Published in final edited form as:

J Fam Issues. 2014 November ; 35(13): 1800–1823. doi:10.1177/0192513X13484120.

Unpacking the Effect of Parental Monitoring on Early Adolescent Problem Behavior: Mediation by Parental Knowledge and Moderation by Parent-Youth Warmth

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Abstract

This study explores the monitoring process longitudinally among a sample of rural early adolescents and addresses two research questions (1) Does maternal knowledge mediate the relationship between three aspects of the parental monitoring process and adolescent problem behavior: active parent monitoring efforts, youth disclosure, and parental supervision? (2) Are these mediational pathways moderated by the affective quality of the parent-child relationship? Parent efforts to monitor youth and youth disclosure in the Fall of Grade 6 predicted substance use and delinquency in Grade 8. These relations were mediated by increases in maternal knowledge assessed in the Spring of Grade 6, suggesting that the protective effects of these constructs are partially indirect. Supervision was not significantly related to maternal knowledge or problem behavior. Parent efforts to monitor were more strongly related to maternal knowledge in families with high levels of positive affect than in families with low levels of positive affect.

Keywords

problem behavior; parenting; parental monitoring

Overview

Low levels of parental monitoring have been associated with high levels of adolescent problem behaviors (for a review, see Crouter & Head, 2002). In this paper, we take a broad approach to parental monitoring, conceptualizing it as process that includes parent, youth and joint parent-youth behaviors. Current models suggest monitoring is a transactional process that reflects active parent efforts to monitor youth, such as parental solicitation of information, and parental supervision. Youth are also active agents in the monitoring process, deciding which information to disclose to their parents (Kerr, Stattin, & Burk,

2010). Both parent and youth actions may lead to actual parental knowledge of youth activities (Fletcher, Steinberg, & Williams-Weaver, 2004). Yet, due to inconsistent measurement in monitoring studies, we have yet to clearly identify how these monitoring components relate to one another and to problem behavior over time

This paper fills three important gaps in the literature. First, theory and prior research suggests parental knowledge may be an important mediator in the monitoring process, yet this link has yet to be adequately tested longitudinally (Fletcher et al., 2004; Soenens, Vansteenkiste, Luyckx, & Goossens, 2006). We explore if maternal knowledge mediates the relationship between three components of monitoring (active parent efforts to monitor, supervision, and youth disclosure) and youth problem behavior (See Figure 1). Exploring this mediational pathway furthers our knowledge regarding the process of parental monitoring, and how monitoring components relate to one another over time. Second, it is likely that the effects of monitoring vary depending on the emotional context of the family (Darling & Steinberg, 1993), yet this area of research has been relatively understudied. We investigate if this mediation pathway is moderated by the affective quality of the parent-child relationship. In other words, we explore if the relations between the three monitoring factors (active parent efforts to monitor, disclosure, supervision), parental knowledge, and child problem behavior differ in families depending on the affective quality of the mother-youth relationship. Lastly, we focus our study on rural youth, a group that is at high risk of problem behavior (Donnermeyer, 1992) but that has not been adequately represented in the monitoring literature.

Defining Parental Monitoring

Active parent monitoring efforts, parental supervision, child disclosure, and parental knowledge have all been identified as important components of monitoring (Crouter & Head, 2002). The field has not consistently measured these aspects of monitoring, making it difficult to identify which specific components are protective. As Crouter and Head (2002) review, many studies define parental monitoring conceptually as parent efforts to solicit information from youth. Yet, many of these studies do not measure parent efforts, but rather measure parental knowledge instead, which may result from both *successful* parent efforts and youth decisions to reveal information. In fact, some studies suggest that youth decisions on which information to share with their parents may be a stronger predictor of problem behavior than parental control or solicitation (Stattin & Kerr, 2000). Many monitoring studies also combine items that measure knowledge with items that measure parental supervision (for a review see Crouter & Head, 2002). These measurement issues may mask underlying processes, making it difficult to disentangle the relations between the specific components of monitoring and youth behavior.

Parental Knowledge as a Mediator in the Monitoring Process

Theoretically it may be important to consider parental knowledge as a mediator in the monitoring process. Conceptually, whether active parent efforts to monitor, child disclosure, and parental supervision are protective against problem behavior may depend on whether or not they lead to increases in parental knowledge of youth activities. For example, current

theory suggests that parents who have knowledge regarding youth activities may be more likely to provide the necessary structure to prevent youth from associating with deviant peer influences (Crouter & Head, 2002). Yet, it is possible that these monitoring efforts will not always lead to knowledge if parents do not implement these efforts well (e.g., supervising in a haphazard fashion; or asking but not listening to youth answers), or if youth avoid or evade parenting monitoring. Alternately, even without knowledge, active parent efforts to monitor or disclosure may be protective for children, as it makes youth feel watched or cared for. Thus, it is possible that actual parental knowledge is not always necessary for monitoring to be protective.

Understanding the role of parent monitoring efforts and parental knowledge depends on the conceptual framework that researchers adopt. For example, most studies do not conceptualize knowledge as a mediator but explore the simultaneous effects of all aspects of monitoring on problem behavior (i.e., Lahey et al., 2008). These studies allow researchers to explore the effect of a specific element of monitoring (e.g., solicitation), while controlling for other components (e.g., knowledge). In some studies, the relationship between solicitation and problem behavior decreased or even become non-significant once child disclosure or parental knowledge are included as additional predictors (Lahey et al., 2008; Kerr & Stattin, 2000; Kerr, Stattin, & Burk, 2010). These results can be seen as suggesting that solicitation is not an important component of the monitoring process. Yet, other studies that have conceptualized parental knowledge as a mediator (e.g., Fletcher, Steinberg, & Williams-Weaver, 2004; Soenens et al., 2006; Vieno, Nation, Pastore, & Santinello, 2009) found that whether parent efforts to monitor youth were protective depended on whether it led to parental knowledge.

Three prior studies have found that parental knowledge may be an important mediator in the monitoring process. However, two of these studies were cross-sectional, a design which cannot distinguish between knowledge mediating the impact of monitoring on youth behavior, and knowledge mediating the impact of youth behavior on monitoring (nor a number of other explanations) (Soenens et al., 2003; Vieno et al., 2010). The third study (Fletcher et al., 2004) tested multiple path models of monitoring activities using two time points of data, a somewhat better but still flawed mediational design. In the best fitting model in that study, parental control and parent solicitation had indirect effects on substance use which were mediated by parental knowledge. However, parent solicitation and control also had residual direct effects on substance use, suggesting the effects of these variables are not entirely dependent on increased parental knowledge. Moreover, parental knowledge was not a significant mediator in regard to delinquency. Thus, this study points to the partial importance of parental knowledge in the monitoring process.

Overall, the role of parental knowledge as a mediator is not fully understood due to the design limitations of the existing cross-sectional and two-wave studies. To adequately test if parental knowledge is a mediator in the monitoring process (i.e., a three step mediation model) one requires three waves of data (Collins, 2006; Collins, Graham, & Flaherty, 1998). Second, these studies include some, but not all key aspects of the monitoring process. Fletcher et al. (2004) did not include measures of disclosure, a limitation they note in their

paper. Neither Soenens et al. (2006), Fletcher et al. (2004), or Vieno (2009) included measures of supervision, a potentially important aspect of monitoring.

The Moderating Role of Affective Quality

Darling and Steinberg (1993) theorize that the emotional aspects of the parent-youth relationship may moderate the effects of parenting actions on youth outcomes. Certain aspects of monitoring, such as parent attempts to solicit information from youth or child disclosure may be more likely to lead to knowledge in the context of a warm parent-child relationship. A warm relationship may make parents more likely to listen to youth when disclosing information, leading to larger increases in knowledge in more positive environments.

However, only a few studies have explored how the affective quality of the parent-child relationship may moderate the monitoring process and findings have been mixed. Keijsers et al., (2009) found the relationship between child disclosure and delinquency to be stronger in families with high levels of parental support than families with low support. The authors also found some evidence that parental support influenced how parental control was linked to the trajectory of delinquency. In highly supportive families, decreases in control were linked to reductions in delinquency, whereas in unsupportive families, decreases in control were associated with increases in delinquency. However, these findings were not consistent across reporters. Kerr, Stattin, and Burk (2010) found that the relationship between disclosure and knowledge was stronger in families with warm relationships than those with strained relationships. However, because the authors found no evidence of moderation in other model paths, they conclude there is little evidence that relationship-quality moderates the monitoring process. One study has, however, found that parental knowledge may be more predictive of problem behavior in families that have lower levels warmth (Pettit & Laird, 2002).

Rural adolescents

We know little about the monitoring process among rural youth, who may be at elevated risk for some problem behaviors, especially early substance use (Donnermeyer, 1992). Most studies on parental monitoring have been conducted on American youth living in urban areas (e.g., Li, Stanton, & Feigelman, 2000), mid size towns or suburbs (e.g., Barnes et al., 2006) or youth in non-U.S. settings (Kerr, Stattin, & Burk, 2010). The monitoring process may work differently in rural areas. The low population density of rural areas may make it difficult for families to gather knowledge about youth activities by direct supervision or observation, leading to increased reliance on children's disclosure or solicitation. Alternately, 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. Thus, child disclosure and active parent efforts may be less central to obtaining parental knowledge in rural communities than prior studies suggest. For example, Chuang et al. (2005) found that parental knowledge was linked to youths' outcomes only in some types of neighborhoods; there was no association between knowledge and problem

behavior among youth in rural communities. Similarly Lahey et al. (2008) found parental limit setting was only predictive of delinquency in high risk neighborhoods, when controlling for parental knowledge.

This Study

This study fills several important gaps in the literature. First, we explore the monitoring process longitudinally among a sample of rural adolescents from Grade 6 to 8. We test if parental knowledge is a mediator between three aspects of the monitoring process (active parent efforts to monitor youth, parental supervision, and youth disclosure) and youth delinquency and substance use initiation (See Figure 1). We use three waves of data: active parent efforts, parental supervision and youth disclosure are measured in the Fall of Grade 6; parental knowledge in the Spring of Grade 6, and youth problem behavior in the Spring of Grade 8. Second, we test whether the relations between aspects of monitoring, knowledge, and youth outcomes differ based on the affective quality of the mother- youth relationship (e.g. moderated mediation), using a two group mediation model. Based on theory and prior research, we expect that three model paths will differ between families with high and low levels of positive affective quality: the relations between youth disclosure and parental knowledge, active parent monitoring efforts and parental knowledge, and parental knowledge and both delinquency and substance use. We hypothesize that youth disclosure and parent attempts to acquire information will have a stronger association with knowledge in the context of a warm parent-youth relationship. We also hypothesize that there will be a stronger relationship between parental knowledge and youth delinquency in families with low levels of positive affective quality.

Our study uses a sample of early adolescents residing in rural communities and small towns, an at-risk but understudied population (Donnermeyer, 1992; Johnston et al. 2005). We focus our study on youth reports of their relationships with their mothers, as mothers are often the main source of parental knowledge in families (Waizenhofer, Buchanan, & Jackson-Newsom, 2004). Thus, our models include youth reports of maternal knowledge, youth disclosure to mothers, and the affective quality of the mother-youth relationship. Our measures of parental supervision and parent active efforts to monitor youth reflect youth perceptions of both parents, which are likely to occur jointly between parents.

Method

Sample

Participants were a randomly-selected subset of 6th graders participating in the PROSPER project (Promoting School-Community-University Partnerships to Enhance Resilience), a large scale effectiveness trial of preventive interventions aimed at reducing substance use initiation among rural adolescents (Spoth, Greenberg, Bierman, & Redmond, 2004). Participants resided in 28 rural communities and small towns in Iowa and Pennsylvania. Initial eligibility requirements for communities considered for the studies were (a) school district enrollment from 1,300 to 5,200, and (b) at least 15% of the student population eligible for free or reduced-cost lunches (For more information see Spoth, Guyll, Lillehoj, Redmond, & Greenberg, 2007).

Schools in intervention communities implemented two evidence-based programs designed to reduce adolescent substance use: a school-based curriculum (delivered in the seventh grade to all students) and a family-based program (offered to all families of sixth graders). Schools selected programs from a menu of evidence-based interventions. In addition, districts were supported by community-based prevention teams (see Spoth, Greenberg, Bierman, & Redmond, 2004 for more information on the PROSPER project and the sample).

The PROSPER project involved youth from two successive cohorts of sixth graders. Students in each of these cohorts completed in-school questionnaires. Data were collected in the Fall and Spring of 6th grade, and annually thereafter. 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 for participation in in-home assessments with their sixth grade child. 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. The in-home assessments included a family composition interview, written questionnaires completed independently by the youth, mother, and if present, father.

The current study includes three waves of data from youth and their mothers; Wave 1 (the intervention pre-test) when the youth were in the Fall of 6th grade, Wave 2, when youth were in the Spring of 6th grade, and Wave 4, when youth were in the Spring of 8th grade. At Wave 1, 977 families completed the in-home questionnaire. By Wave 4, the sample had decreased to 780 cases (77% of those at Wave 1). The mean sample age at Wave 1: 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 and 47% were male. The average household income was \$51,000 (in 2003) and 62% of youth had parents with some post-secondary education. 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.

To test for selection bias in the in-home sample, 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 that 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% versus 33.0% respectively), living with two biological parents (59.3% versus 62.5%), race (88.6% White versus 86.5% White), or gender. In addition, no differences were found between groups in substance use initiation. However, youth that received in-home assessments were less likely to engage in delinquent behavior than youth in the general population of cases ($M = .58$, $SE = .06$ versus $M = .82$, $SE = .04$): $F(1, 27) = 18.32$, $p < .01$. Youth in the in-home sample also perceived fewer benefits from using substances ($M = 4.77$, $SE = .01$ versus 4.71 , $SE = .02$): $F(1, 27) = 12.36$, $p < .01$).

Measures

All measures of parenting were gathered from the PROSPER in-home data. We use PROSPER in-school data for our measures of youth delinquency and substance use (Redmond, Schainker, Shin, & Spoth, 2007). Items were adapted from the Iowa Youth and Families Project (Conger, R. D., 1989; McMahon & Metzler, 1998; Spoth, Redmond, & Shin, 1998).

Active Parent Efforts to Monitor Youth—Youth perceptions of parent efforts to solicit information and actively track their activities were measured using five Likert-type items (1= almost always true to 5 = almost always false). An example item is “I’m expected to let my parents know in advance who will be driving for my friends and me when we go out”. Two items in our Parent Active Monitoring Efforts Scale were averaged due to their conceptual similarity: “Most afternoon and evenings I ask my child if he/she has homework due the next day” and “In the evening I ask my child if he/she has finished his/her homework”. In addition, two items in Maternal Knowledge of Youth Activities Scale were averaged due to their conceptual similarity: “In the course of a day, how often do you know where your child is”, “In the course of a day, how often do you know who this child is with when he/she is away from home”. Averaging these items increased the balance of our factor loadings and improved model fit. The alpha of the scale is .66.

Parental supervision—Youth were asked to rate how often (1) Is an adult home when you home from school; (2) Do you get home from school before your parents are home (1= Always and 5=Never). Items were averaged for our analysis. The correlation between these items is .73.

Youth disclosure—Youth disclosure is measured with one item. Youth were asked how strongly they agree with the statement “I share my thoughts and feelings with my mother” (1= strongly agree to 5 = strongly disagree).

Maternal knowledge of youth activity—Youth perceptions of maternal knowledge were measured using four Likert-type items (1=always to 5=never). Items ask youth how often their mother knows where they are and who they are with, when they do something really well at school or someplace else away from home, and how often their mother knows when they do not do things they have asked him/her to do. The alpha is .83.

Substance use initiation—Items asked youth if they have ever drank alcohol, ever smoked a cigarette, or ever smoked marijuana or hashish (0=no; 1=yes). At Wave 4, 55.47% of youth had used at least one substance.

Delinquency—Delinquency was measured with four items that asked whether the youth had engaged in a deviant behavior. An example item is “In the past twelve months, how often have you taken something worth less than \$25 that didn’t belong to you” (0=no, 1=yes). At Wave 4, 25.10% of youth had engaged in at least one delinquent act.

Positive affective quality of the mother-youth relationship—Positive affective quality was measured by four items. An example item is “When you and your mom have

spent time talking or doing things together, how often did your mom “Let her know she really cares about you”, (on a 1–7 scale where 1=Always to 7= never). The alpha was .87. A median split was used to create families with high and low levels of positive affective quality.

Control Variables—All models also included four control variables that have been associated with our outcome variables (Hawkins, Catalano, & Miller, 1992): gender (0=female; 1=male), dual biological parent status (0=not living with biological parents; 1=living with both biological parents), parent education (0=high school education or less; 1=some college) and intervention condition.

Plan of Analysis

Models are estimated using latent variables in LISREL 8.80 (Jöreskog & Sörbom, 1996). Latent variable models may reduce bias associated with measurement error. Model goodness of fit was assessed using chi-square tests and practical indices of model fit including RMSEA (Browne & Cudeck, 1993), Rho (Tucker & Lewis, 1973; also see Bentler & Bonett, 1980), and CFI (Bentler, 1990). Because X^2 is known to be sensitive to sample size such that even trivial deviations from a perfect model produce a significant X^2 , we used indices of practical fit to make our main judgments about model fit. Differences in model paths based on our grouping variable (high and low levels of positive affective quality) will be tested using a series of nested models. All missing data will be handled using full information maximum likelihood (FIML) procedures (Graham, Cumsille, & Elek-Fisk, 2003; Schafer & Graham, 2002).

Results

Main Mediation Model

To investigate if parental knowledge mediated the relationship between three components of monitoring and problem behavior, we ran a latent variable model in LISREL (See Figure 1). Active parent monitoring efforts, parental supervision, and youth disclosure as measured in the Fall of 6th grade were included as independent variables. Maternal knowledge in the Spring of 6th grade was included as a mediator. Youth delinquency and substance use initiation in 8th grade were included as our outcome variables. We ran two separate models: one that explored the mediation process for delinquency and another that focused on substance use initiation. All models control for parent education, dual biological parent status, gender, and intervention condition.

Goodness of fit—Based on the overall pattern of fit indices, we judged the fit of the models to be acceptable (Hu & Bentler, 1999). The chi-square test of fit was significant, for delinquency; $X^2 = 198.868$, $df = 171$, $p < .05$; for substance use initiation, $X^2 = 258.78$, $df = 122$, $p < .05$. For the delinquency model, RMSEA = .0268 (Browne & Cudeck, 1993), Rho = .961 (Tucker & Lewis, 1973; also see Bentler & Bonett, 1980), and CFI = .972 (Bentler, 1990). For the substance use model, RMSEA = .036, NNFI = .940, and CFI = .957.

Path Coefficients—The results relating to path coefficients for the one-group models appear in Table 1.

Total effects: Total effects for the two models appear at the bottom of each panel of Table 1 (rows 3 and 6). Total effects are the effect of the predictors on our dependent variables when the mediator is omitted from the model (i.e. the total of the indirect and residual direct effects; note that these effects are not estimated separately, but are estimated as a byproduct of analyses that include all variables in the model). Active parent monitoring efforts had a significant total effect on delinquency and substance use (for delinquency, $B = -.06$, $t = -2.30$, $p < .05$; for substance use, $B = -.23$, $t = -4.58$). Significant total effects were not found for supervision or youth disclosure on either dependent variable.

Simple effects: Simple effects are the paths from the independent variables to the mediator, and from the mediator to the outcome (controlling for the independent variable). These effects appear in the first row of each panel of Table 1 (rows 1 and 4). As seen in Table 1, significant paths were found for parental active monitoring efforts predicting maternal knowledge (for delinquency, $B = .29$, $t = 5.70$; for substance use, $B = .29$, $t = 5.71$) and for youth disclosure predicting maternal knowledge (for delinquency, $B = .06$, $t = 4.01$; for substance use $B = .06$, $t = 4.05$). Significant paths were also found for maternal knowledge predicting delinquency and substance use (for delinquency, $B = -.07$, $t = -2.45$; for substance use, $B = -.12$, $t = -2.29$). The path for parental supervision predicting knowledge was not significant for either dependent variable.

Mediated effects: Mediated (indirect) effects are the product of two regression coefficients: the regression coefficient for the independent variable predicting the mediator and the regression coefficient for the mediator predicting the outcome (controlling for the independent variable). The mediated effect is judged to be significant by the joint significance test if the two regression coefficients are both significant in the model (MacKinnon et al, 2002). The older method for testing the significance of the mediated effect (the Sobel test; Sobel, 1982), is known to provide a test of significance that is too conservative. The joint significance test has been shown in simulation work to make the correct decision about the significance of the mediated effect (MacKinnon et al., 2002). Because, the paths for parent efforts to monitor and youth disclosure predicting knowledge, and for knowledge predicting problem behavior were significant, the mediated effects of parental actions and youth disclosure on delinquency and substance use were also significant (MacKinnon et al., 2002).

Residual Direct Effects: Residual direct effects represent the residual effect of the independent variable on the outcome after taking the mediator into account. These effects appear in the middle row of each panel of Table 1 (rows 2 and 5). As seen in Table 1, the residual direct effect for active parent monitoring efforts predicting substance use remained significant with parental knowledge included as a mediator ($B = -.20$, $t = -3.70$). All other residual direct effects from our predictors to delinquency and substance use were non-significant when maternal knowledge was included to the model as a mediator.

Two-Group Mediation Model

To investigate if this mediation model differed for families with high or low levels of positive affective quality, we ran a two-group mediation model using SEM. A series of nested models were run to test for differences in the paths of our mediation model in families with high or low levels of maternal positive affective quality following Joreskog's (1971) suggestions for analysis with two or more groups. First, we confirmed that our model fit the data adequately for families the two groups separately. Then, we tested if the factor structure was equivalent. Finally, we tested if three specific model paths differed between groups.

Testing the hypothesis of invariant factor patterns—First, we tested the goodness of fit of our model separately for youth in families with high and low levels of positive affective quality. Based on the overall patterns of fit in the two groups, we judged fit to be acceptable for families in both groups (Bentler, 1990, Bentler & Bonnett, 1980, Browne & Cudeck, 1993; Hu & Bentler, 1999). For youth in families with high positive affective quality: the model fit for delinquency was $X^2 = 213.14$, $df = 122$, $p < .05$, NNFI=.913, CFI=.938, RMSEA=.034; for substance use $X^2 = 230.68$, $df = 122$, $p < .05$, NNFI=.913, CFI=.938, RMSEA=.043. For families with low positive affective quality: the model fit for delinquency was $X^2 = 176.88$, $df = 122$, $p < .05$, NNFI=.938, CFI=.965, RMSEA=.035; for substance use, the fit was $X^2 = 194.85$, $df = 122$, $p < .05$, NNFI=.925, CFI=.946, RMSEA=.040. Acceptable model fit for both groups confirms that the same basic factor structure held in both groups, and justifies the test of equal factor loadings.

Testing the hypothesis of invariant factor loadings—Next, we tested a series of nested models to determine if the factor loadings of our model differed between our two groups. First we fit the mediation model allowing all model parameters to be freely estimated. This model provided an acceptable fit to the data for both dependent variables (for delinquency, $X^2 = 388.64$, $df = 244$, $p < .05$, NNFI=.926, CFI=.947, RMSEA=.037; for substance use, $X^2 = 425.54$, $df = 244$, $p < .05$, NNFI=.918, CFI=.942, RMSEA=.042). Second, we fit models where the factor loadings were constrained to be equal between groups. Again, indices of practical fit indicated an acceptable fit to this data (model fit for delinquency, $X^2 = 416.09$, $df = 253$, $p < .05$, NNFI=.919, CFI=.940, RMSEA=.039; for substance use, $X^2 = 444.03$, $df = 253$, $p < .05$, NNFI=.917, CFI=.939, RMSEA=.042). Lastly, we tested for differences between these two models (e.g., where factor loadings were freely estimated or constrained to be equal between groups). For delinquency and substance use, the chi square difference in the two models was statistically significant. However, the decrement in fit was small, and was judged not to be of practical importance (The difference in models where factor loadings were freely estimated and constrained: for delinquency: $X^2 = 27.46$, $df = 9$, $p < .01$, RMSEA difference = .0016, NNFI difference = .0065; CFI difference=.0068; for substance use $X^2 = 18.49$, $df = 9$, $p < .05$. RMSEA difference = .0003, NNFI difference = .0012; CFI difference=.0031). We concluded that the factor loadings were invariant across families with low and high affective quality (Widaman, 1985) and factor loadings are constrained to be equal for in subsequent analysis.

Testing the hypothesis of invariant path coefficients—Although there are 15 total paths that can be estimated in this model, we hypothesized that only three paths would differ across groups (the path from active parent monitoring efforts to knowledge, the path from youth disclosure to knowledge, and the path from knowledge to delinquency or substance use). We expected the remaining 12 paths would not differ based on affective quality.

Baseline Model: Before we could test if the 3 paths we hypothesized to differ between groups varied based on affective quality, we first needed to test a baseline model, which would tell us if the 12 paths that we hypothesized would not differ between groups could be constrained to be equal across groups. We compared a model with these 12 paths constrained to be equal (our baseline model) to a model where all 15 paths were freely estimated (e.g., allowed to differ across groups). The difference between these models was not significant, indicating that these 12 paths could be constrained to be equal (Difference in model fit for delinquency, χ^2 difference = 13.19, $df = 12$, $p > .05$; for substance use, χ^2 difference = 11.81, $df = 12$, $p > .05$).

Testing individual paths: Subsequent models tested whether there were group differences for each of the three individual paths that we hypothesized would vary (from active parent monitoring efforts to knowledge, from youth disclosure to knowledge, and from knowledge to delinquency or substance use). We tested each path separately by adding one additional constraint to the baseline model and conducting chi-square difference tests. A model that allowed the path between active parent monitoring efforts to maternal knowledge to vary between groups had a poorer fit than the baseline model, where it was freely estimated (Difference in fit for delinquency, χ^2 difference = 8.54, $df = 1$, $p < .01$; for substance use, χ^2 difference = 7.63, $df = 1$, $p < .01$). This result indicates that the path from active parent efforts to maternal knowledge was significantly different between families with high and low levels of affective quality. As seen in Figure 2, the coefficient for families with high levels of positive affect is .46 for delinquency ($p < .001$) and .45 for substance use initiation ($p < .001$) whereas for families with low levels of positive affect the coefficient for delinquency is .19 ($p < .01$) and for substance use is .20 ($p < .001$). Second, we tested for differences between the baseline model and a model that also constrained the path from youth disclosure to maternal knowledge to be equal across groups. The difference was not significant for substance use or delinquency, suggesting that this path did not differ between groups (Difference in model fit for delinquency, χ^2 difference = 1.44, $df = 1$, $p > .05$; for substance use, χ^2 difference = 1.42, $df = 1$, $p > .05$). Third, we tested for differences between the baseline model and a model that also constrained the path from knowledge to delinquency (or substance use) to be equal across groups. This difference was not significant for either dependent variable, suggesting this path was not significantly different between high and low affective quality groups (Difference in model fit for delinquency, χ^2 difference = .21, $df = 1$, $p > .05$; for substance use initiation, χ^2 difference = .01, $df = 1$, $p > .05$). Thus we concluded that only one path differed between groups: active parenting monitoring efforts to knowledge.

Final two-group model: The final two-group mediation model (See Figure 2) (1) constrained the factor loadings to be equal between families with high and low levels of

positive affective quality; (2) allowed one regression path to differ (the regression coefficient from parent efforts to monitor to knowledge); and (3) constrained all other regression paths to be equal. The final two group mediation model provided an acceptable fit to the data. For delinquency, $\chi^2 = 430.95$, $df = 267$, $p < .05$; RMSEA = .027, NNFI = .922, and CFI = .939. For substance use, $\chi^2 = 457.28$, $df = 267$, $p < .05$; RMSEA = .029, NNFI = .922, and CFI = .939. The pattern of significant path coefficients shown in Figure 2 is similar to those found in the main mediation model. The major difference was that although parent efforts to monitor was a significant predictor of maternal knowledge for both high and low affective quality groups, that path was significantly stronger for those in the high affective quality families.

Discussion

Our analysis suggests that parent active efforts to monitor youth and youth disclosure of thoughts and feelings in 6th grade have implications for delinquency and substance use in 8th grade for rural adolescents. As expected, parent efforts emerged as an important aspect of the monitoring process; it was a significant predictor of maternal knowledge, substance use, and delinquency. These results indicate that parent attempts to solicit information, track youth activities, and require youth permission before engaging in activities are likely to be protective against both delinquency and substance use in rural communities in the U.S. Youth disclosure of thoughts and feelings also significantly predicted maternal knowledge. Contrary to our hypothesis, parental supervision may not be as important as expected to the monitoring process, at least not when considered concurrently with youth disclosure and active parent efforts. Supervision early in 6th grade did not predict later knowledge, delinquency or substance use. The low population density in rural communities may make it more difficult for parents to provide *effective* supervision and supervision in this context is not likely to predict knowledge. Parents in rural communities may be able to gain knowledge without being present to directly observe youth behavior. These results suggest that parent efforts to monitor youth and child disclosure but not supervision remain important mechanisms to prevent problem behavior among rural youth.

As hypothesized, youth reports of maternal knowledge mediated the effects of both youth disclosure and active parent monitoring on youth outcomes, confirming prior cross-sectional and two-wave studies (Fletcher et al., 2004; Soenens et al., 2006). In contrast to findings in Fletcher et al. (2004), maternal knowledge mediated the influences of both child disclosure of thoughts and feelings and parental efforts to monitor on delinquency and substance use. The extent to which youth disclosure and active parent efforts to monitor youth influence problem behavior appear to partially depend on the extent to which these behaviors lead to actual maternal knowledge. These findings suggest that knowledge is an essential intermediary product of effective monitoring. Parent efforts to monitor and youth disclosure that do not lead to parent knowledge may be less effective at reducing later problem behavior.

It is notable that active parent monitoring efforts also had a residual direct effect on substance use after taking maternal knowledge into account, suggesting that parental solicitation influences problem behavior above and beyond increases in maternal

knowledge. Perhaps active parental monitoring reflects parental values of disapproval of substance use and that shape youth attitudes and behaviors. Alternately, youth perceptions of parental knowledge may be to some extent inaccurate, as youth may perceive that parents know less than they actually do. This difference may lead to measurement error in the mediator (knowledge) which may limit our ability to fully capture the mediation process.

Our findings also confirm that the monitoring process may be influenced by the quality of the parent-youth affective relationship. These results support Darling and Steinberg's (1993) conceptualization that the emotional aspects of the parent-child relationship may moderate the influence of parenting behaviors. The association between active parent monitoring efforts and knowledge was stronger in families with higher levels of positive affective quality than for youth in families with lower levels of positive affective quality. It is possible that youth have different perceptions of active parent efforts to monitor youth depending on the emotional context in which they occur. In families with warmer relationships, parent attempts to solicit information from youth may be perceived positively by youth, as signs of parental caring. In contrast, in the context of a less warm parent-youth relationship, parent efforts to monitor youth may be perceived as threatening and provoke resistance, oppositionality, and/or withdrawal. These findings suggest that although active parent monitoring efforts are positively associated with maternal knowledge in all families, active parent monitoring efforts may be most effective in the context of a warm parent-youth relationship.

Contrary to our hypothesis, two of the model paths did not differ based on the affective quality of the parent-youth relationship. The path from disclosure to knowledge did not differ based on affective quality; disclosure is an important predictor of knowledge regardless of the affective quality of the parent youth relationship. The path between maternal knowledge and delinquency also did not differ between families with high and low levels of positive affective quality. Thus, although affective quality may influence delinquency and substance use indirectly through modulating the links between active parent monitoring efforts to knowledge, there is no evidence of that affective quality moderates the relationship between knowledge and youth outcomes directly. The process by which maternal knowledge is associated with problem behavior is not likely influenced by emotional aspects of the relationship.

Our findings contradict some recent longitudinal studies that have suggested that child disclosure may be the strongest predictor of problem behavior (Kerr, Stattin, & Burk, 2010) and that parent attempts to solicit information from youth or to set limits are not likely to have strong effects. There are several possibilities for these inconsistent findings. First, these prior studies explored the effects of disclosure, solicitation, and maternal knowledge on youth outcomes using two waves of data. In contrast, we tested maternal knowledge as a mediator using a three-wave design most appropriate for detecting mediational pathways. Conceptualizing knowledge as a mediator helped to shed light on the process of monitoring, a process that may be masked when knowledge is used as a concurrent predictor.

Second, other studies focused on older adolescents, many of whom resided in non-U.S. settings (e.g., Kerr, Stattin, & Burk, 2010). This study focused on early adolescents living in

rural communities in the United States. It is possible that parent solicitation is more effective earlier in adolescence when youth generally respect parental prerogatives and youth decisions to disclose are more important later, when youth struggle more with parental authority. Alternately, parental solicitation may be more important and child disclosure less important among rural than urban youth. More studies are needed that explore differences in monitoring by both age and neighborhood type (Chuang et al., 2005).

Lastly, our measures differed from prior studies. Our measure of youth disclosure assessed whether on youth share their thoughts and feelings with their mother, not the sharing of information. Disclosure of thoughts and feelings is likely a proxy for disclosure of information. Analysis conducted on the 10–18 dataset (Kerr, Stattin & Burk, 2010; Stattin & Kerr, 2000) suggest that among 11 year olds, the correlation between scales of disclosure of thoughts and feelings and disclosure of information is quite high ($r = .67$ among 11 year olds). Nonetheless, differences in this measure may have influenced our findings. Furthermore, our measures also specifically ask youth about relationships with mothers, whereas some other studies ask about relationships with both parents. It is difficult to disentangle if the differences in our findings are due to differences in our measures or the study population.

There are several limitations to this paper. Although significant, the effect of maternal knowledge on youth delinquency and substance use was small. Maternal knowledge in 6th grade may be weakly associated with delinquency and substance use in 8th grade due to the temporal distance between the variables (Collins, 2006). We also note that our study findings are based only on youth report and thus are likely to contain some degree of rater bias. The in-home sample was somewhat lower in risk than the entire community population; thus, it is possible that high risk youth were somewhat under-represented which may have masked additional effects on problem behavior. In addition, the process by which maternal knowledge influences delinquency may vary depending on specific characteristics of the ecological context. A few studies suggest that the effects of parental monitoring may vary depending on the presence of deviant peers or whether or not youth reside in dangerous neighborhoods (Crouter & Head, 2002; Lahey et al., 2008). Future studies are needed to explore how these paths may differ depending on other ecological factors. Our study explores the effects of problem behavior in Grade 8. It is possible that our results apply to early starters specifically and more studies are needed to explore the monitoring process once more youth are engaging in substance use and delinquency. In order to test a two-group mediation model, we dichotomized our measure of maternal affective quality. In order to avoid inflated Type I error rates, we did not test our models with other cut-points. However it is possible that different cut-points for affective quality would have led to different results.

Our measures of the monitoring process were limited by the questions available in the larger study. Our measure of parental efforts to monitor is broad, which likely led to moderate reliability and may have attenuated our findings. Because these items conceptually tap into a broad range of parental actions, including solicitation and behavioral control, it is likely that alpha underestimates reliability. Lastly, our measure of supervision focuses on whether or not an adult is present at home; they do not specifically capture whether youth are being closely watched and they focus only on supervision after-school, rather than in a variety of

contexts. Although these items have some similarities to other measures of supervision (Loeber et al., 1998; Pettit et al., 1999), it is possible that time spent with adults may not result in close supervision and that supervision varies across different contexts. However, even with these limitations, our study was able to measure and distinguish between the central elements in the monitoring process and our model fit the data well.

Despite these limitations, this study furthers our understanding of the process underlying the association between parental monitoring and delinquency, and how these relations may differ based on the affective parent-youth relationship. Active parent monitoring efforts and youth disclosure are important components of the monitoring process and both are protective against youth delinquency and substance use. However, their effects are at least partly indirect and occur through increases in maternal knowledge. Supervision, at least as measured here, does not appear crucial for promoting maternal knowledge or preventing problem behavior. Finally, active parent monitoring efforts is more likely to produce maternal knowledge in the context of a warm parent-youth relationship. Our findings have several intervention implications. Active parental monitoring and youth disclosure may be salient intervention targets. However, interventions that target active parent monitoring efforts may be most effective if they concurrently provide parents with strategies to improve the emotional quality of the parent-youth relationship.

Acknowledgments

Work on this paper was supported by research grants DA013709, T32-DA017629, and F31-DA028047 from the National Institute on Drug Abuse. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Drug Abuse or the National Institutes of Health.

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Figure 1.
Conceptual Model

Figure 2. Final Two-Group Model: Moderation by Affective Quality

Note: * $p < .05$. ** $p < .01$. *** $p < .001$. Coefficients above the line are for families with low levels of positive affective quality. Coefficients below the line are for families with high levels of positive affective quality. All models control for dual biological parent status, parent education, gender, and intervention condition. Parent active efforts, supervision, and child disclosure are correlated in our final model (not shown). Model estimates are not standardized.

Table 1

Main Mediation Model: Lisrel Estimates and Critical Ratios

	Parent Active Monitoring Efforts	Parental Supervision	Youth Disclosure	Parental Knowledge
<i>Delinquency Model</i>				
Simple Effects				
Parental Knowledge	.29 (5.70) ***	.02 (0.99)	.06 (4.01) ***	
Delinquency	--	--	--	-.07 (-2.45) *
Residual Direct Effects				
Delinquency	-.04 (-1.44)	-.001 (-0.15)	-.002 (-.27)	--
Total Effects				
Delinquency	-.06 (-2.30) *	-.002 (-0.27)	-.006 (-0.77)	--
<i>Substance Use Initiation Model</i>				
Simple Effects				
Knowledge	.29 (5.71) ***	.02 (1.02)	.06 (4.05) ***	
Substance Use	--	--	--	-.12 (-2.29) *
Residual Direct Effects				
Substance Use	-.20 (-3.70) ***	-.01 (-0.48)	-.004 (-0.28)	--
Total Effects				
Substance Use	-.23 (-4.58) ***	-.01 (-0.60)	-.01 (-0.75)	--

Note:

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

Unstandardized coefficients are presented with associated t-values in parenthesis. All models control for dual biological parent status, parent education, gender, and intervention condition. Variable labels shown across the top represent the independent variable for each regression path; those shown at the side represent the dependent variable for each regression path.