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**PARENTAL MONITORING AND EARLY ADOLESCENT RISKY BEHAVIOR:
A PERSON-ORIENTED APPROACH**

A Dissertation in
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by

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ABSTRACT

This dissertation uses person-oriented methods to explore the relationships between specific patterns of parental monitoring-related behaviors and youth risky behavior. Most studies, to date, have used variable-oriented methods to isolate the effects of one specific monitoring behavior on youth outcomes. Yet, families are likely engaging in multiple monitoring behaviors simultaneously and parents and youth may have different perceptions of monitoring. Therefore, person-oriented strategies that identify specific combinations of behavior and integrate multiple reporters may more closely resemble the monitoring process as it occurs in natural family settings.

The first cross-sectional study, uses a sample of 796 6th graders in rural communities and small towns to identify latent classes using mother and youth reports of maternal knowledge, active parent monitoring efforts, youth disclosure, supervision, and the amount of parent-youth communication. Five latent classes were identified: High-Monitors, Maternal Over-Estimators, Low-Monitors, Communication-Focused, and Supervision-Focused when youth were in the sixth grade. Problem behavior and strained parent-youth relationships were associated with increased odds of membership in the Low Monitors, Maternal Over-Estimators, and Supervision-Focused class, relative to the High Monitors. The discussion focuses on the value of using a person-oriented approach with multiple reporters to study patterns of monitoring behaviors in early adolescence.

In Study #2, these analyses are extended longitudinally over the middle school period using Latent Transition Analysis to 1.) identify latent patterns of parental monitoring-related behaviors occurring in mother-youth dyads during middle school and 2.) investigate how changes in monitoring patterns are associated with youth substance use in Grade 6 and substance use initiation from Grade 6 to 8. Using a sample of 536 rural dyads (the longitudinal cases from

Study #1), , mother and youth reports of parental knowledge, active parent monitoring efforts, youth disclosure, supervision, and parent-youth communication were used to identify six latent patterns of monitoring across grade 6-8: High-Monitors, Low Monitors, Communication-Focused, Supervision-Focused, Maternal Over-Estimators, and Youth Over-Estimators. The initiation of alcohol, smoking, and marijuana was significantly associated with transitions between patterns of monitoring. Initiation of alcohol and smoking was associated with increased odds of transition into the Low Monitors from the Communication-Focused, Supervision-Focused, and Maternal Over-Estimators, relative to remaining in the same status. The discussion focuses on the contributions of a person-oriented approach to study changes in monitoring-related behaviors over the middle school period.

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Chapter 1

Introduction

Early adolescence is a time of great change for youth and their parents. For many parents, adolescence brings new challenges and may require new parenting skills. Youth social contexts change dramatically, as youth transition to new schools, develop new peer networks spend less time with their parents, and engage in more risky behavior (Eccles, 2004; Larson et al., 1996). Parents need to adapt to this changing social landscape and an adolescent's growing need for an individual identity and a sense of autonomy. Increases in parent-child conflict and parental feelings of ineffectiveness and strain may increase during early adolescence, as parents and youth transition to a more egalitarian relationship (Collins & Laursen, 2006).

The extent to which an adolescent and their parents can successfully navigate the adolescent transition has strong implications for the development of problem behavior. Early use of substances and delinquency have been associated with certain parenting styles and have also been linked to later problems, such as adult alcohol use disorders, long-term criminal offending and more severe drug use (DeWit et al, 2000; Grant & Dawson, 1997; Loeber, 1996). In fact, 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 et al., 2000). Parenting strategies that delay the onset of problem behaviors may have large, cumulative impacts over time. Because of the challenges of early adolescence, and the important role that parents may play, researchers have sought to identify which particular elements of parenting are protective against the development of youth problem behavior, and

henceforth, which elements of parenting are likely to be effective targets for our preventive interventions.

This dissertation focuses on the role of parental monitoring, the extent to which parents track youth activities, one of the most commonly identified protective factors against youth problem behavior and recently, one of the most debated aspects of parenting in the literature. Parental monitoring was first conceptualized as a protective factor in early work by Patterson and colleagues (Patterson & Stouthamer-Loeber, 1984). In this work, and several studies that followed, researchers concluded that youth who had parents who provided high levels of surveillance and tracking of youth activities were less likely to engage in delinquency. Several studies followed, which found high monitoring to be linked to lower risk of delinquency, substance use, and other risky behaviors (for a review see Crouter & Head, 2002; Dishion & McMahon, 1998).

In 2000, Stattin and Kerr questioned the assumptions underlying this important work. In their seminal paper, Stattin and Kerr (2000) argued that the lack of clarity regarding measurement issues had plagued the field of monitoring. Many studies on monitoring actually measured parental knowledge, the information parents had about youth activities, without specifying how parents obtained this information. Stattin and Kerr (2000) found that child disclosure, the information that youth share with their parents, was a stronger predictor of problem behavior than was parent attempts to solicit youth for information or exert behavioral control.

In the past decade, researchers have reconceptualized monitoring, suggesting that monitoring may reflect a transactional process that includes youth behaviors, such as disclosure, as well as parent efforts to solicit information or provide supervision. Both parent and youth monitoring-related behaviors may lead to actual parental knowledge of youth activities. Much of the recent literature on monitoring has attempted to identify which aspects of this monitoring process are linked with risky behavior. Cross-sectional studies have suggested that parent efforts

to solicit information and parental knowledge may be important aspects of the monitoring process (Fletcher, Steinberg & Williams-Weaver, 2004; Soenens, Vansteenkiste, Luyckx, & Goossens, 2006). A few recent longitudinal studies suggest that child disclosure may be the strongest component of monitoring over time (Kerr, Stattin, & Burk, 2010; Keijsers, Frijns, Branje, & Meeus, 2010). Several scholars now argue that child disclosure may be the most important protective factor against problem behavior and a new line of research has begun that examines factors that predict child disclosure.

Important questions remain regarding the monitoring process. Analyzing monitoring by its specific components has provided important information, particularly on the importance of youth disclosure (Kerr, Stattin, & Burk, 2010; Stattin & Kerr, 2000). Yet, most studies on monitoring aim to pit one aspect of the monitoring against other aspects, which is not how monitoring emerges in natural family settings, where parents and youth are likely engaging in multiple monitoring behaviors or strategies at the same time. Research has yet to identify effective *combinations* of monitoring behaviors.

Further, few studies focus on the adolescent transition, helping us to understand how parents may need to adjust monitoring early in adolescence. This is important, as earlier successful parenting strategies may no longer be effective. Parents and youth spend less time together during adolescence, as youth spend more time with their peers (Larson et al., 1996). At the same time, youth may begin engaging in risk taking activities. This increased separation may make it more difficult for parents to track and supervise youth activities which may lead to an increased reliance on youth disclosure for information. Some studies suggest that too much parental control during the adolescent period may be viewed as a threat to an adolescents' growing sense of autonomy and that youth may view some aspects of control as an invasion of their privacy (Hawk, Hale, Raaijmakers, & Meeus, 2008; Marshall & Chassin, 2000). Yet, parental supervision and control may still be important, especially during early adolescence, as

the slow development of the prefrontal cortex may limit an adolescent's ability to use higher ordered thinking when making decisions, especially under conditions of high peer pressure (Nelson et al., 2004; Steinberg, 2007). Tensions may emerge in families, as parents need to encourage the development adolescent self-efficacy and autonomy, while still providing sufficient structure and supervision.

A person-oriented approach to monitoring may shed light on this important protective factor during the middle school period. By using latent class and latent transition analysis, the proposed study will identify patterns of parental monitoring behaviors used in families and investigate the relationship between these combinations of monitoring behaviors and youth risky behavior over the middle school period (Collins & Lanza, 2010). This work will have implications for interventions by specifying which patterns of monitoring are associated with risky behavior, how monitoring profiles may relate to other aspects of the parent-child relationship, and how effective monitoring behaviors may change over the middle school period.

This study uses data from the PROSPER project (Promoting School-Community-University Partnerships to Enhance Resilience), an effectiveness trial of preventive interventions among rural youth. The PROSPER project is a unique dataset to facilitate this analysis, as it provides reports on monitoring-related activities from parent and youth perspectives. This is important, as parents and youth may have very different perceptions of monitoring, especially in families where youth disclose low levels of information (Cottrell et al., 2003; Crouter & Head, 2002; Lippold, Feinberg, & Greenberg, 2011).

The project contains two research studies with specific research aims. The first cross-sectional paper identifies combinations of monitoring behaviors used in mother-youth dyads in sixth grade, at the entrance into middle school. Paper 1 addresses three specific research questions. First, what unique patterns of monitoring behaviors are used in mother-youth dyads (e.g., monitoring latent classes) during 6th grade? Mother and youth reports of parental

solicitation of information, parental supervision, youth disclosure, parent and youth communication and parental knowledge will be used to identify monitoring latent classes. Second, are these monitoring latent classes the same for boys and girls? Lastly, do child risky behavior and other aspects of the mother-child relationship predict membership in these latent classes in 6th grade? Predictors of class membership will include measures of youth risky behavior such as early initiation of substance use, substance use expectancies, delinquency, and deviant peer associations as well as other family based protective factors, such as the affective-quality of the parent-child relationship, consistent discipline, and quality of parent-youth communication.

The second paper extends this work longitudinally over the middle school period using Latent Transition Analysis. The second paper addresses three additional research questions. First, what are the patterns of monitoring behaviors used in mother-youth dyads between Grade 6 and 8? Mother and youth reports of parental solicitation of information, parental supervision, youth disclosure, parent-youth communication, and parental knowledge at Grade 6 and 8 will be used to identify monitoring profiles (i.e. Latent statuses). Second, what are the normative patterns of change between these monitoring profiles between Grade 6 and 8? Lastly, how does youth substance use relate to changes in these patterns of monitoring from Grade 6 to 8? The dissertation concludes with a discussion of intervention implications and areas for future research.

Chapter 2

Study 1: A Person Oriented Approach to Studying Parental Monitoring at the Entrance to Middle School

Overview

Parental monitoring, defined as active parental tracking of youth activities and active efforts from parents to solicit information from youth, and parental knowledge of youth activities have been identified as important protective factors for youth risky behaviors, such as delinquency, substance use, and risky sexual behavior. Low levels of monitoring have been associated with high levels of adolescent problem behaviors (for a review, see Crouter & Head, 2002 or Stattin, Kerr, & Tilton-Weaver, 2010). Recent conceptualizations of monitoring frame it as a transactional process that includes both parent and youth behaviors. Parent monitoring behaviors include active efforts to solicit information from youth, set rules about youth behavior, or provide supervision. Youth are also active agents in the monitoring process, deciding which information to disclose to their parents (Kerr, Stattin, & Burk, 2010; Soenens, Vansteenkiste, Luyckx, & Goossens, 2006). Both parent and youth actions may lead to actual parental knowledge of youth activities (Fletcher, Steinberg, & Williams-Weaver, 2004). This paper takes a broad approach to parental monitoring, conceptualizing it as process that includes parent, youth and joint parent-youth behaviors.

At present, the field's measures and methods of studying monitoring do not fully capture this monitoring process. Monitoring behaviors do not occur in isolation; parents and youth are likely engaging in monitoring related behaviors simultaneously. Further, parents and youth are likely to have different perceptions of monitoring activities, especially when youth do not disclose information (Stattin & Kerr, 2000; Smetana, Metzger, Gettman, & Campione-Barr, N.

2006). Therefore, a more integrative approach to monitoring would identify *combinations* of monitoring behaviors and integrate the reports of parents and youth.

This study adopts a person-oriented approach in order to model monitoring in a way that may more closely resemble the actual monitoring process. First, Latent Class Analysis is used to identify the specific patterns of maternal and youth monitoring behaviors in mother-youth dyads at the entrance to middle school. Specifically, youth and mother reports of the following monitoring behaviors are used in our models: parent active efforts to monitor youth (where parents ask youth for information), supervision (where parents or another adult are present to observe youth behaviors), parental knowledge (what parents know about youth activities) and youth disclosure (the information youth share with their parents). As Crouter and Head conclude (2002), the field has inconsistently measured and defined parental monitoring, and measures of supervision, control, and knowledge have been inconsistently combined in studies. Therefore, all of these constructs were used in the models, as they have been defined as important aspects of monitoring in prior studies (Crouter & Head, 2002). Using multiple reporters and multiple measures, this study first identifies emergent patterns (latent classes) of monitoring. Then, this study investigates how the identified monitoring latent classes are associated with early adolescent problem behaviors and other aspects of the parent-youth relationship.

Defining Parental Monitoring

Parental monitoring has been inconsistently defined and measured. Many studies measure parental knowledge of youth activities, which is presumed to be the outcome of, and hence indicator of, parent active efforts (Stattin & Kerr, 2000). Other studies have combined items on parental knowledge with measures of parental control and supervision (Crouter & Head, 2002 ; Pettit, Bates, Dodge, & Meece, 1999). Although monitoring has been linked to problem

behavior, the lack of specificity in the construct has made it difficult to identify which specific parent and youth monitoring behaviors are protective (Crouter & Head, 2002).

Recent variable-oriented studies have begun to identify the effects of distinct aspects of monitoring on youth problem behavior. In their seminal paper, Stattin and Kerr (2000) found that youth 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). While some studies have replicated Stattin and Kerr's findings (Keijsers, Branje, VanderValk, & Meeus, 2010; Stattin, Kerr, & Burk, 2010), other studies have found that parent efforts to monitor youth through behavioral control or solicitation may also be important in preventing youth delinquency and substance use (e.g., Fletcher et al., 2004; Soenens et al., 2006, Vieno, Nation, Pastore, & Santinello, 2009). Overall, these variable-oriented studies confirm that youth disclosure, parent active efforts to solicit information from youth and to set rules about youth's behavior, and parental knowledge may all be protective against problem behavior.

The Need for a Person-Oriented Approach

These recent variable-oriented studies have provided greater detail on the effects of specific aspects of monitoring, on average. However, these analyses rely on multiple regression or structural equation approaches to explore how one aspect of monitoring (e.g., disclosure) influences youth outcomes while controlling for other monitoring related behaviors (e.g., solicitation) (Fletcher et al., 2004; Kerr, Stattin, & Burk, 2010). It is difficult to capture the influence of patterns of monitoring using these approaches, as limited power makes it difficult to detect the complex interactions between different variables (Bergman, Cairns, Nilsson, & Nystedt, 2000; Bergman & Trost, 2006). Further, as both youth and parents are engaging in

many monitoring-related behaviors, the effects of one particular aspect of monitoring may vary depending on the other constellations of behaviors used in a family. For example, high amounts of parental solicitation may be protective only when they co-occur with high levels of youth disclosure. Therefore, monitoring may be best understood from a person-oriented perspective, in which researchers explore the effects of the whole monitoring process on youth behavior, rather than trying to isolate individual aspects.

In contrast to variable-focused models, person-oriented models, such as Latent Class Analysis, allow researchers to identify subgroups of families that use particular combinations of monitoring behaviors, and to explore how family processes may differ between these subgroups (Bergman et al., 2000; Bergman & Trost, 2006). A person-oriented approach that incorporates multiple reporters and multiple behaviors will shed new light on the nature of this important parent-child process.

Integrating Multiple Reporters

To date, most studies on monitoring use only one reporter (e.g., Barnes et al., 2006) or run separate models for youth and parent reports of monitoring (e.g., Stattin & Kerr, 2000). To fully capture the patterns of monitoring, the perspectives of both parents and youth should be included. Parents and youth may have different perceptions of parental monitoring, especially when youth are not disclosing information to their parents. In fact, studies suggest that parents may both over-estimate their own knowledge and youth disclosure (Cottrell et al., 2003; Smetana et al., 2006). Such biases may influence parent decisions on the amount of structure to provide to youth to ensure healthy development. In fact, research indicates differences in findings based whether or not monitoring is reported by mothers, fathers, or youth (e.g., Keijsers et al, 2009, 2010; Kerr, Stattin, & Burke, 2010).

Only two published studies have integrated parent and youth reports of monitoring into the same model. These studies suggest that differences in parent and youth perceptions of monitoring may be associated with high levels of problem behavior. Lippold, Greenberg, & Feinberg (2011) found that higher mother than youth ratings of parental knowledge were associated with delinquency and less healthy attitudes towards substances. Similarly, De Los Reyes et al. (2010) found that consistent discrepancies in parent and youth perceptions of parental monitoring were linked to higher levels of problem behavior two years later. Taken together, these studies suggest that estimation biases in parental monitoring are important; maternal overestimation of monitoring may be a risk factor for problem behavior. More studies on parental monitoring that integrate parent and youth perspectives, are needed.

Placing Monitoring in the Broader Context of the Parent-Youth Relationship

Parental monitoring is likely influenced by other aspects of the parent-youth relationship yet its relationship to the broader family context is understudied. Theoretically, the emotional climate of the family may be associated with increased receptivity to parental monitoring, lending support to Darling and Steinberg's (1993) conceptualization that the emotional aspects of the parent-youth relationship may moderate the effects of specific parenting actions on youth outcomes. In families with coercive cycles and patterns, unsuccessful monitoring behaviors may trigger negative emotional reactions in parents, leading to feelings of low self-efficacy and parental disengagement (Bandura, 2001; Dix, 1991; Patterson, DeBaryshe, & Ramsey, 1989). Parental monitoring behaviors may be influenced by youth perceptions of parental enforcement of rules or consistent discipline (Stattin, Kerr, & Tilton-Weaver, 2010). Youth may decide whether or not to disclose information depending on their perceptions of parental consequences and

reactions to the information shared (Tilton-Weaver et al., 2009). Yet, there have been few studies that have explored how monitoring relates to broader parent-youth relationship and most of the studies that have been conducted focus only on the affective quality of the parent-youth relationship.

There is some evidence that the emotional aspects of the parent-youth relationship may predict or moderate aspects of the monitoring process. A warm and positive parent-youth relationship, characterized by mutual trust has been associated with increased higher levels of adolescent disclosure (Kerr, Stattin, & Trost, 1999; Smetana et al., 2006; Soenens et al., 2006) and parental knowledge (Fletcher et al., 2004; Soenens et al., 2006). Findings on the potential moderating effects of the affective relationship on the monitoring process have been mixed. Keijsers et al. (2009) found that in highly supportive families, maintaining high levels of parental control were linked to more delinquency whereas in unsupportive families, decreases in control were associated with increases in delinquency. However other studies, such as Kerr and Stattin (2010) conclude there is little evidence that the affective quality of the parent youth relationship moderates the monitoring process in early adolescence.

This Study

The present study explores associations between combinations of parental monitoring behaviors and early adolescent problem behavior and other qualities of the parent-child relationship. This study fills an important gap in the literature. By taking a person-oriented approach, this paper identifies the combinations of monitoring behaviors used in mother-youth dyads. The study models include several distinct aspects of monitoring, allowing this study to capture a broad range of parent, youth and joint monitoring activities. Both mother and youth

reports of monitoring are incorporated into the models in order to capture important differences in their perceptions.

This study is focused on 6th graders, who are in transition to adolescence, before many youth engage in substance use and other deviant behavior. Sixth graders are the focus of this study for two reasons. First, parents may need to adapt their monitoring behaviors during the adolescent transition in order to balance youth control with a growing need for autonomy (Nelson, Leibenluft, McClure, & Pine, 2004; Steinberg, 2007). Youth may spend less time with their parents and more time with their peers, making it more difficult to track or directly observe youth activities (Smetana et al., 2006; Larson et al., 1996). Second, studying parental monitoring at the transition to adolescence provides information on early starters of problem behavior, a group that has consistently been identified as high-risk for later problem behavior (Patterson, DeBaryshe, & Ramsey, 1989) and later substance abuse problems (DeWit, Adlaf, Offord, & Ogborne, 2000; Grant & Dawson, 1997). Because of the low prevalence of substance use at this age, this study also includes measures of substance use expectancies. Substance use expectancies, the attitudes youth hold about substances, have been consistently linked to increased risk of future substance use. Youth who perceive drinking to have more social benefits and to be common among peers may be more likely to use substances (Callas, Flynn & Worden, 2004; Patel & Fromme, 2009).

Plan of Analysis

Latent Class Analysis (LCA) is used to identify combinations of monitoring behavior used in dyads. Latent Class Analysis is a measurement model that identifies latent subgroups of individuals in a population based on responses to a set of observed categorical items (e.g., latent class indicators). Similar to factor analysis, LCA accounts for measurement error. However,

unlike factor analysis, in which the latent variable is continuous, LCA identifies a set of mutually exclusive categorical subgroups (for a full description of LCA see Collins & Lanza, 2010; Lanza, Collins, Lemmon, & Schafer, 2007). Because Latent Class Analysis is primarily an exploratory technique, researchers typically do not generate a priori hypotheses about the specific latent class solution. Thus, although based on prior literature it is expected that classes with high, low, and discrepant patterns will emerge, this study does not generate or test specific hypotheses about the latent class structure. However, after the latent class solution is identified, this study tests specific hypotheses about two types of predictors (e.g., risky behavior and aspects of the parent-youth relationship) are associated with latent class membership. Using a diverse set of predictor variables allows researchers to gain confidence in the construct validity of the latent class solution.

Mother and youth reports of monitoring constructs were used to identify the latent classes and were dichotomized to indicate high or low levels of behaviors based on a median split. A median split was selected because it is important to consider levels of knowledge relative to other mothers or youth and because the field has yet to identify the specific level of monitoring behaviors that are protective. LCA was chosen over latent profile analysis because many of the monitoring measures were skewed, with pronounced ceiling effects that could not be corrected by statistical transformations. Therefore categorical analysis may be more appropriate than latent profile analysis, which uses continuous variables, but assumes normality (Collins & Lanza, 2010; Feldman, Masyn, & Conger, 2009; Steinley & Brusco, 2011).

The monitoring latent classes are formed using measures of active parent efforts to monitor youth, supervision, maternal knowledge, youth disclosure, and maternal-youth communication. Active efforts to monitor are defined as as mother-driven attempts to solicit information from youth. Parental supervision is defined as as whether or not a parent or another adult is present to observe youth activities. Maternal knowledge is defined as the extent to which

mothers are aware of the location and activities of youth. The amount of communication between mothers and youth is defined as the frequency in which mothers and youth report discussing daily activities. Youth disclosure is defined as youth decisions to share their thoughts and feelings with their mother. This study's measure of youth disclosure does not specifically measure disclosure of activities, commonly used in the literature. However, analysis in a frequently cited dataset (Stattin & Kerr, 2000) suggests that youth disclosure of thoughts and feelings is highly correlated with youth disclosure of information ($r = .67$), suggesting it may be an effective proxy.

Once the latent classes are identified, multinomial logistic regression is used to investigate the relationship between these latent classes and a series of covariates (Collins & Lanza, 2010). The risky behavior variables include: early adolescent problem behavior, such as substance use, attitudes towards substances, delinquency, and antisocial peer associations. The relationship variables include affective quality, consistent discipline, trust, and quality of communication.. In addition, classify-analyze techniques were used to explore mean differences between study covariates by latent class. For this analysis, each dyad was assigned to the latent class with the highest probability of membership. Then, mean differences in covariates (risky behavior and the parent-child relationship variables) were explored using ANOVA and post-hoc Tukey tests.

Method

Study Design and Participants

This study uses a subset of 796 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 (for more information see Spoth, Greenberg, Bierman, & Redmond, 2004). Participants in PROSPER resided in 28 rural communities and small towns in Iowa and Pennsylvania (14 communities were in the intervention condition, 14 in the control condition). The PROSPER project involved youth from two successive cohorts of sixth graders from the 28 project communities. Students in each of the two PROSPER 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 youth. A total of 2267 families were recruited for in-home family assessments; of these, 979 (43%) completed the assessments. Targeted sample sizes 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 interview, and written questionnaires completed independently by the youth, mother, and if present, father. Family interactions were also videotaped. As recommended by Collins & Lanza (2010) all cases with missing data on covariates were deleted for this analysis. Therefore, the current study includes data from 796 youth and their mothers who had complete data on the covariates at Wave 1, in the Fall of Grade 6.

To test for selection bias in the in-home sample, youth in the in-home sample were compared to youth in the total sample 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 total in-school 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 significant 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 in-school sample ($M = .58, SE = .06$ 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. $4.71, SE = .02$): $F(1, 27) = 12.36 p < .01$.

The demographics of the sample are as follows. The mean age of the youth in the sample is 11.3 years ($SD=.49$); the mean age of their mothers is 38.7 ($SD=6.05$) and of their fathers is 41.2 ($SD=7.14$). Sixty-one percent of youth resided in Iowa and 39% lived in Pennsylvania. The average household income was \$51,000 (in 2003) and 62% of youth had parents with some post-secondary education. The average number of youth in the home was three ($SD=1.56$). Most of the youth in the 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 the sample were male and 53% were female.

Measures

Measures include constructs in three domains: maternal monitoring activities, youth risky behavior, and other aspects of the mother-youth relationship. Maternal monitoring and parenting measures were gathered from in-home data collection. Because previous research suggests that youth are more likely to report substance use initiation and delinquency if asked in school, rather than home settings, PROSPER in-school data was used for the measures of youth substance use initiation and delinquency (Redmond, Schainker, Shin, & Spoth, 2007); these measures were

gathered within months of the home visit. All items were adapted from the Iowa Youth and Families Project (Conger, 1989; McMahon & Metzler, 1998; Spoth, Redmond, & Shin, 1998). Means of study variables can be found in Table 2-1.

Monitoring-related activities

All items in parental monitoring scales were recoded so that higher scores indicate higher levels of each construct.

Maternal knowledge of youth activity. Mother and youth perceptions of maternal knowledge were measured using comparable five-item Likert-type items [1=always to 5=never]. For example, mothers were asked to rate how often they know where their youth is and who their youth is with when he or she is away from home. 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?"). The Cronbach alpha for the scale was .66 for mother reports and .68 for youth reports about their mothers.

Parental active efforts to monitor. Mother and youth perceptions of maternal efforts to solicit information from youth are measured using five comparable Likert-type items [1= almost always true to 5 = almost always false]. Examples of items include 'Most afternoons or evenings I ask my youth if she/he has homework to do for the next day', "I expect my youth to let me know in advance who will be driving for my youth and his/her friends when they go out (to parties, movies, etc.)". Youth were asked similar questions about their parents (e.g., "I'm expected to let my parents know in advance who will be driving for friends and me when I go out"). The Cronbach alpha for the scale was .66 for mother reports and .69 for youth reports.

Parental supervision. This scale measures mother and youth perceptions of parental supervision. Mothers were asked to rate how often (1) Is an adult home when your youth gets

home from school and (2) Does your youth get home from school before either you or your partner are home. Youth were asked the same questions about their parents (e.g., “How often is an adult home when you get home from school”) [1= always to 5 = never]. The alpha for the scale was .81 for mother reports and .73 for youth reports.

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].

Amount of communication. These scales capture the amount of communication between parents and youth without specifying the initiator of such conversation. Examples of items include how often mothers and youth talk about plans for the day, his or her school work, what’s going on in his or her life. All items are on 1-4 Likert-type scales where a low score indicates infrequent communication (e.g. “never”). The mother report scale includes 8 items and has a Cronbach alpha of .74. The youth report scale contains four items and has an alpha of .71.

Youth Risky Behavior

All youth- reported outcome measures were derived from the PROSPER in-school data and were coded so that high scores indicate more risky behavior. All 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].

Substance use expectancies. Substance use expectancies were measured using an eleven item scale about how youth perceive that 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 youth perceive more benefits from using substances. The alpha is .92.

Delinquency. Delinquency was measured with a twelve-item scale in which dichotomous questions were summed which asked whether the youth had engaged in a deviant behavior in the past twelve months. Examples of specific 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” [0=no, 1=yes]. The Alpha is .69.

Antisocial peer associations: Three items measured whether participants’ closest friends engaged in antisocial behavior. An example includes: “These friends sometimes get into trouble with the police.” Responses were scored on a Likert scale ranging from “Strongly Disagree” (1) to “Strongly Agree” (5). Cronbach’s alpha was .79.

Parent-Youth Relationship Scales

All items in parent-youth relationship scales were recoded so that higher scores indicate more positive parent-youth relationships. All items were adapted from the Iowa Youth and Families Project (Conger, 1989; McMahon & Metzler, 1998; Spoth, Redmond, & Shin, 1998).

Quality of communication. These scales capture the amount of positive communication between parents and youth. The mother-report scale includes 6 items on a 1-5 Likert-type scale. The youth-report scale has 5 items on a 1-7 scale. Example items include how often the mother

listens to the child's point of view, criticizes the child's ideas, and appreciates the child's ideas. The Cronbach alpha for the youth report is .84 and mother report is .76.

Affective quality of the mother-youth relationship. Two subscales were used; one that measured positive affective quality and another that measured negative affective quality. The positive affective quality scale included three items. An example item asked how often in the past month the mother "Let this youth know you really care about him/her" [on a 1-7 scale where 1=always to 7= never]. Negative affective quality was measured by four items. An example item is "When this youth does something wrong, how often do you lose your temper and yell at him or her" [on a 1-5 scale where 1=always to 7= never]. Youth were asked similar items about interactions with their mother. The alpha of the positive affective quality scales were .86 for mother report and .79 for youth report and for the negative scales, .82 for mother report and .77 for youth report.

Consistent discipline. A three item scale was created to measure consistent discipline. On a one to five scale, mothers were asked to rate how they relate to their youth in the study [1= always, 5=never]. Examples of items include "Once a discipline has been decided, how often can he or she get out of it?" and "How often do you discipline this youth for something at one time and then at other times not discipline him or her for the same thing?" The same items were asked to youth about interactions with their mothers. The alpha for this scale is .70 for mother report and .56 for youth report.

Maternal Trust: Maternal trust was measured with one item "I really trust this child", on a 1-5 scale where 1 indicates "strongly agree" and 5 indicates "strongly disagree".

Results

Model Identification

Using SAS Proc LCA (Collins & Lanza, 2010), a series of models with one to seven latent classes were examined to identify the best fitting latent class model using set of 100 randomly selected starting values (See Table 2-2). The final model was chosen based on fit statistics and conceptual clarity. The AIC (Akaike Information Criterion; Akaike, 1987) and the BIC (Bayesian Information Criterion; Schwarz, 1978) were used to assess model fit (Coffman et al., 2007). The four class model had the lowest BIC but the five class model had the lowest AIC. It is not unusual for model fit indices to disagree on the best solution. As recommended by Collins and Lanza (2010), the five class solution was selected as the final model because it had more distinct latent classes than the four class solution. Because some of the item response probabilities were zero, a rho prior statement was added to the final model to estimate standard errors (for a full description of LCA, see Collins & Lanza, 2010).

LCA estimates two types of model parameters (Table 2-3); the probability of membership in each monitoring latent class and item response probabilities. Membership probabilities indicate the proportion of the sample estimated to be in each monitoring latent class (i.e., the prevalence) and range from 0 to 1. Item response probabilities, in contrast, indicate the probability that a mother-youth dyad will use a high level of each monitoring strategy given membership in a monitoring latent class. Item response probabilities range from 0 to 1. An item response probability of .5 would indicate a 50% chance that mother-youth dyads in a particular latent class have high levels of a particular behavior (e. g. supervision). Item response probabilities that are very high or low are most useful for determining differences between latent classes (Collins & Lanza, 2010).

The final model contains five monitoring latent classes termed: High Monitors (26%), Communication-Focused (18%), Supervision-Focused (30%), Maternal Over-Estimators (10%), and Low Monitors (17%). *High Monitors* (26%) are mother-youth dyads characterized as having a high probability (greater than .70) of being above the median on all monitoring behaviors according to both mothers and youth. Mothers and youth in the *Communication-Focused* (18%) class report a high probability of being above the median in youth disclosure, solicitation, and communication (above .60 for these monitoring behaviors), but they both report a low probability of being above the median for supervision (only .19 based on youth report and .13 based on mother report). This pattern of item response probabilities suggests that Communication-Focused dyads monitor primarily through communication that includes parent monitoring efforts, youth sharing of information, and high levels of parental knowledge. In contrast, youth and mothers in the *Supervision-Focused* class (30%) report a very high probability of being above the median on supervision, but they report average or low probabilities of being above the median for all other monitoring strategies. Dyads in this class have a low probability of being above the median in child disclosure, with item response probabilities of .31 for youth reports. Dyads in the *Maternal Over-Estimators* (10%) class differ by reporter and are characterized by a high probability of being above the median in monitoring behaviors based on mother reports but a low probability of these same behaviors based on youth reports (for example, .98 for mother report of knowledge vs. .28 for youth report). *Low Monitors* (17%) report a low probability of being above the median on all monitoring behaviors regardless of reporter.

Measurement Invariance by Gender

Additional analyses were conducted to test if the latent class structure was the same for boys and girls. A two group latent class model by gender was run to test for measurement

invariance. The g-squared values of a model where item parameters were allowed to vary [$G^2 = 775.88$, $df=925$] was compared to a model where they were constrained to be equal [$G^2=842.64$, $df=970$]. The differences between these two models was not significant [$G^2_{diff}=48.76$, $df=45$, $p>.05$] suggesting no substantial gender differences. Second, latent class models were fit separately for boys and girls. For both genders, the five class solution was the best-fitting model, with adequate model identification and the lowest AIC. Further, model parameters and the conceptual meaning of the classes were the same for boys and girls (not shown).

Latent Class Analysis with Covariates

Multinomial logistic regression was used to predict latent class membership using LCA with covariates. In the study models, risky behavior and other aspects of the parent-youth relationship were conceptualized as predictors of membership in a specific latent class (Collins & Lanza, 2010). The odds ratio indicates the change in odds of membership in a particular class (relative to a reference class), given a one standard deviation increase in the covariate. Because prior studies suggest high levels of parent and youth monitoring behaviors are protective against problem behavior (Crouter & Head, 2002), the High Monitor class was chosen as the reference class for all analysis. Odds ratios greater than 1.0 indicate an increased odds of membership in a latent class relative to the reference class, while those less than one indicate decreased odds. A separate model was run for each risky behavior and parent-youth relationship covariate, all continuous variables were standardized, and both the odds and inverse-odds ratios are included (for a more detailed description see Collins & Lanza, 2010).

It was hypothesized that early risky behavior will be associated with an increased likelihood that a mother-youth dyad is a member of the Low Monitors and Communication-Focused class (as these classes have low levels of supervision) relative to the High Monitors

class. It was expected risky behavior to be associated with increased odds of membership in the Maternal Over-Estimators class, as prior studies have found maternal overestimation of monitoring to be a risk factor for problem behavior (De Los Reyes et al., 2010; Lippold, Greenberg, & Feinberg, 2011). It was expected that mother-youth dyads with strained parent-youth relationships and inconsistent discipline will be more likely to be in the Low Monitors class, as this class may represent coercive patterns, where parents disengage from monitoring in the context of a negative parent child relationship (Dishion, Nelson, & Bullock, 2004; Patterson, DeBaryshe & Ramsey, 1989).

Control Variables

First, this study tested if four control variables significantly predicted latent class membership; gender, dual biological parent status, parent education, and intervention status. Two control variables were significant predictors: gender ($G^2_{diff}(4)=13.47, p<.05$) and dual biological parent status ($G^2_{diff}(4)=15.37, p<.01$). The odds of being in the Low Monitors and Supervision-Focused classes relative to the High Monitors class were significantly higher for boys than girls (see Table 2-4). Youth in homes with both biological parents were less likely to be in the Low Monitors class. Parent education and condition were not significant predictors of class membership.

Risky Behavior

Next, this study tested the association between youth risky behavior and latent class membership, including dual biological parent status and gender as control variables. All risky behavior variables were significant predictors of latent class membership (See Table 2-4) and were coded so higher scores indicate more problem behavior. Significant odds ratios (where a 1 was not in the estimate confidence interval) are indicated with an asterisk.

A general pattern emerged; increases in risky behavior was associated with increased odds that a dyad was in the Supervision-Focused, Maternal Over-Estimators and Low Monitors class relative to the High Monitors class. For example, a one standard deviation increase in substance use initiation was associated with a 47% increase in the odds of being in the Supervision-Focused class and , a 39% increase in the odds of being in the the Low Monitors class relative to the High Monitors class. A one standard deviation increase in perceiving benefits from substance use (substance use expectancies) was associated with increased relative odds of being in the Supervision-Focused, Maternal Over-Estimators, and Low Monitors classes. It should be noted that the odds ratios for the Maternal Over-Estimators only reached statistical significance for substance use expectancies and not other risky behaviors.

The Parent-Youth Relationship

Next, the association between membership in monitoring latent classes and other aspects of the parent-youth relationship were examined, such as affective quality, consistent discipline, quality of communication, and maternal trust. Controlling for gender and dual biological parent status, all parent-youth relationship variables were significant predictors of latent class status

($p < .001$; See Table 2-4). As higher scores on relationship variables indicated positive maternal-youth relationships, inverse odds ratios are also used in data interpretation.

In general, both youth and mother reports of negative parenting characteristics were associated with a large increase in the odds of membership in the Supervision- Focused and Low Monitors classes, relative to the High Monitors class. As seen in the inverse odds ratios, a one standard deviation decrease in the quality of communication was associated with a 9.09 increase in the odds of being in the Low Monitors class relative to the High Monitors class according to youth reports and a 5.26 increase based on mother reports. A one standard deviation increase in negative affective quality nearly doubled the odds of being in the Supervision-Focused class relative to High Monitors (with inverse odds ratios of 2.12 for youth and 2.08 for mothers). The odds of being in the Supervision-Focused class relative to the High Monitors class increased five times for every standard deviation decrease in positive affective quality based on youth reports (and 6.25 times based on mother reports).

In contrast, there were minor differences in the relative odds of membership in the Communication-Focused and High Monitor classes. Although negative parenting characteristics were often associated with increased odds of membership in the Communication-Focused class relative to the High Monitors class, these odds ratios tended to be smaller, indicated by odds ratios closer to 1 and only three of them were significant: mother reports of positive affective quality, consistent discipline, and trust. For example, based on youth reports, a one standard deviation decrease in positive affective quality increased the odds of being in the Communication-Focused class by 30% (inverse odds ratio=1.30); a standard deviation decrease in communication increased the odds by 43% (inverse odds ratio=1.43).

As expected for the Maternal Over-Estimators class, different patterns emerged based on whether or not parenting was being reported by mothers or youth. For example, for every standard deviation decrease in the quality of communication as reported by youth, the odds of

being in the Maternal Over-Estimators class relative to the High Monitors class increase by 7.14 (Inverse OR). However, when mother reports are used as the covariate, the odds actually decrease (indicated by an Inverse odds ratio of .93 which is non significant). A one standard deviation increase in consistent discipline is associated with a nonsignificant 4% increase (odds ratio = 1.04) in the odds of being in the Maternal Over-Estimators class relative to the High Monitors class based on mother report, but significantly decreased odds (odds ratio=.49) based on youth reports. A few reporter differences can also be seen with respect to other classes. For example, the odds of being in the Communication-Focused class relative to the reference class is associated with a decrease of .77 for every one standard deviation increase in positive affective quality according to youth reports (which is not statistically significant), but only by .44 based on mother reports.

Classify-Analyze

In addition to logistic regression, this study also explored mean differences in covariates between latent classes. First, each individual case was assigned to a latent class. Then ANOVA techniques were used to explore mean differences between latent classes.

Using the final five class solution, the classify- analyze technique first estimated the probability that an individual mother-youth dyad will belong to each monitoring latent class. Then, each individual mother-youth dyad was categorized into the monitoring latent class in which they had the highest probability of membership, creating five groups of cases that mirror the five latent classes. Classification led to similar frequencies as the latent class analysis prevalence estimates, with 26.6% of cases in the High Monitors group (n=212), 16.7% in the Communication-Focused group (n=133), 32.1% in the Supervision-Focused group (n=256), 9.4% of cases in the Maternal Over-Estimators group (n=75), and 15.1% in the Low Monitors group

($n=120$). The average highest probability of latent class membership was .82 ($SE=.17$) with a range from .33 to .98. Sixty-six percent had a probability over 75% and 82% had a probability over 60%. Within each latent class, the average probability of membership ranged from .69 ($SE=.18$) in the Maternal Over-Estimators group to .87 ($SE=.15$) the Low Monitors group. ANOVA and post-hoc Tukey tests were used to test for mean differences outcomes between monitoring latent classes.

Risky Behavior

To test for differences in mean levels of risky behavior, ANOVA and post hoc Tukey tests were used. Significant group differences were found for two covariates; gender ($F(4, 791) = 3.30, p<.05$) and dual biological parent status ($F(4, 791) = 3.52, p<.01$), thus they were included as control variables in the models. All covariates passed the homogeneity of variance assumption test except for one. When predicting substance use expectancies, a significant interaction was found between dual biological parent status and the monitoring latent classes, indicating that the relationship between latent classes and expectancies may differ depending on whether or not youth live with two biological parents. Therefore, the models for substance use expectancies included this interaction term. Significant mean differences were found between the monitoring latent classes for substance use initiation ($F(6, 789) = 2.66, p<.05$) and antisocial peer behavior ($F(6, 789) = 4.18, p<.01$), and for the interaction between substance use expectancies and dual biological parent status ($F(4, 785) = 3.83, p<.01$). The association between delinquency and the monitoring latent classes approached, but did not reach statistical significance [$F(6, 789) = 2.23, p=.06$] (See Table 2-5).

Overall, a pattern emerged where youth in the High Monitors and Communication-Focused class had the lowest mean levels of risky behavior, with the Supervision-Focused,

Maternal Over-Estimators, and Low Monitors monitoring groups having relatively high mean levels of problem behavior. Post-hoc Tukey tests revealed significant mean differences between individual monitoring latent classes that varied somewhat by dependent variable. Youth in the High Monitors class had the lowest levels of all of the dependent variables and had significantly lower mean levels of substance initiation and antisocial peers than youth in the Supervision-Focused class [(for substance use, $M=.28$ $SE=.05$ vs $.45$ $SE=.04$; for antisocial peers $M=1.34$ $SE=.05$ vs $M=1.50$, $SE=.04$). In addition, youth in the High Monitors class who were not living with dual biological parents were significantly less likely to perceive benefits from using substances than youth in the Supervision-Focused, Low Monitors and Maternal Over-Estimators classes ($M=1.16$ $SE=.05$ vs 1.34 , $SE=.04$, $M=1.39$ $SE=.05$; $M=1.60$ $SE=.07$). Youth in the Communication-Focused class also had relatively low risk; youth in this latent class had significantly fewer antisocial peer associations than youth in the Supervision-Focused class ($M=1.25$ $SE=.06$ vs $M=1.50$, $SE=.04$) and perceived fewer benefits from using substances than youth in the Maternal Over-Estimators class, who had the highest level of risky substance use expectancies ($M=1.17$ $SE=.05$ vs $M=1.60$ $SE=.07$). In fact, youth in the Maternal Over-Estimators class in mother-youth dyads without dual biological parents had the highest level of risky substance use expectancies.

The Parent-Youth Relationship

Significant mean differences were found between monitoring groups for all of the parenting variables, even when controlling for dual biological parent status and gender (see Table 2-5)[For quality of communication youth report $F(6, 789) = 44.10$, $p<.001$, mother report $F(6, 789) = 33.76$, $p<.001$; for negative affective quality, youth report $F(6, 789) = 15.74$, $p<.001$, mother report $F(6, 789) = 8.30$, $p<.001$; for positive affective quality youth report $F(6, 789) =$

31.02, $p < .001$, mother report $F(6, 789) = 32.77$, $p < .001$; for consistent discipline youth report $F(6, 789) = 5.84$, $p < .001$, mother report $F(6, 789) = 8.64$, $p < .001$; for trust, mother report only $F(6, 789) = 14.93$, $p < .001$].

Overall, a general pattern emerged where youth and mothers in the High Monitors and Communication-Focused class reported high levels of positive parenting variables. In contrast, youth and mothers in the Low Monitors and Supervision-Focused classes reported low levels of positive parenting variables (mean levels of these variables tended to be lower for mothers, especially for supervision). Youth and mothers in the Maternal Over-Estimators class had very different perceptions of parenting; youth reported low mean levels of positive parenting and parent-youth relationship variables while mothers reported high levels.

Youth in the High Monitors and Communication-Focused class reported a significantly higher quality of communication [$M=6.43$ $SD=.06$ and $M=6.35$, $SD=.08$] than the Maternal Over-Estimators, Low, and Supervision classes [$M=5.49$ $SD=.11$, $M=5.35$, $SD=.08$, $M=5.66$, $SD=.06$] (See Table 2-5). The Low Monitors had the lowest quality of communication according to both mothers and youth, and was even significantly lower than the Supervision-Focused class according to both reporters. However, whereas the Maternal Over-Estimators class was associated with a low quality of communication according to youth (it had the second lowest level among groups) it was associated with a high quality of communication according to mother reports [$M=5.49$ $SD=.11$ youth; $M=4.30$ $SD=.05$ mother).

Similar patterns can be seen based on the affective quality of the parent-youth relationship. Youth in the High Monitors class and the Communication-Focused class report significantly higher levels of positive affective quality than youth in the Maternal Over-Estimators, Low Monitors, and Supervision-Focused classes. However, whereas youth in the Maternal Over-Estimators class report relatively low levels of positive affective quality [$M=5.70$ $SD=.12$], mothers in this group report high levels of affective quality [$M=6.39$ $SD=.09$]. The

Supervision-Focused class is associated with high levels of negative affective quality, regardless of the reporter.

Consistent discipline followed a slightly different pattern. Significant differences also emerged between the High Monitors class and the Low Monitors, Maternal Over-Estimators, and Supervision-Focused classes based on youth reports. Mothers in the Supervision-Focused and Low Monitors groups also report low levels of consistent discipline, significantly lower than mothers in the High Monitors class [$M=4.87$ $SD=.05$, $M=4.87$ $SD=.07$, vs $M=5.25$, $SD=.05$]. Both the Maternal Over-Estimators and Communication-Focused class showed different patterns depending on the reporter. Whereas youth in the Communication-Focused class reported relative high levels of consistent discipline [$M=5.32$, $SD=.10$], mothers in the Communication-Focused class report low levels of consistent discipline [$M=5.01$, $SD=.07$]. In addition, mothers in the Maternal Over-Estimators class report rather high levels of discipline [$M=5.18$, $SD=.09$], significantly higher than those in the Supervision-Focused class [$M=4.87$ $SD=.05$]. In contrast, youth in the Maternal Over-Estimators class report the lowest level of discipline [$M=4.96$, $SD=.13$], significantly lower than the High Monitors class [$M=5.51$, $SD=.08$].

Discussion

The goal of this paper was to examine monitoring using a person oriented approach to identify *patterns* (i.e., latent classes) of monitoring-related behaviors as reported by *both* mothers and youth and further and to explore the association between monitoring latent classes and problem behavior and other aspects of parenting. These findings suggest that person-oriented techniques that integrate multiple reporters and multiple monitoring-related behaviors provide unique and novel information on the monitoring process (Bergman et al., 2000).

This analysis identified five latent classes of monitoring-related behaviors used in families. These latent classes correspond to distinct patterns of monitoring-related behaviors rather than simply high or low levels of each behavior, suggesting qualitative differences in the monitoring process that have not been fully identified in prior studies. The five classes were: High Monitors (mothers and youth report a high probability of being above the median in all monitoring-related behaviors), Communication-Focused (mothers and youth report a high probability of being above the median on all monitoring-related behaviors except supervision), Supervision-Focused (mothers and youth report a high probability of being above the median in supervision but a low or average probability on other monitoring-related behaviors), Maternal Over-Estimators (youth report low but mothers report high probabilities of being above the median in monitoring-related behaviors), and Low Monitors (mothers and youth report a low probability of being above the median in all monitoring-related behaviors). These classes have not been previously identified in variable-oriented models.

These patterns of monitoring have clear associations with risky behavior, suggesting that taking a person-oriented approach and exploring how monitoring-related behaviors are organized together may be key to understanding the process underlying the association between parental monitoring and risky behavior. However, this study is cross-sectional. Therefore, the direction of effects cannot be determined in these models. In other words, these patterns of monitoring-related behaviors may lead to risky behavior (a parent-driven model) or risky behavior may lead to these patterns of monitoring-related behaviors (a child-driven model). Because the direction of effects is unknown in this study, both possibilities are discussed when interpreting the findings.

Risky behavior was associated with increased likelihood of membership in the Low Monitors, Supervision-Focused, and Maternal Over-Estimators classes relative to the High Monitors and with relatively high mean levels of risky behavior in our classify analyze results. In contrast, the Communication-Focused and High Monitors Classes had relatively low mean levels

of problem behavior, suggesting the constellations of monitoring-related behaviors used in these classes may be protective against problem behavior. It is possible that the combination of monitoring-related behaviors used in the Low Monitors and Supervision-Focused classes place youth at risk for problem behavior and may not protect youth from potential negative peer influences. An alternate explanation is that youth risky behavior may elicit the patterns of monitoring-related behaviors observed on these classes. In other words, parents may disengage from some aspects of monitoring (e.g., stop soliciting information) in response to youth problem behavior.

Integrating youth and mother reports enabled us to identify the Maternal Over-Estimators Class (10% of the sample), which was characterized by a low probability of being above the median in monitoring-related behaviors according to youth, yet a high probability according to mothers. Substance use expectancies, youth perceptions that there may be benefits to using substances, was linked to increased odds of membership in the Maternal Over-Estimators class relative to the High Monitors, suggesting this group may be at risk for future substance use. Youth in the Maternal Over-Estimators class also had higher mean levels of antisocial peers and substance use expectancies than those in the Communication-Focused class. Mothers and youth in the Maternal Over-Estimators class both report an above average probability of active parent monitoring efforts, suggesting that parents are attempting to solicit information from youth. Yet, these mothers are over-estimating the extent to which these efforts are leading to actual information on youth activities, as seen by discrepancies in mother and youth perceptions of parental knowledge and the low probability of high levels of youth disclosure. This finding supports prior studies that found that maternal overestimation of parental knowledge to be associated with early adolescent problem behavior (Lippold, Greenberg, & Feinberg, 2011) and such discrepancies in monitoring to be linked to later delinquency (De Los Reyes et al., 2010). One interpretation of these findings is that maternal overestimation of knowledge may lead to

inaccurate decisions about a child's need for structure and guidance. Alternately, from a child-effects perspective, risky behavior may lead to discordant perceptions of monitoring, as youth engaging in risky behavior may withhold information from their parents.

These findings confirm that disclosure and communication are important monitoring-related behaviors (Keijsers et al., 2010; Kerr, Stattin, & Burk, 2010). Dyads in the classes associated with lower rates of problem behavior, the High Monitors and Communication-Focused, report a high probability that youth would be above the median in disclosure and communication. In contrast, youth in the three classes associated with risky behavior (Supervision-Focused, Maternal Over-Estimators, and Low Monitors) all reported a low probability of high levels of disclosure. It is unclear, from these cross-sectional data, whether or not high levels of communication protect youth against problem behavior or if problem behavior causes a disruption in communication processes. It is likely that these are interactive processes in which the child and parent behaviors are transactionally affecting youth outcomes.

The findings also indicate that high levels of disclosure are commonly accompanied by high active efforts by mothers to solicit information and greater knowledge. Thus, for many families, parent active efforts to monitor are not likely to be viewed negatively by youth as a source of privacy invasion or excessive control if they also are accompanied by high levels of communication (Hawk, Hale, Raaijmakers, & Meeus, 2008). It may be the joint effect of parent efforts, disclosure, and knowledge that are associated with low problem behavior, highlight the importance of understanding multiple parent and youth monitoring-related behaviors, not simply the effects of one or two specific behaviors.

Supervision may be more effective when it occurs in combination with other monitoring behaviors, but less effective at preventing problem behaviors when it occurs in the absence of other strategies. It is interesting that the two classes associated with a low risk of problem behavior, High Monitors and Communication-Focused, differed in levels of supervision.

Supervision may be associated with problem behavior when it is not accompanied by other monitoring-related behaviors as indicated by higher levels of risk associated with membership in the Supervision-Focused class. This may suggest that supervision may not be necessary to reduce risky behavior when dyads are reporting high levels of other monitoring strategies. Alternately, it is possible that increases in supervision emerged in reaction to youth engaging in increasing levels of risky behavior. Yet, without concurrent increases in other monitoring-related behaviors, such as youth disclosure, these responses are not likely to reduce risk (Kerr & Stattin, 2003). Together these findings suggest that having an adult present to observe activities may not be as central as hypothesized in the monitoring process, at least not in the sixth grade.

There are several possible explanations why the Supervision-Focused class may be associated with risky behavior in spite of some variable-oriented work that suggests that supervision is negatively associated with problem behavior (Sampson & Laub, 1994). First, these differences may reflect measurement issues, as many monitoring studies combine measures of parental knowledge with measures of supervision (Pettit et al., 1999). Second, the measures of supervision assess the extent to which an adult is present; they do not measure actual engagement between parents and youth. It is possible that parents in the Supervision-Focused class may be physically present but disengaged (Patterson et al., 1989). Lastly, perhaps in the absence of other protective monitoring-related behaviors, such as disclosure or parent efforts to monitor youth, adult supervision is viewed negatively by adolescents, as a source of over-control or privacy invasion (Hawk et al., 2008).

These findings also confirm that monitoring should be considered in the context of the broader parent-youth relationship. Strained parent-youth relationships with poor affective-quality were associated with increased odds of belonging to two at-risk groups (Low Monitors and Supervision-Focused). This pattern of findings suggests these classes may be engaged in negative coercive cycles, characterized by negative parent-youth interactions, low levels of

warmth, and parental disengagement from some aspects of the monitoring process (Dishion, Nelson, & Bullock, 2004; Patterson, DeBaryshe & Ramsey, 1989). Mothers and youth in the Maternal Over-Estimators class had different perceptions the broader parent-youth relationship, with youth reporting a negative view of relationships and mothers a positive one. Interestingly, increases in maternal trust were also associated with membership in the Maternal Over-Estimators class, suggesting parents may not only be underestimating monitoring, but the likelihood youth may engage in problem behavior.

Strengths and Limitations

This study is cross-sectional and cannot not reveal the direction of effects or even the temporal precedence underlying an observed association. Longitudinal research is needed to understand how the use of monitoring strategies changes over the middle school period and to understand the reciprocal relationships between risky behavior and patterns of monitoring-related behaviors over time. Further studies are also needed to explore how changes in monitoring-related behaviors may relate to youth risky behavior as such behavior becomes more normative developmentally.

The latent class approach used here has limitations and strengths. Although a FIML missing data procedure is available for LCA, it does not extend to models with covariates. Thus, as recommended by Collins and Lanza (2010), all cases with missing covariates were deleted from the analysis, reducing the sample size and potentially influencing the findings. Further, LCA also required the use of categorical variables, therefore how the variables were dichotomized may have influenced these findings. However, despite these methodological limitations, LCA allowed us to bring a unique perspective to studying parental monitoring. Rather than focusing on a specific variable, LCA permitted us to explore differences in the patterning of

monitoring behaviors between identified subgroups of families as well as to include the perspectives of mothers and youth. Thus, LCA allowed us to take a more integrated approach to understanding monitoring. Future work should be expanded to include the perspective of fathers, which would provide a more comprehensive model of the family ecology (Crouter, Bumpus, Davis, & McHale, 2005).

The present sample used is limited to youth in small towns and rural communities in two states and most are Caucasian; findings may not be generalizable to urban youth or youth in other cultural groups. In addition, 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. Viewed from a different perspective, the rural nature of the sample is a notable strength. This study sheds light on the patterns of monitoring used in rural families, a population that is understudied, yet may be at elevated risk for problem behaviors, especially early substance use (Donnermeyer, 1992; McIntosh et al., 1979). Most studies on parental monitoring have been conducted on US youth living in urban or suburban areas (e.g., Barnes et al., 2006; Laird, Marrero, & Sentse., 2010) or youth in non-U.S. settings (Kerr, Stattin, & Burk, 2010; Keijsers et al., 2009). Replicating this analysis on different youth populations will determine whether these latent statuses are generalizable to other populations.

The measures of monitoring-related behaviors, while extensive, also have limitations. The measure of youth disclosure focuses on youth sharing their thoughts and feelings with their parents. Although this aspect of disclosure is commonly included as part of disclosure measures, this item does not specifically ask if youth are sharing information on their activities with parents without parents asking them. Thus, although the measure is highly correlated with disclosure of information, the measures may not map specifically on other monitoring work (Stattin and Kerr, 2000). The measures of supervision focus on whether or not an adult is present at home; they do

not specifically capture whether youth are being supervised while the adult is present. Even though similar items have been used as part of prior supervision measures (Laird et al., 2010; Pettit et al., 1999), it is possible that some adults that are home will not notice what activities youth are engaging in. Finally, some measures had moderate reliability, which may have attenuated some findings. Despite these limitations, the measures used in this study were comprehensive, and allowed us to identify and distinguish among the major monitoring-related behaviors identified in prior literature (Crouter & Head, 2002).

Conclusions and Implications

This study takes an integrative approach to monitoring, investigating combinations of monitoring-related behaviors used in mother-youth dyads and their relationship to early adolescent problem behavior. Results show that a combination of high levels of parent active efforts to monitor, youth disclosure, communication, and parental knowledge were associated with lower levels of problem behavior. Membership in the High Monitors and Communication-Focused classes was associated with less problem behavior. Risky behavior was associated with greater odds of membership in three classes: Supervision-Focused, Low Monitors, and Maternal Over-Estimators. The findings suggest that in addition to low monitoring being related to early adolescent risk, monitoring patterns that rely solely on supervision or those in which there are substantial discrepancies between the perceptions of mother and youth on monitoring are associated with youth problem behavior. Longitudinal work is necessary to understand causal processes underlying these findings.

Table 2-1. Means and Standard Deviations at Grade 6

Construct	Mean (SD)	
	Mother	Youth
<i>Monitoring Activities</i>		
Parental knowledge of youth activity	4.35 (.42)	4.61 (.50)
Parent efforts to monitor	4.82 (.35)	4.58 (.58)
Parental supervision	4.10 (.91)	3.98 (.92)
Child disclosure	--	4.20 (.95)
Amount of communication	3.48 (.33)	3.17 (.65)
<i>Parent-Youth Relationship Measures</i>		
Affective quality: Positive	6.09 (.85)	6.04 (1.10)
Affective quality: Negative	5.06 (.91)	5.71 (1.08)
Consistent discipline	5.02 (.80)	5.21 (1.18)
Quality of communication	4.71 (.58)	5.91 (1.01)
Maternal trust	4.44 (.72)	--
<i>Youth Outcome Measures</i>		
Substance use initiation	--	0.37 (.68)
Substance use expectancies	--	1.22 (.41)
Delinquency	--	0.57 (1.20)
Deviant peer associations	--	1.41 (.71)

Table 2-2. Model Selection

Number of Classes	Log-likelihood	G-squared	df	AIC	BIC
2	-4564.08	785.99	492	823.99	912.9
3	-4473.92	605.67	482	663.67	799.38
4	-4435.38	528.59	472	606.59	789.09
*5	-4711.09	469.95	462	567.95	797.25
6		unidentified			
7		unidentified			

Table 2-3. A Latent Class Model for Parental-Monitoring Behaviors

	High Monitors		Communication- Focused		Supervision- Focused		Maternal Over- Estimators		Low Monitors	
Prevalence	0.26		0.18		0.30		0.10		0.17	
Parent Active Efforts-Youth	0.83	(0.04)	0.78	(0.05)	0.45	(0.05)	0.59	(0.09)	0.29	(0.06)
Parent Active Efforts -Mother	0.79	(0.04)	0.71	(0.05)	0.51	(0.04)	0.91	(0.08)	0.42	(0.06)
Knowledge-Youth	0.84	(0.04)	0.87	(0.05)	0.45	(0.04)	0.28	(0.08)	0.30	(0.06)
Knowledge-Mother	0.80	(0.04)	0.62	(0.06)	0.36	(0.06)	0.98	(0.07)	0.28	(0.05)
Youth Disclosure-Youth	0.85	(0.05)	0.80	(0.06)	0.31	(0.04)	0.13	(0.07)	0.17	(0.05)
Supervision-Youth	0.87	(0.05)	0.19	(0.10)	0.83	(0.07)	0.50	(0.10)	0.08	(0.03)
Supervision-Mother	0.94	(0.07)	0.13	(0.11)	1.00	(0.01)	0.79	(0.08)	0.14	(0.11)
Amt Communication-Youth	0.92	(0.04)	0.76	(0.06)	0.38	(0.05)	0.13	(0.09)	0.22	(0.06)
Amt Communication-Mother	0.78	(0.04)	0.64	(0.06)	0.29	(0.05)	0.75	(0.09)	0.28	(0.05)

Note: Item response probabilities indicate the probability of being above the median in monitoring-related behavior. Model estimates above .5 are in bold. Standard Errors are in parenthesis

Table 2-4. Odds Ratios and Inverse Odds Ratios

	High Monitors	Communication- Focused	Supervision- Focused	Maternal Over- Estimators	Low Monitors	P. value
Covariates	Reference					
Gender		1.35 (.74)	1.66 (.60)*	0.58 (1.73)	2.32 (.43)*	0.01
Dual Biological Parents		0.87 (1.14)	0.62 (1.61)	0.74 (1.35)	0.36 (2.76)*	0.004
Parent Education		1.34 (.75)	0.66 (1.52)	0.68 (1.46)	1.12 (.90)	.06ns
Condition		1.45 (.69)	1.02 (.98)	0.88 (1.14)	0.81 (1.24)	.46ns
Risky Behavior						
Delinquency		0.82 (1.23)	1.39 (.72)*	1.08 (.93)	1.19 (.84)	0.006
Substance Use Initiation		0.89 (1.12)	1.47 (.68)*	1.41 (.71)	1.39 (.72)*	0.004
Antisocial Peer Associations		0.63 (1.58)	1.53 (.65)*	1.54 (.65)	1.44 (.69)	<.0001
Substance Use Expectancies		.86 (1.16)	1.46 (.69)*	1.83 (.55)*	1.61 (.62)*	<.0001

Parenting*Youth Reports*

Quality of Communication	0.7 (1.43)	0.13 (7.69)*	0.14 (7.14)*	0.11 (9.09)*	<.0001
Negative Affective Quality	1.30 (.77)	0.47 (2.12)*	0.29 (3.47)*	0.45 (2.22)*	<.0001
Positive Affective Quality	0.77 (1.30)	0.20 (5.00)*	0.20 (5.00)*	0.15 (6.67)*	<.0001
Consistent Discipline	0.69 (1.44)	0.60 (1.68)*	0.49 (2.04)*	0.53 (1.90)*	<.0001

Mother Reports

Quality of Communication	0.70 (1.43)	0.18 (5.56)*	1.08 (.93)	0.19 (5.26)*	<.0001
Negative Affective Quality	0.87 (1.14)	0.48 (2.08)*	0.78 (1.28)	0.60 (1.66)*	<.0001
Positive Affective Quality	0.44 (2.27)*	0.16 (6.25)*	0.55 (1.82)*	0.13 (7.69)*	<.0001
Consistent Discipline	0.61 (1.64)*	0.47 (2.13)*	1.04 (.96)	0.44 (2.27)*	<.0001
Trust	0.56 (1.79)*	0.25 (4.00)*	0.73 (1.37)	0.32 (3.13)*	<.0001

Note: * p < .05 All models control for dual biological marital status and gender. Inverse odds ratios are in parenthesis.

Table 2-5. Classify Analyze Results: Means and Standard Errors by Latent Class Membership

	High Monitors (n=212/26.63%)	Communication- Focused (n=133/16.71%)	Supervision- Focused (n=256/32.16%)	Maternal Over- Estimators (n=75/9.42%)	Low Monitors (n=120/15.08%)	F	P
<i>Covariates</i>							
Gender	0.42 ^a (.03)	0.44 (.04)	0.50 (.03)	0.36 ^b (.06)	0.58 ^{ab} (.04)	3.30	0.02
Dual Bio Parents	0.62 ^a (.03)	0.59 ^b (.04)	0.54 (.03)	0.59 (.06)	0.43 ^{ab} (.05)	3.52	0.01
Parent Education	0.66 (.03)	0.71 (.04)	0.59 (.03)	0.59 (.06)	0.69 (.04)	2.14	0.07
Condition	0.59 (.03)	0.68 (.04)	0.60 (.03)	0.57 (.06)	0.58 (.04)	1.15	0.33
Risky Behavior							
Delinquency	0.49 (.08)	0.36 (.10)	0.69 (.07)	0.71 (.14)	0.60 (.11)	2.23	0.06ns

Substance Initiation	0.28 ^a (.05)	0.30 (.06)	0.45 ^a (.04)	0.48 (.08)	0.37 (.06)	2.66	0.03
Antisocial Peers	1.34 ^a (.05)	1.25 ^{bc} (.06)	1.50 ^{ac} (.04)	1.53 ^b (.08)	1.43 (.06)	4.18	0.002
Substance Expectancies						7.65	<.0001
Sub Exp * Dual Bio Parents						3.83	.004
Without Dual Bio Parents	1.16 ^{abc} (.05)	1.17 ^d (.05)	1.34 ^{ce} (.04)	1.60 ^{ade} (.07)	1.39 ^b (.05)		
With Dual Bio Parents	1.12 (.04)	1.12 (.04)	1.58 (.04)	1.19 (.06)	1.68 (.06)		

Parenting

Youth Reports

Quality of Communication	6.43 ^{abc} (.06)	6.35 ^{deg} (.08)	5.66 ^{cdfg} (.06)	5.49 ^{ad} (.11)	5.35 ^{bef} (.08)	44.10	<.0001
Negative Affective Quality	6.03 ^{abc} (.07)	6.02 ^{def} (.09)	5.51 ^{cf} (.07)	5.19 ^{bd} (.12)	5.52 ^{ae} (.10)	15.74	<.0001
Positive Affective Quality	6.57 ^{abc} (.07)	6.41 ^{def} (.09)	5.79 ^{cf} (.06)	5.70 ^{ad} (.12)	5.56 ^{be} (.09)	31.02	<.0001
Consistent Discipline	5.51 ^{abc} (.08)	5.32 (.10)	5.10 ^c (.07)	4.96 ^a (.13)	5.05 ^b (.11)	5.84	0.0001

Mother Reports

Quality of Communication	4.30 ^{ab} (.03)	4.22 ^{ef} (.04)	3.93 ^{adf} (.03)	4.30 ^{cd} (.05)	3.87 ^{bce} (.04)	33.76	<.0001
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Negative Affective Quality	5.26 ^a (.06)	5.22 ^c (.08)	4.83 ^{abc} (.06)	5.17 ^b (.10)	4.99 (.08)	8.30	<.0001
Positive Affective Quality	6.46 ^{ab} (.05)	6.28 ^{ef} (.07)	5.82 ^{bdf} (.05)	6.39 ^{cd} (.09)	5.62 ^{ace} (.07)	32.77	<.0001
Consistent Discipline	5.25 ^{abc} (.05)	5.01 ^b (.07)	4.87 ^{cd} (.05)	5.18 ^d (.09)	4.87 ^a (.07)	8.64	<.0001
Trust	4.68 ^{ab} (.05)	4.56 ^{de} (.06)	4.23 ^{bce} (.04)	4.50 ^c (.08)	4.29 ^{ad} (.06)	14.83	<.0001

Note: subscripts indicate significant differences based on post-hoc Tukey tests ($p < .05$).

Chapter 3

Study 2: Youth Substance Use and Changes in Parental Monitoring During Middle School: A Person-Oriented Approach

Overview

Low levels of parental monitoring have been associated with high levels of a host of adolescent problem behaviors including delinquency, substance use, and risky sexual behavior (for a review, see Crouter & Head, 2002). Early conceptualizations of monitoring define it as parental efforts to solicit information or track youth activities. Current studies suggest there are in fact several monitoring-related behaviors. Parents may actively solicit information from youth, set rules about youth behavior, or provide supervision. Youth may manage information, choosing which information to disclose to their parents (Kerr, Stattin, & Burk, 2010; Soenens, Vansteenkiste, Luyckx, & Goossens, 2006). The combination of these parent and youth behaviors may lead to variability in actual parental knowledge of youth activities and whereabouts (Fletcher, Steinberg, & Williams-Weaver, 2004; Stattin & Kerr, 2000). This paper uses a longitudinal, person-oriented approach to explore how combinations or patterns of these monitoring-related behaviors relate to substance use during the middle school period.

Person-oriented models, such as latent transition analysis (LTA), may provide unique information on monitoring-related behaviors and their relation to substance use over time. Monitoring-related behaviors do not occur in isolation; parents and youth are likely engaging in combinations of behaviors simultaneously. Further, parents and youth are likely to have different perceptions of monitoring-related behaviors (Lippold, Greenberg, & Feinberg, 2011). This paper

takes an integrative approach to monitoring, using latent transition analysis (LTA) to model longitudinal patterns of monitoring-related behaviors used in mother-youth dyads during middle school and the relations between these patterns of monitoring and youth substance use. These patterns of monitoring behaviors may resemble how monitoring-related behaviors occur in natural family settings. This paper is organized into two sub-studies. The first study identifies and describes the latent transition model (i.e. patterns of monitoring) using reports of monitoring-related behaviors from mothers and youth. In addition, the first study also explores normative changes in patterns of monitoring from Grade 6 to 8. The second study explores how youth substance use relates to changes in patterns of monitoring.

The Need for a Person-Oriented, Dyadic Approach

Most studies on monitoring have been variable-oriented and have provided detail on the effects of one specific monitoring-related behavior, on average, on youth problem behavior. These analyses rely on multiple regression or structural equation approaches to explore how one monitoring-related behavior (e.g., disclosure) influences youth outcomes while controlling for other monitoring-related behaviors (e.g., solicitation) (Fletcher et al., 2004; Kerr, Stattin, & Burk, 2010). It is difficult to capture the influence of combinations of monitoring-related behaviors using these approaches, as limited power makes it difficult to detect the complex interactions between different variables (Bergman, Cairns, Nilsson, & Nystedt, 2000; Bergman & Trost, 2006).

Monitoring may be best understood from a person-oriented perspective, where researchers explore the effects of the whole monitoring process on youth behavior, rather than trying to isolate individual behaviors. As both youth and parents are engaging in monitoring-related behaviors, the effects of one particular behavior may vary depending on the other

constellations of monitoring-related behaviors used in a family. For example, high levels of solicitation have different effects when it occurs in conjunction with high levels of parent-child communication than when it occurs in the absence of such behaviors. Parent efforts to solicit information from youth may be viewed as a sign of parental caring by youth when it occurs as part of a mutual communication process. In this context, high levels of solicitation may be associated with lower rates of substance use. In contrast, parent efforts to solicit youth for information in the absence of a mutual communication process may lead youth to feel over controlled. Parents may be soliciting information because they believe youth are engaging in risky behavior.

A person-oriented approach to understanding the monitoring process should include the perspectives of both parents and youth, as parents and youth may have different perceptions of monitoring-related behaviors, especially when youth are not disclosing information to their parents. Some longitudinal research on monitoring-related behaviors report differences in findings, based whether or not the behavior is reported by mothers, fathers, or youth (e.g., Keijsers et al, 2009; Kerr, Stattin, & Burke, 2010). Studies suggest that parents may overestimate their knowledge and youth disclosure (Cottrell et al., 2003; Smetana et al., 2006). Two studies suggest that differences in parent and youth perceptions of monitoring may be associated with high levels of problem behavior (Lippold, Greenberg, & Feinberg, 2011; De Los Reyes et al., 2010).

In contrast to variable-focused models, person-oriented models, such as Latent Transition Analysis, allow researchers to identify subgroups of families that use particular combinations of monitoring-related behaviors and to explore how family processes may differ between these subgroups (Bergman, Cairns, Nilsson, & Nystedt, 2000; Bergman & Trost, 2006). Utilizing a person-oriented approach that incorporates multiple reporters and multiple behaviors will have

added value in understanding the nature of this important parent-child process. Further, it will shed light on how these various combinations of monitoring-related behaviors change over time.

Normative Changes in Monitoring

Monitoring-related behaviors may change over the middle school period, as youth become more autonomous and independent. Parents and youth spend less time together during adolescence, making it more difficult for parents to track and supervise youth activities directly (Larson et al., 1996). High levels of parental control may be viewed as a threat to an adolescents' growing sense of autonomy (Marshall & Chassin, 2000). Only a few studies have explored how monitoring-related behaviors change over time. These studies suggest that specific aspects of monitoring, such as parental control, youth disclosure, and parental knowledge may decline during the adolescent period (Keijsers et al., 2009; Kerr, Stattin, & Burke, 2010). The patterns of change in specific monitoring behaviors may vary depending on who is reporting the behavior. Keijsers et al. (2009) found that adolescents reported a steady decrease in disclosure from age 13-16. However, fathers report a L shaped pattern of sudden decline in disclosure whereas mothers report a more V-shaped pattern in which decreases in disclosure were followed by increases. Similarly, Keijsers et al. (2009) found significant changes in parental solicitation across adolescence based on mother report but not based on adolescent and father reports. These findings suggest that different family members may have distinct perspectives on how a specific monitoring-related behavior may change over time.

Parental Monitoring and Risky Behavior

Longitudinal studies have begun to identify the effects of specific monitoring-related behaviors on youth substance use and other problem behaviors over time. These studies suggest that parent, youth, and joint monitoring-related behaviors may all be protective against substance use (Barnes et al., 2006; Fletcher et al., 2004). Most of these studies explore how parental monitoring at one time predicts subsequent changes in substance use. For example, Barnes et al., (2006) found that parent knowledge of youth activities predicted both the initial level and increases in substance use over time. It should be noted that although recent longitudinal studies have found strong evidence that youth disclosure may be a stronger predictor of youth delinquency than parental solicitation (Kerr, Stattin, & Burk, 2010; Keijsers et al., 2009, 2010), this relationship has yet to be adequately tested for youth substance use.

The temporal relationship between youth risky behavior and monitoring behaviors is not clear. A few studies have found reciprocal relationships between specific monitoring-related behaviors and delinquency, suggesting that monitoring-related behaviors may emerge in response to *and* in reaction to this particular adolescent problem behavior (Jang & Smith, 1997; Keijsers et al., 2010; Laird et al., 2003). Some researchers argue that the effects of monitoring-related behaviors on problem behavior may be primarily child-driven. Clark, Kirisci, Mezzich, and Chung (2008) found that early alcohol use by youth predicted later levels of parental supervision, suggesting that youth behaviors may be driving this association. A few studies on delinquency also support a child effects model: Kerr and Stattin (2003) found evidence that delinquency was significantly associated with reductions in parental control but not vice-versa. However, these models have not been tested for substance use outcomes.

Fully understanding the temporal relationship between risky behavior and monitoring requires models that analyze repeated data on parents and youth over time. Yet, most

longitudinal studies on monitoring explore how monitoring-related behaviors predict changes in problem behavior or how problem behavior predicts changes in monitoring-related behaviors (e.g., Kerr and Stattin, 2003; Fletcher et al., 2004). In fact, only one study has explored how changes in monitoring-related behaviors relate to substance use over time. Tobler & Komro (2010) identified 4 monitoring trajectories based on youth reports: high, medium, decreasing, inconsistent. Youth in the decreasing monitoring trajectory were more likely to report substance use in Grade 8 than those in the High Trajectory (grade 6-8).

Early Adolescence

Early adolescence is an important time to study parental monitoring for two reasons. First, early onset of substance use has been linked to cumulative, long term consequences such as adult alcohol disorders and more severe drug use (DeWit et al., 2000; Grant & Dawson, 1997). Youth at the greatest risk for developing lifetime alcohol disorders are those who begin using substances between the ages of 11 and 14 (Dewit et al., 2000). Thus, understanding the relationship between monitoring-related behaviors and substance use during early adolescence has important implications for prevention efforts. Second, studying monitoring-related behaviors during early adolescence allows us to understand changes in monitoring during the emergence of substance use. Parents and youth may decrease monitoring-related behaviors during early adolescence for positive or negative reasons. For example, Coercion theory (Patterson et al., 1989) posits that parents may reduce supervision or solicitation of information in the presence of problem behavior, as they may perceive their efforts to be ineffective (Bandura, 2001) or to avoid confrontation with youth (Granick & Patterson, 2006). Parents not engaged in coercive cycles may increase monitoring if they suspect youth are engaging in risky behavior in an effort to prevent further escalation. In contrast, some reductions in monitoring-related behaviors may

occur in response to positive youth behavior. Parents of youth who are not engaging in problem behavior may reduce supervision and solicitation because they perceive their youth to be trustworthy and responsible. In this context, reductions in specific monitoring-related behaviors may be a parent's attempt to allow youth more autonomy. Thus, early adolescence is an important time to study the monitoring process, as it allows us to investigate how initial changes in youth behavior may be linked to changes in monitoring-related behaviors over time (Pettit & Laird, 2002).

This Study

This paper explores the relationship between combinations of monitoring-related behaviors and early adolescent substance use over the middle school period. The first substudy uses Latent Transition Analysis (LTA) to identify *combinations* of monitoring-related behaviors used in mother-youth dyads when youth are in the sixth and eighth grade. Both mother and youth reports of monitoring-related behaviors are integrated into the models, allowing us to capture important differences in their perceptions. Then, the first study explores how combinations of monitoring-related behaviors (statuses) change over the middle school period. The second substudy investigates how youth substance use is associated with changes in these monitoring statuses over time. The results from the first study are used to test specific hypotheses about how youth substance use may be associated with changes in these patterns of monitoring. Because the analysis begins when youth are in 6th grade, before most youth begin engaging in substance use, the analysis allows us to explore the specific role of initiation of substance use during the middle school period.

Monitoring latent statuses are formed using measures of active parent efforts to monitor youth, supervision, maternal knowledge, youth disclosure, and maternal-youth communication.

Youth and mother reports of the following monitoring-related behaviors are used in the models: parent active efforts to monitor youth (where parents ask youth for information), supervision (where parents or another adult are present to observe youth behaviors), parental knowledge (what parents know about youth activities), youth disclosure (the information youth share with their parents), and the amount of communication occurring between parents and youth. As Crouter and Head review (2002), the field has inconsistently measured and defined parental monitoring and measures of supervision, control, and knowledge are inconsistently combined in studies. All of these constructs are included in the models because they have been defined as important monitoring-related behaviors in prior studies (Crouter & Head, 2002).

Study 2a: Modeling Monitoring Latent Statuses

Method

Plan of Analysis

Latent Transition Analysis (LTA) is used to identify patterns of monitoring-related behaviors during early adolescence. Latent Transition Analysis identifies latent subgroups (i.e., latent statuses) in a population based on responses to a set of observed categorical items. Similar to factor analysis, LTA accounts for measurement error (for full descriptions of LTA see Collins & Lanza, 2010). LTA also estimates patterns of change in these latent statuses over time, by estimating the proportion of dyads that move between latent statuses over time. Mother and youth reports of the monitoring constructs in 6th and 8th grade were used to identify the latent statuses and were dichotomized to indicate high or low levels of behaviors based on a median split. The measures were dichotomized because many of the monitoring measures were skewed,

with pronounced ceiling or floor effects that could not be corrected by statistical transformations. Therefore categorical analysis may be more appropriate than latent profile analysis, which uses continuous variables, but assumes normality (Collins & Lanza, 2010; Feldman, Masyn, & Conger, 2009; Steinley & Brusco, 2011). Because Latent Transition Analysis is primarily an exploratory technique, researchers typically do not generate a priori hypotheses about the specific latent status solution.

Study Design and Participants

This study includes 536 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 (see Spoth, Greenberg, Bierman, & Redmond, 2004). Participants in PROSPER resided in 28 rural communities and small towns in Iowa and Pennsylvania . The PROSPER project involved youth from two successive cohorts of sixth graders who 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 youth. A total of 2267 families were recruited for in-home family assessments; of these, 979 (43%) completed the assessments. Family recruitment included mail and telephone contacts followed by an in-person recruitment visit. The in-home assessments included a family interview, and written questionnaires completed independently by the youth, mother, and if present, father. As recommended by Collins & Lanza (2010), all cases with missing data on covariates were deleted for this analysis because although a FIML missing data procedure is available for LTA, it does

not extend to models with covariates. Therefore, the current study includes data from 536 youth and their mothers who had complete data on the covariates at in the Fall of Grade 6 (Mean age = 11.9, SD = .47) and in the Spring of Grade 8 (Mean age = 13.9, SD = .50).

To test for selection bias in the in-home sample, youth in the in-home sample were compared to youth in the total sample 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 total in-school 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, or gender. In addition, no significant 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 in-school sample ($M = .58$, $SE = .06$ 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 , $SE = .02$): $F(1, 27) = 12.36$, $p < .01$.

Maternal monitoring and parenting measures were gathered from in-home data collection. Because previous research suggests that youth are more likely to report substance use initiation and delinquency if asked in school, rather than home settings, PROSPER in-school data is used for the measures of youth substance use initiation and delinquency (Redmond, Schainker, Shin, & Spoth, 2007); these measures were gathered within months of the home visit. At Wave 1, the mean age of the youth is 11.3 years ($SD = .49$); the mean age of their mothers is 38.7 ($SD = 6.05$). Sixty-one percent of youth resided in Iowa and 39% lived in Pennsylvania. The average household income was \$51,000 (in 2003) and 62% of parents had some post-secondary education. Most youth 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 the sample were male and 53% were female. There were no significant differences between the in-home sample and the in-school sample on any of these demographic variables.

Measures

All items were adapted from the Iowa Youth and Families Project (Conger, 1989; McMahon & Metzler, 1998; Spoth, Redmond, & Shin, 1998). All items in parental monitoring scales were recoded so that higher scores indicate higher levels of each construct. Alphas are reported when youth were in Grade 6 (G6) and Grade 8 (G8). Means and standard deviations of study variables can be found in Table 3-1.

Maternal knowledge of youth activity scales. Maternal knowledge is defined as the extent to which mothers are aware of the location and activities of youth. Mother and youth perceptions of maternal knowledge were measured using comparable five-item Likert-type items [1=always to 5=never]. For example, mothers were asked to rate how often they know where their youth is and who their youth is with when he or she is away from home. 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?"). The Cronbach alpha for the scale (G6/G8) was .67/.71 for mother reports and .69/.86 for youth reports.

Parent active efforts to monitor scales. Active efforts are defined as mother-driven attempts to solicit information from youth or track youth activities. Mother and youth perceptions of parent efforts are measured using five comparable Likert-type items [1= almost always true to 5 = almost always false]. Examples of items include "Most afternoons or evenings I ask my youth if she/he has homework to do for the next day", "I expect my youth to let me know in advance who will be driving for my youth and his/her friends when they go out (to

parties, movies, etc.)”. Youth were asked the same questions about their parents. The Cronbach alpha for the scale (G6/G8) was .66/.66 for mother reports and .69/.79 for youth reports.

Parental supervision scales. Parental supervision is defined as whether or not a parent or another adult is present to observe youth activities. Mothers were asked to rate how often (1) Is an adult home when your youth gets home from school and (2) Does your youth get home from school before either you or your partner are home. Youth were asked the same questions about their parents [1= always to 5 = never]. The Cronbach alpha for the scale (G6/G8) was .81/.84 for mother reports and .73/.78 for youth reports.

Youth disclosure scale. Youth disclosure is defined as as youth decisions to share their thoughts and feelings with their mother. 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]. The measure of youth disclosure does not specifically measure disclosure of activities, commonly used in the literature. However, analysis in a frequently cited dataset (Stattin & Kerr, 2000) suggests that youth disclosure of thoughts and feelings is highly correlated with youth disclosure of information ($r = .70$), suggesting it may be an effective proxy.

Amount of communication scales. The amount of communication between mothers and youth is defined as the frequency in which mothers and youth report discussing daily activities without specifying the initiator of such conversation. Examples of items include how often mothers and youth talk about plans for the day, his or her school work, what’s going on in his or her life. All items are on 1-4 Likert-type scales where a low score indicates infrequent communication (e.g. “never). The Cronbach alpha for the scale (G6/G8) was .74/.78 for mother reports and .71/.76 for youth reports.

Results

Model Identification

A six status solution was chosen as the best fitting model. SAS Proc LTA (Collins & Lanza, 2010), A series of models were tested with one to seven latent statuses 100 randomly selected starting values (See Table 3-2). The final model was chosen based on fit statistics and conceptual clarity. The AIC (Akaike Information Criterion; Akaike, 1987) and the BIC (Bayesian Information Criterion; Schwarz, 1978) were used to assess model fit (Coffman et al., 2007). The five status model had the lowest BIC but the six status model had the lowest AIC (See Table 3-2). The six status model was chosen because it had a clearer conceptual meaning and more distinct latent statuses than the five status model. Item response probabilities that are very high or low are most useful for determining differences between latent statuses (Collins & Lanza, 2010). The six status model also contained all statuses that were identified when conducting latent class analysis on Grade 6 and 8 data separately (analysis not shown). As recommended by Collins & Lanza (2010), measurement invariance was imposed in the models across time to aid in interpretation of the results.

Final LTA Model

The final LTA model contains six monitoring latent statuses termed: High Monitors, Communication-Focused, Supervision-Focused, Maternal Over-Estimators, Youth Over-Estimators, and Low Monitors (See Table 3-3). Table 3-3 identifies two types of model parameters; the probability of membership in each monitoring latent status and item response probabilities. Membership probabilities indicate the proportion of the sample estimated to be in each monitoring latent status at both time points and range from 0 to 1. For example a

membership probability of .6 would indicate that 60% of dyads are estimated to belong to that particular latent status. Item response probabilities indicate the probability that a mother-youth dyad will be above the median in a monitoring-related behavior given membership in a specific monitoring latent status. Item response probabilities also range from 0 to 1. For example, an item response probability of .75 would indicate a 75% chance that mother-youth dyads in a particular latent status are above the median in a particular behavior (e. g. supervision).

High Monitors (24% at Time 1 and 18% at Time 2). In these dyads, mothers and youth report a high probability (.70 or greater) of being above the median on all monitoring-related behaviors.

Communication-Focused (19% at Time 1 and 12% at Time 2). Dyads in this status report a high probability of being above the median in youth disclosure, solicitation, and communication (above .72 for these monitoring behaviors). However, mothers and youth are both likely to report low levels for supervision (only .18 based on youth report and .23 based on mother report). This pattern of item response probabilities suggests that Communication-Focused dyads have high amounts of knowledge and active communication that includes both parent efforts to gain information and youth sharing of information.

Supervision-Focused (31% at Time 1, 20% at Time 2). Supervision-Focused dyads report a very high probability of being above the median on supervision (.89 for youth report and .98 for mother report). However these dyads are likely to report low levels of report all other monitoring-related behaviors. For example, the probability that youth in this status are above the median in disclosure is only .23.

Maternal Over-Estimators (16% at Time 1, 10% at Time 2). In these dyads, mothers report a higher probability of being above the median than youth for all monitoring-related behaviors. For example, the probability of being above the median in active parent efforts is .80

based on mother reports but only .39 based on youth reports. They are labeled maternal over-estimators as mothers have perceptions of higher monitoring-related behaviors than do youth.

Youth Over-Estimators (5% at Time 1, and 18% at Time 2). Youth Over-Estimators are dyads in which youth report a higher probability of high monitoring-related behaviors than do their mothers. For example, the probability that youth will report mothers are above the median in knowledge is .89 whereas for mothers it is only .36. They are labeled Youth Over-Estimators as mothers have perceptions of lower monitoring-related behaviors than youth.

Low Monitors (7% at Time 1 and 21% at Time 2). Low Monitors report a low probability of being above the median on all monitoring-related behaviors regardless of reporter. These dyads are characterized by a low probability of having high levels of all monitoring-related behaviors, with most item-response probabilities below .25. The probability that mothers and youth will report high levels of active parent efforts and that high levels of disclosure are close to zero.

Transitions Between Latent Statuses

Transition probabilities represent the probability that an individual in a latent status at Time 1 will be in particular latent status at Time 2 (See Table 3-4). Transition probabilities located along the diagonal of the transition matrix indicate the proportion of individuals in the same latent status at both 6th and 8th grade. For example a diagonal probability of .50 would indicate that half of the dyads in this status at Time 1 were also in this status at Time 2. Transition probabilities off the diagonal indicate dyads that change to a new latent status between Grade 6 and 8.

Results suggest that dyads in four latent statuses are likely to be in the same status in 6th and 8th grade (See Table 3-4). Ninety-eight percent of dyads in the Low Monitors Status in 6th

grade are in the same status in 8th grade. Sixty-eight percent of Youth Over-Estimators are also in the same status at both time points (26% percent transition to Low Monitors). The majority of High Monitors in Grade 6 (57%) are in the same status at Grade 8 (19% transition to Supervision-Focused, 11% to Low Monitors and 10% to Communication-Focused). Half of the dyads in the Communication-Focused status in Grade 6 are also in this status at Grade 8 (31% transition to Youth Over-Estimators and 14% transition to the Low Monitors).

However, more than half of dyads in two other statuses transition to a new status between Grade 6 and 8. Forty-six percent of dyads in the Supervision-Focused status are in the same status at both time points (22% transition to Low Monitors, 13% to Youth Over-Estimators, and 11% to High Monitors). Only 36% of Maternal Over-Estimators in 6th grade are in the same status in 8th grade: 27% transition to Low Monitors, 19% to Youth Over-Estimators, and 10% to Supervision-Focused. There is a substantial increase in Low Monitors over time. Between 11 and 27 % of youth from other statuses in Grade 6 transition to Low Monitors by Grade 8.

Study 2b: Youth Substance Use and Latent Status Transitions

Method

Plan of Analysis

Multinomial logistic regression was used to explore how youth substance use was associated with changes in patterns of monitoring over time (e.g., transitions between latent statuses). In these models, substance use was conceptualized as a predictor of change in latent statuses over time (Collins & Lanza, 2010). Two types of predictor variables were used: 6th grade levels of substance use and the initiation of substance use between 6th and 8th grade.

These two types of predictors were chosen because they addressed slightly different research questions. Using 6th grade behavior as a covariate allowed us to explore if early substance use predicts changes in monitoring statuses two and a half years later. Using initiation variables allowed us to investigate if beginning to use substances (e.g., substance use initiation) predicted changes in monitoring statuses. From a prevention standpoint, this analysis enabled us to isolate youth who began using substances prior to 6th grade from those who initiated use during middle school.

Study Hypotheses

It was hypothesized that substance use would increase the likelihood of certain latent status transitions (increased odds) and less likely that families would experience other transitions (decreased odds). Hypotheses were only developed for transitions experienced by at least 10 dyads. In order to estimate the approximate number of dyads making a particular transition, the proportion of youth in a particular latent class at Time 1 was multiplied by the tau matrix probability and the sample size.

Based on prior variable-oriented work, it was expected that when youth use substances, changes in monitoring would reflect decreases in combinations of parent efforts to monitor, knowledge, and communication. Thus, it was hypothesized that sixth grade substance use and substance use initiation between Grade 6 and 8 will be associated with increased odds of all transitions into the Low Monitors from other statuses (High Monitors, Communication-Focused, Supervision-Focused, and Maternal Over-Estimators), relative to remaining in the same status. It was also expected that Grade 6 substance use and substance use initiation to be associated with increased odds of transitions from High Monitors to Supervision-Focused ($OR > 1$), as these transitions may reflect decreases in all behaviors except supervision.

In contrast, it was hypothesized that substance use would be associated with decreased odds of latent status transitions that reflected increases in disclosure, knowledge, and communication and reductions in supervision. Thus, it was hypothesized that substance use in Grade 6 and substance use initiation would decrease the odds of transitions from High Monitors to Communication-Focused and Supervision-Focused to High Monitors, relative to remaining in the same status. A priori hypothesis were not made about transitions into the Maternal Over-Estimators groups, as perceptions between mothers and youth differed in these statuses.

Measures

All items were adapted from the Iowa Youth and Families Project (Conger, 1989; McMahon & Metzler, 1998; Spoth, Redmond, & Shin, 1998).

Substance Use Initiation. In both Grade 6 and 8, three items were used to assess if youth had ever drunk alcohol, smoked a cigarette or smoked marijuana[0=no; 1=yes]. Youth were coded as initiating substances if they had not used a substance in Grade 6 but had used the substance in Grade 8. No use was the reference group for this analysis. To examine substance use initiation, two dummy coded variables were created: one to indicate beginning to use substances between sixth and eighth grade and a second to indicate use at both time points (with no use as the reference group). Thirty-four percent of the sample initiated alcohol use between Grade 6 and 8, 13% initiated smoking, and 7% initiated marijuana.

It should be noted that this paper focuses the results and discussion sections on the effects of initiation on monitoring transitions. A variable was added to capture use at both time points in order to isolate the specific effects of initiation during middle school and to compare initiators during middle school with those who do not use substances during this time period. However because 5% or less of the sample used marijuana and cigarettes at both time points, they

are not the foci of this paper. An additional table was added showing the results for use at both time points (Table 3-7). However, these results are not discussed or interpreted. The results for substance use initiation during middle school are the focus of this paper.

Results

Two nested models were compared to test the significance of the predictor variables. First, a model was run where 6th grade substance use and control variables were entered as predictors of the initial monitoring status (e.g., which status the dyad belonged to in the 6th grade). Next, one of the predictor variables was added to model the transition between latent statuses (e.g. 6th grade level of substance use or substance use initiation variable). Then, tests were conducted to determine if there was a significant difference between these two nested models (See Table 3-5). A variable was a significant predictor of latent status transitions if the difference in the fit of the models ($2 * \log$ likelihood) was significant based on the chi-square distribution (Collins & Lanza, 2010).

Each multinomial model estimates an odds ratio, which indicates the change in the likelihood of transitioning to a new latent status (relative to a reference status), given an increase in the covariate (See Table 3-6). For all analysis, the reference status are those that remain in the same latent status at both time points (e.g., High Monitor in Grade 6 and 8). Odds ratios greater than 1.0 indicate an increased odds of transitioning into new a latent status relative to remaining in the same one, while those less than one indicate decreased odds. A separate model was run for each predictor variable and both the odds and inverse-odds ratios are included. In addition, ten of the model parameters could not be estimated by multinomial logistic regression because the transition probabilities were estimated to be zero. As recommended by Collins and Lanza (2010),

these model parameters were fixed to zero (and odds ratios to 1.00) in all of the multinomial models.

Control Variables

First, this study assessed if four control variables significantly predicted latent status transitions; gender, dual biological parent status, parent education, and intervention status. Only dual biological status was a significant predictor of changes and therefore included in Table 3-4. Being in a family with two biological parents was associated with increased odds of transitions to the Low Monitors from the status of High Monitors, Communication-Focused, and Supervision-Focused, relative to remaining in the same class. However, being in a family with two biological parents was also associated with decreased odds of moving from the Youth Over-Estimators and Maternal Over-Estimators to the Low Monitors. Because the data was from an intervention study, condition was also included as a control variable in all of the models even though it was not a significant predictor.

Substance Use in Grade 6

None of the Grade 6 indicators of substance use were significant predictors of transitions between monitoring statuses (See Table 3-4).

Substance Use Initiation

All indicators of substance use initiation between Grade 6 and 8 were significantly related to transitions between monitoring latent statuses from Grade 6 to 8, after controlling for sixth grade substance use (see Table 3-5).

Table 3-6 presents the odds ratios for latent status transitions relative to the reference group for substance use initiation (i.e. remaining in the same status). For example the odds of transitioning from the High Monitors to Communication-Focused (relative to remaining in the same status) is .40 for the initiation of alcohol use and .36 for smoking (See Table 3-6). Because substance use initiation was dummy coded, an additional table is included that depicts the coefficients for use at both time points (Table 3-7). However, as stated previously, only the results for substance use initiation (Table 3-6) will be discussed and interpreted. Study results for the initiation of substances are organized based on the study hypotheses. Support for study hypotheses are summarized on Table 3-8.

Hypothesized Odds Ratios Greater Than 1

First, this section reviews results regarding hypotheses that substance use initiation would be associated with increased odds ($OR > 1$, Inverse $OR < 1$) of a latent status transition. It was expected that when youth initiate in substance use, changes in monitoring would be characterized by decreases in combinations of parent efforts to monitor, gain knowledge, and communicate.

High Monitors to Supervision-Focused

As expected, the initiation of alcohol and smoking was associated with increased odds of transitions from the High Monitors status to Supervision-Focused (OR = 2.77, 29.32), but marijuana initiation demonstrated the opposite pattern (OR = .46).

High Monitors to Low Monitors

Contrary to the hypotheses, the initiation of substance use was associated with decreased odds of transitions from High Monitors to Low Monitors (OR < 1). In contrast, youth who did not initiate alcohol had a five times greater likelihood of making this transition than did youth who did initiate alcohol (Inverse OR=5.00)

Communication-Focused to Low Monitors

As expected, all odds ratios were greater than one. For example, youth who initiated smoking between Grades 6 and 8 were 3.73 times more likely to transition from the Communication-Focused to Low Monitors than those who did not initiate smoking during this time period, relative to remaining in the same status.

Supervision-Focused to Low Monitors

Results partially supported the hypotheses. The initiation of alcohol and smoking were associated with increased odds that a dyad would transition from the Supervision-Focused status to Low Monitors, relative to remaining in the same status (OR > 1). However, the initiation of

marijuana was associated with lower odds of transitions into the Low Monitors from Supervision-Focused (OR<1).

Maternal Over-Estimators to Low Monitors

As expected, relative to remaining in the same status, the initiation of substance use was associated with increased odds of transitioning to Low Monitors, giving clear and consistent support for the hypothesis. In fact, youth who initiated alcohol were 2.85 times more likely to make this transition than youth who did not initiate alcohol, relative to remaining in the same status.

Hypothesized Odds Ratios Less Than One

Next, this section reviews results regarding hypothesis where it was expected that substance use initiation would be associated with decreased odds of changes between monitoring latent statuses (OR < 1, Inverse OR > 1). It was hypothesized that substance use initiation would be associated with decreased odds of latent status transitions that reflected increases in disclosure, knowledge, and communication and reductions in supervision. Thus, it was hypothesized that substance use would decrease the odds of transitions from High Monitors to Communication-Focused and Supervision-Focused to High Monitors, relative to remaining in the same status.

High Monitors to Communication-Focused

Initiation of alcohol use, smoking and marijuana were associated with decreased odds of transitions from the High Monitors status to Communication-Focused relative to remaining in the

same status. As seen in the inverse odds ratios, youth who did not initiate smoking were 2.78 more related to a greater likelihood of this transition than those who did initiate smoking (Inverse OR=2.78).

Supervision-Focused to High Monitors

The initiation of alcohol, smoking, and marijuana use were all associated with lower odds of transitioning from Supervision-Focused to High Monitors, relative to remaining in the same status (OR = .54, .60, .04). As seen by the inverse odds ratios, youth who did not initiate alcohol had a greater likelihood of the transition from Supervision-Focused to High Monitors than were youth who did not (Inverse OR=1.85).

Transitions without Specific Hypotheses

Maternal Over-Estimators to Supervision-Focused

Inconsistent results were found in predicting transitions to Supervision-Focused from Maternal Over-Estimators. The initiation of alcohol and marijuana were associated with odds ratios greater than one. However, the initiation of smoking had the opposite pattern, with increases in substance use associated with lower odds of transitions from Maternal Over-Estimators to Supervision-Focused.

Communication-Focused to Youth Over-Estimators

The initiation of marijuana and drinking was associated with increased odds of transitions from Communication-Focused to Youth Over-Estimators, relative to remaining in the same status. However the initiation of smoking suggested the opposite pattern, with odds ratios less than one.

Supervision-Focused to Youth Over-Estimator.

The initiation of smoking and marijuana were associated with decreased odds of this transition. In contrast, the initiation alcohol was associated with increased odds of this transition.

Maternal Over-Estimators to Youth Over-Estimators

Initiation of smoking and marijuana was associated with lower odds of transitions from Over-Estimators to Youth Over-Estimators, relative to remaining in the same status. However, initiation of drinking was associated with increased odds of these transitions, relative to remaining in the same status (OR=1.72).

Summary of Support for Study Hypotheses

It was expected that when youth initiate substance use, changes in monitoring would be characterized by decreases in combinations of parent efforts to monitor, gain knowledge, and communicate. The results supported some of our hypotheses (See Table 3-8). The initiation of alcohol, smoking, and marijuana was associated with increased odds of transitions from

Communication-Focused and Maternal Over-Estimators to Low Monitors. However, two transitions demonstrated mixed findings depending on the substance. The odds ratios for transitions from the High Monitors to Supervision-Focused and for transitions from Supervision-Focused to Low Monitors were greater than one for alcohol use and smoking, but not for marijuana. Transitions from High Monitors to Low Monitors demonstrated the opposite pattern than expected for the initiation of all substances ($OR < 1$).

In contrast, it was expected that substance use initiation would be associated with decreased odds of changes between monitoring latent statuses ($OR < 1$, Inverse $OR > 1$) that reflected increases in disclosure, knowledge, and communication and reductions in supervision. These study hypotheses were confirmed. The initiation of alcohol, smoking, and marijuana were associated with decreased odds of transitions from High Monitors to Communication-Focused and from Supervision-Focused to High Monitors. Sixth grade levels of substance use were not a significant predictor of any latent status transitions.

Discussion

Parental monitoring has been identified as an important risk factor in the prevention of early adolescent problem behaviors, such as substance use and delinquency (Crouter & Head, 2002). Despite the strength of this association, little is known about normative developmental changes in monitoring and how they relate to the initiation of substance use. Further, prior studies have been limited by a reliance on variable-oriented approaches and single informants. The goal of this longitudinal study was three-fold: 1) to identify combinations of parent and youth monitoring-related behaviors used in middle school; 2) to explore normative changes in these combinations of monitoring-related behaviors; and 3) to investigate how substance use is related to changes in these patterns of monitoring-related behaviors.

Latent transition analysis allowed us to identify qualitative differences in patterns of monitoring. In fact, this analysis suggested that there are six patterns of monitoring related behaviors; High Monitors, Communication-Focused, Supervision-Focused, Maternal Over-Estimators, Youth Over-Estimators, and Low Monitors. These patterns have not been identified in prior variable-oriented models. Furthermore, these six latent statuses have distinct combinations of monitoring-related behaviors, not simply high or low levels of each behavior. Mothers and youth in two statuses were likely to report high levels of only some monitoring related- behaviors (Communication-Focused, Supervision-Focused) and in two statuses, mothers and youth that had very different perceptions of monitoring-related behaviors (Maternal-Over-Estimators and Youth Over-Estimators). A person-oriented approach to monitoring may provide important information that is distinct from that offered by variable-oriented methods.

Many families remained in the same latent status both in Grade 6 and 8. Fifty percent or more of dyads in the High Monitors, Communication-Focused and Youth Over-Estimators were in the same status in both 6th and 8th grade. The Low Monitors were highly stable, with 98% of dyads in this status in Grade 6 and Grade 8. Thus, even though adolescents may face significant developmental changes over middle school (Steinberg, 2001), many dyads may not change their monitoring-related behaviors to adapt to these changes. Membership in the same latent status at both time points may not always be positive. The high percentage of dyads in the Low Monitors at Grade 6 that remain Low Monitors in Grade 8 suggests that once families disengage from most monitoring-related behaviors, they are not likely to increase behaviors later.

Most of the transitions between monitoring statuses that occurred over the middle school period were in the direction of reductions, rather than increases in monitoring-related behaviors. Ten percent of High Monitors transitioned to Communication-Focused and 19% to Supervision-Focused. Between 11 and 27% of dyads in each of the other statuses transitioned into the Low Monitors between sixth and eighth grade. All of the statuses where either youth or mothers

report high levels of parent active efforts to monitor decrease in prevalence (High Monitors, Communication-Focused, Maternal Over-Estimators), as did the statuses with high levels of Supervision (Supervision-Focused, High Monitors, Maternal Over-Estimators). These findings are consistent with variable oriented studies that suggest that parent efforts to actively monitor youth and supervision may decline, on average, over the middle school transition (Keijsers et al., 2009, 2010). These reductions may reflect normative attempts to grant youth more autonomy during this developmental period and reductions in time parents and youth spend together (Collins & Laursen, 2006; Larson et al., 1996).

However these LTA analyses demonstrate that not all families report reductions in monitoring-related behaviors over time. The reductions depend, in part, on the particular combinations of behaviors used in the dyad. Transitions that reflected increases in parent efforts to monitor were not common. However, one transition reflected increases in both youth and parent efforts along with increases in many monitoring-related behaviors, including communication, knowledge, and youth disclosure: 11% of dyads in the Supervision-Focused status became High Monitors. Interestingly, even though variable oriented approaches suggest disclosure decreases over time (Kerr, Stattin, & Burk, 2010), not all of the latent statuses with high disclosure and communication experience decreases in prevalence over this time period. The Youth Over-Estimators, marked by high levels of youth disclosure and communication (but low maternal perceptions) increased in prevalence over the middle school period. Thus, whether or not aspects of monitoring increase or decreases during early adolescence may be related to the combinations of other monitoring-related behaviors that co-occur, highlighting the unique contribution of a person-oriented perspective.

Transitions between monitoring latent statuses had clear associations with the initiation of substance use, suggesting that how monitoring-related behaviors are organized together may be important in understanding the complex, longitudinal relationships between risky behaviors

and monitoring. Because the models explore the relationship between the initiation of substance use and changes in monitoring patterns, the temporal ordering of the variables is unknown. It is possible that initiating substances causes changes in patterns of monitoring, a child-effects model. However, it is also possible that changes in patterns of monitoring-related behaviors influence whether or not youth begin using substances, a parent-effects model. Alternately, these findings could represent a process of reciprocity, where parents and youth are influencing one another over time. All of these possible interpretations are discussed below.

As hypothesized, the initiation of substance use was associated with increased odds of reductions in some patterns of monitoring, especially those that reflect decreases in communication, disclosure, and knowledge. In particular, the odds of transitions into the Low Monitors from three other statuses (Communication-Focused, Supervision-Focused, and the Maternal Over-Estimators) increased as youth initiated alcohol and cigarettes. These changes in monitoring-related behaviors may place youth at risk for substance use initiation. For example, reductions in parent-child communication may reduce youth's access their parents for advice or support about decisions regarding risky behaviors. However, from a child-effects perspective, these changes in monitoring-related behaviors may emerge in response to youth risky behavior (Patterson et al., 1989). In other words, youth who engage in substances may begin to withhold information from their parents, causing a breakdown in the parent-youth communication process.

The results also suggest that substance use initiation may be associated with reductions in knowledge and communication even if parents remain present to provide supervision. The initiation of drinking and smoking were linked to a greater likelihood of transitions from the High Monitors to Supervision-Focused status, which implies lower levels of communication, solicitation, and disclosure while still maintaining high amounts of supervised time. These results may mean that increases in substance use are linked to reductions in parent-child communication but not reductions in supervision. Supervision, in the absence of other strategies,

may not be effective at preventing youth from engaging in substances. Or, from a child-effects perspective, it may suggest that parents may disengage from communication in response to youth risky behavior but are not likely to reduce their efforts at supervision.

Supervision may not be necessary to ensure healthy development. Dyads that reduced supervision over the middle school period, but maintained knowledge about youth activities were not at increased risk of substance use initiation. As hypothesized, substance use initiation was associated with lower odds of transitions from High Monitors to Communication-Focused. Perhaps continued parent-child communication allows parents and youth to openly discuss the consequences of early substance use and any emergent peer pressures. Alternately, from a child-effects perspective, positive youth behavior may lead parents to have a higher level of trust in youth, and a belief that youth who are not likely to be engaging in substances do not need to be closely supervised (Kerr, Stattin, & Trost, 1999).

Contrary to our expectations, substance use initiation was associated with decreased odds of transitions from High Monitors to Low Monitors, relative to remaining in the same status. These findings may contradict some prior research, which suggests low levels of disclosure may be associated with increased risky behavior (Stattin & Kerr, 2000). The findings suggest that declines in youth disclosure and communication may not be negative if youth experienced high levels of all other monitoring-related behaviors two years earlier. There are several possible explanations for this finding. From a child-effects perspective, parents making this particular transition may reduce monitoring behaviors because they believe their youth are capable of navigating their daily activities successfully without any parental guidance or input. In other words, parents may be granting youth more autonomy because they believe their youth are not going to use substances and that youth are capable of increased independence. Alternately, High Monitors may remain in the same status because they know youth are using substances. In other words, mothers may feel it is necessary to continue providing high amounts of supervision and

parent efforts to monitor and youth. Youth in the High Monitors status may be disclosing to parents that they have engaged in substance use. Therefore, the use of substances does not disrupt existing monitoring strategies. From a parent-effects perspective, youth who experience high monitoring in Grade 6 may have already internalized positive norms and values from their parents (Catalano & Hawkins, 1996) and this may have led to the selection of prosocial peers earlier in middle school. These internalized values and existing positive peer relationships may protect youth from risky behavior two years later, even if monitoring-related behaviors are reduced. It should be noted that substance use initiation reduced the odds of transitions only from High Monitors to Low Monitors, not from other statuses. Therefore whether or not reductions in monitoring-related behaviors are positive may depend on the particular constellation of monitoring behaviors used at both time points.

This study also suggests that increases in parent efforts to monitor may be positive if they occur in conjunction with communication, knowledge, and youth disclosure. As expected, substance use initiation was associated with lower odds of transitions from Supervision-Focused to High Monitors. The effects of parent efforts to solicit information may vary depending on the other monitoring behaviors used. Perhaps increases in parent efforts to solicit information are perceived as a sign of caring by youth when they occur as part of a daily communication process, and this protects youth from risky behavior. Alternately, youth who do not engage in substance use may begin sharing more information with parents, and it is this increased youth disclosure that may lead parents to increase their monitoring efforts. It should be noted that increases in solicitation were common in monitoring patterns over time, and there were no transitions experienced by at least 10 dyads that represented increases in parent efforts to monitor in conjunction with decreases in knowledge and communication.

The integration of multiple reporters in the models allowed us to identify two statuses where youth and mothers had different perceptions of monitoring: Maternal Over-Estimators and

Youth Over-Estimators. The Maternal Over-Estimators, in which mothers reported higher levels of monitoring-related behaviors than youth, decreased in prevalence from Grade 6 to 8, suggesting that maternal overestimation of monitoring-related behaviors may become less common as youth age. This is important, as maternal overestimation of monitoring has been identified as a risk factor for early problem behavior (De Los Reyes et al., 2010; Lippold, Greenberg, & Feinberg, 2011). Over a quarter of Maternal Over-Estimators transitioned into Low Monitors and the initiation of substance use was associated with increased odds of these transitions. Dyads in the Maternal Over-Estimators that transitioned to Low Monitors became concordant in their perceptions of monitoring over time. However, this concordance was in the direction of mothers perceiving lower levels of monitoring behaviors. Although maternal overestimation of monitoring-related behaviors may decrease over time, it remains an important potential indicator of future risk.

In contrast, mothers in the Youth Over-Estimators status reported lower levels of many monitoring-related behaviors than did their youth. Mothers in this status report a zero probability of high parent efforts to monitor and a low probability of high knowledge. Perhaps mothers in the Youth-Over Estimators status are less likely to listen or trust information when communication is youth, rather than parent, initiated. Mothers in this status may also feel ineffective. An alternate explanation is that youth may feel parent efforts are invasive, causing them to notice and react to parent efforts to monitor more frequently than parents do.

There were some inconsistent findings in this study, where some of the substance use initiation variables exhibited different relationships to latent status transitions than did others. Differences in the findings may reflect differences in risk processes between drinking, drunkenness, smoking, and marijuana. Drinking becomes more normative over this developmental period and may be indicative of a lower level of risk than other substances. Also, it is possible that smoking either cigarettes or marijuana is more noticeable to parents, especially

if they are physically present to smell these substances. It is also possible that marijuana was a less consistent predictor of transitions due to the low rate of use of this substance during the middle school period.

The lack of significant findings for sixth grade levels of substance use warrants further discussion. Sixth grade levels of alcohol, smoking, and marijuana did not predict changes in monitoring over the middle school period. It is possible that more closely spaced measures of the variables would have resulted in different or stronger associations (Collins, 2006). However, the strong associations with the initiation variables suggest that it is not original levels of substance use, but increases in behavior that may be linked to changes in monitoring-related behaviors. Simultaneous change models, such as Associative Latent Transition Analysis may be also helpful for exploring these processes more distinctly (Bray, Lanza, & Collins, 2010). Longer studies that span across adolescence would be needed to explore these questions more thoroughly.

Limitations, Strengths, and Future Directions

The latent transition approach used here has limitations and strengths. As recommended by Collins & Lanza (2010), all cases with missing covariates were deleted from the analysis, reducing the sample size and potentially influencing the findings. Further, LTA also required the use of categorical variables, therefore how the variables were dichotomized may have influenced these findings. However, despite these methodological limitations, LTA allowed us to bring a unique perspective to studying parental monitoring. Rather than focusing on a specific variable, LTA permitted us to explore differences in subgroups of families using combinations of monitoring-related behaviors. LTA enabled us to include several monitoring-related behaviors into the models, as well as the perspectives of mothers and youth. Thus, LTA allowed us to take a more integrated approach to understanding monitoring. Future work should be expanded to

include the perspective of fathers, which would provide a more comprehensive model of the family ecology (Crouter, Bumpus, Davis, & McHale, 2005).

Latent transition analysis creates statuses specific to the study sample. Study participants are from small towns and rural communities in two states and most are Caucasian; findings may not be generalizable to urban youth or youth in other cultural groups. 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. Viewed from a different perspective, the rural nature of the sample is a notable strength. This study sheds light on the patterns of monitoring used in rural families, a population that is understudied, yet may be at elevated risk for problem behaviors, especially early substance use (Donnermeyer, 1992; McIntosh et al., 1979). Most studies on parental monitoring have been conducted on American youth living in urban areas (e.g., Laird et al., 2010), mid-size towns or suburbs (e.g., Barnes et al., 2006) or youth in non-U.S. settings (Kerr, Stattin, & Burk, 2010). Replicating this analysis on different youth populations will determine whether these latent statuses are generalizable to other study populations.

The measures of monitoring-related behaviors, while extensive, also have limitations. The measure of youth disclosure focuses on youth sharing their thoughts and feelings with their parents. Although this aspect of disclosure is commonly included as part of disclosure measures, this item does not specifically ask if youth are sharing information on their activities with parents without parents asking them. Thus, although the measure is highly correlated with disclosure of information, the measures may not map specifically on to other monitoring work (Stattin and Kerr, 2000). The measures of supervision focus on whether or not an adult is present at home; they do not specifically capture whether youth are being supervised while the adult is present. Even though similar items have been used as part of prior supervision measures (Laird et al., 2010; Pettit et al., 1999), it is possible that some adults that are home will not notice what

activities youth are engaging in. Some of the measures have only moderate reliability, especially in sixth grade, which may have attenuated some of the findings. Despite these limitations, the measures used in this study were comprehensive, and allowed us to identify and distinguish among the major monitoring-related behaviors identified in prior literature (Crouter & Head, 2002).

The measures also have several strengths. The measures used here contain repeated data across the middle school period from both mother and youth perspectives. This is important, as despite the complexity of our theoretical models of parenting, very few longitudinal studies are able to model changes in parent and youth behaviors over time (Keijsers et al., 2009). Prior studies have used either static measures of monitoring to model changes in youth behavior (e.g., Kerr, Stattin, & Burke, 2010) or static measures of youth behavior to model changes in monitoring over time (e.g., Kerr & Stattin, 2003).

Conclusions

This study identified important combinations of monitoring-related behaviors used in mother-youth dyads and explored associations between changes in these combinations of monitoring-related behaviors and youth substance use. By taking a person-oriented approach and integrating the perspectives of mothers and youth, this study identified six unique combinations of monitoring behaviors used in families (latent statuses): High Monitors, Communication-Focused, Supervision-Focused, Youth Over-Estimators, Maternal Over-Estimators and Low Monitors. These latent statuses had distinct patterns of change over middle school period, with 98% of Low Monitors remaining in the same status at both time points. Changes between latent statuses were significantly related to the initiation of alcohol use, smoking, and marijuana from Grade 6-8. The initiation of substances was associated with increased probability of transitions

into the Low Monitors from all other statuses, except High monitors, relative to remaining in the same status. However, substance use initiation was also associated with reduced odds of transitions from the High Monitors to Communication-Focused. Taking a person-oriented approach to the monitoring process provided a unique perspective on this important protective factor for youth.

Table 3-1: Means and Standard Deviations in Grade 6 & 8

Construct	Mean (SD)			
	Mother		Youth	
	Wave 1	Wave 4	Wave 1	Wave 4
<i>Monitoring Activities</i>				
Parental knowledge of youth activity	4.35 (.42)	4.32 (.43)	4.61 (.50)	4.57 (.64)
Parent efforts to monitor	4.83(.35)	4.58 (.50)	4.58 (.58)	4.18 (.82)
Parental supervision	4.06(.92)	3.83 (.89)	3.95 (.94)	3.58 (.96)
Child disclosure	--	--	4.19 (.96)	4.03 (1.08)
Amount of communication	3.48 (.32)	3.41 (.35)	3.19 (.65)	3.12 (.72)
<i>Youth Outcomes</i>				
Ever drank alcohol	--	--	.25 (.43)	.54 (.49)
Ever smoked cigarettes	--	--	.05 (.23)	.17 (.38)
Ever smoked marijuana	--	--	.001 (.04)	.08 (.26)

Table 3-2: LTA Model Selection

Number of Classes	Log- likelihood	<i>G-squared</i>	<i>df</i>	AIC	BIC
2	-6124.94	5591.98	262122	5633.98	5723.94
3	-5966.81	5275.73	262108	5345.73	5495.67
4	-5838.07	5018,24	262092	5120.24	5338.73
5	-577.757	4897.25	262074	5030.11	5326.42
*6	-7223.62	4789.35	262054	4967.35	5348.64
7			unidentified		

*selected model

Table 3-3. A Six-Class Latent Status Model for Parental Monitoring in Grade 6-8

	High Monitors	Communication -Focused	Supervision- Focused	Maternal Over- Estimators	Youth Over- Estimators	Low Monitors
Prevalence (Grade 6/8)	(.24/.18)	(.19/.12)	(.31/.20)	(.16/.10)	(.05/.18)	(.07/.21)
Parent Action-Youth	0.77	0.76	0.41	0.39	0.38	0.03
Parent Action-Mother	0.70	0.85	0.48	0.80	0.00	0.00
Knowledge-Youth	0.89	0.86	0.39	0.38	0.89	0.23
Knowledge-Mother	0.81	0.76	0.42	0.51	0.36	0.23
Youth Disclosure-Youth	0.84	0.82	0.23	0.17	0.71	0.03
Supervision-Youth	0.94	0.18	0.89	0.03	0.18	0.18
Supervision-Mother	0.96	0.23	0.98	0.29	0.23	0.38
Amt Communication-Youth	0.92	0.85	0.36	0.18	0.77	0.16

Amt Communication-Mother	0.77	0.72	0.36	0.47	0.35	0.11
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Note: Prevalence estimates are in parenthesis. Model estimates above .5 are in bold.

Table 3-4. Transitions Between Monitoring Latent Statuses from 6th to 8th Grade

		Latent Status in 8th Grade					
		High Monitors	Communication-Focused	Supervision-Focused	Maternal Over-Estimators	Youth Over-Estimators	Low Monitors
Latent Status in 6th Grade	High Monitors	0.57	0.10	0.19	0.05	0.07	0.11
	Communication-Focused	0.05	0.50	0.00	0.00	0.31	0.14
	Supervision-Focused	0.11	0.00	0.46	0.09	0.13	0.22
	Maternal Over-Estimators	0.04	0.05	0.10	0.36	0.19	0.27
	Youth Over-Estimators	0.00	0.00	0.06	0.00	0.68	0.26
	Low Monitors	0.00	0.00	0.00	0.00	0.02	0.98

Note: Rows may not sum to 1 due to rounding. Estimates in bold indicate the probability of membership in the same status at both time points.

Table 3-5. Testing the Significance of Latent Status Predictor Variables

	Log-likelihood	Log-Likelihood	Difference in	
	Model 1	Model 2	Model Fit * 2	df
Control Variables				
Dual Biological Marital Status	-5718.46	-5699.14	38.64 **	20
Gender	-5721.19	-5706	30.38	20
Condition	-5721.44	-5712.45	17.98	20
Parent Education	-5719.92	-5711.32	17.20	20
Grade 6 Behaviors				
Ever Drank Alcohol	-5712.17	-5704.97	14.40	20
Ever Smoked Cigarettes	-5712.74	-5705.32	14.84	20
Ever Smoked Marijuana	-5714.69	-5714.49	0.40	20
Initiation of Substances Between Grade 6-8				
Drinking	-5704.91	-5656.53	96.76***	40
Smoking Cigarettes	-5712.74	-5641.4	142.68***	40
Smoking Marijuana	-5714.69	-5674.89	79.60***	40

Model 1 estimated the initial latent status (including dual biological marital status, condition, and Time 1 behaviors as controls). Model 2 estimated the initial status (including controls) and the latent status transition. A variable was a significant predictor of latent status transitions if the difference in the fit of the models ($2 \times \log\text{-likelihood}$) was significant based on the chi-square distribution.

Table 3-6. Predicting Latent Status Transitions from the Initiation of Substances Between Grades 6 - 8: Odds Ratios and Inverse Odds Ratios

Latent Status in Grade 6	Latent Status in Grade 8					
		Communication-	Supervision-	Maternal		
	High Monitors	Focused	Focused	Over- Estimators	Youth Over- Estimators	Low Monitors
	OR (1/OR)	OR (1/OR)	OR (1/OR)	OR (1/OR)	OR (1/OR)	OR (1/OR)
High Monitors						
Drinking Alcohol	Reference	0.48 (2.08)	2.77 (0.36)	<i>3.55 (0.28)</i>	<i>124.99 (0.01)</i>	0.20 (5.00)
Smoking	Reference	0.36 (2.78)	29.32 (0.03)	<i>31.13 (0.03)</i>	<i>67.58 (0.01)</i>	0.26 (3.85)
Marijuana	Reference	0.10 (10.00)	0.46 (2.17)	<i>7.17 (0.14)</i>	<i>2.21 (0.45)</i>	0.15 (6.67)
Communication-Focused						
Drinking Alcohol	<i>0.07 (14.29)</i>	Reference	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	1.28 (0.78)	19.95 (0.05)
Smoking	<i>10.37 (0.10)</i>	Reference	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	0.69 (1.45)	3.73 (0.27)
Marijuana	<i>1.00 (1.00)</i>	Reference	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	1.11 (0.90)	26.02 (0.04)
Supervision-Focused						

Drinking Alcohol	0.54 (1.85)	<i>1.00 (1.00)</i>	Reference	0.35 (2.86)	0.18 (5.56)	2.58 (0.39)
Smoking	0.60 (1.67)	<i>1.00 (1.00)</i>	Reference	0.92 (1.09)	0.08 (12.50)	1.81 (0.55)
Marijuana	0.04 (25.00)	<i>1.00 (1.00)</i>	Reference	0.06 (16.67)	0.27 (3.70)	0.82 (1.22)
Maternal Over-Estimators						
Drinking Alcohol	<i>0.07 (14.29)</i>	<i>0.62 (1.61)</i>	1.59 (0.63)	Reference	1.72 (0.58)	2.85 (0.35)
Smoking	<i>0.04 (25.00)</i>	<i>2.40 (0.42)</i>	0.90 (1.11)	Reference	0.09 (11.00)	1.12 (0.89)
Marijuana	<i>0.23 (4.35)</i>	<i>9.03 (0.11)</i>	3.40 (0.29)	Reference	0.29 (3.45)	2.66 (0.38)
Youth Over-Estimators						
Drinking Alcohol	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>39.81 (0.03)</i>	<i>1.00 (1.00)</i>	Reference	5.65 (0.18)
Smoking	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>0.00 (0.00)</i>	<i>1.00 (1.00)</i>	Reference	10.63 (0.09)
Marijuana	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>0.56 (1.79)</i>	<i>1.00 (1.00)</i>	Reference	3.03 (0.33)
Low Monitors						
Drinking Alcohol	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>0.03 (33.33)</i>	Reference
Smoking	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>1.67 (0.60)</i>	Reference
Marijuana	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>1.00 (1.00)</i>	<i>0.25 (4.00)</i>	Reference

All models control for dual biological marital status, condition, and Time 1 Use. Substance use initiation is dummy coded, with the reference group of no use at both Time 1 and Time 2. An additional dummy variable was included to indicate substance use at both time points (shown in Table 3-8). Model estimates for transitions with less than ten predicted members are in italics. Model estimates for transitions with specific hypotheses are in bold.

Table 3-7. Additional Information on Predicting Latent Status Transitions from the Use of Substances at both Grade 6 and 8: Odds Ratios and Inverse Odds Ratios (Not Discussed in Paper)

		Latent Status in Grade 8					Low Monitors
		High Monitors	Communication-Focused	Supervision-Focused	Maternal Over-Estimators	Youth Over-Estimators	
Latent Status in Grade 6		OR (1/OR)	OR (1/OR)	OR (1/OR)	OR (1/OR)	OR (1/OR)	OR (1/OR)
High Monitors							
	Drinking Alcohol	Reference	0.74 (1.35)	1.03 (0.97)	7.95(0.13)	18.91 (0.05)	0.02 (50.00)
	Smoking	Reference	0.12 (8.33)	0.90 (1.11)	0.38 (2.63)	0.42 (2.38)	0.07 (14.28)
	Marijuana	Reference	0.85 (1.18)	0.99 (1.01)	1.57(0.63)	1.19 (0.84)	0.56 (1.78)
Communication-Focused							
	Drinking Alcohol	7.17(0.14)	Reference	1.00 (1.00)	1.00 (1.00)	0.37 (2.72)	6.44 (0.16)
	Smoking	96.05 (0.01)	Reference	1.00 (1.00)	1.00 (1.00)	2.54 (0.39)	10.38 (0.09)

Marijuana	1.07 (0.93)	Reference	1.00 (1.00)	1.00 (1.00)	1.15 (0.89)	1.35 (0.74)
Supervision-Focused						
Drinking Alcohol	1.06 (0.94)	1.00 (1.00)	Reference	0.26 (3.84)	1.39 (0.72)	1.51 (0.66)
Smoking	0.09 (11.11)	1.00 (1.00)	Reference	0.07 (14.29)	0.44 (2.27)	1.41 (0.71)
Marijuana	0.77 (1.30)	1.00 (1.00)	Reference	0.83(1.20)	0.82 (1.21)	0.96 (1.04)
Maternal Over-Estimators						
Drinking Alcohol	0.11 (9.09)	0.03(33.33)	0.39 (2.56)	Reference	3.40 (0.29)	7.79 (0.13)
Smoking	1.23(0.81)	1.33(0.75)	12.58 (0.08)	Reference	8.09 (0.12)	15.81 (0.06)
Marijuana	0.70 (1.42)	1.66 (0.60)	1.27 (0.79)	Reference	1.16 (0.86)	1.04 (0.96)
Youth Over-Estimators						
Drinking Alcohol	1.00 (1.00)	1.00 (1.00)	3.35(0.30)	1.00 (1.00)	Reference	6.49 (0.15)
Smoking	1.00 (1.00)	1.00 (1.00)	0.00 (0.00)	1.00 (1.00)	Reference	1.01 (0.99)
Marijuana	1.00 (1.00)	1.00 (1.00)	0.36 (2.78)	1.00 (1.00)	Reference	0.39 (2.56)
Low Monitors						
Drinking Alcohol	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.02(50.00)	Reference
Smoking	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.07(14.29)	Reference

Marijuana	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.59(1.69)	Reference
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These results were not the focus of the paper and therefore were not discussed. All models control for dual biological marital status, condition, and Time 1 levels of behavior. Substance use at both time points dummy coded, with the reference group of no use at both Time 1 and Time 2. An additional dummy variable was included to indicate initiation of substance use at both time points as seen in Table 3-6.

Table 3-8. Support of Hypotheses for Substance Use Initiation Predicting Changes in Parental Monitoring Status

	Latent Transition from Grade 6-8							
	Hypothesized OR > 1				Hypothesized OR < 1			
	H-M	C-F	S-F	M-OE	H-M	H-M	S-F	
	to	to	to	to	to	to	to	
	L-M	L-M	L-M	L-M	S-F	C-F	H-M	
Drinking Alcohol	--	x	x	x	x	x	x	
Smoking	--	x	x	x	x	x	x	
Marijuana	--	x	--	x	--	x	x	

H-M=High Monitors, C-R= Communication-Focused, S-R= Supervision-Focused, O-E=Maternal Over-Estimators, YO-E=Youth Over-Estimators, L-M=Low Monitors. An x indicates support for study hypotheses. A dash indicates no support for the study hypotheses. Only significant predictors of the

latent statuses are shown.

Chapter 4

Conclusions and Intervention Implications

Parental monitoring has been identified as an important risk factor in the prevention of early adolescent problem behaviors, such as substance use and delinquency (Crouter & Head, 2002). Current conceptualizations suggest monitoring is a transactional process that reflects parent efforts to monitor through solicitation and behavior control, parental supervision, youth decisions on information to disclose, and parental knowledge (Stattin & Kerr, 2000; Fletcher et al., 2004; Soenens et al., 2006). Prior studies on monitoring have been limited by a reliance on variable-oriented approaches, which isolate the effects of one specific aspect of the monitoring process. Further, most studies use parent and youth reports of monitoring separately, which do not capture important differences in their perceptions (Lippold, Greenberg, & Feinberg, 2011). This study argues that a more integrative approach to monitoring would identify combinations of monitoring-related behaviors and integrate the perspectives of mothers and youth.

This dissertation took a person-oriented approach to parental monitoring, identifying patterns of monitoring used in mother youth dyads during middle school and investigating the relationship of these combinations of monitoring to youth risky behavior. The first study used Latent Class Analysis to identify combinations of monitoring used in mother-youth dyads when youth were in the sixth grade and to explore how these combinations of monitoring relate to risky behavior such as substance use, delinquency, and antisocial peer relationships. The second study extended this work longitudinal study, over the middle school period using Latent Transition Analysis. The second study identified combinations of parent and youth monitoring-related behaviors used when youth were in Grade 6 and 8, explored normative changes in these

combinations of monitoring-related behaviors between Grade 6 and 8, and investigated how substance use was related to changes in these patterns of monitoring-related behaviors.

Review and Integration of Findings Across Studies

Clear and consistent patterns of monitoring emerged from this analysis, suggesting person-oriented methods may make a unique contribution to our understanding of parental monitoring. In sixth grade, five latent classes emerged: High Monitors (mothers and youth report a high probability of being above the median in all monitoring-related behaviors), Communication-Focused (mothers and youth report a high probability of being above the median on all monitoring-related behaviors except supervision), Supervision-Focused (mothers and youth report a high probability of being above the median in supervision but a low or average probability on other monitoring-related behaviors), Maternal Over-Estimators (youth report low but mothers report high probabilities of being above the median in monitoring-related behaviors), and Low Monitors (mothers and youth report a low probability of being above the median in all monitoring-related behaviors). The longitudinal analysis identified similar patterns. A High Monitors, Low Monitors, Supervision-Focus, Communication-Focused and Maternal Over-Estimators status also emerged by Grade 8. However, one additional pattern (Youth Over-Estimators) was identified in the longitudinal analysis only. Youth Over-Estimators were marked by higher youth perceptions of monitoring behaviors than their mothers.

Despite the fact that similar latent classes/ statuses were identified in both studies, many dyads changed their monitoring behaviors between Grade 6 and 8. Most of the transitions between monitoring statuses that occurred over the middle school period were in the direction of reductions, rather than increases in monitoring-related behaviors. Between 11 and 27% of dyads in each of the other statuses transitioned into the Low Monitors between sixth and eighth grade.

All of the statuses where either youth or mothers report high levels of parent active efforts to monitor decrease in prevalence (High Monitors, Communication-Focused, Maternal Over-Estimators), as did the statuses with high levels of Supervision (Supervision-Focused, High Monitors, Maternal Over-Estimators). These findings are consistent with variable oriented studies that suggest that parent efforts to actively monitor youth and supervision may decline, on average, over the middle school transition. These reductions may reflect normative attempts to grant youth more autonomy during this developmental period and reductions in time parents and youth spend together (Collins & Laursen, 2006; Larson et al., 1996). Families who did not have high levels of any monitoring behavior in Grade 6 were not likely to increase monitoring by Grade 8 : The Low Monitors were highly stable, with 98% of dyads in this status in Grade 6 also in this status at Grade 8. This finding suggests that for dyads in the Low Monitors status, disengagement from the monitoring process likely begins prior to Grade 6.

Patterns of parental monitoring in Grade 6 and changes in these patterns of monitoring over middle school were both significantly related to youth risky behavior. The first study found that in sixth grade, membership in the High Monitors and Communication-Focused classes was associated with less problem behavior. Risky behavior was associated with greater odds of membership in three classes: Supervision-Focused, Low Monitors, and Maternal Over-Estimators. The second study found that youth initiation of alcohol, marijuana, and smoking was predictive of changes between patterns of monitoring.

These studies support several variable-oriented studies that suggest that youth disclosure and high levels of parent-child communication are protective against problem behavior. Yet, this study also suggests that disclosure and communication often co-occur with parent efforts to monitor and high levels of knowledge. Youth in the High Monitors and Communication-Focused classes had the lowest level of problem behaviors in the sixth grade. In the longitudinal analysis, many of the changes in monitoring that reflected decreases in combinations of disclosure,

knowledge, and communication were linked to increased risk of youth beginning to engage in substances. The initiation of substances increased the odds of transitioning to the Low Monitors from other statuses (except High Monitors).

The findings suggest that supervision, at least defined as having an adult present, may not be necessary to ensure healthy development during the middle school period. Further, supervision in the absence of other monitoring behaviors may be linked to risky behavior. In sixth grade, monitoring patterns that rely solely on supervision are associated with youth problem behavior (e.g. those in the Supervision-Focused class). In contrast, dyads with low supervision but high levels of all other monitoring strategies (Communication-Focused) were not at increased risk of problem behavior. The longitudinal study found that many youth in the Supervision-Focused Status transition to Low Monitors, and that this particular transition was associated with increased risk of substance use relative to remaining in the same status. Yet, families that decreased only supervision (transitioned from High to Communication-Focused) did not face additional risk of substance use initiation.

Lastly, these studies confirm the importance of understanding multiple perspectives on monitoring. Both studies identified patterns of monitoring where mothers had higher perceptions of monitoring than youth (Maternal Over-Estimators). Maternal overestimation was linked to higher levels of problem behaviors in sixth grade, as risky behavior increased the odds of membership in the Maternal Over-Estimators class. Further, 27% of youth in the Maternal Over-Estimators status became Low Monitors by Grade 8 and substance use initiation increased the odds of this transition. Youth in dyads where mothers perceive higher levels of monitoring than youth may be at increased risk for problem behavior. Perhaps mothers who overestimate monitoring are less likely to provide the supervision and structure necessary to ensure healthy development. Interestingly, discrepant perceptions in Grade 6 extended beyond monitoring into the general parent-child relationship. Mothers in the discrepant class also had more positive

perceptions of the affective relationship, their discipline strategies and the quality of communication.

Interestingly, the longitudinal study suggests that an additional discrepant status emerges over time. By Grade 8, 18% of dyads were in the Youth Over-Estimators status, marked by higher perceptions of monitoring by youth than mothers. Thus, by eighth grade, a subset of mothers may feel more ineffective at monitoring than youth report them to be. Twenty-six percent of Youth Over-Estimators transition into the Low Monitors status by Grade 8, suggesting that maternal feelings of ineffectiveness may lead to further disengagement.

Prevention Implications

There are several implications of these papers for the development of preventive interventions. First, these studies suggest that interventions may want to target a host of monitoring behaviors, rather than one or two. The first study suggests that encouraging families to use a variety of monitoring behaviors in sixth grade may be a protective approach against problem behavior. Parent efforts to solicit youth for information may be positive, if these efforts are also accompanied by high levels of communication. Yet, supervision may not be necessary, as both High Monitors and Communication-Focused patterns were associated with the lowest risk of problem behavior. Families who do not engage in high levels of any monitoring behaviors (Low Monitors), those where mothers perceive higher monitoring than youth (Maternal Over-Estimators), and those where families were engaging in only supervision (Supervision-Focused) were associated with the highest rates of problem behavior in Grade 6.

The second study suggests that parents should use caution when reducing monitoring during the middle school period. Decreasing all monitoring behaviors and transitioning in the Low Monitors Status was associated with increased risk of the initiation of substance use from all

statuses except High Monitors. It appears maintaining high amounts of parent efforts to monitor and communication may be necessary over the middle school period and that the middle school period may be an important period of time to target in preventive interventions. Despite the rapid changes in adolescence, and the increased need for youth autonomy, this study suggests that parents should continue to solicit youth for information, set rules for behavior and engage in communication with their adolescents during the middle school period.

Both studies suggest that assessing parent and youth perceptions of monitoring behaviors may add important information. These studies identified two patterns of monitoring where parents and youth have different perceptions of behaviors (Maternal Over-Estimators and Youth Over-Estimators). Youth in the Maternal Over-Estimators class were at high risk of problem behavior in Grade 6 and likely to transition to Low Monitors by Grade 8. The study also suggests that by Grade 8, a subset of mothers feel more ineffective at monitoring than youth perceive them to be (Youth Over-Estimators) and nearly a quarter of these dyads transition into Low Monitors. Interventions may be bolstered by helping mothers accurately gauge their relationships with youth and the effectiveness of their monitoring strategies. It may benefit families to have an outside observer or coach to help them more objectively assess their interactions. Alternately, pre-intervention data on the parent-child relationship from both parents and youth may help interventionists identify families with discrepant perceptions and tailor interventions to help them gauge their relationships more accurately.

Future Directions

There are several direction for further research in this area. These studies were conducted on a specific sample: mother-adolescent dyads living in rural communities and small towns in Pennsylvania and Iowa. Future work should explore if these patterns of monitoring can

be replicated in other datasets, particularly those that contain urban youth. The low population density in rural communities may make it more difficult for parents to provide monitoring. It is possible that combinations of monitoring have different effects in different ecological contexts, and this is an area ripe for future studies. Second, models should be extended to include the perspectives of other family members, including fathers. This study focuses on mothers, as they are often the main source of parental knowledge (Waizenhofer et al., 2004). However, it is possible that adding fathers will enable us to identify new patterns of monitoring. It would also allow us to explore how patterns of congruence in father and mother or youth perceptions of monitoring relate to risky behavior. Additional analysis on datasets with more modern monitoring measures would allow us to understand how this work specifically maps on to recent variable-oriented studies.

More research is needed to understand how other covariates relate to these patterns of monitoring. For example, parental work status and characteristics of parents' employment may predict latent classes and changes between classes over time. It is possible that parents who work long hours or odd shifts may have difficulty providing supervision or may otherwise need to alter their monitoring strategies. Some studies suggest that maternal work status may moderate the effects of knowledge on youth risky behavior and that knowledge is a stronger predictor of risky behavior when mothers work full-time (Jacobson & Crockett, 2000). More work is needed to understand how maternal work and other aspects of the ecological system may relate to the identified monitoring latent classes.

Additional research is also needed to understand the role that parent and youth depression may play in predicting these latent classes. A recent study suggests that parental knowledge, parental control, and youth disclosure may have reciprocal relationships with youth depression over time (Hamza & Willougyby, 2011). Some studies suggest youth and maternal depression may be linked with differences in parent and youth perceptions of parental knowledge (De Los

Reyes et al., 2008). Youth who are experiencing depression may have more negative perceptions of their parent child relationship than their parents, thereby increasing the odds of membership in the Maternal Over-Estimators class. In addition, maternal depression may be related to membership in the Youth Over-Estimators class, as depression may lead mothers in this status may feel ineffective at monitoring. Maternal depression may also be associated with the Low Monitors class, as depression may underlie both parent and youth disengagement from the monitoring process. Additional studies that focus on internalizing symptoms may further our understanding of patterns of monitoring and changes in monitoring over time.

These studies focus only on transitions in middle school. More work would help us understand how patterns of monitoring change during high school and how monitoring relates to risky behavior during middle and late adolescence. This study suggests that reductions in monitoring in middle school, in most cases, are associated with increased risk for substance use initiation. Yet, we know little about how monitoring latent classes relate to substance use once it becomes more normative. 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 beginning to struggle with parental authority. Therefore it is possible that patterns of monitoring and their relationship to risky behavior may change over the high school period.

Lastly, these studies can not reveal the direction of effects underlying these findings. As discussed in each paper, it is possible that monitoring-related behaviors are causing risky behavior. It is also possible that risky behavior is eliciting the patterns of monitoring observed in these studies. Future work is needed to examine bidirectional effects between these latent classes and child behavior problems over time.

Conclusions

This dissertation suggests that a person-oriented approach that integrates multiple reporters provides novel information on parental monitoring and its relation to youth problem behavior during the middle school period. We identified distinct patterns of monitoring that had not been identified in prior variable-oriented studies. In sixth grade, five latent classes emerged: High Monitors (mothers and youth report a high probability of being above the median in all monitoring-related behaviors), Communication-Focused (mothers and youth report a high probability of being above the median on all monitoring-related behaviors except supervision), Supervision-Focused (mothers and youth report a high probability of being above the median in supervision but a low or average probability on other monitoring-related behaviors), Maternal Over-Estimators (youth report low but mothers report high probabilities of being above the median in monitoring-related behaviors), and Low Monitors (mothers and youth report a low probability of being above the median in all monitoring-related behaviors). One additional pattern of monitoring emerged in dyads between Grade 6 and 8: Youth Over-Estimators (youth report high but mothers report low probabilities of high monitoring).

Patterns of monitoring had clear associations with youth risky behavior. Low levels of all aspects of monitoring, a reliance solely on supervision, and maternal overestimation of monitoring was associated with problem behavior in Grade 6. Changes in patterns of monitoring between Grade 6 and 8 were associated with youth initiation of substances. Initiating substances was associated with increased odds of transitions to the Low Monitors from Communication-Focused, Supervision-Focused, and Maternal Over-Estimators. These findings suggest that parents and youth are engaging in distinct patterns of multiple monitoring behaviors. Identifying combinations of monitoring behaviors and integrating perspectives of parents and youth shed important light on this important protective process.

References

- Akaike, H. (1987). Factor analysis and AIC. *Psychometrika*, 52, 317-332.
- Barnes, G., Hoffman, J., Welte, W., Farrell, M., & Dintcheff, B. (2006). Effects of parental monitoring and peer deviance on substance use and delinquency. *Journal of Marriage and The Family*, 68, 1084-1104. doi: 10.1111/j.1741-3737.2000.00175.x
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1-26.
- Bergman, L. R., Cairns, R. B., Nilsson, L. G., & Nystedt, L. (2000). Developmental science and the holistic approach. Mahwah, N.J.: Erlbaum.
- Bergman, L. R., & Trost, K. (2006). The person-oriented versus the variable-oriented approach: Are they complementary, opposites, or exploring different worlds? . *Merrill-Palmer Quarterly*, 52, 601-632. doi: 10.1353/mpq.2006.0023 .
- Bray, B., Lanza, S., T., & Collins, L.M. (2010). Modeling relations among discrete developmental processes: A general approach to associative latent transition analysis. *Structural Equation Modeling*, 17, 541-569. Doi: 10.1080/10705511.2010.510043.
- Callas, P.W., Flynn, B.S., & Worden, J. K. (2004). Potentially modifiable psychosocial factors associated with alcohol use during early adolescence. *Addictive Behaviors*, 29, 1503-1515. doi: 10.1016/j.addbeh.2004.02.028
- Catalano, R., & Hawkins, D. (1996). The Social Development Model: A theory of antisocial behavior. In J. D. Hawkins (Ed.), *Delinquency and crime: Current theories* (pp. 149-197). Cambridge: Cambridge University Press.
- Coffman, D. L., Patrick, M. E., Palen, L. A., Rhoades, B.L, Ventura, A. K. (2007). Why do high school seniors drink? Implications for a targeted approach to intervention. *Prevention Science*, 8, 241-248. Doi: 10.1007/s11121-007-0078-1.

- Collins, L. M. (2006). Analysis of longitudinal data: The integration of theoretical model, temporal design, and statistical model. *Annual Review of Psychology*, *57*, 505-528.
- Collins, L. M., & Lanza, S. T. (2010). *Latent class and latent transition analysis for the social, behavioral, and health sciences*. New York: Wiley.
- Collins, W. A., & Laursen, B. (2006). Parent-Adolescent Relationships. In P. Noller & J. Feeney (Eds.), *Close relationships: Functions, forms, and process* (pp. 111-125). New York: Psychology Press.
- Conger, R. D. (1989). *Iowa Youth and Families Project, Wave A*. Report prepared for Iowa State University, Ames, IA: Institute for Social and Behavioral Research.
- Cottrell, L., Li, X., Harris, C., D'Alessandri, D., Atkins, M., Richardson, B., & Stanton, B. (2003). Parent and adolescent perceptions of parental monitoring and adolescent risk involvement. *Parenting: Science and Practice*, *3*, 179-195. doi: 10.2224/sbp.2006.34.10.1297
- Clark, D. B., Kirisci, L., Mezzich, A., & Chung, T. (2008). Parental Supervision and Alcohol Use in Adolescence: Developmentally Specific Interactions, *Journal of Developmental and Behavioral Pediatrics*, *29*, 285-292. doi: 10.1097/DBP.0b013e31816e22bd.
- Crouter, A., & Head, M. (2002). Parental monitoring and knowledge of children. In M. Bornstein (Ed.), *Handbook of parenting* (2 ed., Vol. 3, pp. 461-483). Mahwah, New Jersey: Lawrence Erlbaum.
- Crouter, A. C., Bumpus, M. F., Davis, K. D., & McHale, S.M. (2005). How do parents learn about adolescents' experiences? Implications for parental knowledge and adolescent risky behavior. *Child Development*, *76*, 869-882.
- Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin*, *113*, 487-496. doi: 10.1037/0033-2909.113.3.487

- De Los Reyes, A. , Goodman, K. L., Kliewer, W., Reid-Quinones, K. (2010). The longitudinal consistency of mother-child reporting discrepancies of parental monitoring and their ability to predict child delinquent behaviors two years later. *Journal of Youth and Adolescence*. doi: 10.1037/1040-3590.20.2.139.
- De Los Reyes, A. , Kliewer, W., Reid-Quinones, K. (2008). Whose depression relates to discrepancies? Testing relations between informant characteristics and informant discrepancies from both informants' perspectives. *Psychological Assessment*, 20, 139-149. . doi: 10.1037/1040-3590.20.2.139
- DeWit, D. J., Adlaf, E. M., Offord, D. R., & Ogborne, A. C. (2000). Age at first alcohol use: A risk factor for the development of alcohol disorders. *American Journal of Psychiatry*, 157, 745-750. doi: 10.1176/appi.ajp.157.5.745
- Dishion, T., Nelson, S. E., & Bullock, B. M.. (2004). Premature adolescent autonomy: parental disengagement and deviant peer process in the amplification of problem behavior. *Journal of Adolescence*, 27, 515-530. doi: 10.1016/j.adolescence.2004.06.005.
- Dishion, T. J., & McMahon, R. J. (1998). Parental monitoring and the prevention of youth and adolescent problem behavior: A conceptual and empirical formulation. *Clinical Child and Family Psychology Review*, 1, 61–75. doi: 10.1023/A:1021800432380.
- Dix, T. (1991). The affective organization of parenting: Adaptive and maladaptive processes. *Psychological Bulletin*, 110, 3-25. doi: 10.1037/0033-2909.110.1.3
- Donnermeyer, J. F. (1992). The use of alcohol, marijuana, and hard drugs by rural adolescents: A review of recent research. In *Drug Use in Rural American Communities*, edited by Ruth W. Edwards. Binghamton, NY: Harrington Park Press.
- Eccles, J. S. (2004). Schools, academic motivation, and the stage-environment fit. In R.M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (2nd ed., pp. 125-153). New York: Wiley.

- Feldman, B. J., Masyn, K. E., & Conger, R. D. (2009). New approaches to studying problem behaviors: A comparison of methods for modeling longitudinal, categorical adolescent drinking data. *Developmental Psychology*, 45, 652-676. doi: 10.1037/a0014851
- Fletcher, A., Darling, N., & Steinberg, L. (1995). Parental monitoring and peer influences on adolescent substance use. In J. McCord (Eds.), *Coercion and punishment in long-term perspective* (pp. 259-271). New York: Cambridge University Press.
- Fletcher, A. C., Steinberg, L., & Williams-Wheeler, M. (2004). Parental influences on adolescent problem behavior: Revisiting Stattin and Kerr. *Child Development*, 75, 781-196. doi: 10.1111/j.1467-8624.2004.00706.x.
- Granic, I., & Patterson, G. R. (2006). Toward a comprehensive model of antisocial development: A dynamic systems approach. *Psychological Review*, 113, 101-131.
- Grant, B. F., & Dawson, D. A. (1997). Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic survey. *Journal of Substance Abuse*, 9, 103-110. doi: 10.1016/S0899-3289(97)90009-2.
- Hamza, C. A., Willoughby, T. (2011). Perceived parental monitoring, adolescent disclosure, and adolescent depressive symptoms: A longitudinal examination. *The Journal of Youth and Adolescence*, 40, 902-915. doi: 10.1007/s10964-010-9604-8
- Hawk, S. T., Hale, W. W., Raaijmakers, Q. A. , & Meeus, W. (2008). Adolescents' perceptions of privacy invasion in reaction to parental solicitation or control. *The Journal of Early Adolescence*, 28, 583-608. doi:10.1177/0272431608317611
- Jacobson, K. C., & Crockett, L. J. (2000). Parental monitoring an adolescent adjustment: An ecological perspective. *Journal of Research on Adolescence*, 10, 65-97. doi: 10.1207/SJRA1001_4

- Jang, S. J. & Smith, C. A. (1997). A test of reciprocal causal relationships among parental supervision, affective ties, and delinquency. *Journal of Research in Crime and Delinquency*, 34, 307-336.
- Keijsers, Frijns, T., Branje, S. J., & Meeus, W. (2009). Developmental links of adolescent disclosure, parental solicitation, and control with delinquency: Moderation by parental support, *Developmental Psychology*, 45, 1314-1327. doi: 10.1037/a0016693.
- Keijsers, L., Branje, S. J., Vandervalk, I. E., Meeus, W. (2010). Reciprocal effects between parental solicitation, parental control, adolescent disclosure, and adolescent delinquency. *Journal of Research on Adolescence*, 20,88-113. doi: 10.1111/j.1532-7795.2009.00631.x
- Kerr, M., & Stattin, H. (2003). Parenting of Adolescents: Action or Reaction? In A. Crouter & A. Booth (Eds.), *Children's influence on family dynamics: The neglected side of family relationships*. Mahwah, N.J: Lawrence Erlbaum Associates.
- Kerr, M., & Stattin, H. (2003). Parenting of Adolescents: Action or Reaction? In A. Crouter & A. Booth (Eds.), *Children's influence on family dynamics: The neglected side of family relationships*. Mahwah, N.J: Lawrence Erlbaum Associates.
- Kerr, M., Stattin, H., & Burk, W. J. (2010). A reinterpretation of parental monitoring in longitudinal perspective. *Journal of Research on Adolescence*, 20, 39-64. doi: 10.1111/j.1532-7795.2009.00623.x
- Kerr, M., Stattin, H., & Trost, K. (1999). To know you is to trust you: parents' trust is rooted in youth disclosure of information. *Journal of Adolescence*, 22, 737-752. doi: 10.1006/jado.1999.0266
- Laird, R. D., Marrero, M. D., & Sentse. M. (2010). Revisiting parental monitoring: Evidence that parental solicitation can be effective when needed most. *Journal of Youth & Adolescence*, 39, 1431-1441. doi: 10.1007/s10964-009-9453-5.

- Laird, R. D., Pettit, G. S., Bates, J. E., & Dodge, K. A. (2003). Parents' monitoring-relevant knowledge and adolescents' delinquent behavior: Evidence of correlated developmental changes and reciprocal influences. *Child Development, 74*, 752-768.
- Lanza, S. T., Collins, L. M., Lemmon, D. R., Schafer, J. L. (2007). PROC LCA: A SAS Procedure for Latent Class Analysis, *Structural Equation Modeling, 14*, 671-694.
- Larson, R. W., Richards, M. H., Moneta, G., Holmbeck, G., & Diclett, E. (1996). Changes in adolescents' daily interactions with their families from ages 10-18: Disengagement and transformation. *Developmental Psychology, 32*, 744-754. doi: 10.1037/0012-1649.32.4.744.
- Lippold, M. A., Greenberg, M. T., & Feinberg, M. E. (2011). A dyadic approach to understanding the relationship of maternal knowledge of youths' activities to youths' problem behavior among rural adolescents. *The Journal of Youth and Adolescence*. Doi: 10.1007/s10964-010-9595-5
- Loeber, R. (1996). Developmental continuity, change, and pathways in male juvenile problem behaviors and delinquency. In J. D. Hawkins (Ed.), *Delinquency and crime: Current theories* (pp. 1-27). Cambridge, UK: Cambridge University Press.
- Marshall, M. P., & Chassin, L. (2000). Peer influences on adolescent alcohol use: The moderating role of parental support and discipline. *Applied Developmental Science, 4*, 80-88.
- McMahon, R.J., & Metzler, C.W. (1998). Selecting parenting measures for assessing family-based prevention interventions. In R.S. Ashery, E.B. Robertson, & K.L. Kumpfer (Eds.), *Drug abuse prevention through family interventions*. NIDA Research Monograph 177. Rockville, MD: National Institute on Drug Abuse.
- McIntosh, W. A., Nyberg, K. L., Fitch, S. D., Wilson, J. B. & Staggs, Jr., F. M. (1979). Age and drug use by rural and urban adolescents. *Journal of Drug Education, 9*, 129-143.

- Nelson, E. E., Leibenluft, E., McClure, E. B., & Pine, D. S. (2004). The social re-orientation of adolescence: A neuroscience perspective on the process and its relation to psychopathology. *Psychological Medicine*, *35*, 163-174. doi: 10.1017/S0033291704003915
- Patel, A. B., & Fromme, K. (2009). Explicit Outcome Expectancies and Substance Use: Current Research and Future Directions. In L. Scheier (Ed.) *Handbook of Drug Use Etiology*, Washington DC: American Psychological Association Press.
- Patterson, G. R., DeBaryshe, B. D., & Ramsey, E. (1989). A developmental perspective on antisocial behavior. *American Psychologist*, *44*, 329-335. doi: 10.1037/0003-066X.44.2.329
- Patterson, G. R., & Stouthamer-Loeber, M. (1984). The correlation of family management practices and delinquency. *Child Development*, *55*, doi: 1299-1307. 10.2307/1129999.
- Pettit, G. S., & Laird, R. D. (2002). Psychological control and monitoring in early adolescence: The role of parental involvement and earlier child adjustment. In B. K. Barber (Ed.), *Intrusive parenting: How psychological control affects children and adolescents* (pp. 97-125). Washington, DC: American Psychological Association.
- Pettit, G. S., Bates, J. E., Dodge, K. A., & Meece, D. W. (1999). The impact of after-school peer contact on early adolescent externalizing problems is moderated by parental monitoring, perceived neighborhood safety, and prior adjustment. *Child Development*, *70*, 768-778. DOI: 10.1111/1467-8624.00055
- Redmond, C., Schainker, L, Shin, C., & Spoth, R. (2007, May). Discrepancies between in-home and in-school adolescent self-reports of substance use. Poster presented at the Annual Meeting of the Society for Prevention Research, Washington, DC.
- Schwarz, G. (1978). Estimating the dimensions of a model. *The Annals of Statistics*, *6*, 461-464.

- Smetana, J., Metzger, A., Gettman, D. C., & Campione-Barr, N. (2006). Disclosure and secrecy in adolescent-parent relationships. *Child Development, 77*, 201-217. doi: 10.1111/j.1467-8624.2006.00865.x.
- Soenens, B., Vansteenkiste, M., Luyckx, L., & Goossens, L. (2006). Parenting and adolescent problem behavior: An integrated model with adolescent self-disclosure and perceived parental knowledge as intervening variables. *Developmental Psychology, 42*, 305-318. doi: 10.1037/0012-1649.42.2.305
- Spoth, R., Greenberg, M. T., Bierman, K., & Redmond, C. (2004). PROSPER community-university partnership model for public education systems: Capacity-building for evidence-based, competence-building prevention. *Prevention Science, 5*, 31-39. doi: 10.1023/B:PREV.0000013979.52796.8b.
- Spoth, R., Redmond, C., & Shin, C. (1998). Direct and indirect latent-variable parenting outcomes of two universal family-focused preventive interventions: Extending a public health-oriented research base. *Journal of Consulting and Clinical Psychology, 66*, 385-399. doi: 10.1037/0022-006X.66.2.385
- Stattin, H., Kerr, M., & Tilton-Weaver, L. (2010). Parental monitoring: A critical examination of the research. In P. Dittus, V. Guilamo-Ramos & J. Jaccard (Eds.), *Parental monitoring of adolescents*. New York: Columbia University Press.
- Stattin, H., & Kerr, M. (2000). Parental monitoring: A reinterpretation. *Child Development, 71*, 1072-1085. doi 10.1111/1467-8624.00210.
- Steinberg, L. (2007). Risk taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science, 16*, 55-59. doi: 10.1111/j.1467-8721.2007.00475.x
- Steinberg, L., & Morris, A. S. (2001). Adolescent development. *Annual Review of Psychology, 52*, 83-110.

- Steinley & Brusco, 2011, Mixture modeling for clustering: Recommendations and cautions. *Psychological Methods*, 16, 63-79. Doi: 10.1037/a0022673.
- Tilton-Weaver, L., Kerr, M., Pakalniskeine, V., Tokic, A., Salihovic, S., & Stattin, H. (2009). Open up or close down: How do parental reactions affect youth information management? *Journal of Adolescence*, 33, p.333-346. doi:10.1016/j.adolescence.2009.07.011.
- Tobler, A. L. & Komro, K. A. (2010). Trajectories of parental monitoring and communication and effects on drug use among urban adolescents. *Journal of Adolescent Health*, 46, 560-568. doi:10.1016/j.jadohealth.2009.12.008.
- Vieno, A., Nation, M., Pastore, M., Santinello, M. (2009). Parenting and antisocial behavior: A model of the relationship between adolescent self-disclosure, parental closeness, parental control, and adolescent antisocial behavior. *Child Development*, 1509-1519. doi: 10.1037/a0016929

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