

Trajectories of Family Management Practices and Early Adolescent Behavioral Outcomes

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Stage–environment fit theory was used to examine the reciprocal lagged relations between family management practices and early adolescent problem behavior during the middle school years. In addition, the potential moderating roles of family structure and of gender were explored. Hierarchical linear modeling was used to describe patterns of growth in family management practices and adolescents' behavioral outcomes and to detect predictors of interindividual differences in initial status and rate of change. The sample comprised approximately 1,000 adolescents between ages 11 years and 15 years. The results indicated that adolescents' antisocial behaviors and substance use increased and their positive behavioral engagement decreased over time. As adolescent age increased, parental knowledge of their adolescent's activities decreased, as did parental rule making and support. The level and rate of change in family management and adolescent behavioral outcomes varied by family structure and by gender. Reciprocal longitudinal associations between parenting practices and adolescent problem behavior were found. Specifically, parenting practices predicted subsequent adolescent behavior, and adolescent behavior predicted subsequent parenting practices. In addition, parental warmth moderated the effects of parental knowledge and rule making on adolescent antisocial behavior and substance use over time.

Keywords: parenting practices, family management, early adolescence, antisocial behavior, substance use

Adolescence is a developmental period marked by numerous changes for the individual, including biological changes, contextual changes (e.g., transition to middle or high school), and the pursuit of autonomy and independence (Eccles et al., 1993; Lerner & Galambos, 1998; Wang & Holcombe, 2010). In particular, youth renegotiate their relationships with their parents during this period (Steinberg & Silk, 2002). How parents and adolescents manage these changes and maintain the quality of their relationship with each other may have an enduring impact on the adolescents' behavioral development. Stage–environment fit theory (Eccles & Midgley, 1989) provides a comprehensive theoretic framework for considering the joint influence of puberty, school systems, and parent–child relationships on positive and on problem adolescent development. Transactions that result from changes

in all three spheres can result in a mismatch between youths' socioemotional needs and their social environment, particularly during the transition to middle school (Dishion & Patterson, 2006; Eccles, Lord, & Buchanan, 1996). The ways in which parents apply their efforts to their adolescent's transitional period can significantly determine the youth's success or can contribute to problematic behavior.

Longitudinal Trajectories of Family Management Practices and Adolescent Behavior

The term *family management practices* describes a set of parenting practices that are comprehensive in scope and specifically address key dimensions, such as the parent–child relationship (Baumrind, 1991a, 1991b). Although there are several conceptual models for family management, in general, the specific parenting practices can be conceptualized along two dimensions: parents' efforts to manage and monitor children's behavior and efforts to provide emotional support (Darling & Steinberg, 1993). Parental monitoring and behavior management involve parental behaviors toward the child that are intended to track the whereabouts of their children, set rules and expectations for behavior, and supervise or guide children to prevent or reduce problem behavior (Amato & Fowler, 2002). Many studies suggest that greater parental control is associated with fewer opportunities for engagement with deviant peers and associated externalizing problems, such as drug use or criminal activity (Barnes, Hoffman, Welte, Farrell, & Dintcheff, 2006; Dishion, Bullock, & Kiesner, 2008; Griffin, Botvin, Scheier, Diaz, & Miller, 2000; Smetana, Crean, & Daddis, 2002).

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Parental support also encompasses the emotional quality of the interactions between a youth and parents and includes responsiveness to a child's needs and use of encouragement, praise, and physical affection (Barnes, Farrell, & Cairns, 1986; Rollins & Thomas, 1979). Parents who exhibit high levels of these behaviors are characterized as accepting and nurturing, whereas parents with low levels may be described as cold and rejecting. A warm and supportive parent-child relationship is associated with fewer problem behaviors (Forgatch & Stoolmiller, 1994; Scaramella, Conger, & Simons, 1999) and more positive behavioral outcomes, such as academic achievement and social competence (Otto & Atkinson, 1997).

Results of recent studies have revealed the importance of conceptualizing parenting as a longitudinal process rather than as a snapshot in time, as is the case with cross-sectional studies or even those that have two time points (Bullock & Dishion, 2007; Keijsers, Frijns, Branje, & Meeus, 2009; Laird, Criss, Pettit, Dodge, & Bates, 2008). Nevertheless, our understanding has been limited in terms of how individual trajectories of parenting practices and adolescent behavior change over time because, in most extant studies of parenting, data were examined at only one or two time points. Moreover, there had yet to be a study that examined multiple aspects of parenting over time with respect to changes in problem behavior. Thus, the first aim of our study was to identify the developmental trajectories of multiple aspects of family management practices and adolescent behavior from ages 11 years to 15 years.

Reciprocal Relations Among Parental Knowledge, Family Management Practices, and Adolescent Behavior

Healthy adolescent autonomy unfolds in an environment that is structured, that is contingent on daily routines, and that scaffolds adolescent self-determination of actions and decisions. The paradox is that as adolescents engage in more problem behavior, parents' efforts to control or monitor them result in frequent and negative interactions and more disobedience, which in turn lead either to parents reducing requests and demands for more appropriate behavior or to increased parent-adolescent hostility (Collins & Laursen, 2004; Patterson, 1992). Researchers have proposed bidirectional effects to account for the dynamic process between parenting and delinquent behavior (Dishion, Nelson, & Bullock, 2004; Huh, Tristan, Wade, & Stice, 2006; Kerr & Stattin, 2003; Kiesner, Dishion, Poulin, & Pastore, 2009; Laird, Pettit, Bates, & Dodge, 2003); that is, they have posited that on one hand, parenting practices influence adolescents' behaviors, and on the other hand, adolescent behavior elicits parenting reactions. As such, enhancing parents' ability to monitor is expected to lead to improvements in the behavior of their adolescent (e.g., Dishion et al., 2004), yet youths' problem behaviors may lead to decreased parental knowledge or control if youth are the parents' primary source of information or if parents become frustrated and withdraw from their monitoring efforts (e.g., Stice & Barrera, 1995).

Findings relevant to these bidirectional longitudinal effects are mixed. Inconsistent results may arise from measurement of different aspects of parenting practices or the timing of such measurements with respect to developmental periods examined across studies (Huh et al., 2006; Laird et al., 2003). For instance, Brody

(2003) found that although parental monitoring of youth behavior longitudinally predicted decreases in aggressive and delinquent behavior, difficult youth temperament predicted worsening parent-child relationship quality and diminished parental monitoring and knowledge. Conversely, Kerr and Stattin (2003) found that increased delinquency predicted declines in parental control and emotional support 2 years later; however, parenting behavior did not predict change in delinquency over time.

One interpretation of parental monitoring suggests that the relation between parental monitoring and adolescent problem behavior is confounded by parental knowledge (Kerr & Stattin, 2000; Stattin & Kerr, 2000). After disentangling various sources of parental knowledge (i.e., parent solicitation, child disclosure, parental control), these researchers found that only youth disclosure significantly predicts decreases in adolescent norm-breaking behavior, when considered together with parental solicitation and parental control. Parents' efforts to monitor and supervise their youth actually have limited benefit for reducing adolescent problem behavior. They thus suggested that parental knowledge should be distinguished from parental monitoring efforts with respect to specific measurements in order to assess their unique associations with problem behavior (Keijsers, Branje, Van der Valk, & Meeus, 2010; Kerr, Stattin, & Burk, 2010). To date, however, relatively few studies have used more than two time points of data to examine bidirectional associations between parenting practices and adolescent behavioral development by distinguishing parental knowledge from parental control efforts (Fletcher, Steinberg, & Williams-Wheeler, 2004; Keijsers et al., 2010; Soenens, Vansteenkiste, Luyckx, & Goossens, 2006). A long-term longitudinal study to model explicitly reciprocal effects among the key parent and adolescent variables was needed to clarify the effects of parental knowledge and control efforts on adolescents' problem behavior. This approach became the second aim of our study.

Moderation Effect of Family Structure and of Gender

Surprisingly little research has examined how the effects of family management practices vary by key demographic characteristics, such as family structure and gender. Adolescents from single-parent families characterized by socioeconomic disadvantage and greater social isolation tend to have higher rates of problem behaviors, including substance use (Elder, Eccles, Ardel, & Lord, 1995), aggression (Vaden-Kiernan, Ialongo, Pearson, & Kellam, 1995), and dropping out of school (Astone & McLanahan, 1991). However, adequate parental control and support may buffer this negative relationship (Murry, Bynum, Brody, Willert, & Stephens, 2001). For example, high levels of parental monitoring are associated with less delinquency and alcohol use for those from single-parent families, relative to those from two-parent families. A positive parent-adolescent relationship in a single-parent family helps protect adolescents from the influence of delinquent peers (Farrell & White, 1998). Although family structure has been recognized as important in the etiology of adolescent problem behavior, few studies have examined interaction effects of family structure and family management practices on adolescents' behavioral development.

In addition to the effects of family structure, gender may also play a moderating role in terms of early adolescents' trajectories of problem behavior. For example, male adolescents in middle school

have demonstrated an increased frequency of problem behavior, such as antisocial behaviors and delinquency, as a result of gender role socialization and peer pressure (Crosnoe, Erickson, & Dornbusch, 2002; Webb, Bray, Adams, & Getz, 2002; Wang, 2009). Relationships with parents may be more important for girls than for boys (Geuzaine, Debry, & Liesens, 2000). Several studies document that girls experience higher mean levels of parental control than do boys (Dishion & McMahon, 1998; Kiesner et al., 2009). Studies have also indicated that adequate parental control and support may play different roles in alleviating boys' and girls' problem behaviors, though the findings have been mixed. For instance, parental control is associated with less alcohol use and delinquency for boys, but not for girls, and parental support is predictive of depression for girls only (Gutman & Sameroff, 2004). In contrast, some studies examining the effects of parental support have found no significant moderating effects of gender on delinquent behaviors (Deković, Buist, & Reitz, 2004). This suggests that the extent to which gender moderates the effects of parenting practices may depend on the outcomes being assessed. Thus, the third goal was to test how the effects of family management practices on adolescents' problem behaviors differ by family structure and by youths' gender.

Moderation Effect of Parental Support

One of the developmental tasks in adolescence is to establish autonomy while maintaining warm and close relationships with parents (Baumrind, 1991b). Positive and close interactions with parents provide adolescents with the necessary support for mastering challenges and establishing independence (Papini & Roggman, 1992) and for helping them conform to parental values regarding delinquent behaviors (Brook, Brook, Gordon, White-man, & Cohen, 1990). Although studies have documented the individual effects of parental support and of monitoring attempts on adolescents' behavioral problems, relatively few empirical studies have tested the interactive effect of these related but distinct constructs in the same model. Researchers have found that the effect of parental monitoring on adolescents' behaviors varies by levels of emotional supportiveness from parents (see Keijsers et al., 2009; Mounts, 2002; Soenens et al., 2006). According to stage-environment fit theory, changes in social, cognitive, and emotional development across adolescence suggest that each period of adolescence may require a different mix of parental monitoring and support (Ciairano, Kliewer, Bonino, & Bosma, 2008). In particular, parental warmth, as indicated by the quality of the parent-adolescent relationship, may be more important for establishing a relational context in which adolescents feel comfortable sharing information, thereby increasing parental knowledge or monitoring. Thus, the fourth goal of this study was to identify the best mix of parent factors for inhibiting problem behaviors and promoting positive behaviors during the middle school years.

The Linear or Nonlinear Relation

Researchers have found consistent linear relations between parental support and adolescent behavioral outcomes, such that more parental support contributes to fewer adolescent problem behaviors and better adolescent adjustment. Nevertheless, there has been a great deal of theoretical disagreement and empirical inconsistencies regarding the

effects of parental control on adolescents' behavioral outcomes (Barnes, Reifman, Farrell, & Dintcheff, 2000; C. A. Mason, Cauce, Gonzales, & Hiraga, 1996; Stattin & Kerr, 2000). Although parental control might have a positive effect on adolescent problem behavior, extreme parental control may result in rebellion against parental norms (Barnes et al., 2000). Although structure is generally associated with desirable adolescent behavioral outcomes, too much structure may infringe upon adolescents' autonomy and be perceived as coercive. Conversely, overly neglectful parenting may leave youth feeling insecure and uncared for. The fifth goal of our study was to investigate the nonlinear relations between parental control and adolescents' behavioral outcomes.

Overview of the Current Study

As discussed, several gaps remain in the literature regarding the impact of family management practices on adolescents' behavioral development. First, research evidence has indicated that adolescents experience developmental changes in their relationships with their parents and in behavioral outcomes during early adolescence; however, data have been examined at only one or two time points in most extant studies. Our use of trajectory modeling with three time points enabled us to construct a more nuanced portrait of the developmental course of adolescents' behavioral outcomes and of perceived family management practices (e.g., Loeber et al., 2000). Second, although the effects of parenting on adolescent problem behavior have been examined in several studies (De Goede, Branje, & Meeus, 2009; Gutman & Eccles, 2007; Keijsers et al., 2009; Loeber et al., 2000; Masche, 2010), and some researchers have examined the effects of adolescent behavior on parenting practices (e.g., Kerr & Stattin, 2003), relatively few have investigated the reciprocal lagged relations between these two constructs—parent effect and child effect—longitudinally. The study of transactional lagged effects with more than two data points would enable one to test both parent and youth effects and identify the longitudinal effects. Third, few studies have investigated how parenting effects may differ by individual characteristics, including family structure and gender. The examination of adolescents' family structure and gender as moderators would enable us to explain individual differences in family management practices and adolescents' problem behavior. Fourth, although studies have investigated the individual impact of various family management practices on adolescents' behavioral problems, relatively few longitudinal studies have used the same analytic model to simultaneously examine the interaction effects of multiple dimensions of parental monitoring and support over time (Keijsers et al., 2009). The relation between parental control and adolescent behavioral outcomes must be considered in the broader context of the quality of the parent-child relationship, especially during early adolescence. Finally, as stated previously, parents must distinguish between the right amount of parental control that precipitates desirable behavioral outcomes and too much control that may compromise the developing youth's autonomy and be perceived by the adolescent as coercive. More research is needed that explores the nonlinear relation between parental control and adolescent behavior.

To extend previous research, we used hierarchical linear modeling to describe trajectories of family management practices and adolescent behavioral outcomes from ages 11 years to 15 years during the middle school years. Relevant to previous studies that examined the impact of family management practices on adolescents' behaviors

(Gutman & Eccles, 2007; Smetana, 2000), we included indicators of parental monitoring and support in our measures of family management. Stattin and Kerr (2000) interpreted the term *monitoring* to indicate a parent-driven process and maintained that parenting studies should distinguish parental knowledge from parental monitoring efforts. Thus, we used the construct of “parental knowledge” in this study to focus on the extent to which parents are aware of the whereabouts and activities of their youths and avoided equating parental knowledge with parenting practice. The construct of “parental rule making and expectations regarding behavior” was used to measure active parental control. Parental support included two dimensions: (a) parental use of positive reinforcement and (b) parental warmth. To accommodate a strengths-based approach in youth development, we chose measures of adolescent behavioral outcomes to reflect developmental trajectories that are vulnerable to change during adolescence. Adolescent behavioral outcomes included (a) antisocial behavior, (b) substance use, and (c) positive behavioral engagement in school and family life.

Working within the framework of stage–environment fit theory, first, we hypothesized that adolescents’ antisocial behaviors and substance use would increase and their positive behavioral engagement would decrease over time. As adolescent age increased, parental knowledge of their adolescent’s activities would decrease, as would parental rule making and support. Second, we expected that adolescents who perceive greater parental knowledge, rule making, use of encouragement, and parental warmth would have fewer antisocial behaviors, less substance use, and greater engagement in positive behaviors, both reciprocally and longitudinally, from ages 11 years to 15 years. Third, we predicted that differences in family structure and adolescent gender would emerge regarding the association between parenting practices and adolescent behavioral outcomes; however, we predicted that similarities might also be evident. For instance, we predicted that adolescents from two-parent families would experience higher levels of parental rule making than would adolescents from single-parent families, but both groups would experience similar positive effects from increased parental rule making. We also predicted that girls would experience higher levels of parental rule making than boys, and boys would experience more positive effects from increased parental rule making than girls. Fourth, we expected that parental support would moderate the associations between parental knowledge and control and adolescents’ problem behaviors. Specifically, we hypothesized that the link between parental knowledge and control and adolescent problem behaviors is stronger for youth who have more positive parental support. Finally, in the absence of a strong theoretical or empirical basis for making predictions about whether the association between parental control and adolescents’ behavioral problems is linear or nonlinear, we treated the analyses as exploratory.

Method

Sample

Our data were collected as part of The Next Generation Project, a family based intervention program designed to increase understanding about how middle school parents and schools can work together to promote success, health, and well-being in the next generation of youth (Stormshak, Dishion, Light, & Yasui, 2005). In the project, researchers recruited adolescents from eight middle

schools in a school district in the Pacific Northwest. Participating adolescents were followed from sixth through eighth grades. The initial sample of adolescents in the 1st year of data collection included 1,030 students from the 1,036 total consenting sixth graders (99% completion rate). This sample at Year 1 comprised 69% of the total available sixth graders in the eight schools. At Year 2 of collection, the sample comprised 1,069 adolescents out of the 1,092 total consenting seventh graders (98% completion rate). The sample at Year 2 represented 72% of the total available seventh graders. At Year 3, the sample was 1,076 out of the 1,106 total consenting eighth graders (97% completion rate). The sample at Year 3 represented 72% of the total available eighth graders. Of the adolescents surveyed in the first wave, 91% completed all three waves.

Approximately 76% of participating adolescents were European American, 5% were Asian or Pacific Islander, 4% were Hispanic, 3% were American Indian, 1% were African American, and 11% were others. Approximately 54% of the adolescents were female, and 27% were from single-parent families. The percentage of adolescents participating in the free or reduced-price lunch program was 25%. In addition, we excluded seven adolescents from our study who were older than 15 years because they were beyond the typical age range for middle school students and might have skewed our findings. To ascertain whether the adolescents who dropped out of the study in any wave differed from the adolescents who participated in all three waves, a series of contingency table analyses and *t* tests were conducted with all study variables at each wave. Statistically significant differences were not found between the two groups.

The Next Generation Project was a pilot study designed to develop, implement, and test the family check-up model in a public middle school environment (Dishion & Kavanagh, 2003). Of the eight middle schools, four were randomly assigned to the family check-up model, which involved a 3-year process of engaging parents in the school context to provide support to students, especially those experiencing academic and behavioral difficulties. Although treatment versus control comparisons did not yield significant differences, it was found that within the experimental condition, the number of contacts with parents accounted for reductions in teacher-rated behavior problems from Grade 6 through Grade 8 (Stormshak et al., 2005).

Procedure

All students in the participating middle schools were sent a letter from the principal endorsing The Next Generation Project. Phone calls, home visits, and classroom incentives (e.g., movie passes) were provided to maximize the return of consent forms. Participating adolescents who returned consent forms were assigned a school-based research number to ensure confidentiality. School-wide assessments were administered each year that included questionnaire data collection from participating adolescents, teachers, and peer reports regarding the participating students’ behaviors. Data were collected in the spring of Year 1, the winter of Year 2, and the fall of Year 3. At each time of data collection, The Next Generation Project staff members visited each classroom and instructed the participating adolescents to complete the questionnaire during allotted class time. Incentives (e.g., movie passes) were given to adolescents during each session of data collection.

Measures

Adolescent self-report and teacher-report measures were administered when participants were in sixth grade through eighth grade, to measure students' behavioral outcomes and perceived parental practices over time (see Table 1). All these measures had been validated in prior studies in this population (see Stormshak et al., 2005; Wang, Selman, Dishion, & Stormshak, 2010).

In The Next Generation sample, students were measured at sixth (M age = 12.01 years), seventh (M age = 13.45 years), and eighth (M age = 14.73 years) grades, but there was a great deal of

Table 1
Means, Standard Deviations, Range, and Reliabilities
for Measures

Age in years	M	SD	Min	Max	α
Antisocial behavior scale					
11	1.41	0.48	0	2.67	.81
12	1.45	0.51	0	3.00	.84
13	1.47	0.50	0	3.00	.86
14	1.44	0.49	0	2.90	.85
15	1.40	0.45	0	2.54	.86
Substance use scale					
11	12.36	1.96	2.00	20.00	.69
12	12.64	2.53	2.00	20.00	.68
13	12.88	2.83	2.00	20.00	.70
14	13.42	3.32	2.00	20.00	.68
15	13.71	4.35	2.00	20.00	.68
Positive behavior engagement scale					
11	3.32	0.54	1.00	4.00	.86
12	3.25	0.54	1.00	4.00	.88
13	3.19	0.59	1.67	4.00	.85
14	3.13	0.58	1.59	4.00	.89
15	3.10	0.64	1.42	4.00	.88
Parental knowledge scale					
11	3.55	0.73	1.00	4.00	.85
12	3.51	0.72	1.00	4.00	.86
13	3.45	0.70	1.00	4.00	.84
14	3.41	0.74	1.00	4.00	.84
15	3.33	0.78	1.00	4.00	.86
Parental rule making scale					
11	2.44	0.46	1.25	3.00	.75
12	2.37	0.50	1.25	3.00	.75
13	2.28	0.51	1.25	3.00	.73
14	2.19	0.52	1.25	3.00	.74
15	2.13	0.53	1.25	3.00	.76
Use of positive reinforcement scale					
11	3.13	0.97	1.00	4.50	.82
12	3.10	1.01	1.00	5.00	.83
13	3.07	1.05	1.00	4.50	.84
14	2.95	1.02	1.00	4.50	.85
15	2.88	1.09	1.00	4.50	.84
Parental warmth scale					
11	3.37	0.78	1.00	4.00	.80
12	3.17	0.83	1.00	4.00	.80
13	3.09	0.91	1.00	4.00	.86
14	2.99	0.95	1.00	4.00	.88
15	2.90	1.00	1.00	4.00	.85

Note. Min = minimum; Max = maximum.

variability in students' age at each wave: Adolescents were between ages 11 years and 14 years at the first wave of assessment and between ages 13 years and 15 years at the final wave of assessment. Because there was an overlap in adolescents' ages at each wave (e.g., there were adolescents who were ages 13 years and 14 years at each wave), it was possible to examine a more general and longer developmental trajectory of adolescents' behaviors, starting at age 11 years and finishing at age 15 years (Willett, Singer, & Martin, 1998). In addition, each age group at each wave of assessment had a fair number of students for analyses (Wave 1: 34% of the sample were 11 years old, 51% were 12 years old, 12% were 13 years old, and 3% were 14 years old; Wave 2: 27% were 12 years old, 65% were 13 years old, and 8% were 14 years old; Wave 3: 7% were 13 years old, 55% were 14 years old, and 38% were 15 years old). Thus, we used age to provide the time metric in this analysis, centered on the first occasion of assessment at age 11 years, yielding values for the five occasions of assessment of 0, 1, 2, 3, and 4, respectively.

Outcome Variables

Teacher reports of adolescent antisocial behavior. Teacher Perception of Risk (TRISK; Soberman, 1994) was used to assess the extent of adolescents' antisocial behaviors. The 16-item measure taps adolescents' classroom behavior, involvement with deviant peers, and parents' contact with school. This scale began with the phrase "During the last three months, consider the extent to which each of the items below is true for this student." Example items were "argues a lot or uncooperative with the teacher," "misbehaves to get out of schoolwork," and "physically fights and/or bullies." All items were rated on a 4-point scale ranging from 0 (*never true*) to 3 (*frequently recurring*). The 16 items from the TRISK were averaged to measure adolescents' antisocial behavior on each occasion, with higher scores reflecting more antisocial behaviors. The measure has high estimated internal consistency reliability and has been used in previous research with at-risk youth to measure problem behavior (Biglan, Metzler, & Ary, 1994).

Adolescent reports of substance use. Two items from the Student Self-Report Survey (SSRS; Dishion & Stormshak, 2001) were used to form a substance use construct. Adolescents self-reported their quantity of alcohol consumption and tobacco use during the past 3 months. Example items were "How many cigarettes have you smoked, even a puff, in the last month?" and "How many alcoholic drinks (even a sip) have you had in the last month?" The two items used 21-point response scales ranging from 0 (*never*) to 20 (*41 or more*). The scores on these two items were averaged to form a composite measure of substance use. This construct has been shown to be a good indicator of substance use at this age and is sensitive to intervention effects (Dishion & Kavanagh, 2003).

Adolescent reports of positive behavioral engagement. Adolescents' positive engagement was assessed with 13 questions from the Social Skills Rating System (Gresham & Elliott, 1990), including items assessing positive engagement in the home setting (e.g., "help with chores around the house"), school setting (e.g., "cooperate with my teachers," "feel positive about going to school"), and personality characteristics (e.g., "follow through with plans and goals," "feel confident and proud of accomplishments") for the past 3 months. All items were rated on a 5-point scale ranging from 1 (*never/almost never*) to 5 (*always/almost always*). The 13 items from this rating

system were averaged to create the composite of adolescent positive behavioral engagement on each occasion, with higher scores reflecting more positive behaviors.

Predictors

The SSRS was used to assess adolescents' perceptions of family management practices and other domains and was adapted from a previous self-report instrument by Dishion and Kavanagh (2003). There was one construct of parental knowledge, and there were three constructs underlying family management practices.

Parental knowledge. Four items were used to reflect the degree of parents' knowledge about their youth's activities, whereabouts, and plans in the past 3 months. All items were rated on a 5-point scale ranging from 1 (*never true*) to 5 (*always*). The four items were "How often does at least one of your parents know what you are doing when you are away from home?" "How often does at least one of your parents have a pretty good idea about your plans for the coming day?" "How often does at least one of your parents have a pretty good idea about your interests, activities, friends, and whereabouts?" and "How often does at least one of your parents know where you are after school?" The four items were averaged to create the composite of parental knowledge on each occasion, with higher scores reflecting higher levels of parental knowledge.

Parental rule making. Four items were used to assess parental rule making. These items reflected rules or expectations that adolescents reported their parents had of them (e.g., do homework every day, get home on time). For each item, adolescents used a 4-point scale to indicate the degree to which their parents had a clear rule or expectation, including 1 (*don't have a rule/don't think it's important*), 2 (*sort of expect*), 3 (*definitely expect*), and 4 (*have a clear rule*). Example items were "My parents _____ that I should do my homework every day," "My parents _____ that I should not stay out late when there are no adults there," "My parents _____ that I should check in with them if I am going to be home late," and "My parents _____ that I should not smoke cigarettes or use smokeless tobacco." The four items were averaged to form a composite measure of parental rule making on each occasion, with higher scores indicating higher levels of parental rule making.

Parental use of positive reinforcement. The use of the positive reinforcement construct was defined by six items assessing how often the parents reinforced positive behaviors, such as following a household rule or doing something well in the past 3 months. The item response formats were 5-point frequency scales ranging from 1 (*never/almost never*) to 5 (*daily*). Example items were "How often do your parents praise or compliment you for anything you did well?" and "How often do your parents let you do something you like to do (such as watch TV or use the phone) after you had already done something well (like schoolwork or chores)?" The scores on these six items were averaged to form a composite measure of use of reinforcement.

Parental warmth. Eight items were used to measure parental warmth. Items involved the degree of trust, warmth, fun, and togetherness between parents and adolescents in the past 3 months. This scale began with the phrase "How true are the following statements for you and your parents?" with respondents answering on a 5-point scale ranging from 1 (*never true*) to 5 (*always true*).

Example items were "My parents trust and support my judgment" and "I can depend on my parents when I have personal problems." Responses to these eight items were averaged to create the construct of parental warmth, with higher scores reflecting more expression of warmth.

Covariates. Demographic characteristics of the target sample used in the analyses included gender (0 = female, 1 = male), family structure (0 = two-parent family, 1 = single-parent family), ethnicity (0 = non-White, 1 = White), and socioeconomic status (SES) because previous literature has highlighted the importance of these characteristics on issues integral to study design. The school's categorization of student ethnicity was based on parents' reports as indicated in school district enrollment data. Family structure indicated whether the adolescent's family was or was not a single-parent family. The SES indicator showed whether the student received free or reduced-cost lunch (0 = no, 1 = yes). Because half of the families were randomly assigned to the program group and received services from the program during the period under study, the possible effect of family program status on adolescent outcomes was also considered treatment (0 = control group, 1 = treatment group).

Data Analyses

To investigate how adolescents' behavioral outcomes and perceived parenting practices changed from ages 11 years to 15 years in middle school and how this change differed across adolescents, we used hierarchical linear modeling (Raudenbush & Bryk, 2002; Singer & Willett, 2003). All analyses were conducted using HLM 5, full information maximum likelihood estimation (FIML). FIML assumes that missing data are missing at random (MAR). The amount of missing data was less than 2%, and the data were missing at random, as evidenced by nonsignificant results derived from the generalized least squares combined test of homogeneity of means and covariance matrices representing complete and incomplete data, $\chi^2(125, N = 1030) = 1,543.25, p = 1.8$ (Bentler, 2005; Little & Rubin, 1987). The Level 1 (within-person) models described individual change over time in adolescents' behavioral outcomes. The Level 2 (between-person) models described how these individual changes differed by demographic characteristics (e.g., gender and family structure). To answer our five research questions, we conducted the following steps. First, after testing a variety of possible Level 1 model specifications, we concluded that the best fitting Level 1 individual growth model for adolescent behavioral outcomes and parent variables included linear components only,¹ as follows:

$$Y_{ij} = \pi_{0i} + \pi_{1i}(\text{AGE} - 11)_{ij} + \varepsilon_{ij} \text{ (Level 1)} \quad (1)$$

In Equation 1, Y_{ij} represents the intended outcome for adolescent i at time j . When the time metric is centered at age 11 years, the individual growth parameters have the following interpretations: π_{0i} represents adolescent i 's true scores in the outcome at age 11 years, and π_{1i} represents adolescent i 's true rate of growth over time. The residual in Equation 1, ε_{ij} represents that portion of adolescent i 's outcome at age j that is not predicted by his or her age.

¹ The exception was that antisocial behaviors included both linear and quadratic terms.

The hypothesized Level 2 models treated the individual growth parameters from Level 1 as outcomes that enabled us to examine whether adolescents differed in their initial status or rates of change, and if so, what predicted that variation. The initial Level 2 model specifications (Equation 2) were unconditional growth models that included no substantive time-invariant predictors and simply allowed each Level 1 individual growth parameter to differ randomly in terms of its population.

$$\begin{aligned} \pi_{0i} &= \gamma_{00} + \zeta_{0i} \\ \pi_{1i} &= \gamma_{10} + \zeta_{1i} \end{aligned} \tag{2}$$

The two fixed effects (γ_{00}, γ_{10}) served as Level 2 intercepts, representing the average true level of adolescent outcomes at age 11 years, and the average true rate of change, respectively. The Level 2 residuals (ζ_{0i} and ζ_{1i}) represent the deviation of each adolescent's growth parameters from the population average. We then fitted a series of nested multilevel models in which we tested the effect of each time-varying and time-invariant predictor on the intercept, rate of change, and acceleration in the outcomes.

Second, to test for reciprocal lagged associations between family management practices and behavioral outcomes, we conducted two sets of analyses. We matched the time-varying parent variables from ages 11 years to 14 years to the corresponding time-lagged adolescent outcomes from ages 12 years to 15 years and fitted the following model by adding the four time-varying parent variables (i.e., parental knowledge, rule making, positive reinforcement, and warmth) as question predictors to the Level 1 equation of the baseline model:

$$\begin{aligned} Y_{ij} = & \pi_{0i} + \pi_{1i}(\text{AGE} - 11)_{ij} + \pi_{2i}(\text{KNOWLEDGE})_{ij} \\ & + \pi_{3i}(\text{RULEMAKE})_{ij} + \pi_{4i}(\text{REINFORCE})_{ij} \\ & + \pi_{5i}(\text{WARMTH})_{ij} + \epsilon_{ij} \end{aligned} \tag{3}$$

$$\begin{aligned} \pi_{0i} &= \gamma_{00} + \zeta_{0i} \\ \pi_{1i} &= \gamma_{10} + \zeta_{1i} \\ \pi_{2i} &= \gamma_{20} \\ \pi_{3i} &= \gamma_{30} \\ \pi_{4i} &= \gamma_{40} \\ \pi_{5i} &= \gamma_{50} \end{aligned} \tag{4}$$

Then, we examined the reverse causal model in the same manner as we did the first set of analyses by matching the adolescent behavior outcomes from 11 years to 14 years to the corresponding parent variables from ages 12 years to 15 years. The four time-varying parent variables were grand mean centered, which ensured that adding these variables did not change the meaning of the other coefficients in the model (Raudenbush & Bryk, 2002).

Third, we tested cross-level interactions between the Level 2 adolescent characteristics and each of the time-varying predictors. This step was undertaken to determine whether certain characteristics of the adolescent (gender and family structure) moderated the associations between family management practices and behavioral outcomes. Fourth, to test whether parental support moderated the association between parental control or

parental knowledge and adolescent problem behavior, all two-way interactions among the four parent variables in the prediction of adolescents' behaviors were also examined. Because of the restriction in degrees of freedom, we did not include the residual variance components of the Level 1 family management variables in the model.

Finally, to test whether the four parent variables showed curvilinear relations to adolescent problem behavior, we added linear intercept and quadratic intercept of parent variables to the model:

$$\begin{aligned} Y_{ij} = & \pi_{0i} + \pi_{1i}(\text{AGE} - 11)_{ij} + \pi_{2i}(\text{KNOWLEDGE})_{ij} \\ & + \pi_{3i}(\text{KNOWLEDGE})_{ij}^2 + \pi_{4i}(\text{RULEMAKE})_{ij} \\ & + \pi_{5i}(\text{RULEMAKE})_{ij}^2 + \pi_{6i}(\text{REINFORCE})_{ij} \\ & + \pi_{7i}(\text{REINFORCE})_{ij}^2 + \pi_{8i}(\text{WARMTH})_{ij} + \\ & \pi_{9i}(\text{WARMTH})_{ij}^2 + \epsilon_{ij} \end{aligned}$$

Because all the quadratic intercepts of parent variables were not statistically significant and the addition of quadratic effects worsened the model fit, we kept only significant parent variables with linear intercept in our final model predicting change in adolescent behavioral outcomes.

Results

Table 1 displays the means, standard deviations, and ranges for each of the parent variables and the behavioral outcomes. We present three sets of analytic results. The first set examines trajectories of adolescent behavioral outcomes (see Table 2) and the trajectories of parental knowledge and family management practices (see Table 3). For the first set of analyses, we describe trajectories from ages 11 years to 15 years and examine how trajectories differ by family structure and by gender. In other words, we use gender and family structure to predict the level of and change in parental knowledge, family management practices, and adolescent behavioral outcomes. The second set of analyses shows reciprocal associations among parental knowledge, family management practices, and adolescent behavioral outcomes across lagged trajectories and whether these associations differ by gender or family structure (see Tables 4 and 5). The third set of analyses examines whether parental support moderates the associations between parental knowledge and rule making and adolescent problem behaviors.

Trajectories of Adolescent Behavioral Outcomes

Model 1 in Tables 2 and 3 is the resulting fitted unconditional growth model. Model 2 shows the effects of covariates.

Antisocial behavior. The average adolescent experienced an increase in antisocial behavior from ages 11 years to 13 years, followed by a slight decrease from ages 14 years to 15 years (see Table 2, Antisocial behavior Model 1). The initial status of antisocial behavior varied by gender (see Table 2, Antisocial behavior Model 2). Boys demonstrated more antisocial behavior than did girls at age 11 years. Antisocial behavior increased over time for the average adolescent, and this increase was greater for adolescents from single-parent families. There

Table 2
Unstandardized Fixed Effects, Variance Components, and Fit Statistics for the Growth Models of Adolescent Antisocial Behavior, Substance Use, and Positive Behavioral Engagement

Variance component	Antisocial behavior		Substance use		Positive behavioral engagement	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Fixed effects for initial status						
Intercept	0.341*** (.038)	0.293*** (.059)	1.576*** (.119)	1.327*** (.284)	3.455*** (.025)	3.499*** (.059)
Treat		-.019 (.014)		-.119 (.240)		.014 (.042)
White		-.120 (.090)		.391 (.284)		.119* (.058)
SES		-.042 (.026)		-.034 (.023)		.190 (.043)
Male		.137*** (.090)		-.104 (.182)		-.244*** (.058)
Single-parent		-.010 (.118)		-.207 (.349)		-.179* (.071)
Single × Male		.216 (.186)		.510 (.535)		.161 (.109)
Fixed effects for linear slope						
Intercept	.109** (.036)	.109** (.041)	.703*** (.074)	.775*** (.167)	-.125*** (.011)	-.118*** (.027)
Treat		.021 (.017)		.034 (.145)		-.017 (.012)
White		.041 (.088)		-.251 (.164)		-.023 (.027)
SES		.021 (.019)		.024 (.037)		-.015 (.037)
Male		.045 (.085)		.253* (.127)		-.039 (.026)
Single-parent		.207* (.105)		.175 (.207)		.031 (.033)
Single × Male		.014 (.040)		-.111 (.305)		-.098* (.050)
Fixed effects for quadratic slope						
Intercept	-.026** (.008)	-.024** (.008)				
Treat		-.002 (.004)				
White		-.008 (.020)				
SES		-.013 (.020)				
Male		.029* (.015)				
Single-parent		-.032 (.031)				
Single × Male		.037 (.044)				
Random effects						
Initial status	.014***	.012***	.033***	.026***	.204***	.195***
Linear slope	.008***	.007***	.064***	.059***	.031***	.029***
Quadratic slope	.002**	.001**				
Level 1 residual	.048***	.047***	.048***	.047***	.127***	.127***
Goodness of fit						
-2LL	535.3	439.9	1,035.9	998.1	6,760.1	6,688.7
AIC	565.2	461.9	1,057.9	1,016.1	6,806.8	6,710.7

Note. Model 1 is an unconditional growth model. Standard errors are in parentheses. Model 2 adds the controlling variables. Quadratic effects were tested but were not significant for substance use and positive behavioral engagement. SES = socioeconomic status; Treat = treatment group; LL = log likelihood; AIC = Akaike information criterion.

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

was also a significant negative quadratic trend that was more negative for girls.

Substance use. For the average adolescent, substance use increased from ages 11 years to 15 years (see Table 2, Substance use Model 1). There were no gender or family structure differences in the initial level of substance use at age 11 years (see Table 2, Substance use Model 2). The rate of increase of substance use was greater for boys than for girls.

Positive behavioral engagement. For the average adolescent, positive behavioral engagement decreased from ages 11 years to 15 years (see Table 2, Positive behavioral engagement Model 1). As shown in Table 2, Positive behavioral engagement Model 2, the initial status of positive behaviors differed by family structure and by gender. Girls had more positive behavioral engagement than did boys at age 11 years. Adolescents from two-parent families reported more positive behavioral engagement than did those from single-parent families at age 11 years. A significant gender by family structure interaction revealed that girls from single-parent families (-.087) reported a smaller decrease in positive behaviors, followed by girls from two-parent families (-.118),

boys from two-parent families (-.157), and boys from single-parent families (-.216).

Trajectories of Perceived Parental Knowledge and Family Management Practices

Parental knowledge. The average adolescent experienced a decrease in parental knowledge from ages 11 years to 15 years (see Table 3, Parental knowledge Model 1). As shown in Table 3, Parental knowledge Model 2, the intercept differed by family structure and by gender. Girls reported more parental knowledge than did boys at age 11 years. Adolescents from single-parent families reported less parental knowledge than did adolescents from two-parent families at age 11 years. Perceptions of parental knowledge decreased over time, and the rate of decrease was greater for boys than for girls.

Parental rule making. On average, adolescents experienced a decrease in parental rule making as they increased in age (see Table 3, Parental rule making Model 1). There were gender and family structure differences in the intercept of parental rule making

Table 3
Unstandardized Fixed Effects, Variance Components, and Fit Statistics for the Growth Models of Parental Knowledge and Family Management Practices

Variance component	Parental knowledge		Parental rule making		Use of reinforcement		Parental warmth	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Fixed effects for initial status								
Intercept	3.672* (.031)	3.675*** (.076)	2.603*** (.021)	2.683*** (.050)	3.331*** (.044)	3.486*** (.105)	3.640*** (.037)	3.728*** (.090)
Treat		.008 (.064)		.026 (.042)		.010 (.087)		.017 (.042)
White		.075* (.037)		-.020 (.049)		-.002 (.103)		.015 (.089)
SES		.024 (.035)		.035 (.023)		.079 (.049)		.210 (.132)
Male		-.214** (.074)		-.095* (.049)		-.207* (.103)		-.123 (.089)
Single-parent		-.183* (.093)		-.137* (.060)		-.137* (.128)		-.221* (.110)
Single × Male		.123 (.142)		.125 (.092)		-.175 (.195)		-.109 (.167)
Fixed effects for linear slope								
Intercept	-.114*** (.015)	-.088* (.034)	-.159*** (.009)	-.141*** (.025)	-.143*** (.019)	-.142*** (.020)	-.256*** (.018)	-.282*** (.043)
Treat		-.019 (.029)		-.020 (.018)		-.047 (.039)		-.026 (.037)
White		-.041 (.035)		-.031 (.022)		-.032 (.047)		-.001 (.042)
SES		.038 (.029)		.032 (.027)		.043 (.051)		.039 (.045)
Male		-.049* (.024)		-.023 (.022)		-.008 (.046)		.056 (.042)
Single-parent		.016 (.044)		.005 (.028)		-.007 (.059)		-.054 (.053)
Random effects								
Intercept	.295***	.276***	.114***	.104***	.545***	.516***	.324***	.317***
Linear Slope	.045***	.043***	.015***	.014***	.066***	.066***	.075***	.074***
Level 1 Residual	.238***	.237***	.101***	.103***	.443***	.444***	.343***	.345***
Goodness of fit								
-2LL	5,721.1	5,665.3	3,392.9	3,350.4	7,558.6	7,510.6	6,805.4	6,768.1
AIC	5,733.1	5,687.3	3,404.9	3,370.4	7,570.6	7,530.6	6,817.4	6,788.1

Note Model 1 is an unconditional growth model. Model 2 adds the controlling variables. Standard errors are in parentheses. Quadratic effects were tested but not significant for family management practices. SES = socioeconomic status; Treat = treatment group; LL = log likelihood; AIC = Akaike information criterion.

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

Table 4
Unstandardized Fixed Effects, Variance Components, and Fit Statistics for the Growth Models in Which Parental Knowledge and Family Management Practices Predict the Adolescent Behavioral Outcomes Longitudinally

Variance component	Longitudinal model		
	Antisocial behavior	Substance use	Positive behavioral engagement
Fixed effects for initial status			
Intercept	1.024*** (.059)	13.602*** (.968)	2.075*** (.157)
Treat	-.018 (.016)	.017 (.012)	.039 (.034)
White	-.041 (.101)	.434 (.677)	.160 (.121)
SES	-.077 (.066)	-.090 (.098)	.064 (.043)
Male	.118*** (.102)	.865† (.734)	-.409** (.121)
Single-parent	.005 (.131)	-.463 (.872)	-.242* (.127)
Single × Male	.073 (.197)	.289 (.443)	.211 (.237)
Fixed effects for linear slope			
Intercept	.091* (.051)	.562* (.302)	-.043* (.037)
Treat	.018 (.022)	.035 (.148)	-.013 (.024)
White	-.017 (.038)	-.255 (.295)	-.040 (.047)
SES	-.075 (.063)	-.522 (.539)	-.035 (.042)
Male	.120 (.103)	.230 (.299)	.111* (.047)
Single-parent	.004 (.130)	.184 (.387)	.082 (.063)
Single × Male	.070 (.195)	-.165 (.576)	.127 (.092)
Fixed effects for quadratic slope			
Intercept	-.015* (.005)		
Treat	-.012 (.015)		
White	-.008 (.020)		
SES	-.010 (.026)		
Male	-.018 (.019)		
Single-parent	-.032* (.015)		
Single × Male	.034 (.044)		
Knowledge			
Intercept	-.077*** (.018)	-.776** (.142)	.116*** (.024)
Male	.038* (.015)		
Rule making			
Intercept	-.031* (.016)	-.182 (.193)	.071* (.032)
Reinforcement			
Intercept	-.024† (.012)	-.296 (.194)	.038* (.016)
Warmth			
Intercept	-.047** (.017)	-.446** (.158)	.174*** (.021)
Single		.506* (.199)	
Knowledge × Warmth			
Intercept	-.026*** (.003)	-.126** (.036)	
Rule Making × Warmth			
Intercept		-.098* (.055)	
Random effects			
Initial status	.011***	.024***	.187***
Linear slope	.007***	.056***	.027***
Quadratic slope	.001**		
Level 1 residual	.030***	.019***	.110***
Goodness of fit			
-2LL	437.9	1,032.7	6,674.5
AIC	459.9	1,054.7	6,701.5

Note. Standard errors are in parentheses. quadratic effects were tested but not significant for substance use and positive behavioral engagement. SES = socioeconomic status; Treat = treatment group; LL = log likelihood; AIC = Akaike information criterion.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

(see Table 3, Parental rule making Model 2). Girls reported more parental rule making than did boys at age 11 years. Adolescents from single-parent families reported less parental rule making than did those from two-parent families at age 11 years.

Parental use of positive reinforcement. The average adolescent experienced a decrease in parental use of positive reinforcement (see Table 3, Parental use of positive reinforcement Model 1). Findings indicated that the intercept varied by family structure and by gender (see Table 3, Parental use of positive reinforcement Model 2). Girls reported more parental use of reinforcement than did boys at age 11 years. Adolescents from two-parent families reported greater parental use of reinforcement than did those from single-parent families at age 11 years.

Parental warmth. For the average adolescent, perceptions of parental warmth decreased over time (see Table 3, Parental warmth Model 1). As shown in Table 3, Parental warmth Model 2, there were family structure differences in the intercept of parental warmth. Adolescents from single-parent families perceived less parental warmth at age 11 years than did those from two-parent families. A significant gender by family structure interaction indicated that girls from single-parent families (-.336) experienced a greater decrease in parental warmth than did girls from two-parent families (-.282), boys from two-parent families (-.226), and boys from single-parent families (-.174).

Reciprocal Relations Among Parental Knowledge, Family Management Practices, and Adolescent Behaviors

Table 4 presents the final parsimonious models, which show the effect of time-varying parent variables on initial status and the rate of change in adolescent behavioral outcomes longitudinally. To test for reciprocal effect, we used adolescents' behavioral variables as predictors to test for the effects of adolescents' behavior on family management practices (see Table 5).

Longitudinal effect of parental knowledge and family management on antisocial behavior. As shown in Table 4, Antisocial behavior column, the statistically significant Level 1 coefficients indicated that adolescents were less likely to engage in antisocial behavior when they perceived greater parental knowledge, rule making, and warmth from their parents. The standardized effect sizes (d), calculated according to Raudenbush and Xiao-Feng (2001), suggest that a standard deviation increase in parental knowledge, rule making, and parental warmth, respectively, was linked to a modest decrease of .33, .25, and .29 standard deviations in adolescents' antisocial behavior. The effect of parental knowledge on adolescent antisocial behavior differed by gender. With greater parental knowledge, boys experienced fewer antisocial behaviors than did girls ($d = 0.18$). According to the pseudo- R^2 (Singer & Willett, 2003), parenting predictors explained 22% of the previously unexplained residual variance for the intercept in antisocial behavior and 25% of the variance in change over time in the form of individual differences in the slope.

Longitudinal effect of parental knowledge and family management on substance use. As shown in Table 4, Substance use column, the statistically significant Level 1 coefficients indicated that adolescents used substances less frequently when they perceived greater parental knowledge and warmth. A standard devi-

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Table 5

Unstandardized Fixed Effects, Variance Components, and Fit Statistics for the Growth Models in Which Adolescent Behavior Predicts Parental Knowledge and Family Management Practices Longitudinally

Variance component	Longitudinal model			
	Parental knowledge	Parental rule making	Use of reinforcement	Parental warmth
Fixed effects for initial status				
Intercept	2.734*** (.216)	2.419*** (.145)	2.175*** (.308)	1.907*** (.282)
Treat	-.091 (.132)	.044 (.086)	-.034 (.186)	.001 (.174)
White	.014 (.156)	-.074 (.102)	-.071 (.219)	.040 (.205)
SES	.014 (.037)	.025 (.021)	.068 (.046)	.196 (.127)
Male	-.354** (.133)	-.098 (.086)	-.248† (.125)	-.249 (.175)
Single-parent	-.040 (.150)	-.178* (.082)	-.124 (.210)	-.155 (.197)
Single × Male				
Fixed effects for linear slope				
Intercept	-.133* (.068)	-.112* (.043)	-.164* (.086)	-.129* (.089)
Treat	.010 (.052)	-.037 (.033)	-.001 (.071)	-.032 (.069)
White	.011 (.062)	-.019 (.039)	-.008 (.085)	-.026 (.082)
White	.023 (.025)	.035 (.031)	.038 (.046)	.021 (.046)
SES	.102† (.052)	.029 (.033)	.071 (.072)	.137* (.069)
Male	-.022 (.060)	.012 (.038)	.018 (.082)	.029 (.078)
Antisocial behavior				
Intercept	-.039** (.035)	-.073** (.024)	-.123* (.055)	-.102* (.049)
Substance use				
Intercept	-.023** (.008)	-.017* (.005)	.001 (.011)	-.034** (.010)
Positive behavior				
Intercept	.002 (.038)	.013 (.026)	.102† (.051)	.281*** (.045)
Random effects				
Intercept	.192***	.106***	.696***	.721***
Linear slope	.034***	.025***	.047***	.119***
Level 1 residual	.274***	.103***	.466***	.431***
Goodness of fit				
-2LL	4,105.3	2,760.4	6,102.3	5,970.0
AIC	4,116.4	2,796.4	6,132.3	5,996.0

Note Standard errors are in parentheses. quadratic effects were tested but not significant for family management practices. SES = socioeconomic status; Treat = treatment group; LL = log likelihood; AIC = Akaike information criterion.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

ation increase in parental knowledge and parental warmth was associated with a modest decrease of .24 and .20 standard deviations in substance use, respectively. Findings also revealed that the effect of parental warmth on substance use differed by family structure. With one standard deviation increase in parental warmth, adolescents from single-parent families experienced a greater decrease of .20 standard deviation in substance use than did adolescents from two-parent families. The parenting predictors explained 27% and 13% of the unexplained variance in the intercept and slope, respectively.

Longitudinal effect of parental knowledge and family management on positive behavioral engagement. As shown in Table 4, Positive behavioral engagement column, adolescents who perceived higher parental knowledge, rule making, use of positive reinforcement, and warmth from their parents reported greater engagement in positive behaviors. One standard deviation increase in parental knowledge, rule making, use of reinforcement, and parental warmth enhanced adolescent positive behavioral engagement by .19, .14, .07, and .32 standard deviations, respectively. The parenting predictors explained 10% and 15% of the unexplained variance in the intercept and slope, respectively.

Longitudinal effect of adolescent behavior on parental knowledge and family management. The models indicate that the longitudinal associations between parent variables and adoles-

cent problem behavior (i.e., antisocial behavior and substance use) can be modeled as reciprocal associations. The reciprocal effects between parent variables and adolescents' positive behavioral engagement were not found, except for the association between adolescents' positive behavioral engagement and parental warmth. As shown in Table 5, antisocial behavior and substance use had a significant longitudinal effect on parental knowledge ($ds = 0.14$ and 0.10 , see Parental knowledge column), rule making ($ds = 0.15$ and 0.12 , see Parental rule making column), and parental warmth ($ds = 0.20$ and 0.16 , see Parental warmth column). Specifically, less parental knowledge, rule making, and parental warmth at ages 12–15 years were predicted by more problem behavior 1 year earlier. The delinquent behavior predictors explained 13% and 16% of the unexplained variance in the intercept and slope for parental knowledge, 12% and 15% of the unexplained variance for parental rule making, and 18% and 21% of the unexplained variance for parental warmth, respectively.

Moderation Effect of Parental Support

We found three moderation effects (see Table 4). First, the interaction effect of Knowledge × Warmth ($d = 0.37$) suggests that the positive effect of parental knowledge on antisocial behavior increased with greater parental warmth (see Figure 1). Further-

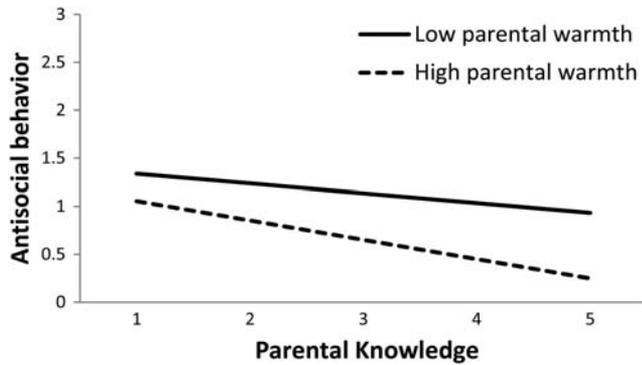


Figure 1. Longitudinal association between parental knowledge and antisocial behavior as a function of parental warmth.

more, the moderation effect of knowledge by warmth ($d = 0.41$) suggests that more parental knowledge was associated with less substance use as adolescents experienced more parental warmth (see Figure 2). Finally, the interaction effect of rule making by warmth ($d = 0.30$) suggests that the positive impact of rule making on substance use increased as adolescents experienced greater warmth from parents (see Figure 3).

The Linear or Nonlinear Relation

We included linear and quadratic intercepts of parent variables, including parental knowledge, parental rule making, parental use of positive reinforcement, and parental warmth, into the model. All the quadratic intercepts of parent variables were not statistically significant and the addition of quadratic effects worsened the model fit. Therefore, our study suggested a linear relationship between parent variables and adolescent antisocial behavior and substance use during the middle school years.

Discussion

Among a sample of approximately 1,000 young adolescents ages 11–15 years, the trajectories of adolescent behavioral development and family management practices were examined as a function of adolescents' gender and family structure. Working

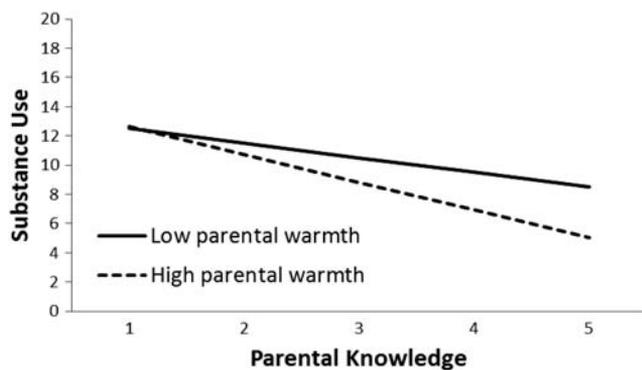


Figure 2. Longitudinal association between parental knowledge and substance use as a function of parental warmth.

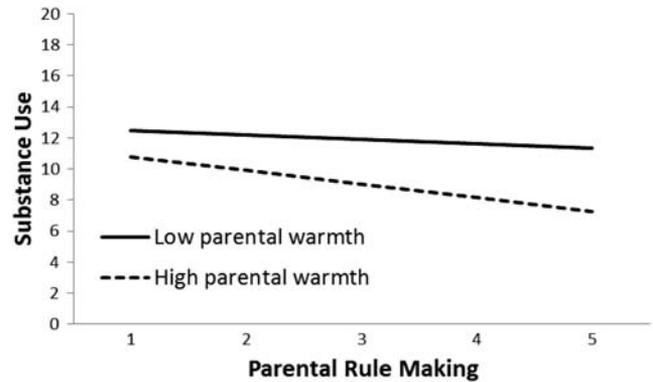


Figure 3. Longitudinal association between parental rule making and substance use as a function of parental warmth.

within the framework of stage–environment fit theory (Eccles & Midgley, 1989), we also examined the associations between family management practices and adolescent behavioral outcomes both reciprocally and longitudinally, as well as the moderating effects of parental support in the associations between parental control and adolescent behavioral outcomes. The results demonstrated that adolescents' antisocial behaviors and substance use increased over time, and their positive behavioral engagement decreased over time. As adolescent age increased, parental knowledge, parental rule making, and parental support decreased. The level and rate of change in family management practices and adolescent behaviors differed by youths' gender and family structure. Parenting practices contributed both reciprocally and longitudinally to adolescent problem behaviors. The longitudinal associations between parental knowledge and rule making and adolescent problem behaviors differed according to the level of parental warmth.

Trajectories of Adolescent Behavioral Outcomes

According to the rate of change, findings indicated that adolescent antisocial behavior showed substantial stability over time ($d = 0.19$), whereas early adolescent substance use did not ($d = 0.48$; e.g., Dishion & Andrews, 1995). This difference in stability or rate of change may be associated with the different developmental periods in which these two problem behaviors emerged for the majority of the sample (Stice & Barrera, 1995). Substance use typically begins in early adolescence (Chassin, 1984), so it has a more obvious rate of growth during this time, whereas antisocial behavior is usually first evidenced during childhood (Dishion & Patterson, 2006), so it is relatively stable in adolescence. This indicates that although there may be differences in average levels and rates of change with respect to different types of problem behaviors, vulnerabilities to behavioral problems may be evident for all adolescents at particular periods in adolescence. These results also underscore the need for early intervention efforts at different stages in adolescence to effectively stem the onset of problem behaviors before these behavior problems become ingrained (Coie et al., 1993).

Moreover, boys and adolescents from single-parent families engaged in more problem behaviors and fewer positive behaviors relative to girls and adolescents from two-parent families in

middle school (Bongers, Koot, Van der Ende, & Verhulst, 2004; Griffin et al., 2000). For example, youth from single-parent families had a faster rate of growth in antisocial behaviors than did those from two-parent families, and boys had a greater increase in substance use than did girls. This suggests that boys and adolescents in single-parent families were at greater risk for maladaptive outcomes. Boys in single-parent families also had the lowest engagement in positive behaviors than did all other groups.

Trajectories of Perceived Parental Knowledge and Family Management

We found that adolescents' perceptions of parental rule making decreased over time. Prior findings have revealed that parents relax control during adolescence, suggesting that parents acknowledge their children's increasing need for autonomy and therefore allow them to take more responsibility for their own lives (Laursen & Bukowski, 1997; Smetana, 2000). On the other hand, parents may relax control because their children's escalated problem behavior has led them to become overly permissive in an attempt to avoid adolescent defiant reactions or because they feel unsuccessful in their control efforts (Keijsers et al., 2009). This explanation mirrors the increase in adolescents' problem behaviors found in our study. In addition, adolescents' perceived parental knowledge decreased, and boys perceived less parental knowledge than did girls from ages 11 years to 15 years (Dowdy & Kliewer, 1998). This pattern may indicate that parents are less likely to solicit information from boys or that boys are less likely to self-disclose to parents than are girls (Crouter & Head, 2002). Boys are more involved in deviance than are girls, and therefore, they are more likely to hide information from their parents, for instance, to avoid punishment or negative parental reactions (Keijsers et al., 2010).

As for parental support, adolescents reported decreases in parental use of positive reinforcement and warmth over time. In particular, boys and adolescents from single-parent families perceived less parental warmth over time. Compared with changes in parental control, the decline in parental warmth was the most pronounced developmental change in the parent-adolescent relationship among this study sample. From a developmental perspective, adolescents' relationship with their parents transforms from one that is asymmetrical in terms of power and authority to one that is more symmetric in terms of youth becoming more autonomous and independent from their parents (Collins & Laursen, 2004). It is not surprising that these changes may precipitate disruptions in the parent-adolescent relationship. Our findings suggest that although the level or the rate of growth of parental monitoring and support may differ by youths' gender and by family structure, parents ultimately demonstrate less monitoring and less support as adolescents increase in age in middle school. In addition, findings indicate that family interventionists may want to direct more efforts toward boys and adolescents in single-parent families who perceive less parental control and warmth and show a steeper trajectory in the development of problem behaviors.

Reciprocal Relations Among Parental Knowledge, Family Management Practices, and Adolescent Behaviors

Reciprocal lagged relations were found between perceived parenting and adolescent substance use and antisocial behavior, such that lower levels of parental rule making and warmth in 1 year predicted greater problem behavior in the following year and that lower levels of problem behavior in 1 year predicted higher levels of parental rule making and warmth in the next year. Through this reciprocal process, higher levels of parental rule making and warmth predict decreased behavioral problems. Regarding youth positive behavior, we found the unidirectional effects of parenting practices only on adolescent positive behavioral engagement, with the exception that adolescents' positive behavioral engagement also positively predicted parental warmth.

Our findings support the parent-effects perspective by demonstrating the essential protective role of rule making in inhibiting adolescents' future involvement in delinquent behavior and promoting positive behavioral engagement (Dishion, Nelson, & Kavanagh, 2003; Willoughby & Hamza, 2011). Parents' deficits in setting rules and expectations result in behavior problems because they disrupt the internalization of parental norms and increase the risk of affiliation with deviant peers (Laird et al., 2008, 2003; W. A. Mason & Windle, 2001). The implication of such findings is that parents may deter adolescent involvement in problem behavior not only by engaging in behaviors that help them become more knowledgeable about their children's lives (through adolescent disclosure, parental solicitation, or parental control) as suggested by Kerr and Stattin (2000) but also by establishing guidelines and exercising control over adolescents' activities and associates. In addition, the longitudinal association between parental knowledge and antisocial behavior differed by adolescents' gender. Parental knowledge was most strongly associated with fewer antisocial behaviors in boys, which suggests that knowledge served as a stronger protective effect in boys than in girls. This outcome may be the result of the higher base level of antisocial behaviors in boys relative to girls. Boys' higher initial status of antisocial behaviors may allow parental knowledge to exert a stronger effect on this behavior. Thus, when examining stage-environment fit, it is necessary to consider both the extent and the relative level of change when examining the effects of parental knowledge and parenting practices on adolescent behavioral outcomes.

Consistent with findings from previous studies suggesting that family relationships relate to developmental outcomes for adolescents (Allen & Hauser, 1996; Barnes & Farrell, 1992), we found that adolescents who perceived more parental warmth engaged in less antisocial behavior and substance use and more positive behavior. Adolescents who feel valued, accepted, and loved may be more inclined to follow parental expectations because they tend to internalize parental values and expectations and accept parents' rules and attitudes (Henry, Wilson, & Peterson, 1989). Moreover, parental warmth had a more adaptive, longitudinal effect on substance use for adolescents from single-parent families than for those from two-parent families. Our study findings indicate that adolescents from single-parent families perceived less parental warmth over time. Provision of parental warmth might thus be indicative of increasing family interaction and opportunities for

parents to give advice and influence the youth's behavior. Such interactions with parents that are associated with parental advice might have a preventive effect and disengage adolescents from norm-breaking behavior (Bongers et al., 2004). Moreover, it is noteworthy that a unidirectional effect of parenting practices on adolescents' positive behavioral engagement was found in our study. This finding suggests that appropriate parenting, as indicated by high levels of parental rule making and reinforcement of positive behavior, may be the best target for promoting adolescents' engagement in positive behaviors and activities.

However, it is noteworthy that we also found evidence to support a youth-effects perspective: Escalating problem behaviors were associated with reductions in parental knowledge, parental rule making, and parental warmth, suggesting that parents responded by withdrawing from monitoring activities or that parents have more difficulty obtaining information from adolescents who are involved in problem behavior. As several researchers have suggested (Dishion & McMahon, 1998; Kerr & Stattin, 2000), as adolescents become more delinquent they tend to undermine parental attempts to supervise their activities, and they reveal less information to their parents. In this manner, the delinquent behavior of adolescents may make parental controlling attempts or information acquisition more difficult (Marshall, Tilton-Weaver, & Bosdet, 2005). Similarly, adolescents' engagement in problem behavior may lead to frequent negative parent-child interactions, and in turn, parents may increase their tolerance of delinquent behavior and decrease their monitoring efforts to avoid conflict and tension with adolescents (Dishion et al., 2004). As adolescents' behavior becomes increasingly threatening, parents may respond by being less supportive. Eventually, parents may come to emotionally reject adolescents exhibiting problem behavior (Huh et al., 2006).

Considering the findings from recent studies by Kerr et al. (2010) and Keijsers et al. (2010), it is remarkable that we found effects of parental control on adolescent problem behaviors. This discrepancy may reflect the different aspects of parental control that were measured and conceptualized across different studies. Our measure of parental behavioral control—parental rule making—encompasses behaviors such as structuring the child's behavior, setting limits, and communicating expectations, whereas the behavioral control used in the Kerr et al. and Keijsers et al. studies is more restrictive or aimed at controlling the adolescent's activities and friendships. Some researchers have provided evidence that parental behavioral control is differentially related to developmental outcomes, depending on the domain (Arim, Marshall, & Shapka, 2010; Kakiyama, Tilton-Weaver, Kerr, & Stattin, 2010). Parental behavioral control in the personal domain, including issues pertaining to friendships such as seen in the studies by Kerr et al. (2010) and Keijsers et al. (2010), is more likely to create resistance because it controls behavior that is valued by youths and is perceived by most youths as intrusive and psychologically controlling (Smetana & Daddis, 2002; Soenens et al., 2006). In other domains such as prudential, moral, conventional, and multifaceted domains, adolescents are more likely to view their parents as having legitimate control, which may inhibit tendencies to engage in problem behaviors (Smetana & Asquith, 1994). In a recent study conducted by Kakiyama et al. (2010), parental control was differentiated into parental rules and restriction of freedom. They found that youths whose parents had more rules decreased

their norm-breaking behaviors over 2 years, whereas parental control related to restriction of freedom was indirectly linked to increases in norm-breaking behaviors through increases in youths' feeling over controlled by parents. The results underscore the importance of assessing parents' use of behavior regulation in a contextualized, domain-specific way. It is essential in future research to examine parental behavioral control in different domains in order to fully understand its relation with adolescent behavioral outcomes.

Moderation Effect of Parental Support

We found that parental warmth moderated the effects of parental knowledge and rule making on adolescent behavioral problems. This finding suggests that the positive effect of parental knowledge or rule making on problem behaviors increases as adolescents perceive more support and warmth from their parents. These findings coincide with the stage-environment fit theory, which emphasizes adolescents' developmental needs for structure and relational support. As such, greater behavioral structure from parents and parental knowledge set the stage for a healthy process of independence from the family. Adolescents are more likely to reveal information to parents and accept behavioral regulation and rules if they have positive relationships with parents and perceive that parents care for them (Keijsers et al., 2009). Setting and communicating rules and articulating expectations for behavior may constitute preventive factors for adolescent problem behaviors, especially when parents are responsive to adolescents' developmental needs and maintain a good relationship with them. The structure of parental rules and knowledge must be balanced with parental support for struggling adolescents in order to achieve positive outcomes.

Linear Relation Between Parental Control and Adolescent Behavior

Although in our study parental rule making was associated with decreased adolescent behaviors, some studies have indicated that either too much or too little parental control may not be beneficial for adolescents, who are striving for more autonomy from their parents (Barnes et al., 2000; Stattin & Kerr, 2000). Our study, however, did not find a curvilinear relation among parental control, adolescent antisocial behavior, and substance use during the middle school years. Differences in the ways parental control is measured and conceptualized could explain the differences in results across studies. In our study, the measures of control tapped the more positive aspects of control (e.g., a clear statement of rules and expectations), whereas the measures used in those studies that found a nonlinear relationship between parental control and adolescents' behavior reflected more authoritarian control attempts and intrusive psychological control (Barber, Olsen, & Shagle, 1994; Peterson & Hann, 1999). Moreover, this finding is plausible from a developmental perspective in that younger adolescents during the middle school years, as our study sample included, may still be cognitively and socially immature. Greater parental control and rule making enable a healthy process of individuation from the family as adolescents search for autonomy (Dishion et al., 2004). Thus, this finding suggests that the nature of the relations between parenting and problem behaviors might change throughout devel-

opment. Developmentally appropriate parenting should recognize adolescents' changing needs in terms of structure, autonomy, and connectedness at various developmental stages. Researchers should consider the meaning of developmentally appropriate parenting in terms of the characteristics of the adolescents themselves, as well as initial level and rate of change when examining the effects of parenting on adolescent developmental outcomes (Gutman & Eccles, 2007).

Limitations

Several limitations of this study and some caveats must be noted. First, the study mainly relied on adolescent reports of family management practices. Future inclusion of parental reports and direct observations of parenting practices could reveal differences in parents' and adolescents' reports of the family management practices that influence adolescent behavioral outcomes. Second, this study's sample comprised primarily European American adolescents and was not representative of the general population. Therefore, generalizing from this sample must be done with caution. Replication of these findings is needed using a study of more ethnically diverse samples. Third, although our findings support the idea that parental knowledge is negatively related to adolescents' problem behavior, the source of parental knowledge (e.g., adolescent disclosure, parental solicitation, or parental control) cannot be identified on the basis of the items we used to assess parental knowledge in this study. Recent studies suggest that youth disclosure is a stronger predictor of parental knowledge than are parental monitoring behaviors (e.g., Stattin & Kerr, 2000). Future study should distinguish the source of parental knowledge and investigate the most effective strategies to promote youth disclosure. Finally, the study identified the protective roles of specific aspects of family management practices on adolescents' behavioral outcomes. However, little is known about processes in terms of how adolescents' perceptions of parenting mediate their behaviors. Although longitudinal analysis eliminates questions about the temporal precedence of effects, it does not exclude the alternative explanation that a third variable accounts for the relations between parenting and adolescent behavioral outcomes. Thus, future research examining mediators would extend our understanding of the processes underlying parenting effects.

Implications for Practice

Despite its limitations, this study contributes to findings from previous studies by our having investigated growth trajectories of family management practices and adolescent behavioral outcomes and, more notably, having investigated how parental knowledge and family management practices relate to adolescent behaviors both reciprocally and longitudinally in early adolescence. Our study provides evidence of the bidirectional nature of longitudinal associations between parental knowledge and practices and youth delinquent behavior. In doing so, we reinforce the need for future investigation into the specific processes through which parenting practices and adolescents' engagement in problem behavior influence one another over time. Parents' capacity to cultivate positive relationships with their children is as important as any specific parenting practice in influencing their child's behavior and in determining the amount of information they acquire about their

adolescent's behavior (Kiesner et al., 2009). At the same time, adolescents play an important and active role in regulating parents' monitoring behaviors and the amount of information that parents have about their behavior (Keijsers et al., 2009). For parents, maintaining some of the boundaries and limits that are consistent with developmental stages for young adolescents can reduce adolescent problem behavior. However, it is important to recognize the limits of their control and promote close relationships in which their adolescents feel comfortable being tracked or sharing information about their activities. It suggests that prevention programs might focus not only on teaching parents to provide structure and to apply appropriate levels of behavioral control but also on developing trusting and nonintrusive parent-child communication that encourages the child to develop a habit of disclosing and provides parents with accurate monitoring knowledge (Crouter & Head, 2002; Soenens et al., 2006). Further, the implications of these findings indicate the need to refine intervention models to more fully account for the transactional processes between parenting practices and adolescents' problem behavior, particularly the putative influence of adolescents on parents. The consistency with which adolescent problem behavior has been shown across many studies to corrode parenting suggests that effective interventions must engage both parent and adolescent. The integration of parent training (e.g., parental management skills) and adolescent training (e.g., problemsolving strategies) may result in greater reductions in adolescent problem behavior than would either intervention alone.

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