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EMPIRICAL RESEARCH

A Longitudinal Examination of the Bidirectional Associations Among Perceived Parenting Behaviors, Adolescent Disclosure and Problem Behavior Across the High School Years

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Abstract This longitudinal study investigated the importance of parental monitoring to the deterrence of adolescent problem behavior by examining bidirectional associations among perceived parental monitoring, adolescent disclosure and problem behaviors across the high school years. Adolescents ($N = 2{,}941$; 50.3% female) were surveyed each year from grades 9 through 12. There was a reciprocal association between problem behavior and parental knowledge, such that higher parental knowledge predicted reduced problem behavior over time and higher problem behavior in turn predicted lower parental knowledge. It was adolescent disclosure that predicted parental knowledge, however, rather than parental monitoring behaviors. Parental control was a direct deterrent of problem behavior over time, and time spent engaged in family fun activities demonstrated indirect links to problem behavior, particularly through parental control and adolescent disclosure. Importantly, these effects were invariant across grade. Overall, these findings suggest a "family-centered process", rather than primarily a youth-driven or parent-driven process, in the prediction of problem behavior.

Keywords Adolescent problem behavior · Longitudinal study · Bidirectional effects · Perceived parental monitoring behaviors · Adolescent disclosure

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Introduction

The importance of parental monitoring to the deterrence of adolescent problem behavior has long been emphasized in developmental theories of adolescence and is supported by findings from many research studies (e.g., Dishion and McMahon 1998; Pettit et al. 1999; Steinberg et al. 1994). Historically, parental monitoring has been conceptualized as direct actions on the part of parents to control and solicit information about their adolescent's activities and friends (Dishion and McMahon 1998), such as setting rules for how late their adolescent can stay out at night and asking their adolescent where they have been or where they are going. Previous research has been persuasive, showing that highly monitored adolescents engage in less delinquency (e.g., Patterson and Stouthamer-Loeber 1984), cigarette smoking (Mott et al. 1999), substance use (Barnes et al. 2000), and risky sexual behaviors (Meschke and Silbereisen 1997) than do poorly monitored adolescents. Research by Stattin and Kerr (2000; Kerr and Stattin 2000), however, brought the association between parental monitoring and problem behavior into question, forcing researchers to reconsider the role of parent monitoring in problem behavior prevention (see also Crouter and Head 2002). Following Stattin and Kerr's finding that the measure used to assess parental monitoring in past studies has been confounded with parental knowledge, researchers recently have attempted to disentangle different parental monitoring measures in order to assess their unique associations with problem behavior (e.g., Fletcher et al. 2004; Keijsers et al. 2010; Kerr et al. 2010; Soenens et al. 2006). To date, however, no study has offered a comprehensive examination of parenting and adolescent (i.e., disclosure, problem behavior) behaviors in a long-term longitudinal study that is focused on the high school years, or assessed the

bidirectional effects among these variables across each year of high school. The present study specifically addresses these gaps.

Background on Parental Monitoring Literature

In an extensive review of the literature on parental monitoring, Stattin and Kerr (2000) and Kerr and Stattin (2000) found that monitoring was most often operationalized by asking adolescents and parents the extent to which parents were knowledgeable about their adolescent's activities, with the implication that parents who were knowledgeable *actively* solicited that information from their adolescent (i.e., parental solicitation) as well as set limits on their adolescent's behavior (i.e., parental control). Stattin and Kerr argued, however, that determining parents' knowledge about their adolescent's activities does not provide information about the ways that parents came to be knowledgeable. Indeed, parental knowledge may be gained primarily through passive means, such as voluntary adolescent disclosure, rather than through active parental efforts to solicit information or control behavior. Consistent with this hypothesis, in a cross-sectional study of 14 year olds in Sweden, Stattin and Kerr found that adolescent disclosure, rather than parental control or solicitation, was the most significant predictor of parental knowledge (see also Soenens et al. 2006), and, in fact, when voluntary adolescent disclosure was controlled, the association between parental solicitation and parental knowledge was eliminated. Parental knowledge, therefore, may largely be a result of adolescents' willingness to spontaneously disclose information about their activities to their parents.

Furthermore, Stattin and Kerr (2000) found evidence of only a small direct effect of parental control and solicitation on delinquent behavior (see also Fletcher et al. 2004). Importantly, for solicitation it was in the opposite direction to what was expected: that is, higher levels of solicitation were associated with greater delinquency. Stattin and Kerr suggested that adolescents might perceive their parents' efforts to obtain information about their activities as intrusive, and concluded that contrary to previously reported research (e.g., Patterson and Stouthamer-Loeber 1984; Pettit et al. 1999), parental control and solicitation of information may not be the most effective parenting strategies to deter problem behavior, and in some cases for parental solicitation, may even be related to increased levels of problem behavior.

These cross-sectional studies, however, are not able to distinguish the direction of effects among the key parenting and adolescent variables. Adolescents' behaviors may have a stronger effect on parenting practices than parenting has on adolescents' behaviors (Keijsers et al. 2010). For example, parental solicitation may elicit adolescent disclosure but adolescent disclosure also may facilitate opportunities for parents to engage in parental solicitation. Before we conclude that active parental monitoring efforts are not critical for deterring problem behavior, longitudinal studies that include a bidirectional focus are needed (Stattin and Kerr 2000). Although there are many longitudinal studies examining parental monitoring and problem behavior (e.g., Biglan et al. 1995; Chilcoat and Anthony 1996; Fletcher et al. 2004; Shillington et al. 2005), most have conceptualized parental monitoring as "knowledge" and few have included a longitudinal design in order to explicitly test bidirectional (i.e., cross-lagged) effects among the key parental and adolescent variables outlined in this study.

Laird et al. (2003) assessed cross-lagged effects specifically between parental knowledge and delinquency with 396 American adolescents over a 4-year period. Higher parental knowledge at one grade predicted reduced delinquency at the next grade, but higher delinquency at one grade also predicted lower parental knowledge at the next grade, suggesting a bidirectional process (see also Jang and Smith 1997). The link between parental knowledge and lower subsequent delinquency traditionally has been explained by evoking parents' efforts to monitor their adolescent's activities (given that researchers in the past thought knowledge was "monitoring"), but findings from Stattin and Kerr's (2000) study suggest that the role of disclosure in increasing parental knowledge might be the more plausible explanation. Indeed, findings from a recent 2-wave longitudinal study conducted with 938 7th and 8th grade Swedish students (Kerr et al. 2010), as well as a two-wave study of 289 Dutch adolescents (modal age 14) from 2-parent homes (Keijsers et al. 2010), found that delinquent adolescents disclosed less of their activities to parents over time. Kerr et al. specifically examined bidirectional links among adolescent disclosure, delinquent behavior, parental solicitation, and control, while Keijsers et al. investigated bidirectional links among adolescent disclosure, delinquent behavior and parental solicitation. Both studies revealed a bidirectional association between delinquency and disclosure, such that the more adolescents engaged in delinquent behaviors at Time 1, the less they disclosed at Time 2, and the less they disclosed at Time 1, the more they engaged in delinquent behaviors at Time 2.

The link from delinquency to disclosure suggests that the more adolescents engage in delinquent activities, the less willing they may be to disclose information over time. On the other hand, the path from disclosure to delinquency is less easy to explain (Kerr et al. 2010). Why would adolescents who willingly disclose information to their parents be less likely to engage in delinquency in the

future? One possible explanation might be that an adolescent's willingness to disclose might encourage parents to ask more questions and to create rules that in turn discourage delinquency (Kerr et al. 2010). In support of this hypothesis, both Kerr et al. and Keijsers et al. (2010) found that higher levels of adolescent disclosure at Time 1 predicted higher levels of parental solicitation at Time 2.

Overall, however, Kerr et al. (2010) and Keijsers et al. (2010) found that parental solicitation and control were not strong deterrents to delinquent activity. For example, both found that higher levels of delinquency at Time 1 did not predict higher levels of parental solicitation or control at Time 2. The reverse was also true, in that higher levels of parental monitoring behaviors at Time 1 did not directly predict delinquency at Time 2, with the exception that Kerr et al. found that higher levels of parental solicitation at Time 1 predicted higher levels of problem behavior at Time 2 (similar to their cross-sectional findings in Stattin and Kerr 2000). Keijsers et al. and Kerr et al. concluded, therefore, that active parental monitoring efforts play a limited role in directly deterring delinquency and as reactions to their adolescent's behavior (see also Kerr and Stattin 2003; Kerr et al. 2008). Instead, they suggest that their findings indicate more of a youth-driven process (e.g., disclosure) than a parental monitoring-driven process during the adolescent period.

The Present Study

Prior to concluding that parental monitoring during the adolescent period plays a limited role in deterring problem behavior, or as reactions to problem behavior, however, there are five gaps in the literature that need to be addressed. First, it is important to examine the bidirectional association among all of the relevant parenting and adolescent variables simultaneously in one analysis, in order to clearly disentangle both the direct and indirect links between parenting practices, disclosure, and problem behavior. Past research has documented a robust link between higher parental knowledge and lower problem behavior (e.g., Barnes et al. 2000). More recently, researchers have responded to Stattin and Kerr's (2000) seminal article criticizing how researchers have operationalized parental "monitoring" as knowledge by focusing on the possible sources of parental knowledge, whether parental monitoring practices predict adolescent disclosure, or the bidirectional association among parental control, solicitation, adolescent disclosure and problem behavior (e.g., Keijsers et al. 2010; Kerr et al. 2010), but no study has yet addressed these questions simultaneously in one analysis. For example, Keijsers et al. and Kerr et al. did not include parental knowledge in their model assessing the bidirectional associations among the parenting and adolescent variables (Keisjers et al. also did not include parental control in their longitudinal analysis). In order to clearly disentangle the direct and indirect effects of these variables in deterring problem behavior, however, a simultaneous examination is necessary, in particular a rigorous longitudinal analysis that measures each variable over time and includes stability paths as well as concurrent associations among the variables within each time period.

Second, it is important to include a broader set of parental monitoring behaviors beyond control and solicitation that might be a source of parental knowledge as well as a direct predictor of problem behavior. For example, one way for parents to monitor their adolescent is to be directly involved in their activities, for example, by engaging in activities together as a family (Keijsers et al. 2010; Waizenhofer et al. 2004). According to Waizenhofer et al., parents who are involved in their adolescent's daily life have a direct means of acquiring knowledge about their adolescent's activities without having to resort to other monitoring techniques such as solicitation. In addition, spending time together should facilitate opportunities for adolescent disclosure (see Keijsers et al. 2010). In the present study, therefore, we included an assessment of the frequency of time adolescents spent doing fun activities with their family.

Third, Kerr et al. (2010) and Keijsers et al. (2010) included questions in their adolescent disclosure measure that assessed how much adolescents hide information from their parents (e.g., Do you hide a lot from your parents about what you do during nights and weekends?). Finkenauer et al. (2002) found that hiding information (or secrecy) was related to, but not the same as, disclosure, and they suggested that disclosure and secrecy should be considered as two distinct factors (see also Frijns et al. 2009). Most critically, these questions are conceptually very close to the items used to measure parental knowledge (e.g., How much do your parents really know about what you do during nights and weekends), and may partially explain the strong association found between adolescent disclosure and parental knowledge in these studies. In the present study, the disclosure measure does not assess secrecy but only willingness to disclose information about activities to parents.

Fourth, researchers have not been consistent in how they have measured problem behavior in these studies, with some including substance use (Fletcher et al. 2004; Soenens et al. 2006), a normative behavior in adolescence (see Willoughby et al. 2004), and others focusing only on non-normative delinquent behaviors such as shoplifting and theft (Kerr et al. 2010). For the most part, the measure of problem behavior has been skewed in these studies, with the result that the assessment of how parent behaviors and adolescent disclosure relate to problem behavior might be

less informative for typical problem behaviors. A full range of problem behaviors (i.e., alcohol, smoking, marijuana, hard drugs, and delinquency), therefore, were included in the present study.

Fifth, no study has examined the relationships among these variables across the high school years from grades 9 to 12. Kerr et al. (2010) and Keijsers et al. (2010) included short-term longitudinal studies of young adolescents. It may be that in the context of all the key variables, parental solicitation and control play a more important role in the early years of high school than in the later years when adolescents increase their problem behavior involvement and become more autonomous, although findings on the importance of parenting practices throughout the course of adolescence are mixed. Cross-sectional studies of young adolescents have found that parental control predicted lower problem behavior, albeit weakly (Stattin and Kerr 2000) as well as higher disclosure (Vieno et al. 2009), but Kerr et al.'s (2010) two-wave study of young adolescents and Keijsers et al.'s (2010) two-wave study of 14 to 16 year olds found that parental control was not associated with problem behavior. Moreover, as adolescents spend increasingly more time outside the home during the later high school years, and adolescent behaviours are no longer readily observable to parents (Fleming et al. 2008), disclosure may become more critical in order for parents to be informed. Grade differences in how these perceived parent and adolescent variables are related, including potential bidirectional links, remain unexplored across the entirety of the high school years.

In order to address these gaps in the literature we surveyed a large sample of adolescents each year from grade 9 to grade 12, and examined three main questions. First, are the patterns of associations among the parenting and adolescent variables consistent across the high school years? Expectations for differences in the pattern of findings across grades were not clear given the mixed findings and lack of long-term longitudinal studies in this area. This analysis, therefore, was exploratory, although we expected that the importance of perceived parental monitoring behaviors might decline in the senior high school grades as adolescents become more autonomous and spend more time away from home.

Second, we asked whether active parental monitoring behaviors play a direct or indirect role in deterring problem behavior or whether it is more of a youth-driven (e.g., disclosure) process during the adolescent period. According to Kerr et al. (2010) and Keijsers et al. (2010), adolescent disclosure and problem behavior are strongly linked over time with limited effects for active parental monitoring directly deterring problem behavior, consistent with a youth-driven process. Given our large longitudinal sample, and the inclusion of parental knowledge, a broad array of problem behaviors, an additional potential source of parental knowledge (i.e., time spent in family fun activities), as well as a stringent measure of disclosure, it was not clear whether our results would be consistent with those of Kerr et al. and Keijsers et al. In addition, some of the effects of parental monitoring on problem behavior might be more indirect, in that they would not directly deter problem behavior but would predict a parenting or adolescent behavior that in turn was a direct predictor of problem behavior. For example, if adolescent disclosure directly predicts lower problem behavior over time, and time spent in family fun activities predicts more disclosure over time, then time spent in family fun activities could have an indirect effect on problem behavior through disclosure.

Based on past research, we expected that higher parental knowledge would be directly related to less problem behavior over time (Kerr et al. 2010; Laird et al. 2003), and that parental solicitation would be a direct predictor of problem behavior but in a negative direction, such that higher levels of solicitation would be associated with higher levels of problem behavior over time, consistent with Stattin and Kerr (2000; Kerr and Stattin 2000), Kerr et al. (2010). In contrast, it was not clear whether parental control would be a direct predictor of problem behavior given the inconsistent results found in past research (e.g., Fletcher et al. 2004; Kerr et al. 2010; Soenens et al. 2006). We also expected that adolescent disclosure would be directly related to more parental knowledge over time. The inclusion of the predictive effect of time spent engaged in family fun activities on parental knowledge and problem behavior was exploratory, but we hypothesized that it might indirectly predict problem behavior over time through its potential positive effect on adolescent disclosure, as spending time with adolescents might foster more opportunities for disclosure (see Keijsers et al. 2010) and parental monitoring behaviors.

Our expectations for whether parental monitoring behaviors might be *reactions* to their adolescent's behavior also were more exploratory given the limited long-term longitudinal studies explicitly testing the bidirectional effects among a comprehensive set of parental monitoring and adolescent behaviors (i.e., disclosure, problem behavior). However, we hypothesized that greater problem behavior would be directly associated with less parental knowledge (see Kerr et al. 2010; Laird et al. 2003) and parental control over time (see Kerr et al. 2008). Less parental knowledge also was expected to be related to less disclosure over time, which in turn was expected to be associated with less solicitation (see Kerr et al. 2010).

Our third question examined whether the patterns of associations among the parenting and adolescent variables are consistent across gender. Researchers have noted gender differences in willingness to disclose (Crouter and

Head 2002; Stattin and Kerr 2000; Waizenhofer et al. 2004), as well as differences in parenting strategies employed for boys and girls (Pomerantz and Rubble 1998). In addition, boys are more likely than girls to engage in problem behaviors. In order to account for these gender effects, gender was included as a control variable in all analyses. Although we did not expect to find a moderating effect of gender on our model given past research that has not found a moderating effect (e.g., Soenens et al. 2006), we also tested for moderation of gender in our results.

Method

Students from eight high schools encompassing a school district in Ontario, Canada took part in the study. This study was part of a larger longitudinal project examining youth lifestyle choices, involving 5 waves of survey data from 2003 to 2008. Consistent with the broader Canadian population (Statistics Canada 2001), 92.4% of the participants were born in Canada and the most common ethnic backgrounds reported other than Canadian were Italian (31%), French (18%), British (15%), and German (12%). Data on socioeconomic status indicated mean levels of education for mothers and fathers falling between "some college, university or apprenticeship program" and "completed a college/apprenticeship/technical diploma." Further, 70% of the respondents reported living with both birth parents, 12% with one birth parent and a stepparent, 15% with one birth parent (mother or father only), and the remainder with other guardians (e.g., other relatives, foster parents, etc.).

The present study included four waves of survey data from the larger dataset. These waves were chosen because they included all of the measures pertinent to this study. The overall participation rate ranged from 83 to 86% across the four waves; nonparticipation was due to student absenteeism (average of 13.5%), parental refusal (average of .06%), or student refusal (average of 1.4%). Student absenteeism from class was due to illness, a co-op placement, a free period, or involvement in another school activity. Participants who completed the survey at only one time period reported significantly more problem behavior and lower scores on the parenting measures, with the exception of parental solicitation and adolescent disclosure, than longitudinal participants ($ps < .001$; mean differences ranged from .20 for parental knowledge to .27 for problem behavior; η^2 values ranged from .01 for parental education to .03 for problem behavior).

The current analysis is based on 2,941 participants (50.3% female) who completed the survey at a minimum of

Table 1 Means and standard deviations of study measures for boys and girls

Domain	Variable	Grade 9		Grade 10		Grade 11		Grade 12	
		Boys *M* (SD)	Girls *M* (SD)	Boys *M* (SD)	Girls *M* (SD)	Boys *M* (SD)	Girls *M* (SD)	Boys *M* (SD)	Girls *M* (SD)
Gender	Gender	50.3% female							
Age	Age	14y (0.33)	14y (0.30)	15y (0.46)	15y (0.44)	16y (0.51)	16y (0.48)	17y (0.50)	17y (0.49)
Parental education	Paternal education	3.36 (1.21)	3.31 (1.25)	N/A					
	Maternal education	3.33 (1.26)	3.19 (1.28)						
Problem behaviors	Alcohol frequency	1.33 (0.40)	1.34 (0.43)	1.66 (0.65)	1.56(0.54)	1.88 (0.72)	1.72 (0.58)	1.97 (0.75)	1.78 (0.56)
	Alcohol amount	1.56 (0.69)	1.54 (0.67)	2.16 (0.96)	1.95 (0.81)	2.56 (0.98)	2.28 (0.84)	2.73 (0.96)	2.39 (0.78)
	Smoking	1.04 (0.21)	1.06 (0.25)	1.13 (0.43)	1.10 (0.33)	1.23 (0.62)	1.16 (0.43)	1.29 (0.66)	1.15 (0.42)
	Marijuana	1.30 (0.59)	1.27 (0.57)	1.62 (0.90)	1.50 (0.79)	1.93 (1.05)	1.73 (0.91)	2.11 (1.10)	1.74 (0.92)
	Hard drugs	1.02 (0.16)	1.02 (0.12)	1.13 (0.46)	1.05 (0.21)	1.26 (0.67)	1.09 (0.34)	1.34 (0.78)	1.09 (0.35)
	Delinquency	1.24 (0.37)	1.16 (0.28)	1.36 (0.53)	1.23 (0.35)	1.53 (0.68)	1.29 (0.44)	1.55 (0.70)	1.25 (0.38)
Parental control	Parental control	2.95 (0.64)	3.09 (0.64)	2.71 (0.71)	3.04 (0.73)	2.60 (0.72)	2.84 (0.80)	2.46 (0.72)	2.71 (0.78)
Family activities	Family fun activities	2.42 (0.81)	2.26 (0.79)	2.30 (0.78)	2.20 (0.85)	2.22 (0.85)	2.08 (0.83)	2.10 (0.87)	2.04 (0.83)
Adolescent disclosure	Adolescent disclosure	2.53 (0.67)	2.63 (0.70)	2.37 (0.70)	2.63 (0.75)	2.39 (0.73)	2.67 (0.76)	2.39 (0.69)	2.72 (0.75)
Parental solicitation	Parental solicitation	2.10 (0.47)	2.21 (0.47)	2.06 (0.51)	2.19 (0.50)	2.11 (0.54)	2.20 (0.51)	2.13(0.55)	2.21 (0.50)
Parental knowledge	Parental knowledge	3.21 (0.58)	3.25 (0.57)	3.07 (0.62)	3.17 (0.66)	2.99 (0.70)	3.17 (0.66)	3.00 (0.70)	3.19 (0.67)

Higher scores for variables indicate more problem behavior, parental control, family fun activities, adolescent disclosure, parental solicitation, and parental knowledge

2 time points. See Table 1 for mean age across each grade. One cohort of students ($N = 1{,}492$) was in grade 9 at the first wave of data collection and completed the survey in grades 9, 10, 11 and 12. Another cohort of students ($N = 1{,}226$) was in grade 10 at the first wave of data collection and completed the survey in grades 10, 11 and 12. In addition, 223 students who were absent at the first wave of data collection completed the surveys during the subsequent data collection periods. Because these missing data were not dependent on the values of the study measures, it is reasonable to assume that these data are missing at random (Little and Rubin 2002; Schafer and Graham 2002). In path analyses, missing waves are estimated in AMOS 16.0 using the full information maximum likelihood (FIML) estimation method (Arbuckle and Wothke 1999; Schafer and Graham). An examination of mean differences on the study measures depending on cohort revealed no significant differences. Analyses, therefore, combined students across cohorts into one sample. Moreover, analyses were rerun using only the data contributed by the cohort who participated in all 4 waves. We found no difference in the pattern of results.

A second source of missing data occurred because some students did not finish the entire questionnaire. To ensure that any missing data were missing at random, we included 3 versions of the survey at each time period so that the same scales were not always near the end of the survey. For multi-item scales, composite scores were computed for participants who responded to at least 50% of the relevant items. For participants who did not give a sufficient number of responses within a multi-item scale, or did not provide a response to a single-item measure, missing values *within each wave* were imputed using the EM (expectation–maximization) algorithm. EM is an iterative maximum-likelihood procedure in which a cycle of calculating means and covariances followed by data imputation is repeated until a stable set of estimated missing values is reached (Schafer and Graham 2002). In total, 12% of the data were imputed. This percentage of imputed data is consistent with other longitudinal survey studies (e.g., Ciarrochi et al. 2009; Feldman et al. 2009; Hyde and Petersen 2009).

Procedure

Active informed assent was obtained from the adolescent participants. Parents were provided with written correspondence mailed to each student's home prior to the survey administration outlining the study; this letter indicated that parents could request that their adolescent not participate in the study. An automated phone message about the study also was left at each student's home phone number. This procedure was approved by the participating school board and the University Research Ethics Board. At all time periods, the questionnaire was administered to students in classrooms by trained research staff. Students were informed that their responses were completely confidential.

Measures

Means and standard deviations for the measures are provided in Table 1. Each measure other than demographics was assessed at each of the high school grades. Parenting practices in the present study refer to adolescents' *perception* of these behaviors as we did not have permission to survey the parents of participating adolescents. It is important to note, however, that Soenens et al. (2006), Kerr and Stattin (2000), and Kerr et al. (2010) found that adolescent and parent reports of similar variables to those measured in the present study yielded similar findings. Furthermore, in Keijsers et al.'s (2010) study, findings held across multiple informants, including mothers, fathers and adolescents. The only difference between parent and adolescent reports was that the relationship between reported disclosure and delinquency was stronger for adolescent reports, which is not surprising as parents tend to underestimate adolescents' involvement in delinquent activities (e.g., Fagan and Najman 2003). Moreover, as Fletcher et al. (2004) argued, it is the adolescents' perceptions that may be critical when examining potential predictors of their behavior.

Demographics

Age, sex, and parental education (one item per parent, averaged for those reporting on both parents, $r = .44$) were assessed. Higher scores indicated greater age, female gender (1 = male, 2 = female), and greater parental education (1 = *did not finish high school* to 6 = *professional degree*).

Parental Control

Parental control was assessed with 6 items (Stattin and Kerr 2000) that asked the extent to which parents imposed restrictions and required information about adolescent's activities and whereabouts (e.g., Do you need your parent's permission to stay out late on a weekday evening?). Respondents answered on a 4-point scale from 1*(almost never or never)* to 4 *(almost always or always)*. Ratings were averaged such that higher scores indicated more control. Cronbach alphas were .88, .88, .88 and .89 for grades 9 to 12, respectively.

Family Fun Activities

The frequency of how often "My family does something fun together" was measured on a 4-point scale ranging from 1 *(almost never)* to 4 *(almost every day)*.

Adolescent Disclosure

Adolescent disclosure was measured by three items from Stattin and Kerr (2000) that required adolescents to report how much they spontaneously tell their parents about their friends, school activities and free time [e.g., Do you spontaneously tell your parents about your friends (which friends you hang out with and how they think and feel about various things)]? Respondents answered on a 4-point scale 1*(almost never or never)* to 4 *(almost always or always).* Ratings were averaged such that higher scores indicated more disclosure. Cronbach alphas were .80, .77, .79 and .82 for grades 9, 10, 11 and 12, respectively.

Parental Solicitation

Parental solicitation was measured with 5 items (Steinberg et al. 1994) assessing the frequency in which parents solicited information about the adolescent's activities (e.g., Do your parents/guardians ask you where you go at night? What you do with your free time? Who your friends are? Where you are most afternoons after school?). The 4-point scale included the following categories: 1 = *I tell them without their asking,* 2 = *they never ask,* 3 = *they sometimes ask,* and 4 = *they often ask.* Given that the "*I tell them without their asking"* category overlaps with our measure of adolescent disclosure, we recoded all "1" responses as "missing". This recoding involved 15% of the total number of individual items across all four waves; however, as the ratings for the 5 items were averaged into a composite score for each grade the recoding only affected scores for 7% of participants who answered "*I tell them without their asking"* for all 5 items within a grade (specifically, 4% answered "*I tell them without their asking"* for all 5 items in one of the 4 grades; 2% answered with this category for all 5 items in 2 of the 4 grades; 0.8% answered with this category for all 5 items in 3 of the 4 grades). Missing data were imputed in an identical manner to other variables—see discussion earlier in the method section. In order to make sure this recoding did not introduce bias to our results, we reran all the primary analyses excluding the participants who answered "*I tell them without their asking"* to all 5 parental solicitation questions within a grade. There was no substantive change in the pattern of results. Higher scores for the measure indicated greater parent solicitation. Cronbach alphas were .79, .81, .83, and .84 for grades 9, 10, 11 and 12, respectively.

Parental Knowledge

The 5 items used to assess parental knowledge (Brown et al. 1993) required the respondent to indicate on a 4-point scale from 1 *(almost never or never))* to 4 *(almost always or always)* how much his/her parent really knows about his/her free time activities (e.g., How much do your parents/guardians really know about where you go at night?). Ratings were averaged such that higher scores indicated more perceived knowledge. Cronbach alphas were .85, .85, .87 and .89 for grades 9, 10, 11 and 12, respectively.

Problem Behavior

Problem behavior was measured as a composite of delinquent activity, alcohol, smoking, marijuana, and hard drug use. Given that delinquent activity was measured on a 4-pt scale while other problem behaviors were measured on 6 to 8-pt scales, all behaviors were recoded to fit a range of 1 to 4 in order to create a composite for problem behavior. Delinquent activity was assessed by the frequency of involvement in 7 activities (e.g., joyriding, shoplifting, wrecking other's property, carrying a knife as a weapon) in the past year on a 4-pt scale from 1 *(never)* to 4 *(more than 5 times).* Alcohol use was measured by frequency of use with an 8-pt scale, recoded to 1 = *never;* 1.428 = *less than once a month*; 1.856 = *1–3 times a month*; 2.284 = *once a week*…4 = *every day,* and average consumption per drinking episode with a 6-pt scale, recoded to fit 1 = *less than 1 drink*; 1.6 = *1 drink*… 4 = *4 or more drinks*; scores for these two items were averaged (r = .74, .70, .66, .68 for grades 9 to 12, respectively). Smoking was indicated by the typical number of cigarettes smoked each day on an 8-pt scale, recoded to 1 = *I don't smoke*; 1.428 = *I don't smoke every day*…4 = *more than a pack.* Marijuana use was assessed by the frequency of use in the past year on a 6-pt scale, recoded to 1 = *never*; 1.6 = *once*…4 *(a few times a month or more.* Hard drug use (e.g., cocaine, heroin, stimulants, etc.) was measured using the same scale and time frame as marijuana use. All ratings were averaged such that higher scores indicated more problem behavior.

Results

Preliminary Analyses

All variables exhibited acceptable skewness and kurtosis (Kline 2005). Means and standard deviations of the variables are presented for each gender in Table 1. Alpha level was set at .01 for all analyses given the large sample size. Preliminary analyses examined gender and parental education differences within each grade in perceived parenting, disclosure, and problem behavior measures. Four MANOVAs were conducted, one for each grade, with gender and parental education as between-subjects factors. A significant multivariate main effect was found for gender across each grade (all Wilks $\lambda < .001$, η^2 ranging from .04

in grade 9 to .11 in grade 12). No significant differences were found for parental education. Boys reported less parental control, less parental solicitation, and less self-disclosure than girls across all grades, all $ps < .01$. In addition, boys reported more problem behavior and less parental knowledge in grades 10 to 12, as well as weaker parent-adolescent relationship in grade 10 and grade 12 than girls.

Table 2 outlines the intercorrelations among all variables separately for boys and girls. There was stability in scores across grades for each variable, with the greatest stability shown for problem behavior (average $r = .58$ for boys and .68 for girls across adjacent grades). Correlations across grade for the remaining measures were moderately stable (ranging from an average across adjacent grades of $r = .35$ and .38 for parental solicitation for boys and girls, respectively, and $r = .37$ and .50 for parental knowledge for boys and girls, respectively). In general, girls exhibited higher stability than boys. The strongest associations with problem behavior were observed for perceived parental knowledge followed by parental control, and the weakest were with parental solicitation for both boys and girls.

Primary Analyses

The primary statistical analysis was carried out using path analysis in AMOS 16.0. We adopted a conservative approach to our analyses by including only manifest variables, as a fully latent approach is more difficult to estimate with the number of variables included in our study. Overall model fit was evaluated using the comparative fit index (CFI), and the root mean squared error of approximation (RMSEA, Bentler 1995). As recommended by Hu and Bentler (1999), CFI values greater than .95 and RMSEA's less than .06 (simultaneously) were used as the criteria for a well-specified or close-fitting model. Gender was included as a covariate, with paths allowed from gender to each variable. Stability paths across adjacent grades and concurrent associations among all the variables within each grade were included in the analysis, as well as cross-lagged paths from each variable to the other five variables across each adjacent grade—see Fig. 1. The model had good fit, $\chi^2(108) = 595.49$, $p < .001$, CFI = .97, RMSEA = .039 (.036–.042).

Question 1: Are the Patterns of Associations Among the Perceived Parenting and Adolescent Variables Consistent Across the High School Years?

We first assessed whether the pattern of results was invariant across grade. Invariance was tested by comparing a model in which all cross-lagged paths were constrained to be equal across grade to the unconstrained model in which all structural paths were free to vary. The chi-square difference test of relative fit indicated that the unconstrained model was not a significant better fit than the constrained model, suggesting that the patterns of associations among parenting and adolescent variables were consistent across the high school years, $\chi^2_{\text{diff}}(60) = 56.71$, $p = .60$ [CFI = .97, RMSEA = .031 (.029–.034) for the constrained model]. To further verify the equivalence of each individual path across grade, we tested models in which each path was constrained at a time. Comparison of the fit of these models to the unconstrained model showed that none of the tests was significant, confirming the equivalence of each path across grade. As the constrained model was the most parsimonious model, all further interpretations were based on the constrained model. Figure 2 summarizes the significant paths and Table 3 outlines the path estimates (note that as paths across each adjacent grade were constrained to be equal, paths are shown for only 2 time points, labeled as Time 1 and Time 2).

Question 2: Do Perceived Active Parental Monitoring Behaviors Play a Direct or Indirect Role in Deterring Problem Behavior, or is it more of a Youth-Driven (e.g., Disclosure) Process During the Adolescent Period?

To address this question, using the more parsimonious constrained model as shown in Fig. 2, we first examined whether parental practices and adolescent disclosure directly or indirectly predicted problem behavior. Behaviors that might play an indirect role in deterring problem behavior were indicated if they did not directly predict problem behavior but did predict a behavior that was a significant predictor of problem behavior. The Sobel z test (1982) was used to examine whether indirect effects were significant, with z-value = a*b/SQRT(b2*sa2 + a2*sb2).

Consistent with past research and our hypothesis, higher levels of parental knowledge significantly predicted less problem behavior over time, $\beta = -.06$, $p < .001$ (e.g., Crouter and Head 2002; Laird et al. 2003), and adolescent disclosure was the main predictor of parental knowledge over time, $\beta = .14$, $p < .001$, rather than the parental control and solicitation behaviors (Kerr et al. 2010; Keijsers et al. 2010), although time spent engaged in family fun activities predicted more parental knowledge over time at a trend level, $\beta = .03$, $p = .048$. Greater levels of adolescent disclosure also directly predicted less problem behavior over time at a trend level, $\beta = -.04$, $p = .01$. Importantly, however, parental control and solicitation directly predicted problem behavior, with higher levels of parental control associated with less problem behavior over time, $\beta = -.05$, $p < .001$, but higher levels of parental

Table 2 Correlation table

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Problem Behavior 9	–	.68	.47	.40	−.30	−.23	−.24	−.11	−.30	−.11	−.13	−.07	−.35	−.14	−.08	−.04	−.14	−.05	−.14	−.11	−.47	−.30	−.14	−.17
2. Problem Behavior 10	.56	–	.73	.57	−.26	−.32	−.28	−.22	−.31	−.21	−.15	−.10	−.34	−.27	−.16	−.08	−.11	−.10	−.12	−.17	−.42	−.43	−.28	−.20
3. Problem Behavior 11	.36	.57	–	.64	−.17	−.28	−.27	−.24	−.22	−.20	−.12	−.06	−.28	−.24	−.21	−.17	−.07	−.11	−.08	−.14	−.30	−.37	−.36	−.29
4. Problem Behavior 12	.38	.42	.60	–	−.16	−.20	−.22	−.18	−.14	−.13	−.15	−.04	−.17	−.19	−.18	−.14	−.06	−.02	−.10	−.14	−.28	−.28	−.30	−.38
5. Control 9	−.29	−.22	−.15	−.13	–	.43	.30	.30	.21	.10	.07	.01	.40	.20	.11	.11	.50	.29	.29	.19	.40	.25	.14	.15
6. Control 10	−.16	−.21	−.16	−.17	.40	–	.47	.33	.15	.21	.11	.12	.21	.34	.21	.15	.31	.46	.32	.22	.25	.37	.24	.20
7. Control 11	−.02	−.04	−.16	−.12	.22	.28	–	.48	.13	.17	.17	.09	.19	.24	.32	.17	.19	.28	.47	.28	.23	.26	.30	.15
8. Control 12	−.15	−.12	−.06	−.05	.29	.24	.30	–	.12	.13	.16	.18	.14	.18	.15	.34	.26	.17	.25	.45	.19	.20	.20	.23
9. Family activities 9	−.22	−.13	−.00	−.00	.28	.13	.08	.11	–	.45	.38	.35	.45	.28	.16	.15	.21	.13	.14	.14	.44	.25	.09	.12
10. Family activities10	−.15	−.18	−.08	−.06	.18	.21	.09	.19	.40	–	.45	.46	.26	.36	.29	.24	.14	.20	.18	.17	.28	.32	.23	.16
11. Family activities 11	−.11	−.08	−.10	−.04	.19	.11	.19	.18	.33	.40	–	.53	.30	.26	.36	.25	.09	.10	.20	.18	.21	.22	.27	.21
12. Family activities12	−.08	−.09	−.08	−.05	.15	.09	.13	.20	.32	.35	.44	–	.21	.21	.24	.31	.08	.08	.13	.23	.15	.16	.16	.22
13. Disclosure 9	−.20	−.11	−.01	−.03	.43	.22	.12	.04	.37	.26	.26	.26	–	.45	.37	.36	.29	.16	.26	.18	.59	.41	.31	.33
14. Disclosure 10	−.08	−.12	−.16	−.10	.20	.42	.13	.14	.21	.32	.24	.24	.36	–	.50	.41	.24	.27	.25	.24	.32	.53	.37	.27
15. Disclosure 11	−.05	−.02	−.04	−.11	.17	.13	.47	.17	.14	.14	.29	.22	.24	.26	–	.50	.13	.16	.34	.23	.25	.37	.50	.37
16. Disclosure 12	−.05	−.03	−.01	.02	.16	.14	.11	.53	.17	.16	.22	.26	.19	.25	.34	–	.18	.12	.20	.31	.30	.36	.38	.51
17. Solicitation 9	−.16	−.05	.05	.04	.47	.21	.09	.19	.34	.14	.18	.14	.37	.15	.08	.15	–	.38	.27	.29	.32	.19	.15	.19
18. Solicitation 10	−.12	−.04	−.01	−.07	.31	.44	.17	.15	.20	.22	.12	.11	.25	.31	.13	.11	.33	–	.40	.30	.21	.29	.16	.10
19. Solicitation 11	.04	.01	−.06	.03	.20	.26	.41	.24	.19	.14	.28	.18	.18	.15	.24	.19	.24	.35	–	.37	.25	.25	.31	.17
20. Solicitation 12	−.04	−.07	.01	−.05	.24	.19	.27	.36	.19	.20	.18	.28	.22	.13	.15	.25	.28	.30	.38	–	.17	.26	.21	.29
21. Knowledge 9	−.39	−.26	−.13	−.04	.48	.23	.11	.13	.36	.21	.21	.11	.50	.18	.17	.17	.42	.22	.18	.15	–	.47	.35	.35
22. Knowledge 10	−.28	−.36	−.27	−.15	.28	.38	.14	.21	.17	.30	.16	.19	.28	.44	.18	.20	.14	.35	.16	.22	.36	–	.52	.42
23. Knowledge 11	−.14	−.25	−.34	−.26	.18	.20	.27	.16	.14	.17	.29	.15	.19	.26	.37	.23	.08	.14	.30	.14	.29	.38	–	.50
24. Knowledge 12	−.13	−.15	−.20	−.30	.20	.18	.11	.21	.10	.18	.11	.25	.20	.24	.26	.35	.06	.17	.09	.35	.20	.33	.37	–

$N = 1{,}463$ males; 1,478 females. Females = above the diagonal; Males = below the diagonal; 9 = grade 9; 10 = grade 10; 11 = grade 11; 12 = grade 12. Higher scores for variables indicate more problem behavior, parental control, family fun activities, adolescent disclosure, parental solicitation, and parental knowledge

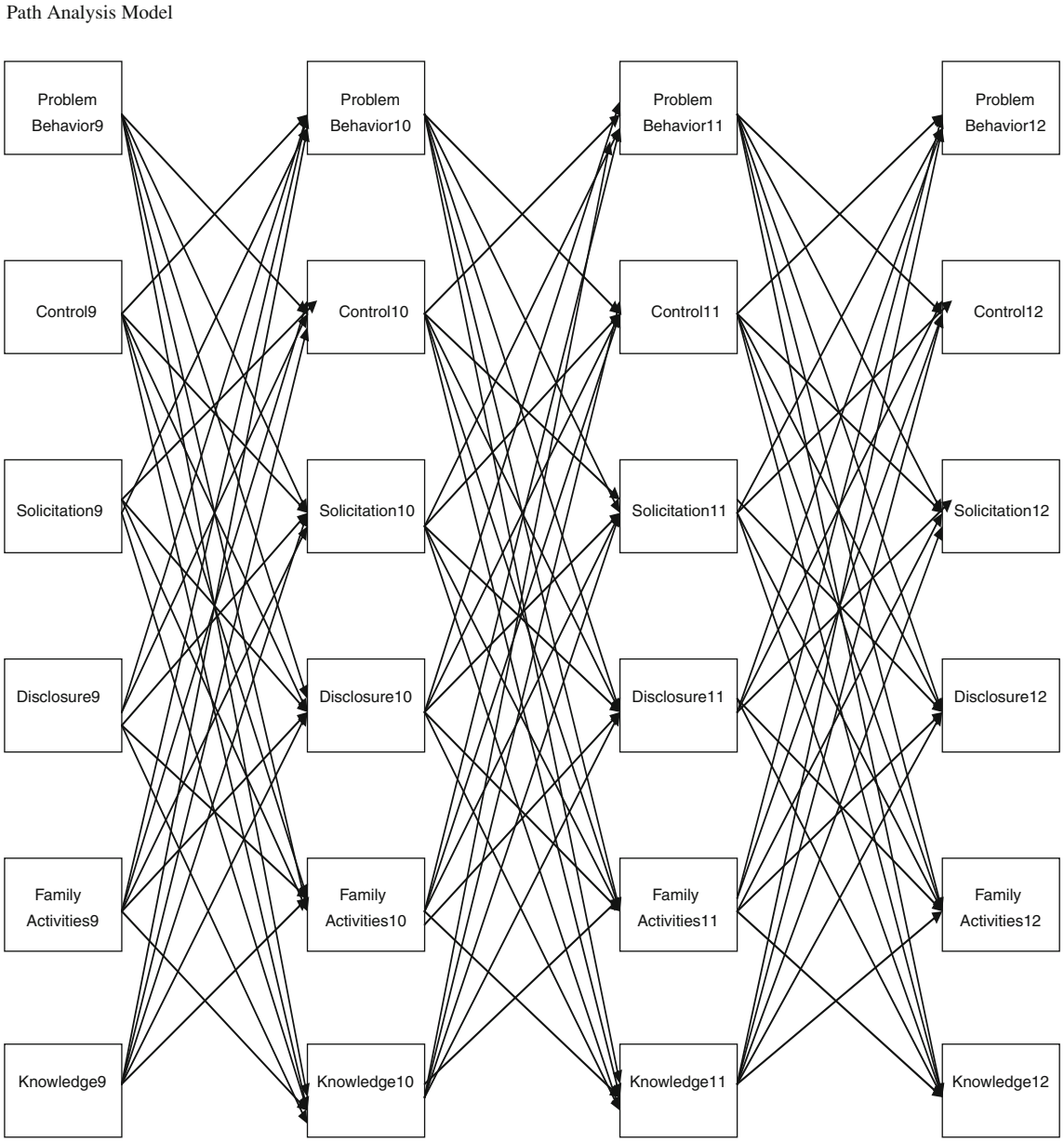

Fig. 1 Path analysis model. *Note*. Concurrent associations among variables within a grade as well as stability paths across adjacent grades are not shown. Numbers denote grade level

solicitation associated with *more* problem behavior, $\beta = .05$, $p < .001$ (for a similar finding, see Stattin and Kerr 2000; Kerr et al. 2010).

Also consistent with our expectations, higher levels of time spent engaged in family fun activities predicted more adolescent disclosure over time, $\beta = .08$, $p < .001$, suggesting that time spent in fun activities with the family also indirectly predicted problem behavior through its association with adolescent disclosure ($z = 2.38$, $p = .017$), as well as through disclosure's relationship to parental knowledge. Parental solicitation also predicted disclosure over time, although at a trend level, $\beta = .06$, $p = .01$. Moreover, higher levels of time spent in family fun activities significantly predicted more parental solicitation, $\beta = .06$, $p < .001$, and parental control over time, $\beta = .05$, $p = .001$, and also indirectly deterred problem behavior through parental control, $z = 2.53$, $p < .01$. Finally, there were bidirectional associations between parental control and solicitation, suggesting a reciprocal association between these parental monitoring strategies ($\beta = .07$, $p < .001$, for solicitation to control and $\beta = .12$, $p < .001$, for control to solicitation).

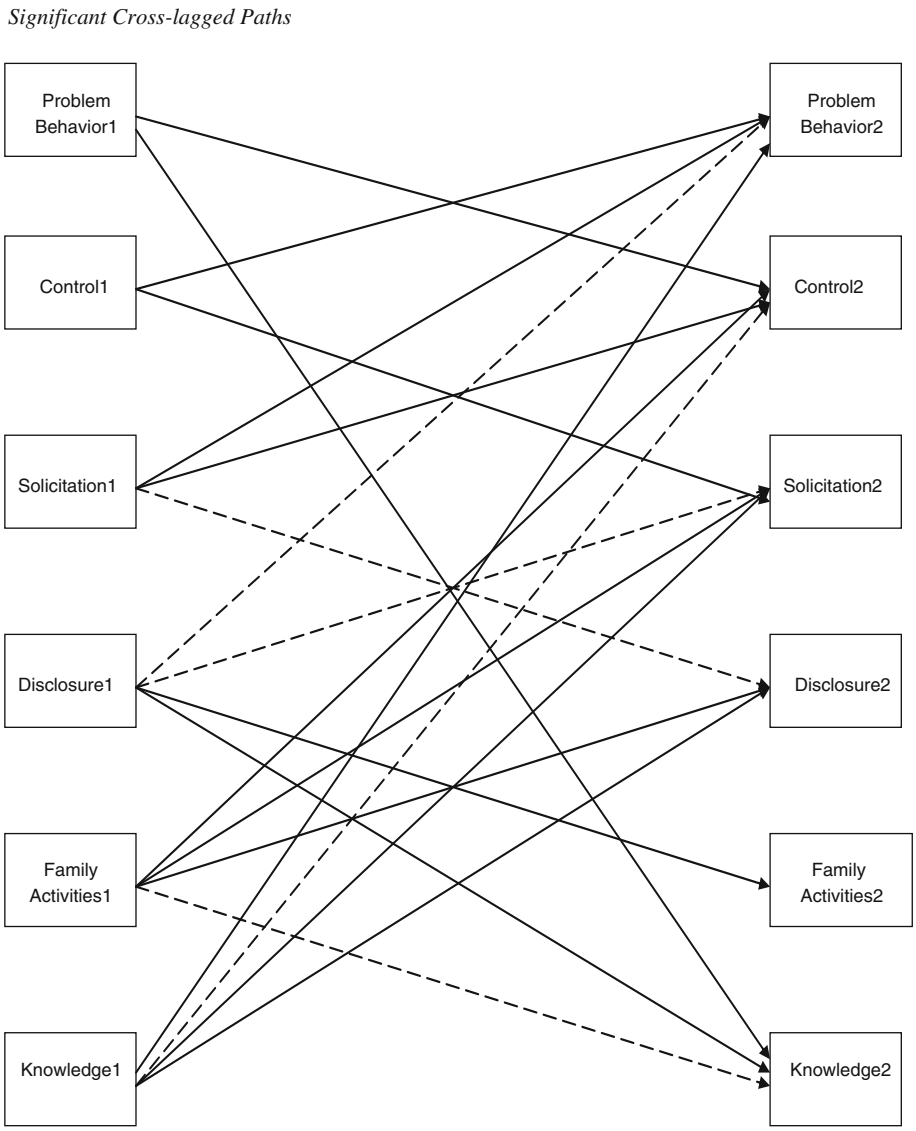

Fig. 2 Significant cross-lagged paths. Note. Numbers after variable names indicate either Time 1 or Time 2—only 2 time points are shown as cross-lagged paths were invariant across the four high school grade levels. *Solid lines* = $p < .01$; *dashed lines* = $p < .05$. All stability paths were significant but are not shown. See Table 3 for cross-lagged path coefficients

Second, we examined whether perceived parental monitoring behaviors might be reactions to their adolescent's behavior. Consistent with our expectations, higher levels of problem behavior significantly predicted less parental knowledge, $\beta = -.07$, $p < .001$, and less parental control over time, $\beta = -.04$, $p < .001$. There also were indirect effects from problem behavior to parental solicitation through parental knowledge, with less parental knowledge predicting less parental solicitation over time, $\beta = .04$, $p = .005$ ($z = 2.55$, $p < .01$ for the indirect effect). Less parental knowledge also was related to less disclosure over time, $\beta = .09$, $p < .001$, which in turn was associated with less time spent doing family fun activities, $\beta = .09$, $p < .001$ ($z = 4.47$, $p < .001$ for the indirect effect), as well as less solicitation but only at a trend level, $\beta = .03$, $p = .045$ ($z = 1.84$, $p = .066$ for the indirect effect).

Question 3: Are the Patterns of Associations Among the Parenting and Adolescent Variables Consistent Across Gender?

To test whether the results were invariant across gender, a multi-group analysis was performed. Invariance was tested by comparing a model in which all cross-lagged paths were constrained to be equal across gender to the unconstrained model in which all structural paths were free to vary. The chi-square difference test of relative fit indicated that there was a trend favoring the unconstrained model, CFI = .965, RMSEA = .023 (.021–.024), over the constrained model, χ^2_{diff} (150) = 181.85, $p = .04$ [CFI = .967, RMSEA = .028 (.026–.031)]. Further examination of individual cross-lagged paths indicated that higher levels of problem behavior significantly predicted less parental control over time for girls but not for boys.

Table 3 Path coefficients for cross-lagged paths

Cross-lagged paths	*B*	Beta	SE	*p*
PControl1 → ProblemBehavior2	−.031	−.046	.009	<.001
FamilyActivities1 → ProblemBehavior2	.002	.004	.007	.789
Disclosure1 → ProblemBehavior2	−.023	−.037	.009	.011
PSolicitation1 → ProblemBehavior2	.046	.051	.013	<.001
PKnowledge1 → ProblemBehavior2	−.045	−.061	.011	<.001
ProblemBehavior1 → PControl2	−.098	−.036	.024	<.001
FamilyActivities1 → PControl2	.041	.045	.013	.001
Disclosure1 → PControl2	.006	.005	.017	.732
PSolicitation1 → PControl2	.107	.069	.023	<.001
PKnowledge1 → PControl2	.045	.035	.019	.019
ProblemBehavior1 → FamilyActivities2	−.009	−.003	.026	.728
PControl1 → FamilyActivities2	−.013	−.010	.018	.473
Disclosure1 → FamilyActivities2	.112	.092	.018	<.001
PSolicitation1 → FamilyActivities2	.017	.010	.025	.478
PKnowledge1 → FamilyActivities2	.029	.020	.021	.163
ProblemBehavior1 → Disclosure2	.032	.012	.024	.167
PControl1 → Disclosure2	−.016	−.013	.016	.330
FamilyActivities1 → Disclosure2	.078	.084	.012	<.001
PSolicitation1 → Disclosure2	.057	.036	.022	.010
PKnowledge1 → Disclosure2	.122	.093	.019	<.001
ProblemBehavior1 → PSolicitation2	.032	.017	.017	.058
PControl1 → PSolicitation2	.094	.116	.012	<.001
FamilyActivities1 → PSolicitation2	.039	.062	.009	<.001
Disclosure1 → PSolicitation2	.023	.031	.012	.045
PKnowledge1 → PSolicitation2	.038	.061	.014	.005
ProblemBehavior1 → PKnowledge2	−.156	−.065	.021	<.001
PControl1 → PKnowledge2	.021	.021	.014	.136
FamilyActivities1 → PKnowledge2	.022	.027	.011	.048
Disclosure1 → PKnowledge2	.132	.138	.014	<.001
PSolicitation1 → PKnowledge2	−.020	−.014	.020	.311

Numbers after variable names indicate Time 1 or Time 2—only 2 time points are shown as cross-lagged paths were invariant across grade. *B* = unstandardized coefficient; Beta = standardized coefficient; SE = standard error. For each variable, stability paths across each adjacent grade were all significant at $p < .001$. Space restriction does not allow for the effects of the stability paths or gender to be presented. More information about these effects is available from the first author

Discussion

This study is the first to provide a comprehensive examination of bidirectional associations among perceived parenting and adolescent (i.e., disclosure, problem behavior) behaviors, in addition to parental knowledge, across all the high school years from grades 9 through 12. Furthermore, we extended past research by including time spent engaged in family fun activities as an additional source of parental knowledge, a disclosure measure that was not confounded with secrecy and therefore did not overlap with the parental knowledge measure, and an examination of normative problem behavior. First, we found that the pattern of results across the behaviors was consistent across each of the high school years. Although we expected that the importance of perceived parental monitoring behaviors might decline in the senior high school grades as adolescents become more autonomous and spend increasingly more time away from home, this hypothesis was not supported. One conclusion based on these findings could be that parental monitoring behaviors play a limited role in deterring problem behavior across all of the high school grades. However, our results do not support that conclusion. Although our findings are consistent with Kerr et al. (2010) and Keijsers et al. (2010) in that there was a youth-driven process (e.g., disclosure) in the prediction of problem behavior, albeit indirect through parental knowledge, we found significant direct and indirect effects for perceived parental monitoring on problem behaviors during this high school period.

For example, consistent with the extant literature, we found that higher parental knowledge predicted lower problem behavior over time. Researchers traditionally have thought that this effect is due to active parental monitoring efforts, specifically parental control and solicitation. Our results support the contention of Kerr et al. (2010), however, that parental control and solicitation do not add

predictive power to our understanding of parental knowledge. Instead, consistent with their findings, adolescent disclosure was the most important predictor of parental knowledge. Importantly, however, both parental control and solicitation were significant *direct* predictors of problem behavior in the present study. Higher levels of parental control were associated with less problem behavior over time, suggesting that parents' regulatory activities do play an active role in deterring problem behavior when that behavior is measured broadly (including alcohol, smoking, marijuana, and hard drug use, as well as delinquency).

In contrast, the effect for solicitation was negative, such that higher parental solicitation was associated subsequently with *more* problem behavior (see also Kerr et al. 2010, and Otto and Atkinson 1997, for a similar finding with academic grades). Given that parental solicitation was a marginal predictor of adolescent disclosure in the present study, it may be that parental attempts to solicit information over and above what they can garner from disclosure is perceived by their adolescent as "over-solicitation" and intrusive, eliciting a response of even more engagement in problem behaviors (Kerr and Stattin 2000). Further research directly assessing this issue is warranted; for example, there may be a curvilinear effect (i.e., too much or too little parental solicitation may lead to more problem behavior over time) or an interaction (i.e., parental solicitation may be perceived as intrusive only when the adolescent is unwilling to disclose) between these variables.

The frequency of time spent engaged in family fun activities also was a significant predictor of disclosure over time (see also Keijsers et al. 2010), indicating an indirect association between more time spent engaged in family fun activities and less problem behavior over time, given the significant link between disclosure and parental knowledge, which in turn was predictive of problem behavior. Time spent engaged in family fun activities also was indirectly associated with reducing problem behavior through its predictive association with parental control. Overall, therefore, parents may be aware of their adolescent's whereabouts because some of these activities clearly take place with the parent. In addition, spending time with their child may be an important way in which parents can find out about their adolescent's activities, eliciting disclosure and facilitating opportunities for parental monitoring.

Consistent with Kerr et al. (2010) and Laird et al. (2003) who examined the bidirectional effects specifically between parental knowledge and delinquency, there also were significant effects from problem behavior to parental knowledge in our study, such that higher levels of problem behavior predicted lower perceived parental knowledge over time. Not surprisingly, adolescents who engage in higher levels of problem behavior have more to hide from their parents than adolescents who engage in lower levels of problem behavior (see the special issue of the Journal of Adolescence in 2010 that examines how adolescents manage their parents' access to information). In the present study, however, we did not find significant direct effects from problem behavior to disclosure. With parental knowledge in the model, the effect from problem behavior to disclosure appears to work indirectly through parental knowledge. This finding concurs with results outlined in Soenens et al.'s cross-sectional study (2006), which found no support for a model that included a pathway from problem behavior to disclosure; in contrast, others who have found that greater delinquency predicted less disclosure did not include parental knowledge in their model and their measure of disclosure included secrecy items (e.g., Keijsers et al. 2010; Kerr et al. 2010).

Was there evidence that perceived parent monitoring behaviors are reactions to problem behavior? Higher levels of problem behavior directly predicted *less* rather than more parental control over time for girls more so than for boys, although this gender difference was only at a trend level. As girls, on average, report higher levels of parental control than boys across all grades, it is perhaps not surprising that girls in particular may perceive that parental control declines in response to problem behavior. Kerr and Stattin (2003) also have reported that parents tend to withdraw rather than increase monitoring efforts in response to adolescent's problem behaviors, most likely to avoid conflict. In addition, although we hypothesized that higher levels of adolescent disclosure would predict more parental solicitation over time, such that parents may be responding to their child's openness about their activities by asking more questions, this was only marginally supported in the present study. Instead, adolescent disclosure most strongly predicted more time spent engaged in family fun activities over time. It is likely that disclosure facilitates a warm and trusting parent-adolescent relationship, which in turn results in increased willingness to spend time together.

A significant finding in our study was a reciprocal association between parental control and solicitation, such that higher control predicted more solicitation over time and higher solicitation predicted more control over time. Keijsers et al. (2010) suggested that control and solicitation should perhaps not be regarded together as parental monitoring, but that solicitation may be better conceptualized as a facet of parental communication, along with adolescent willingness to disclose. Our findings, however, do not support such a conclusion; instead our findings are consistent with Stattin and Kerr's contention that parental control and solicitation are both related aspects of parental monitoring.

Overall, our results confirm the suggestions of Kerr et al. (2010) and Keijsers et al. (2010) that adolescent-driven

behaviors such as disclosure are linked to problem behavior, but in our study this was only an indirect effect through parental knowledge. Importantly, perceived active parental monitoring efforts also played an important role, particularly with control directly deterring problem behavior, and time spent in family fun activities indirectly deterring problem behavior through its effect on parental control and adolescent disclosure. Furthermore, consistent with the suggestion of Kerr et al. (2008), it is clear that adolescents do not perceive that their parents increase their monitoring efforts, such as control and solicitation, directly in response to problem behavior. Instead, our results suggest that girls in particular perceive that parents decrease their control behaviors, again most likely to avoid conflict (see Kerr et al. 2008).

Why were active parental monitoring efforts more predictive of problem behavior in the present study in comparison to Kerr et al. (2010) and Keijsers et al. (2010) studies? The differing results likely are not due to the fact that these latter studies included the parents' own assessment of their monitoring behaviors (in addition to the adolescents' perceptions of their parents' behaviors), and therefore their variables might be more "accurate" of parenting behaviors than in our study which only included the adolescents' perceptions. Indeed, the parents and adolescents showed the same pattern of results in both Kerr et al. and Keijsers et al., so that explanation appears to be doubtful. Instead, there appear to be four possible reasons for the differing results. First, the present study examined normative problem behavior, including a comprehensive set of behaviors that are prevalent in this population, such as alcohol and marijuana use. Parental monitoring might be less predictive of non-normative behaviors such as delinquency, the predominant adolescent behavior examined in the Kerr et al. and Keijsers et al. studies. Second, time spent in family fun activities is an important way for parents to facilitate disclosure, and the inclusion of this measure as a direct predictor of all the parenting and adolescent variables in the present study offers a broader examination of perceived parental monitoring efforts beyond solicitation and control. Third, our disclosure measure was not confounded with secrecy. Fourth, this is the first longitudinal study to include all of the relevant parenting and adolescent variables simultaneously in one analysis, in order to clearly disentangle the direct and indirect links between perceived parenting practices and adolescent behavior, and therefore, differing results are not unexpected.

Limitations

Our study was specifically focused on an examination of the relationships among the parenting, disclosure, and problem behavior variables outlined in the Stattin and Kerr (2000) article. We do not claim, however, to have presented an exhaustive investigation of the parent-adolescent effects on problem behavior. There may be other variables that play a critical role. A limitation of the present study also was that responses were based on self-report and were uncorroborated by other sources. For example, our parental knowledge measure assessed adolescents' perceptions of how knowledgeable their parents are about their activities rather than the parents' actual knowledge. Although researchers have found that adolescent and parent reports of similar variables to those measured in the present study yield similar findings (Keijsers et al. 2010; Kerr and Stattin 2000; Kerr et al. 2010; Soenens et al. 2006), our study would have benefited from the participation of parents.

Our reliance on a single source of information may have introduced positive bias to the degree of inter-relations among the study variables. To minimize this bias, however, we used a longitudinal design and accounted for all concurrent measures at each grade level, allowing us to examine the unique role that each variable played in the prediction of problem behavior. In addition, although our sample included the majority of enrolled students from a school district, findings may not generalize to other geographic regions, including those with differing ethnic and/or demographic mixes. For example, in Chinese culture, voluntary adolescent disclosure may not be encouraged (Shek 2008). In this case, parental control and solicitation may play a much larger role in predicting parental knowledge and problem behavior than in Western cultures.

Finally, given that standardized path coefficients of .10 are typically seen as small effects in the social sciences (e.g., Cohen 1988), the structural paths that were significant in the present study were all small in magnitude. However, these effect sizes are common in cross-lagged models with high stability coefficients between adjacent waves of data (see problem behavior especially) and when accounting for concurrent associations among variables. In this case, small effects would be expected. However, small effects are not necessarily trivial effects. This study represents a rigorous and conservative examination of the associations among perceived parenting practices and adolescent disclosure in predicting problem behavior; large effects, therefore, would not be expected.

Conclusions

Consistent with a vast amount of research, higher parental knowledge played a key role in predicting lower problem behavior in the present study. Moreover, there was a reciprocal association between problem behavior and parental knowledge, such that higher levels of parental

knowledge not only predicted reduced problem behavior but higher levels of problem behavior in turn predicted lower parental knowledge. It was voluntary adolescent disclosure that predicted parental knowledge, however, rather than parental monitoring behaviors, indicating that a youth-driven process in the prediction of problem behavior may be indirect through parental knowledge. Although these findings underscore the importance of adolescents' willingness to disclose, it is likely that parents play a key role in fostering adolescent disclosure. For example, our study demonstrates that engaging in family fun activities is an important way for parents to gain knowledge about their child's activities over time. Furthermore, a warm relationship between the parent and adolescent may facilitate voluntary disclosure (see Soenens et al. 2006). Moreover, parental monitoring behaviors in the present study were important, with parental control a direct deterrent of problem behavior over time, and time spent engaged in family fun activities demonstrating indirect links to problem behavior over time, particularly through parental control and adolescent disclosure. Overall, these findings suggest a "family-centered process", rather than a primarily youth-driven or parent-driven process in the prediction of problem behavior. Importantly, these effects were invariant across grade, suggesting that interventions aimed at parents of adolescents engaged in problem behavior, for example, can be broadly based. Most critically, these results suggest that parenting behaviors continue to play an important role in deterring problem behavior throughout the high school years, even as adolescents become increasingly autonomous and spend less time under the direct supervision of their parents.

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