

Perceived Parental Monitoring, Adolescent Disclosure, and Adolescent Depressive Symptoms: A Longitudinal Examination

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Abstract Parental monitoring has long been stressed as an important parenting practice in reducing adolescents' susceptibility to depressive symptoms. Reviews have revealed, however, that measures of monitoring have been confounded with parental knowledge, and that the role of adolescent disclosure has been neglected. In the present study, adolescents ($N = 2,941$; 51.3% female) were surveyed each year from grades 9–12. To disentangle parenting factors, bidirectional associations among parental knowledge, adolescent disclosure, and parental monitoring (i.e., solicitation and control) were examined. Higher parental knowledge was associated with lower adolescent depressive symptoms over time. Adolescent disclosure and parental control also predicted lower adolescent depressive symptoms indirectly through knowledge. Conversely, higher adolescent depressive symptoms predicted lower parental knowledge, adolescent disclosure, and parental solicitation over time, highlighting the bidirectional nature of associations among parenting factors and adolescent depressive symptoms. Importantly, these effects were invariant across gender and grade, suggesting that interventions can be broadly based.

Keywords Adolescent depressive symptoms · Longitudinal study · Bidirectional effects · Perceived parental monitoring behaviors · Adolescent disclosure

Introduction

Depression is a widespread and serious problem among adolescents. Estimates of prevalence suggest 15–35% of adolescents experience depressive symptoms during adolescence (Compass et al. 1993; Lewinsohn et al. 1993), and higher levels of adolescent depressive symptoms are associated with less positive adjustment in adulthood (Devine et al. 1994), as well as risk for suicide (Hovanesian et al. 2009), lower levels of self-esteem and self-efficacy (Kerr and Stattin 2000), and externalizing behavior engagement (Fleming et al. 2008). Throughout the past several decades, parental monitoring has been regarded by researchers as one important way parents can reduce adolescents' susceptibility to depressive symptoms (Frojd et al. 2007; Jacobson and Crockett 2000; Kim and Ge 2000; Sagrestano et al. 2003; Steinberg et al. 1991). In 2000, however, Stattin and Kerr called into question the association between parental monitoring efforts and adolescent depressive symptoms, after an extensive review revealed that researchers had confounded measures of parental monitoring with knowledge. Yet, since Stattin and Kerr's review, no study has disentangled monitoring from knowledge, and examined associations among these parenting factors and adolescent depressive symptoms over time. Further, no study has considered bidirectional associations among parental monitoring behaviors and adolescent depressive symptoms. The present study specifically addresses these gaps.

Parental 'Monitoring' and Adolescent Depressive Symptoms

In the past, several studies have underscored the importance of parental monitoring as a predictor of lower levels

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of adolescent depressive symptoms (Frojd et al. 2007; Jacobson and Crockett 2000; Kim and Ge 2000; Sagrestano et al. 2003; Steinberg et al. 1991). According to researchers, parental monitoring reduces adolescents' susceptibility to depressive symptoms because parental attempts to solicit information from adolescents, and supervise adolescents' activities, communicate to adolescents that parents are interested in and concerned about their adolescents' well-being (Frojd et al. 2007). The association between higher levels of parental monitoring and lower levels of adolescent depressive symptoms appears to be robust across adolescent gender, and has been reported among samples of early and late adolescents in both cross-sectional and longitudinal research (Jacobson and Crockett 2000; Kim and Ge 2000; Sagrestano et al. 2003). Importantly, the association has also been reported across multiple informants (Sagrestano et al. 2003; Kim and Ge 2000), suggesting that both parent- and adolescent-reported parental monitoring is associated with lower levels of depressive symptoms among adolescents. As a result, parental monitoring has been regarded by researchers as an important predictor of positive adolescent adjustment (Frojd et al. 2007; Kim and Ge 2000; Sagrestano et al. 2003).

As compelling as the research may seem, however, there is reason to question the claim that parental monitoring reduces adolescents' susceptibility to depressive symptoms. In 2000, Stattin and Kerr called into question the decades of research supporting the importance of parental monitoring after a comprehensive review of the literature revealed that parental monitoring was most often operationalized by asking adolescents and parents the extent to which parents were *knowledgeable* about their adolescents' whereabouts and activities, with the implication that parents who were knowledgeable about their adolescents' activities *actively* solicited that information from their adolescents. Stattin and Kerr argued that assuming knowledgeable parents are good monitors is erroneous, however, because determining parents' knowledge of their adolescents' activities does not actually inform researchers about the ways parents come to be knowledgeable. Indeed, in a study of 703 adolescents in Sweden, Stattin and Kerr found that when parental knowledge was disentangled from parental monitoring (i.e., parental solicitation and control), parental knowledge—not monitoring—was highly correlated with adolescent problem behavior, supporting Stattin and Kerr's claim that parental monitoring and parental knowledge represent distinct parenting constructs, and may be uniquely related to adolescent outcomes (also see Crouter and Head 2002). Given that such an extensive body of literature on parental monitoring actually reflects decades of research on parental knowledge (Waizenhofer et al. 2004), uncovering the ways parents obtain knowledge has become a significant priority among researchers.

Stattin and Kerr asserted that parents may obtain knowledge in three primary ways: adolescent disclosure (i.e., spontaneous sharing of information by the adolescent), parental solicitation (i.e., parental asking), and parental control (i.e., parental limit-setting). Parental solicitation and control are consistent with past conceptualizations of parental monitoring. In contrast to past research, Stattin and Kerr (2000) posited that parents' primary source of knowledge may be adolescent disclosure rather than parental monitoring efforts, suggesting that by the time youth reach adolescence, parents no longer can rely on regulatory components of parenting (i.e., parental solicitation and control) because adolescents manage parents' level of knowledge by choosing which information to voluntarily disclose (Kerr et al. 2010). Consistent with their hypothesis, (Stattin and Kerr 2000; Kerr and Stattin 2000) found that adolescent disclosure was the most significant predictor of parental knowledge in their sample of adolescents in Sweden, and parental solicitation and control contributed little to the prediction of parental knowledge.

If adolescent disclosure is an important source of parental knowledge, adolescent disclosure also may be relevant to understanding adolescent depressive symptoms, but the role of adolescent willingness to disclose in relation to adolescent depressive symptoms is poorly understood at present. It may be that disclosure provides parents with opportunities to provide support and guidance to struggling adolescents (Keijsers et al. 2009). Furthermore, adolescent depressive symptoms may not be readily observable to parents (Fleming et al. 2008), and thus to be knowledgeable, parents may have to rely on adolescents' willingness to disclose. The act of disclosing, in and of itself, may reduce adolescents' susceptibility to depressive symptoms (Kerr and Stattin 2000), because adolescents may feel better after disclosing and disclosure may facilitate a better relationship with parents (Collins and Miller 1994).

There have been some recent studies exploring the link between adolescent disclosure and depressive symptoms, but findings have been mixed. For example, Laird and Marrero (2010) found that less disclosure was associated with more depressive symptoms in a sample of American pre-adolescents, but Frijns et al. (2010) reported that disclosure was not associated with depressive symptoms in their longitudinal study of 13–16 year-olds in Belgium. To the best of our knowledge, there is only one study that has considered the role of adolescent disclosure in the context of the parental monitoring behaviors (i.e., parental solicitation and control) and adolescent depressive symptoms. In a cross-sectional study examining these measures in a sample of 14 year-olds in Sweden (Kerr and Stattin 2000), adolescent disclosure emerged as the strongest predictor of adolescent depressive symptoms, and perceived parental solicitation and control were not associated with reduced

adolescent depressive symptoms. Although Kerr and Stattin examined parental knowledge and its association with each hypothesized source of parental knowledge individually (i.e., adolescent disclosure, parental solicitation, and parental control), they did not test associations among parental knowledge, adolescent disclosure, parental solicitation, and parental control simultaneously in relation to adolescent depressive symptoms. Therefore, the role of adolescent disclosure in the context of all the parenting factors (i.e., parental knowledge, parental solicitation, and parental control) is unknown. Moreover, although Kerr and Stattin concluded that adolescent disclosure likely reduces adolescent susceptibility to depressive symptoms, it is unclear whether disclosure reduces adolescent risk for depressive symptoms or whether depressive symptoms leads to reduced disclosure to parents. Kerr and Stattin's study was not able to directly test the direction of effects because the study was limited by its cross-sectional design.

Given that past measures of parental "monitoring" have captured adolescents' willingness to disclose more so than parental solicitation and control efforts, what then is the role of the parent in the prediction of adolescent depressive symptoms? Kerr and Stattin's study focused on early adolescence, but the influence of parental solicitation and parental control may change over time. More specifically, as adolescents try to establish independence from parents in mid to late adolescence, parental attempts to solicit and control may be perceived by the adolescent as intrusive or controlling (Kerr et al. 2010; Keijsers et al. 2009). Researchers have shown that feelings of being controlled and experiencing lack of personal control are associated with maladjustment and internalizing problems such as depressive symptoms (Kerr and Stattin 2000; Seligman 1991). Moreover, it may be that parental monitoring behaviors serve more as responses, rather than antecedents, to adolescent depressive symptoms, but researchers have yet to consider bidirectional associations among parental solicitation, parental control, parental knowledge, and adolescent depressive symptoms over time. To address these limitations, longitudinal research that includes an examination of these variables is needed.

The Present Study

To determine the role of the parent in adolescent depressive symptoms, the present study extends the reinterpretation of parental monitoring by disentangling previously confounded parenting practices and examining these parenting behaviors (i.e., parental solicitation and parental control) along with parental knowledge and adolescent disclosure in relation to adolescent depressive symptoms. Importantly, this study represents the first longitudinal examination of

bidirectional associations among the parenting factors, adolescent disclosure and depressive symptoms. Four central issues were addressed.

Question 1: Are the patterns of associations among parental knowledge, adolescent disclosure, parental solicitation, parental control and adolescent depressive symptoms consistent across the high school years? As adolescents spend increasingly more time out of the home, adolescent disclosure may become more critical in the later high school years in order for parents to be informed. Moreover, it may be that as adolescents become more autonomous in mid to late adolescence, parental solicitation and control are perceived by the adolescent to be increasingly intrusive, and thus associated with increased risk for depressive symptoms. Differences across high school grades in how these perceived parent and adolescent variables are related, including potential bidirectional links, however, remain unexplored. Given the lack of longitudinal research addressing this question, these analyses were exploratory.

Question 2: Do parental knowledge, adolescent disclosure, parental solicitation and parental control predict adolescent depressive symptoms? We expected to replicate the findings of past research that higher parental knowledge would be linked with lower levels of adolescent depressive symptoms (Kerr and Stattin 2000). We also anticipated that higher levels of adolescent willingness to disclose would be associated with lower levels of depressive symptoms (Kerr and Stattin 2000; Laird and Marrero 2010). In contrast, we predicted that active parental solicitation and control would be perceived by adolescents as intrusive (Kerr and Stattin 2003), and therefore, linked with higher levels of adolescent depressive symptoms.

Question 3: Do adolescent depressive symptoms predict parental knowledge, adolescent disclosure, parental solicitation and parental control? It is important for researchers to consider not only whether parental monitoring practices contribute to adolescent depressive symptoms, but also whether associations between parenting variables and adolescent depressive symptoms are better explained by parents' responding to adolescents' depressive symptoms. To our knowledge, this study represents the first examination of the reciprocal relationships among adolescent depressive symptoms, parental knowledge, adolescent disclosure and parental monitoring, and therefore, our analyses were exploratory. We anticipated, however, that higher adolescent depressive symptoms would be associated with lower levels of parental knowledge over time. Furthermore, since withdrawal is a characteristic of depression (DSM-IV-TR 2000), we also predicted that depressive symptoms would predict lower levels of adolescent disclosure over time. Lastly, given that there is

some evidence that parents may withdraw monitoring efforts if adolescents seem closed off from parents, or involved in problem behaviors (Kerr and Stattin 2003; Kerr et al. 2010), we predicted that adolescent depressive symptoms would predict lower levels of parental solicitation and control over time.

Question 4: Are the patterns of associations among parental knowledge, adolescent disclosure, parental solicitation, parental control and adolescent depressive symptoms consistent across gender? Several studies have documented gender differences in depressive symptoms, such that girls tend to report more depressive symptoms than boys during adolescence (Frojd et al. 2007; Kerr and Stattin 2000). Further, researchers have found that girls report more parental knowledge, adolescent disclosure, parental solicitation and parental control, on average, than boys (Crouter and Head 2002; Kerr and Stattin 2000; Stattin and Kerr 2000). In order to account for these gender differences, gender was included as a covariate in all primary analyses in the present study. Although Kerr and Stattin (2000) did not find evidence that gender moderated associations among parental knowledge, adolescent disclosure and parental monitoring behaviors, we also tested for moderation of gender in our results.

Method

Participants

Students from eight high schools encompassing a school district in Ontario, Canada took part in the study as part of a larger longitudinal project examining youth lifestyle choices in adolescence, involving five 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 national 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 the measures pertinent to this study. The overall participation rate ranged from 83 to 86% across all

the waves of data collection; 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 less parental knowledge, less parental control and more adolescent depressive symptoms than longitudinal participants (all $ps < .001$).

The current analysis is based on 2,941 participants (50.3% female) who completed the survey at a minimum of two time points. 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 survey during the subsequent data collection periods. Because this missing data was not dependent on the values of the study measures, it is reasonable to assume that this data is missing at random (Schafer and Graham 2002). In path analyses, missing values are estimated in AMOS 16.0 using the full information maximum likelihood (FIML) estimation method (Arbuckle and Wothke 1999; Schafer and Graham 2002). 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. To ensure that there were no biases in the sample, however, cohort was treated as a covariate in all subsequent analyses.

A second source of missing data occurred because some students did not finish the entire questionnaire. To ensure that any missing data was missing at random, three versions of the survey were included at each time period so that the same scales were not always near the end of the survey. For multi-scale items, composite scores were computed for participants who responded to at least 50% of the relevant items. For participants who did not provide 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 EM (expectation–maximization) algorithm. EM is an iterative maximum-likelihood (ML) procedure in which a cycle of calculating means and covariances followed by data imputation is repeated until a stable set of estimates missing values is reached. Methodological research has demonstrated that ML estimation is preferable to pair-wise deletion, list-wise deletion, or means substitution (Schafer and Graham 2002). In total, 10.8% of the data were imputed. This percentage of imputed data is comparable with other longitudinal survey studies (e.g., 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 students' 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 students' 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

The study measures are described below. Each measure, other than demographics, was assessed at each of the high school grades and is based on self-report by the adolescent.

Demographics

Age, sex, and parental education (one item per parent, averaged for those reporting on both parents, $r = .43$.) were assessed. Higher scores indicate greater age, female gender (1 = male, 2 = female), and greater parental education, respectively (1 = *did not finish high school* to 6 = *professional degree*). The average age across grades was 14, 15, 16, and 17.

Parental Knowledge

The five items used to assess parental knowledge (Brown et al. 1993) required the respondent to indicate on a four-point scale (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's alphas were .85, .85, .87, and .89 for grades 9, 10, 11 and 12, respectively.

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 such as which friends you hang out with and how they think and

feel about various things)? Respondents indicated degree of disclosure on a four-point scale (1 = *almost never or never* to 4 = *almost always or always*). Ratings were averaged such that higher scores indicated more adolescent disclosure. Cronbach's alphas were .80, .77, .79, and .82 for grades 9, 10, 11 and 12, respectively.

Parental Solicitation

Parental solicitation was measured with five items (Steinberg et al. 1994) assessing the frequency in which parents sought to solicit 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?). The four-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 overlapped with the adolescent disclosure measure, 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 of the 5 items were averaged into a composite score for each grade, the recoding only affected 7% of participants who answered "I tell them without their asking" for all 5 items within a grade. Missing data was imputed for these participants in an identical manner to other variables—see missing data section above. In order to make sure that 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 parental solicitation. Cronbach's alphas were .79, .81, .83, and .84 for grades 9, 10, 11 and 12, respectively.

Parental Control

Parental control was assessed using six items from Stattin and Kerr (2000) that required adolescents to report on 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 four-point scale (1 = *almost never or never* to 4 = *almost always or always*). Ratings were averaged such that higher scores indicated more parental control. Cronbach's alphas were .88, .88, .88, and .89 for grades 9, 10, 11 and 12, respectively.

Depressive Symptoms

Depressive symptoms were measured using the Center for Epidemiological Studies Depression Scale (CES-D,

Radloff 1977). Participants indicated how often they experienced 20 symptoms (e.g., I could not get going) over the past 2 weeks using a four-point scale of 1 (*never*) to 4 (*always*). The scale has been shown to have good reliability with adolescent samples (Kim and Ge 2000). Ratings were averaged such that higher scores indicated greater reported depressive symptoms. Cronbach's alphas were .91, .92, .92, and .93 for grades 9, 10, 11 and 12, respectively.

Results

Preliminary Analyses

All constructs exhibited acceptable skewness and kurtosis (Kline 2005). Means and standard deviations of the variables are presented in Table 1. Preliminary analyses examined gender and parental education differences within each grade in perceived parenting, adolescent disclosure and adolescent depressive symptoms. 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 .009 in grade 9 to .097 in grade 10). No significant differences were found for parental education. Girls reported more parental knowledge, adolescent disclosure, parental solicitation and parental control than boys across all grades (all $ps < .01$). Girls also reported significantly more depressive symptoms than boys in grades 9, 10, and 11 (all $ps < .01$). Table 2 outlines the intercorrelations among all variables separately for girls and boys. There was stability in scores across grades for each construct, with the greatest stability shown for depressive symptoms (average $r = .52$ for girls and .38 for boys across adjacent grades). Correlations across grade for the remaining measures were moderately stable (ranging from an average across adjacent grades of $r = .50$ for girls and .37 for boys on parental knowledge, and $r = .47$ for girls and .32 for boys on disclosure). The strongest associations with adolescent depressive symptoms were observed for perceived parental knowledge followed by adolescent disclosure, and the weakest were with parental solicitation and parental control for both girls and boys. For each of the variables, a repeated measures ANOVA was conducted to examine mean level differences across grade. All ANOVAS were significant, except for disclosure and solicitation (Wilks $\lambda p < 0.001$ η^2 ranging from .071 for knowledge to .278 for control). Across the high school years, mean depressive symptoms scores increased while parental control and knowledge decreased. These findings are consistent with previous research (Keijsers et al. 2009; Willoughby and Hamza 2010).

Primary Analyses

The primary statistical analyses were carried out with AMOS 16.0. We adopted a conservative approach to our analyses by using an alpha of .01 and 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 values less than .06 (simultaneously) were used as the criteria for a well-specified model. Gender, parental education and cohort were controlled in all analyses with paths from these covariates to each variable in each grade. Stability paths and concurrent associations among all the variables within each grade were also included in the analyses. The overall model with reciprocal effects that was tested is presented in Fig. 1. The model had good fit $\chi^2 (115) = 531.10$, $p < 0.001$, CFI = .97, RMSEA = .035 (.032–.038).

Question 1. Are the patterns of associations among parental knowledge, adolescent disclosure, parental solicitation, parental control and adolescent depressive symptoms 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 significantly better fit than the constrained model, suggesting that the patterns of associations among parenting and adolescent constructs were consistent across the high school years $\chi^2_{diff} (40) = 36.69$, $p = .62$ [CFI = .96, RMSEA = .044 (.040–.047) for unconstrained model]. As the constrained model was the most parsimonious model, all further interpretations are based on the constrained model (questions 2–4). Table 2 outlines the path estimates (note that as paths across each adjacent grade were constrained to be equal, paths are shown for only two times points, labeled Time 1 and Time 2) and Fig. 2 summarizes the significant paths.

Question 2: Do parental knowledge, adolescent disclosure, parental solicitation and parental control predict adolescent depressive symptoms? To address this question, using the more parsimonious constrained model as shown in Fig. 2, we first examined whether adolescent disclosure and parental monitoring directly or indirectly predicted adolescent depressive symptoms. Behaviors that might play an indirect role in deterring adolescent depressive symptoms were indicated if they did not directly predict depressive

Table 1 Means, standard deviations and correlations among variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Knowledge 9	–	.47	.35	.35	.59	.32	.25	.30	.32	.21	.25	.17	.25	.25	.23	.19	–.39	–.28	–.23	–.22
2. Knowledge 10	.36	–	.51	.42	.41	.53	.37	.36	.19	.29	.25	.26	.25	.37	.26	.20	–.28	–.35	–.23	–.22
3. Knowledge 11	.29	.38	–	.50	.31	.40	.50	.38	.15	.16	.31	.21	.14	.24	.30	.20	–.14	–.22	–.24	–.21
4. Knowledge 12	.20	.33	.37	–	.33	.27	.37	.51	.19	.10	.17	.29	.15	.20	.15	.23	–.21	–.14	–.17	–.26
5. Disclosure 9	.50	.28	.19	.20	–	.45	.37	.36	.29	.16	.30	.18	.40	.21	.19	.14	–.36	–.32	–.20	–.23
6. Disclosure 10	.18	.44	.26	.24	.36	–	.50	.41	.24	.27	.25	.24	.20	.34	.24	.20	–.22	–.29	–.17	–.20
7. Disclosure 11	.17	.18	.37	.26	.24	.26	–	.50	.13	.16	.34	.23	.11	.21	.32	.15	–.18	–.18	–.22	–.17
8. Disclosure 12	.17	.20	.23	.35	.19	.25	.34	–	.17	.12	.20	.31	.11	.15	.17	.34	–.14	–.14	–.20	–.19
9. Solicitation 9	.42	.14	.08	.06	.37	.15	.08	.15	–	.38	.27	.29	.50	.31	.19	.26	–.10	–.06	–.03	–.04
10. Solicitation 10	.22	.35	.14	.17	.25	.31	.13	.11	.33	–	.40	.30	.29	.46	.28	.17	–.10	–.10	–.12	–.08
11. Solicitation 11	.18	.16	.30	.09	.18	.15	.24	.19	.24	.35	–	.37	.29	.31	.47	.25	–.10	–.14	–.08	–.18
12. Solicitation 12	.15	.22	.14	.35	.22	.13	.15	.25	.28	.30	.38	–	.19	.22	.28	.45	–.10	–.14	–.13	–.13
13. Control 9	.48	.28	.18	.20	.43	.20	.17	.16	.47	.31	.20	.24	–	.43	.31	.30	–.15	–.12	–.07	–.10
14. Control 10	.23	.38	.20	.18	.22	.42	.13	.14	.21	.44	.26	.19	.40	–	.47	.33	–.20	–.11	–.10	–.08
15. Control 11	.11	.14	.27	.11	.12	.13	.47	.11	.09	.17	.41	.27	.22	.28	–	–.48	–.17	–.11	–.08	–.14
16. Control 12	.13	.21	.16	.21	.04	.14	.17	.53	.19	.15	.24	.36	.29	.24	.30	–	–.01	–.07	–.03	–.06
17. <i>DepressSym</i> 9	–.31	–.19	–.18	–.12	–.28	–.16	.14	–.08	–.12	–.15	–.05	–.02	–.19	–.06	–.09	.05	–	.54	.41	.44
18. <i>DepressSym</i> 10	–.26	–.30	–.20	–.15	–.15	–.15	.10	–.07	–.08	–.12	–.07	–.10	–.16	–.11	–.04	–.01	.41	–	.50	.46
19. <i>DepressSym</i> 11	–.12	–.16	–.17	–.14	–.10	–.11	.03	–.03	–.03	–.04	.03	.04	–.10	–.08	.01	.01	.31	.39	–	.53
20. <i>DepressSym</i> 12	–.05	–.08	–.12	–.14	–.11	–.06	.09	.07	–.05	.01	–.02	.08	–.06	–.02	.04	.12	.33	.30	.35	–
Girls																				
M	3.25	3.17	3.17	3.19	2.63	2.63	2.67	2.72	2.21	2.19	2.20	2.21	3.09	3.04	2.84	2.71	2.01	2.08	2.10	2.10
SD	0.57	0.66	0.66	0.67	0.70	0.75	0.76	0.75	0.47	0.50	0.51	0.50	0.64	0.73	0.80	0.78	0.68	0.69	0.65	0.66
Boys																				
M	3.21	3.04	2.99	2.99	2.53	2.37	2.39	2.40	2.10	2.03	2.11	2.13	2.95	2.71	2.60	2.46	1.80	1.87	2.02	2.08
SD	0.58	0.62	0.70	0.70	0.67	0.70	0.73	0.69	0.47	0.51	0.54	0.55	0.64	0.71	0.72	0.72	0.59	0.62	0.72	0.71

$N = 2,941$. Girls are above the diagonal, boys are below the diagonal. 9 = grade 9; 10 = grade 10; 11 = grade 11; 12 = grade 12. *DepressSym* = depressive symptoms. Higher scores for variables indicate more parental knowledge, more adolescent disclosure, more parental solicitation, more parental control more adolescent depressive symptoms. Any correlation .05 or above is significant at the alpha .01 level

Table 2 Path coefficients for cross-lagged paths

Cross-lagged path	B	Beta	SE	p
Knowledge1 → Disclosure2	.120	.092	.018	<.001
Knowledge1 → Solicitation2	.030	.034	.013	.020
Knowledge 1 → Control2	.070	.054	.018	<.001
Knowledge 1 → DepressSym2	−.060	−.050	.016	<.001
Disclosure 1 → Knowledge2	.124	.136	.014	<.001
Disclosure1 → Solicitation2	.029	.041	.011	.009
Disclosure 1 → Control2	.007	.007	.016	.655
Disclosure1 → DepressSym2	−.022	−.023	.014	.127
Solicitation1 → Knowledge2	−.032	−.023	.019	.092
Solicitation1 → Disclosure2	.074	.047	.021	<.001
Solicitation1 → Control2	.100	.064	.022	<.001
Solicitation1 → DepressSym2	−.010	−.007	.020	.595
Control 1 → Knowledge2	.039	.043	.014	.005
Control1 → Disclosure2	−.017	−.017	.016	.266
Control1 → Solicitation2	.089	.125	.011	<.001
Control1 → DepressSym2	−.019	−.020	.014	.179
DepressSym1 → Knowledge2	−.064	−.073	.013	<.001
DepressSym1 → Disclosure2	−.045	−.045	.015	.002
DepressSym1 → Solicitation2	−.030	−.044	.011	.005
DepressSym1 → Control2	−.032	−.032	.015	.033

Numbers after construct names indicate Time 1 or Time 2—only two time points are shown as cross-lagged paths were invariant across grade (estimates were equal across grade). *B* = unstandardized coefficient; *Beta* = standardized coefficient; *SE* = standard error. *DepressSym* = depressive symptoms. For each construct, stability paths across each adjacent grade were all significant at *p* < 0.001. Space restriction does not allow for the effects of stability paths or gender to be presented. More information about these effects is available from the first author

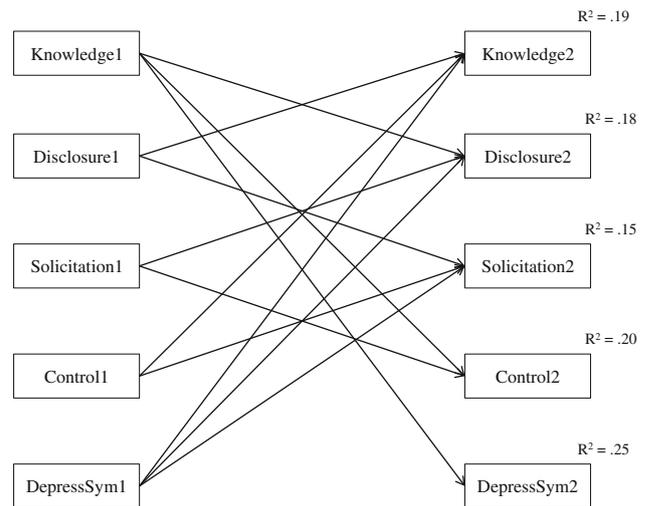
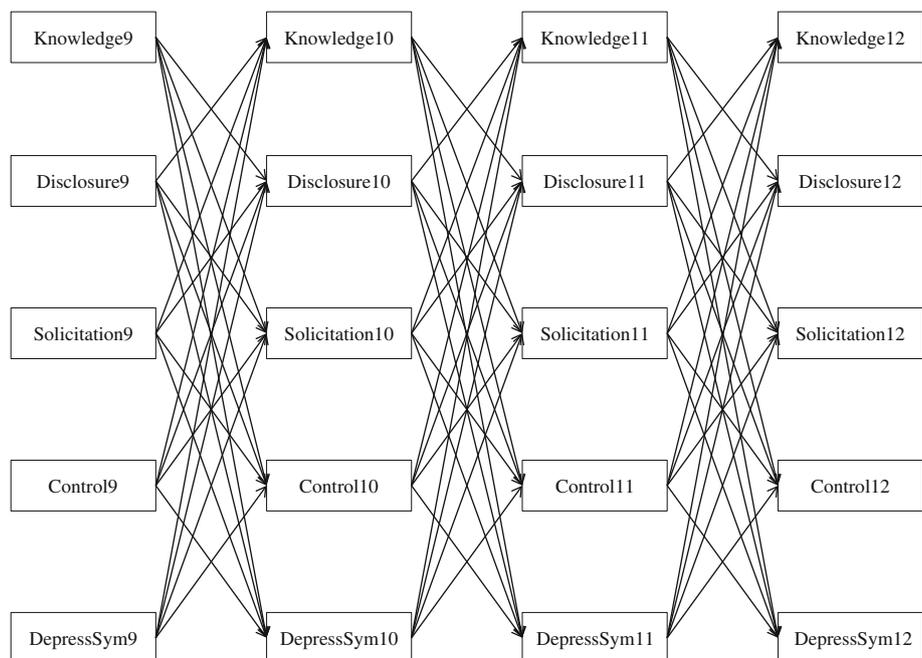


Fig. 2 Significant cross-lagged paths. *Note.* Numbers after construct names indicate either Time 1 or Time 2—only two time points are shown as cross-lagged paths were invariant across the four high school grade levels. Solid lines indicated *p* < 0.01. *DepressSym* = depressive symptoms. All stability paths were significant but are not shown. See Table 2 for cross-lagged path coefficients

symptoms but did predict a parent or adolescent behavior that was a significant predictor of adolescent depressive symptoms. The Sobel *z* test (1982) was used to examine whether indirect effects were significant, with *z*-value = $a*b/\text{SQRT}(b2*sa2 + a2*sb2)$.

Consistent with past research and our hypothesis, higher levels of parental knowledge significantly predicted lower levels of adolescent depressive symptoms over time,

Fig. 1 Representation of the overall model. *Note.* *DepressSym* = depressive symptoms. Concurrent associations among constructs within a grade as well as stability paths across adjacent grades are not shown. Numbers denote grade level



$\beta = -.05$, $p < .001$ (Kerr and Stattin. 2000). Also consistent with our expectations, higher levels of adolescent disclosure predicted higher parental knowledge $\beta = .14$, $p < .001$, suggesting that higher levels of disclosure were indirectly associated with lower adolescent depressive symptoms through parental knowledge ($z = 3.45$, $p < .001$). Contrary to our predictions, however, parental monitoring was not directly associated with higher levels of depressive symptoms. In fact, higher parental control predicted higher parental knowledge, $\beta = .04$, $p = .005$, suggesting that higher levels of control were associated with lower levels of adolescent depressive symptoms indirectly through parental knowledge ($z = 2.24$, $p = 0.03$).

Question 3: Do adolescent depressive symptoms predict parental knowledge, adolescent disclosure, parental solicitation and parental control? When we examined reciprocal associations among parental knowledge, adolescent disclosure and parental monitoring, we found that consistent with our predictions higher adolescent depressive symptoms directly predicted lower parental knowledge, $\beta = -.07$, $p < 0.001$, lower adolescent disclosure, $\beta = -.05$, $p = .002$, and lower parental solicitation over time, $\beta = -.04$, $p = .005$. Inconsistent with our expectations, however, adolescent depressive symptoms did not significantly predict lower parental control over time, $\beta = -.03$, $p = .03$.

Question 4: Are the patterns of associations among parental knowledge, adolescent disclosure, parental solicitation, parental control and adolescent depressive symptoms 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 the structural paths were free to vary. The chi-square difference test of relative fit indicated that the unconstrained model did not provide a significantly better fit, CFI = .963, RMSEA = .031 (.028–.033), over the constrained model $\chi^2_{diff}(100) = 130.5$, $p < 0.02$ [CFI = .960, RMSEA = .025], suggesting the pattern of associations were invariant across gender.

Other Cross-Lagged Paths in the Model

Although not directly related to our hypotheses, we also found a reciprocal association between adolescent disclosure and parental solicitation, such that higher adolescent disclosure predicted higher parental solicitation over time, $\beta = .04$, $p = .009$, and higher parental solicitation predicted higher disclosure over time, $\beta = .05$, $p < .001$. Higher parental knowledge was also associated with increased disclosure, $\beta = .09$, $p < .001$, and parental

control, $\beta = .05$, $p < .001$, over time. Lastly, higher parental solicitation predicted higher parental control over time, $\beta = .06$, $p < .001$, and higher parental control predicted higher parental solicitation over time, $\beta = .13$, $p < .001$. This finding is not surprising as both parental solicitation and control are conceptualized as related aspects of parental monitoring (Stattin and Kerr 2000; Willoughby and Hamza 2010).

Discussion

For decades, parental monitoring has been stressed as an important predictor of lower levels of adolescent depressive symptoms (see Crouter and Head 2002). Stattin and Kerr (2000), however, called the decades of research on parental monitoring into question after an extensive review revealed that parental monitoring had long been confounded with knowledge. To uncover the role of perceived parenting practices in the development of adolescent depressive symptoms, we extended the reinterpretation of parental monitoring by disentangling previously confounded parenting practices (i.e., parental solicitation and control) from parental knowledge, and considering these parenting factors, as well as adolescent disclosure, in relation to adolescent depressive symptoms. Importantly, the present study represents the first large-scale longitudinal test of bidirectional associations among the key parenting variables identified by Stattin and Kerr (2000) and adolescent depressive symptoms, and offers new insight into the role of both parents and adolescents (as perceived by the adolescent) in reducing adolescent susceptibility to depressive symptoms.

First, we found that the pattern of results across the perceived parenting and adolescent behaviors was consistent across each of the high school years. Although the prevalence of adolescent depressive symptoms may increase in adolescence (Lewinsohn et al. 1993), our findings suggest that associations among parenting factors, adolescent disclosure and adolescent depressive symptoms do not change across the high school years. As youth become increasingly autonomous, perceived parenting practices continue to play a role in the development of depressive symptoms. For example, from early to late adolescence, parental knowledge predicted lower levels of adolescent depressive symptoms, and adolescent depressive symptoms predicted lower parental knowledge. The significant bidirectional association is consistent with findings from studies that have relied on measures of parental knowledge to assess “monitoring,” as well as Kerr and Stattin’s (2000) finding that parental knowledge was associated with lower levels of depressive symptoms in a sample of early adolescents. Parental knowledge may be

associated with lower adolescent depressive symptoms over time because knowledge provides parents with opportunities to intervene in adolescents' activities. For example, if parents are knowledgeable of their adolescents' activities, and the amount of time that they spend with peers, parents may be able to recognize changes in behaviors early on, and provide guidance when needed. In support of this hypothesis, we found that higher levels of knowledge predicted increased parental solicitation and control over time, suggesting that the more adolescents perceived that their parents knew about their activities, the more they felt their parents supervised their activities. Therefore, *how much parents know* did seem to be associated with the extent to which parents monitored.

The extent to which parental knowledge reflects aspects of the parent-adolescent relationship also may help to explain the link between higher levels of knowledge and lower adolescent depressive symptoms. For example, Fletcher et al. (2004) found that adolescents with good parental relationships reported that their parents were more knowledgeable about their activities than adolescents with poor parental relationships. Adolescents who have a warm parent-adolescent relationship most likely facilitate parental knowledge because they spend time with their parents, invite friends to their home, and engage in activities under the direct supervision of their parents (Kerr and Stattin 2000). Further, the extent to which parental knowledge reflects aspects of the parent-child relationship may help to explain the bidirectional association between adolescent depressive symptoms and parental knowledge. Depressed adolescents may have less positive relationships with parents or spend less time engaged in activities with parents (Willoughby and Hamza 2010). As a result, parents may have lower levels of parental knowledge.

Past research on parental "monitoring" (i.e., knowledge) has widely disregarded the role of adolescent disclosure (Stattin and Kerr 2000), but adolescent disclosure appears to be an important source of parental knowledge. When we examined the predictive value of adolescent disclosure in the context of the key parenting factors and adolescent depressive symptoms, we found that consistent with our hypotheses, as well as the findings of Kerr and Stattin (2000), adolescents' perceptions of higher levels of adolescent disclosure predicted higher parental knowledge, and lower levels of adolescent depressive symptoms indirectly through parental knowledge. Importantly, disclosures may provide parents with *youth-initiated* opportunities to provide support and guidance to their adolescents.

Consistent with our expectations, we also found that higher levels of adolescent depressive symptoms predicted decreased adolescent willingness to disclose over time. Our findings are in line with those of Laird and Marrero (2010),

who reported that depressed adolescents disclosed less to parents in their sample of American adolescents. Given that withdrawal is characteristic of depressive symptoms (DSM-IV-TR 2000), it is not surprising that we found that as reported depressive symptoms increased, disclosures to parents appeared to decrease. Importantly for parents, these reduced disclosures also resulted in lower levels of parental knowledge, meaning that parents of more depressed adolescents might have had fewer opportunities to provide support and guidance to their struggling adolescents.

Given adolescents' increasing autonomy needs during mid-adolescence (Kerr et al. 2010; Keijsers et al. 2009), we expected that when active parental monitoring strategies were measured, higher levels of parental solicitation would be associated with higher levels of depressive symptoms, but our findings did not support this hypothesis. In fact, we found that parental solicitation may offer parents some benefit, because adolescents' perceptions of higher levels of solicitation predicted higher adolescent willingness to disclose over time. Our finding is inconsistent with Kerr et al. (2010); however, Kerr et al.'s disclosure measure included items about hiding information from parents (e.g., Do you hide a lot from your parents about what you do during nights and weekends). Finkenauer et al. (2002) argue that disclosure and secrecy are two distinct constructs and may uniquely be related to parenting. Given that we did not include secrecy in our measure of disclosure, it is not surprising that our results differ from Kerr et al. (2010).

We also expected that higher levels of perceived parental control might be associated with higher levels of adolescent depressive symptoms (Kerr and Stattin 2000), but this hypothesis was not supported. Instead, we found that higher levels of parental control were associated indirectly with lower levels of depressive symptoms, through parental knowledge (also see Soenens et al. 2006). The finding that parental control is indirectly linked to depressive symptoms among adolescent reports is encouraging, because it suggests that parental supervision and limit-setting may offer parents opportunities to be knowledgeable about their adolescents activities, and in turn, this knowledge may lower adolescents' susceptibility to depressive symptoms.

When we examined reciprocal associations between adolescent depressive symptoms and perceived parental monitoring behaviors (i.e., parental solicitation and control) we found that, consistent with our expectations, higher levels of adolescent depressive symptoms predicted decreased parental solicitation over time. We had predicted that depressive symptoms would be associated with lower levels of solicitation because there has been research showing that parents tend to withdraw monitoring efforts when adolescents are involved in problem behaviors (Kerr

et al. 2010), or when adolescents seem closed off from parents (Kerr and Stattin 2003). Although parents may be concerned about the adolescent, and parents may respond to depressive symptoms more sympathetically than risky behaviors (Laird and Marrero 2010), the reasons parents withdraw monitoring efforts may be the same: parents may want to avoid uncomfortable conversations or conflict with the adolescent (Kerr and Stattin 2003). Inconsistent with our expectations, however, adolescent depressive symptoms did not significantly predict lower perceived parental control over time, suggesting that parents may maintain parental supervision and limit-setting in response to adolescents' depressive symptoms. Researchers suggest that parental solicitation may be a more direct form of monitoring than control (Hawk et al. 2008), and thus parents may be more likely to modify the frequency with which they ask the adolescent about their activities in response to depressive symptoms, while continuing to provide limits on adolescents activities.

Consistent with previous research, associations among parent and adolescent variables were invariant across adolescent gender (Kerr and Stattin 2000). An interesting avenue for future research may be to examine additional sources of moderation. For example, associations between parenting and adolescent depressive symptoms may be stronger among individuals who place greater emphasis on interpersonal relationships with others, or in cultures where a lot of importance is placed on family context, and parents are highly valued (Gil-Rivas et al. 2003). Future research in this area also could consider person-centered approaches to the study of parental monitoring in order to better understand how parental knowledge, adolescent disclosure and parental monitoring are related over time. Moreover, growth modeling techniques may further elucidate the development trajectories of adolescent depressive symptoms.

Limitations

Despite the many strengths of the present study, including the use of a longitudinal design and large sample size, the present study is not without limitations. First, although the present study was specifically focused on an examination of the relationships among the parenting and adolescent variables outlined in the Stattin and Kerr (2000) article, we do not claim to have provided an exhaustive investigation of the parent-adolescent effects on adolescent depressive symptoms. Another limitation of the present study is that measures relied on adolescent self-reports, and were uncorroborated by other sources. For example, the parental solicitation measure assessed adolescents' perceptions of how often their parents solicit information about their activities rather than the parents' actual solicitation

practices. Although it would have been beneficial to have had parents report on their parenting practices as well, we did not have permission to survey the parents of participating adolescents. It is important to note, however, that parent and adolescent reports of parental knowledge, adolescent disclosure and parental monitoring behaviors appear to be significantly correlated (Kerr and Stattin 2000; Kerr et al. 2010; Soenens et al. 2006). Moreover, Kerr and Stattin found that adolescent and parent reports of similar variables to those in the present study yielded similar findings (also see Soenens et al. 2006; Keijsers et al. 2009). These findings offer support for the contention that adolescent and parent perceptions are closely related. In addition, as Steinberg et al. (1991) argues, it is adolescents' perceptions that may be important when examining predictors of their behavior.

Another limitation of the present study was that reliance on a single source of information (adolescent reports) may have introduced bias to the degree of inter-relations among the study variables. For example, more depressed adolescents may have rated their parents more negatively across all domains of parenting. To minimize this bias, however, we used a longitudinal design and accounted for correlations among measures at each time point, allowing us to examine the unique role that each variable played in the prediction of adolescent depressive symptoms. Nevertheless, the study would have benefited from corroboration by other sources, particularly separate assessments of each behavior from the participants' mothers and fathers.

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 solicitation and control may play a much larger role in predicting parental knowledge and problem behavior than in Western cultures.

While our measures are consistent with those used by Kerr and Stattin (2000), it should be noted that the measures of parental solicitation and control included in this study did not include questions pertaining to parents' asking about adolescents' depressive thoughts or behaviors. Research on the study of parental monitoring and adolescent depressive symptoms has consistently relied on measures of parental solicitation and control about adolescents' activities and whereabouts in order to capture parental tracking and supervision efforts (see Crouter and Head 2002 for a review). To provide a more comprehensive examination of the role of the parent, however, future research should consider measures specific to adolescent feelings and mood (i.e., how often do your parents ask if

you are feeling sad or upset?). Moreover, it may be important to determine the extent to which parental solicitation and control are perceived as intrusive by the adolescent. According to self-determination theory, internalizing problems occur when adolescents' central needs for autonomy, or more specifically when adolescents' needs for personal choice over their actions, are thwarted by controlling parenting behaviors (Friendly and Grolnick 2009). Therefore, measures that specifically test whether adolescents perceive parental solicitation and control as intrusive may be more closely related to adolescent depressive symptoms than items that ask about adolescents' daily activities and whereabouts. Regardless, however, our measures provide information about the ways parental monitoring behaviors may be implicated in the study of depressive symptoms, and can serve to inform future research in this area.

Given that path coefficients of .10 are typically seen as small effects in the social sciences (e.g. Cohen 1988), we acknowledge that some of the significant effects in the present study are quite small. Small effects were expected, however, given that our study represents the first-large scale longitudinal test of associations among all the parenting factors identified by Stattin and Kerr (2000) and adolescent disclosure, and given the use of a cross-lagged model with high stability coefficients between adjacent waves of data, while also accounting for concurrent associations among variables. In addition, the size of our significant standardized path estimates are comparable to results presented in other studies [e.g. Fletcher et al. (2004) found a significant standardized path of .07 from parental control to adolescent delinquency; also see Soenens et al. 2006]. Moreover, the amount of variance accounted for by our study variables (see Fig. 2) is consistent with previous research (see Stattin and Kerr 2000; Kerr and Stattin 2000; Soenens et al. 2006; Willoughby and Hamza 2010). At the same time, the development of depressive symptoms is clearly complex (Greenberger and Chen 1996), and it is not surprising that there are other more influential factors that contribute to the development of depressive symptoms. Again, however, effects found in the present study may have been larger had the measures of parental monitoring and disclosure been specifically related to adolescents' emotions.

Conclusions

In the past, parental monitoring was regarded as an important parenting practice in reducing adolescent susceptibility to depressive symptoms, until Stattin and Kerr (2000) called previous research into question after an extensive review revealed that researchers had confounded

measures of parental monitoring with knowledge and had neglected to consider the role of the adolescent. To examine parental and adolescent contributions to the development of adolescent depressive symptoms, the present study disentangled previously confounded parenting factors (i.e., parental knowledge, parental solicitation and parental control) and examined associations among these factors, as well as adolescent disclosure, in relation to adolescent depressive symptoms across all of the high school years.

Consistent with the extant literature on parental knowledge, as well as Kerr and Stattin (2000), higher levels of parental knowledge were associated with lower levels of depressive symptoms, suggesting that parents' level of knowledge may be an important predictor of adolescent depressive symptoms. Importantly, however, when parental knowledge and monitoring (i.e., solicitation and control) were disentangled, parental control was also associated with lower levels of depressive symptoms indirectly through parental knowledge. Moreover, parental solicitation appeared to foster adolescent willingness to disclose. Our results, therefore, provide evidence that parental monitoring is an important parenting practice in reducing adolescent susceptibility to depressive symptoms, even in the context of parental knowledge and adolescent willingness to disclose.

Adolescent contributions, however, were also meaningful. Adolescent disclosure was not only associated with lower levels of depressive symptoms indirectly through parental knowledge, it also supported parental monitoring efforts. Furthermore, the extent to which adolescents were experiencing depressive symptoms also appeared to predict perceived parenting behaviors. Specifically, adolescents with higher levels of depressive symptoms reported that their parents had lower levels of knowledge and solicited less. Moreover, more depressed adolescents reported that they disclosed less information to their parents about their activities and whereabouts over time. These findings underscore the bidirectional nature of associations between parent and adolescent behaviors, and suggest that both parent and adolescent behaviors serve as responses, as well as antecedents, to adolescent depressive symptoms. Future research on adolescent depressive symptoms, therefore, will want to include an examination of bidirectional associations to disentangle parent versus adolescent contributions to the development of depressive symptoms.

Although there are many factors associated with the development of depressive symptoms (e.g., biological and psychological vulnerabilities), our research suggests that the family environment is also relevant. Intervention efforts aimed at parents of depressed youth may benefit from teaching parents ways to establish open channels of communication with adolescents (i.e., through parents' asking

about adolescents' activities), as well as teaching parents effective supervision strategies to increase parents' knowledge about adolescents' activities. Increased knowledge, in turn, may provide parents with more valuable opportunities to provide support and guidance to adolescents. Moreover, by creating an open environment in which adolescents are willing to share information about their activities, parents may have more youth-initiated opportunities to provide support. Importantly, our findings were invariant across adolescent gender and grade, suggesting that intervention programs aimed at parents of depressed youth could be broadly based across the high school years, as parents continue to be important throughout adolescence, even as adolescents become increasingly autonomous.

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