels may have substantial risk; youth in these dyads had the highest level of delinquency. That is, youth in the High Youth/High Mother group had lower levels of delinquency and perceived fewer benefits from using substances compared to the Low Youth/High Mother group. These findings suggest that estimation biases matter; maternal overestimation of knowledge may lead to inaccurate decisions about a child's need for structure and guidance, increasing their risk of problem behavior. High levels of parent knowledge may be most protective in congruent dyads; higher mothers' reports of knowledge accompanied by lower youths' perceptions of knowledge may be a risk factor for delinquency and unhealthy attitudes towards substances. Considering both mothers' and youths' perspectives of knowledge is valuable, as maternal overestimation of knowledge may be a risk factor for some problem behaviors.

Maternal overestimation of knowledge likely reflects a transactional process between mothers and youth. Maternal overestimation may be due to active youth efforts to hide information from their mother and thus be indicative of low levels of disclosure about daily activities (Stattin & Kerr, 2000). On the other hand, the results may reflect a parent-driven phenomenon; disagreement may reflect maternal disengagement (e.g., a mother's inability to notice, respond to, and acknowledge youth activities) or a lack of maternal solicitation (e.g., failure to solicit information from their youth), or a combination of processes (Jang & Smith, 1997; Laird et al., 2003). Incongruent perceptions of knowledge may emerge from youths' decisions to share information and parental attempts to gain knowledge of youth activities.

The consistency of our findings lends support for the idea that problem behaviors tend to cluster (Jessor, 1993); relationships were found between at least one aspect of congruence and the youth outcomes of delinquency, substance use expectancies, and substance use.

However, our method of analysis yielded differences in results across problem behaviors as well. No significant relationship between differences in mothers' and youths' perceptions of knowledge and youth substance use initiation was found using a difference score approach. This null finding may be the result of the low number of substance users at this age, which lowered statistical power. It should be noted that youth in High Youth/ High Mother dyads did differ in substance use initiation from Low Youth/Low Mother dyads, which may point to somewhat greater sensitivity in the dyadic knowledge group analyses. In addition, an association was found between differences in mothers' and youths' perceptions of knowledge and substance use expectancies, a well-established risk factor for later substance use, in both our difference score and dyadic knowledge group methods (Hawkins et al., 1992). Congruence in knowledge may influence later substance use by encouraging healthier attitudes towards substances and subsequently delaying substance use. Findings in regards to maternal overestimation and delinquency were consistent; both the difference score and dyadic knowledge group analyses suggest that maternal overestimation may be associated with high risk of delinquent behavior. Thus, although our study suggests that congruence in knowledge may be important for both substance use and delinquency, the variation in results across outcomes suggests that these problem behaviors may have different relationships with congruence and, therefore, should be studied separately.

Our findings may reflect family processes specific to rural youth. Several studies suggest that both the levels and effects of parental monitoring and knowledge may be influenced by broader contextual factors, such as neighborhood safety (Pettit, Bates, Dodge, & Meece, 1999), socio-economic status (Chuang et al., 2005), and neighborhood type (Chuang, Ennett, Bauman, & Foshee, 2009). Parental monitoring, especially supervision, may be more strongly related to problem behavior in neighborhoods that are unsafe (Pettit, Bates, Dodge, & Meece, 1999; Sampson & Laub, 1994), have low collective efficacy (Rankin and Quane, 2002), or high numbers of unemployed males (Hoffman, 2002). At least one study (Chuang et al., 2005) found that parental knowledge was linked to youths' outcomes only in some types of neighborhoods; there was no association between problem behavior and knowledge among youth in rural communities. Jones, Forehand, Brody, and Armistead (2003) found that parental knowledge increased to a greater degree across adolescence in urban versus rural areas. Neighborhood characteristics are likely to influence how much knowledge parents obtain about youth activities and how protective such knowledge is against problem behavior.

Rurality may affect congruence in parent and youth perceptions of knowledge in several ways. The low population density of rural areas may make it difficult for families to gather information on youth activities by direct observation, leading to increased reliance on children's disclosure and inflating discrepancies between youths and parents' perceptions. Alternatively, the dense social networks in rural areas in which teens are known to many adults, geographic stability, and adult's sense of responsibility for all children in the community may lead to greater exchange of information among adults/parents in rural communities and fewer discrepancies in perceptions of parental knowledge. It is possible that living in rural areas may increase or decrease the likelihood that mothers and youth will have discrepant perceptions of knowledge.

Limitations

This study has some methodological limitations. First, dyadic knowledge groups were created using median cutoffs and are likely to be sample specific. Second, many of the youth and mothers here reported high rates of maternal knowledge. For example, even youth in the Low Youth/Low Mother group had a mean knowledge score of 4.16, indicating they feel, on average, their mothers are knowledgeable between "almost always" and "always". High percentages of respondents giving specific scores (e.g., giving a "5") resulted in a slightly

skewed sample (skewness statistic = $-.53$ for mother report and -2 for youth report) that could not be improved by a statistical transformation. Third, the maternal knowledge of youth activity scales had only moderate reliability, which reduced the ability to detect differences. Low reliability could have reflected the broad nature of the measured construct. In addition, some of our findings may have been influenced by informant effects. Youth reported on both parental knowledge and their own outcomes and thus youths' reports may have stronger associations with problem behavior due to common method variance. However, without observational data on youth engaging in problem behavior, it is difficult to disentangle the confound between actual effects and common method variance. Our findings should be considered in light of these limitations to our study methods.

Our sample may not be reflective of the general population. Our findings may be specific to rural and small town Caucasian adolescents and not generalize to urban teens. Although low parental monitoring has been identified as a risk factor for urban youth in previous studies (e.g., Li, Stanton, & Feigelman, 2000), our findings may not be generalizable to non-rural youth or other ethnic or cultural groups.

The youth had a mean age of 11, prior to the age when most youth begin engaging in delinquency or substance use (Grant & Dawson, 1997; Moffitt, 1993). Thus, these findings reflect behavior by early starters; it is unclear if and how maternal overestimation may be associated with youth problem behavior as youth age and as delinquent behavior and substance use become more normative. This in-home sample was somewhat lower in risk than the entire community population and it is possible that high risk youth were somewhat under-represented which may have masked additional effects on problem behavior, particularly early substance use. Lastly, our analyses did not include fathers and thus we have not fully characterized the family ecology of knowledge and risk. A family-based approach which also includes paternal reports may provide additional information (Crouter, Bumpus, Davis, & McHale, 2005). Care should be taken not to extend our findings to other study populations. Our findings may not apply to youth who engage in problem behavior later in adolescence, among high risk populations, or those living in urban areas.

Conclusion

Parental knowledge is a well established protective factor for youth substance use and delinquency (Crouter & Head, 2002). This study suggests that integrating both parents and youth's perspectives of parental knowledge may enhance our understanding of this important protective factor. High levels of parental knowledge are protective when both mothers and youth share congruent perceptions: The High Youth/High Mother group demonstrated lower levels of substance use initiation and healthier attitudes about substances than the Low Youth/Low Mother group. Yet, maternal overestimation of knowledge (relative to youth perceptions) may be a distinct risk factor for early adolescent delinquency and unhealthy attitudes towards substances. Dyads in which mothers report high but youth report low levels of knowledge were at substantial risk and had the highest rates of delinquency. These findings have implications for prevention and intervention. Developmental studies suggest that risk may be cumulative; youth engaging in problem behavior in the transition to adolescence may be particularly vulnerable to later problems such as substance abuse and delinquency (DeWit et al., 2000; Moffitt, 1993). The findings here suggest that improving maternal knowledge, and helping mothers accurately gauge their level of knowledge, may be a salient prevention strategy.

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Table 1

Correlations Among Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Delinquency	--										
2. Substance Use Initiation	.45***	--									
3. Substance Expectancies	-.21***	-.26***	--								
4. Mother Report of Knowledge	-.08*	-.08*	-.07*	--							
5. Youth Report of Knowledge	-.17***	-.12***	.22***	.15***	--						
6. Difference Score	.06	.02	-.09***	.66***	-.65***	--					
7. Level of Knowledge	-.16***	-.13***	.20***	.76***	.77***	-.001	--				
8. Dyadic Knowledge Group	.14***	.09**	-.13***	-.46***	-.65***	.14***	-.73***	--			
9. Gender	.14***	.03	.009	-.12**	-.13***	.007	-.16***	-.14***	--		
10. Dual Biological Parent Status	-.10**	.16***	.19***	-.002	.11***	-.08*	.08*	.07*	.07*	--	
11. Parental Education	-.10**	-.02	.09**	.02	.15***	-.10**	.11***	-.14***	0.03	.13***	--

Table 2

Regression Using Mother-Youth Difference Scores

Variable	B	SE	t
(n=938)			
Delinquency			
Difference Score	0.07	0.04	2.13*
Level of Knowledge	-0.22	0.06	3.73***
Dual Biological Parents	-0.20	0.08	-2.34*
Parental Education	-0.10	0.04	-2.52*
Gender	0.29	0.08	3.39***
Substance Use Expectancies			
Difference Score	-0.06	0.02	-3.44***
Level of Knowledge	0.11	0.02	5.54***
Dual Biological Parents	0.14	0.03	4.98***
Parental Education	0.02	0.01	1.50
Substance Use Initiation			
Difference Score	0.03	0.03	1.02
Level of Knowledge	-0.12	0.03	-3.73***
Dual Biological Parents	-0.21	0.05	-4.52***

Note:

* $p < .05$.** $p < .01$.*** $p < .001$.

Table 3

Adjusted Means and Standard Errors by Dyadic Knowledge Group

	High Youth/High Mother (n = 285)	High Youth/Low Mother (n = 210)	Low Youth/High Mother (n = 185)	Low Youth/Low Mother (n = 258)	F
<i>Covariates</i>					
<i>Dual Biological Parent Status</i>	.60 (.03)	0.55 (.03)	0.54 (.04)	0.51 (.03)	1.39
<i>Parental Education</i>	2.92 ^{ab} (.06)	2.25 ^c (.07)	2.56 ^b (.08)	2.59 ^{ac} (.07)	7.07 ^{****}
<i>Gender</i>	0.38 ^a (.03)	0.47 (.03)	0.46 (.04)	0.58 ^a (.03)	7.33 ^{****}
<i>Dependent Variables</i>					
<i>Substance Use Initiation</i>	0.27(.04) ^a	0.39 (.05)	0.36 (.05)	0.45 ^a (.04)	3.41 [*]
<i>Substance Use Expectancies</i>	4.85 ^{ab} (.03)	4.80 (.03)	4.72 ^b (.03)	4.73 ^a (.03)	5.27 ^{****}
Parental Education					5.00 [*]
<i>Delinquency</i>	0.42 ^a (.07)	.57 (.09)	0.75 ^a (.10)	0.70 (.08)	3.18 [*]
Parental Education					6.18 ^{***}
Gender					12.24 ^{****}

Note:

* $p < .05$.** $p < .01$.*** $p < .001$ Within each row, subscripts indicate significant group differences at $p < .05$ based on post-hoc Tukey tests