

Family and School Spillover in Adolescents' Daily Lives

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This study examined spillover between daily family stressors and school problems among 589 ninth-grade students (mean age = 14.9 years) from Mexican, Chinese, and European backgrounds. Spillover was examined using a daily diary methodology in which adolescents reported on their school and family experiences each day for 2 weeks. Analyses using hierarchical linear modeling revealed reciprocal spillover effects between adolescents' daily functioning in the family and school domains that spanned several days. Longitudinal analyses indicated that spillover between family stressors and school problems also occurs across the high school years, from 9th to 12th grade, and that both are predictive of poorer academic performance in 12th grade. These findings have practical implications for adolescents' academic achievement trajectories and general well-being.

As two of the primary contexts for development, family and school substantially shape adolescents' lives. In addition to directly informing adolescents' experiences, events in each setting can also affect what happens in the other setting. This sphere of influence, referred to as the mesosystem, occurs as a transaction between primary developmental contexts (Bronfenbrenner, 1986). The centrality of family and school to adolescent development is reflected in the wealth of research that has examined the role of family resources and parenting in the school adjustment of teenagers (e.g., Steinberg, Lamborn, Dornbusch, & Darling, 1992). However, these studies have focused primarily on more global measures of family resources and practices, such as parental education and parenting style, as opposed to a more microlevel approach that examines the daily experiences of adolescents in families and schools. The primary goal of the current study was to provide a twofold view of how the family may shape school adjustment and vice versa. We examine this both in the short term, by focusing on the daily transaction between experiences at home and at school, and over the long term, by considering the implications for adjustment and achievement across the years of high school.

Spillover in Adolescents' Daily Lives

The process by which experiences in one context influence the experiences in another context is often

referred to as spillover (Almeida, Wethington, & Chandler, 1999). The concept of spillover has been used primarily in studies of adult stress and coping, such as research that has focused on the linkages between work stress and family experience. These studies have found that stressful experiences at the workplace can lead to greater conflict and emotional distress between family members (e.g., Repetti, 1989; Schulz, Cowan, Pape Cowan, & Brennan, 2004). The concept of spillover offers a useful framework with which to examine the linkages between family and school experiences among children and adolescents. Such an approach was taken by Repetti and colleagues in their study of the connections between the family and school settings among elementary school children. Children's daily social and academic failure experiences at school increased the likelihood of subsequent aversive interactions with parents at home (Repetti, 1996). Parents' aversive behavior, on the other hand, was not associated with problems at school the following day. Furthermore, negative mood was found to mediate the association between school failure and aversive parent–child interactions (Lehman & Repetti, 2007).

Although comparable studies have not been done among older children, there are several reasons to believe that the years of adolescence would be a particularly fruitful time to examine spillover processes between experiences at home and at school. Adolescence represents a period of significant changes in the family and school contexts. The move into the teenage years is accompanied by greater academic and family demands, such as more homework and responsibilities

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at home (Isakson & Jarvis, 1999). As parental monitoring of children's school behaviors decreases during secondary school, school responsibilities, such as completing homework and attending classes, increasingly fall upon the adolescents themselves (Spera, 2005). In terms of family relationships, disagreements and conflicts with parents become more intense and less easily resolved (Laurson, Coy, & Collins, 1998; Smetana & Asquith, 1994). As a result of the need to negotiate changes in these settings in their lives, adolescents frequently identify school and family as sources of stress and concern (de Anda et al., 2000; Phelan, Yu, & Davidson, 1994).

Along with the increased demands and pressures that they experience at home and school, adolescents undergo cognitive and emotional changes. As a result of their increased cognitive skills, adolescents have a greater propensity for rumination. Stressful experiences may be more likely to carry across settings as teenagers mull over and hold on to negative events for a longer period of time (Muris, Roelofs, Meesters, & Boomsma, 2004). Adolescents also exhibit a decline in positive emotion and an increase in intensity of negative emotion (Larson, Moneta, Richards, & Wilson, 2002). Such a tendency toward experiencing stronger negative emotion may enhance the likelihood of spillover. Finally, compared to adults, adolescents' sense of self tends to be less well developed (Harter, 1999). Because their concept of themselves in different roles, such as family members and students, is less differentiated, events that happen in one area may be more likely to impact their functioning and experiences in other areas (Harter, Bresnick, Bouchey, & Whitesell, 1997).

Increased stress in the family and school contexts accompanied by cognitive and emotional changes, therefore, makes adolescence a developmental period during which spillover effects may be particularly prominent. The preceding discussion suggests that key events to examine within the family include experiences of conflict and too many demands, as these are experiences that have been shown to be particularly salient and stressful for adolescents (de Anda et al., 2000; Phelan et al., 1994). At school, experiences relevant to adolescents' achievement and motivation, such as their effort and learning difficulties, would be important to examine given that school is a setting that requires a level of attention and performance that may be hard for students to muster if they have had trying experiences in the home. It is also possible that diminished effort or learning difficulties at school, in turn, could carry over into the home environment and create higher levels of parent-child conflict and parental discipline, as was observed in

prior research with elementary school-age children (Lehman & Repetti, 2007; Repetti, 1996).

A Daily Diary Approach to Spillover

Daily diary methods are ideal techniques for observing spillover processes because they capture naturally occurring events as they unfold over time (Bolger, Davis, & Rafaeli, 2003). In the daily diary approach, study participants are asked to complete diary checklists each day for a short period of time, often ranging from several days to several weeks. This method allows researchers to estimate whether specific events, behaviors, and feelings co-occur with one another on a daily basis. For example, Repetti (1996) documented spillover between elementary school-age children's academic functioning and interactions with their parents by having children first report on their academic experiences during the day and then, later, on interactions with their parents in the evening for two consecutive weekdays. The temporal sequencing of reports made it possible to more strongly infer that children's academic failure experiences at school were associated with aversive interactions with parents at home. In another example, Almeida et al. (1999) examined spillover of emotions emanating from the marital dyad and flowing to the parent-child dyad. Tension in parent-child dyads was observed on days following tense marital interactions, with controls for parent-child tension from the prior day.

The daily diary method possesses other strengths suitable for the examination of family and school spillover among adolescents. By assessing experiences on a daily basis, this method reduces potential biases associated with extended recall. In addition, although causality cannot be determined because of the nonexperimental nature of the data, the ability to establish a temporal sequence while also controlling for prior levels of the dependent variable allows for stronger inferences about the linkages between experiences in the different settings of adolescents' daily lives (Bolger et al., 2003). In the current study, adolescents reported on family and school experiences once each day over a 2-week period. The daily diary checklists that adolescents completed included items that assessed experiences such as parental conflict and discipline, family demands, learning difficulties, and school attendance. Using the daily diary method allowed us to examine the daily associations between family and school experiences, controlling for prior levels of the outcome variable. We conducted tests of spillover in each direction to compare how family stressors impacted school functioning and, conversely, how school events influenced subsequent family

functioning. The design of this study also allowed us to examine lagged effects of spillover in both directions. For example, we explored the possibility that effects of heightened levels of family stress would continue to linger and be associated with poorer academic adjustment for multiple days after the initial stress. In addition, by aggregating the daily diary data, we were able to examine long-term patterns of spillover and implications for academic achievement over the course of high school, thus gaining a macroscopic view while taking advantage of the daily diary design. This longitudinal approach also complements the microscopic perspective afforded by daily-level analyses.

Group Differences in Spillover

In the current study, we examined whether spillover between family and school varied according to adolescents' gender and ethnic background. Although we did not expect there to be large gender differences, we hypothesized that differences would reflect greater spillover among girls. Females have been shown to report more daily stress and greater emotional reactivity than males (Almeida & Kessler, 1998; Kearney, Drabman, & Beasley, 1993). In particular, events that involve family members have been found to have a greater impact on girls than boys (Larson & Asmussen, 1991). In addition, research with adults has found gender differences in work-home spillover, with females subject to greater spillover effects in both directions (Keene & Reynolds, 2005; Schulz et al., 2004). Therefore, although under some conditions boys have shown a greater susceptibility to major family changes such as divorce (Hetherington & Stanley-Hagan, 1999), prior research on daily stress and reactivity would seem to suggest that any gender differences observed in the present study would be in the direction of greater spillover from family to school on the part of girls.

Predictions about potential ethnic differences are tentative given the paucity of research on any kind of spillover among ethnically diverse populations. Yet, it is possible that spillover in either direction would be greater for adolescents from Mexican and Chinese backgrounds. Adolescents from both these groups come from traditions that place great importance upon the family in children's lives (Chao & Tseng, 2002; Fuligni & Hardway, 2006; García-Coll & Vázquez García, 1995), such that adolescents may show greater reactivity to negative family experiences that would spill over into their school experiences. Adolescents from Chinese backgrounds may experience greater spillover from school to family because of the

strong emphasis placed upon high levels of academic success among their families (Chao & Tseng, 2002; Fuligni, 1997). Finally, socioeconomic differences among adolescents could produce ethnic differences in spillover. Prior research has shown that lower socioeconomic status (SES) is a risk factor for increased vulnerability to stress in children (Wadsworth, Raviv, Compas, & Connor-Smith, 2005) and higher reactivity to stress among adults (Grzywacz, Almeida, Neupert, & Ettner, 2004).

Long-Term Consequences of Stress

Effects of such daily stress may accumulate over time and have negative long-term consequences. The toll of chronic stress on mental and physical health outcomes is well documented. Certain groups are disproportionately subject to stressful experiences, such as individuals from low-SES backgrounds (Almeida, Neupert, Banks, & Serido, 2005; Grzywacz et al., 2004). Therefore, examining the effect of high levels of daily stress on adolescents' long term functioning would be informative. Examining how stress in the family and school domains predicts one another at a between-subjects level, over the long term, complements the within-subjects, daily-level perspective. Additionally, academic performance is an important indicator of current functioning and a prognosticator of advancement and future opportunities. Therefore, it is relevant to examine the predictive association between high levels of family stress and school problems at the beginning of high school and academic achievement by the end of high school.

Primary Research Questions

The present study addressed the following key questions about family and school spillover among adolescents from Latin American, Asian, and European backgrounds who are in their 1st year of high school: (a) Are daily family conflict and demands associated with attendance and learning problems at school the following day? (b) Does spillover also occur in the reverse direction, with daily academic problems predicting increased difficulties at home on the following day? (c) Are spillover effects pervasive, persisting for up to 2 days following the occurrence of the initial stressor? (d) Are there gender, ethnic, or socioeconomic differences in the extent of spillover between home and school? (e) What are the long-term implications of heightened levels of daily family stress and school problems?

Method

Participants

Students in the 9th grade from three high schools in the greater Los Angeles metropolitan area were invited to participate in the study. Approximately 65% of adolescents agreed to participate and returned a signed parent consent form. Of the 783 ninth-grade students who participated, 589 adolescents of Chinese ($n = 174$), Mexican ($n = 241$), and European American ($n = 174$) descent comprised the target sample for this study (mean age of students = 14.86 years, $SD = 0.38$). The 194 participants from ethnic minority groups that comprised too small a number for meaningful comparisons in our sample (e.g., other Latino, other Asian, Middle Eastern, and African American backgrounds) were excluded from these analyses. The sample was relatively evenly split between boys (48%) and girls (52%). Longitudinal analyses, across the high school years, were conducted on data from a subset of 503 adolescents who participated in both 9th and 12th grades.

The three schools represented a diverse cross-section of Los Angeles in terms of ethnic composition, SES, and levels of overall academic achievement. Enrollment at the first school consisted of primarily Asian American and Latino students with academic achievement in the lower-middle to middle range, based on state-mandated standardized achievement tests, and from working to lower-middle socioeconomic backgrounds. The student body at the second school was predominantly European American and Latino from families in the lower-middle- to middle-class spectrum of parental education, occupation, and income. The third school enrolled primarily European American and Asian American students from middle- to upper-middle-class socioeconomic backgrounds. Schools 2 and 3 were characterized by average to above-average levels of academic achievement, respectively. The two largest ethnic groups at each school comprised approximately 30%–50% of the total population of students at each school; however, no single ethnic group predominated.

Adolescents indicated the highest level of education attained by each parent on the following scale: 1 = elementary/junior high school, 2 = some high school, 3 = graduated from high school, 4 = some college, 5 = graduated from college, and 6 = law, medical, or graduate school. Mothers' and fathers' levels of education were highly significantly correlated ($r = .71, p < .001$); therefore, an index was created based on parents' average education level. Parents of students from Mexican backgrounds had lower levels of education than those from Chinese backgrounds, whose

education level was lower than that of those from European American backgrounds, $F(2, 505) = 85.14, p < .001, \eta^2 = 0.25$. On average, Mexican parents had attained approximately a high school education ($M = 3.09, SD = 1.27$), Chinese parents had between a high school education and some college ($M = 3.79, SD = 1.52$), and European American parents had between some college and graduated from college ($M = 4.85, SD = 1.00$).

A similar pattern of ethnic group differences emerged for parent occupation. Parent occupation was classified into standard categories: 1 = unskilled, 2 = semiskilled, 3 = skilled, 4 = semiprofessional, and 5 = professional. Parents of students from Mexican American backgrounds had lower occupational status jobs as compared to Chinese parents, who had lower occupational status jobs relative to European American parents, $F(2, 468) = 54.80, p < .001, \eta^2 = 0.19$. On average, Mexican parents were employed in semiskilled to skilled jobs ($M = 2.92, SD = 0.92$), Chinese parents held skilled to semiprofessional jobs ($M = 3.39, SD = 0.97$), and European American parents were in semiprofessional jobs ($M = 3.96, SD = 0.81$).

Procedure

Participants were recruited from spring semester classes which all ninth-grade students were required to take regardless of their academic ability (e.g., social studies, physical education). At two of the three high schools, the entire ninth-grade student body was invited to participate. At the third high school, approximately half of the ninth graders were invited to participate because the large size of the school did not make it feasible to recruit all the students. Consent forms and study materials were available to students and their parents in English, Chinese, and Spanish. Eight participants chose to complete the questionnaires in a language other than English (4 in Chinese and 4 in Spanish).

Students who returned signed parent consent forms and provided their own assent to participate completed an initial background questionnaire during a 50-min class period. In the background questionnaire, adolescents reported on their family, peer, and academic values in addition to demographic variables. After completing the background questionnaire, adolescents were provided with a 14-day supply of diary checklists to complete at home each night before going to bed. The three-page diary checklists, which consisted of daily family-, peer-, and school-related experiences, took approximately 5–10 min to complete. Adolescents were instructed to seal the diary sheets in individual envelopes each

night and to stamp the seal of the envelope with a preprogrammed electronic time stamper to record the date and time of completion. The electronic time stamper was programmed such that adolescents could not alter the date and time.

Adolescents were contacted by phone during the 2-week period to answer questions about the procedures and to monitor the status of their diary completion. Adolescents received \$30 for participating in the study after returning their questionnaires at the end of the 2nd week. In addition, they were offered two movie passes for accurately and fully completing all materials. The time stamper method of monitoring daily diary completion and incentives resulted in a high rate of compliance. Approximately 95% of daily diaries were completed, and 86% of these were completed on time, either that night or before noon the following day. All analyses were conducted using only those diaries completed on time to reduce possible biases associated with late diaries.

Measures

Adolescents reported on their experiences and events in the school and family domains each day. Adolescents provided these reports at the end of each day over the course of the 2-week study period. The items comprising each scale were designed for use in this study and were selected based upon their relevance to adolescents' daily lives. Spillover effects involving experiences between home and school were examined on both a daily and a longitudinal basis. Daily analyses were conducted using ninth-grade daily diary reports. Longitudinal analyses were conducted using aggregated data from 9th-grade and 12th-grade diaries and 12th-grade grade point average (GPA) as an outcome variable. Analyses of attrition compared the initial 9th-grade sample and final 12th-grade sample to the longitudinal sample ($N = 503$), with significant differences noted below.

Family Stress

Daily family conflict and demands. Five items presented in a checklist format tapped into stressful experiences related to the family. Each day for 2 weeks, adolescents indicated whether any of the following had occurred: (a) punished or disciplined by parents, (b) argued with your mother about something, (c) argued with your father about something, (d) argued with another family member about something, and (e) had a lot of demands made by your family. The total number of items endorsed each day was summed to create an index of daily family

stress ($M = 0.46$, $SD = 0.83$, range = 0–5). Daily family stress was examined in conjunction with school stress to observe within-person, daily and lagged spillover effects. For between-person, individual-level analyses, assessing change across the high school years, family conflict, and demands were summed over the 2-week study period, in each year of the study, to form an overall estimate of family stress (9th grade: $M = 6.22$, $SD = 6.95$; 12th grade: $M = 4.70$, $SD = 5.22$). No differences in daily family stress emerged between adolescents who participated in the study in both 9th and 12th grades (i.e., the longitudinal sample) as compared with those who only participated in 9th grade.

School Problems

Daily attendance and learning problems. Seven items presented in a checklist format assessed problems related to attendance and learning at school. Each day, adolescents indicated whether they had experienced any of the following: (a) had difficulty getting to school on time; (b) were late for class; (c) skipped or cut a class; (d) skipped school; (e) did not understand something taught in class; (f) did poorly on a test, quiz, or homework; and (g) did not turn in homework that was due. Total attendance and learning problems were summed each day as an indicator of academic adjustment ($M = 0.74$, $SD = 1.01$, range = 0–7). The association between daily school stress and family stress was used to examine within-person, daily and lagged spillover effects. Between-person, individual-level analyses were conducted across the high school years by summing the number of attendance and learning problems over the 2-week study period, separately for each year of the study (9th grade: $M = 7.13$, $SD = 6.60$; 12th grade: $M = 8.80$, $SD = 7.11$). Adolescents in the longitudinal sample had lower average levels of attendance and learning problems ($M = 6.56$, $SD = 6.02$) as compared with students who participated only in 9th grade ($M = 8.23$, $SD = 7.47$), $t(439.40) = 3.12$, $p < .01$.

GPA

GPA, on a 4-point scale, was obtained from school records at the end of the 9th- ($M = 3.00$, $SD = 0.72$) and 12th-grade ($M = 3.00$, $SD = 0.69$) school years. GPA at both time points was obtained for 460 students ($N = 479$ in 9th grade, $N = 481$ in 12th grade). The longitudinal sample had higher 9th-grade GPAs ($M = 3.00$, $SD = 0.72$) than students who only participated in 9th grade ($M = 2.47$, $SD = 0.94$), $t(386.46) = -7.71$, $p < .001$.

Results

Analysis Plan

The nested design of this daily diary study, in which daily reports were nested within individuals, made multilevel modeling appropriate for statistical analysis (Raudenbush & Bryk, 2002). Daily-level analyses examined spillover effects within and between subjects. Daily- and individual-level equations were estimated simultaneously using hierarchical linear modeling (HLM) statistical software. Hierarchical generalized linear modeling (HGLM), a nonlinear analysis, was applied to count variable outcomes by specifying a Poisson model with equal exposure. A similar pattern of results emerged from HGLM and standard HLM analyses; therefore, for ease of interpretation, results of standard HLM models are presented. Daily-level equations allowed for the estimation of associations between prior-day family stressors and next-day school adjustment and vice versa. Individual-level equations allowed for estimating whether group characteristics according to gender and ethnicity moderated those daily-level associations.

The following analyses are based on data from diary sheets that were completed on time. Late diaries were excluded from these analyses in order to reduce biases resulting from inaccurate reporting. First, the proposed home-to-school spillover hypothesis was tested, followed by 2-day lagged spillover analyses. Second, gender and ethnicity were examined as potential moderators of family-to-school spillover, and the interactions between ethnicity and gender were examined. Whenever significant effects of ethnicity were observed, follow-up analyses were conducted in order to examine whether the effects of ethnicity could be explained by differences in parental education. The same plan of analysis was followed in order to examine spillover in the opposite direction. School-to-family spillover and 2-day lagged spillover were first examined, followed by tests of the effects of gender, ethnicity, Ethnicity \times Gender interactions, and when applicable, SES. Next, we examined between-subjects effects of high levels of stress over time, from 9th to 12th grade, using regression analyses.

Spillover From Family to School

The following daily-level equations show the basic model for academic adjustment predicted by prior-day family stress while controlling for academic adjustment the prior day:

$$\begin{aligned} \text{School problems}_{ij} = & b_{0j} + b_{1j}(\text{family stress}_{t-1}) \\ & + b_{2j}(\text{school problems}_{t-1}) \\ & + b_{3j}(\text{week of study}) + e_{ij}. \end{aligned} \quad (1)$$

Academic adjustment on a given day (i) for a particular adolescent (j) was modeled as a function of each individual's intercept (b_{0j}) and family stress experienced the previous day (b_{1j}). Prior-day academic adjustment (b_{2j}) was included to control for prior-day effects and to capture the spillover across days resulting from events in the family domain carrying over to influence changes in experiences in the school domain the next day. In order to reduce possible confounds resulting from effects of the repeated-measures diary method, the week of the study (effect coded -1 for Week 1, Days 1–7, and 1 for Week 2, Days 8–14) was entered as a control variable in all equations (b_{3j}). The error term in the equation represents unexplained variance (e_{ij}).

Two-day lagged spillover was modeled according to the following equation:

$$\begin{aligned} \text{School problems}_{ij} = & b_{0j} + b_{1j}(\text{family stress}_{t-2}) \\ & + b_{2j}(\text{family stress}_{t-1}) \\ & + b_{3j}(\text{school problems}_{t-1}) \\ & + b_{4j}(\text{school problems}_{t-2}) \\ & + b_{5j}(\text{week of study}) + e_{ij}. \end{aligned} \quad (2)$$

Academic adjustment on a given day (i) for a particular adolescent (j) was modeled as a function of each individual's intercept (b_{0j}) and family stress experienced 2 days earlier (b_{1j}). Prior-day family stress (b_{2j}) and academic adjustment from the previous day (b_{3j}) and 2 days before (b_{4j}) were included as control variables to isolate the spillover resulting from events in the family domain carrying over to experiences in the school domain across a 3-day span.

As shown in Table 1, family stressors from the prior day significantly predicted more problems with attendance and learning the next day, even after controlling for school adjustment the prior day. Spillover effects continued to persist 2 days after the occurrence of the initial stressor, controlling for subsequent levels of stress. That is, family stress uniquely predicted school adjustment problems not only the next day but also 2 days later.

Gender and Ethnicity

In order to examine whether the spillover of family stress onto academic adjustment varied by gender or ethnicity, the following individual-level equations

Table 1
Predicting Daily School Problems From Family Stress 1 and 2 Days Prior

1 day prior		2 days prior	
Daily level	School problems, <i>b</i> (<i>SE</i>)	Daily level	School problems, <i>b</i> (<i>SE</i>)
Intercept	.34 (.02)**	Intercept	.25 (.01)**
Family stress _(<i>t</i>-1)	.10 (.02)**	Family stress _(<i>t</i>-1)	.05 (.01)**
School problems _(<i>t</i>-1)	.46 (.02)**	Family stress _(<i>t</i>-2)	.05 (.01)**
Week of study	-.01 (.00)	School problems _(<i>t</i>-1)	.32 (.01)**
		School problems _(<i>t</i>-2)	.26 (.01)**
		Week of study	.00 (.00)

Note. Subscripts: (*t* - 1) = 1 day prior; (*t* - 2) = 2 days prior. Gender coded: -1 = boy; 1 = girl. Week of study coded: -1 = Week 1 (Days 1-7); 1 = Week 2 (Days 8-14).

***p* < .01.

were mapped onto the daily-level equations from above:

$$(\text{Intercept})b_{0j} = c_{00} + c_{01}(\text{gender}) + c_{02}(\text{Mexican}) + c_{03}(\text{Chinese}) + u_{0j}. \quad (3)$$

$$(\text{Slope})b_{1j} = c_{10} + c_{11}(\text{gender}) + c_{12}(\text{Mexican}) + c_{13}(\text{Chinese}) + u_{1j}. \quad (4)$$

The intercept Equation 3 tested whether there are gender or ethnic differences in the average levels of academic adjustment. The slope Equation 4 examined gender and ethnicity as moderators of spillover effects from home to school. Gender was effect coded, with -1 for boys and 1 for girls. Ethnicity was dummy coded, with adolescents from European backgrounds designated as the baseline group for comparison with adolescents from Mexican and Chinese backgrounds. Comparisons between adolescents from Mexican and Chinese backgrounds were made by changing the baseline group in Equations 3 and 4 to Mexican American adolescents. Error terms contributing to unexplained variance are represented by u_{0j} and u_{1j} . Error terms were specified as random or fixed according to the significance of variance estimates. Data for 9 days of the 14-day study period permitted examination of academic adjustment as the outcome, predicted by family stress on the prior day. The first day of the study was excluded because there was no information about prior-day family stressors before the study began. In addition, Saturdays and Sundays were excluded from analyses because students did not attend school on these days and academic adjustment could not be predicted on weekends.

In terms of gender, no differences emerged in the average level of daily academic adjustment. Likewise, gender did not moderate the spillover of prior-day academic adjustment onto family stressors the follow-

ing day. However, ethnic group differences emerged in the average daily level of academic adjustment. Adolescents with Chinese backgrounds reported fewer problems with attendance and learning as compared to those with European and Mexican backgrounds ($b_{CA} = .44$, $b_{EA} = .63$, $b_{MA} = .70$, $p < .01$). Results also showed that spillover from family stress to attendance and learning problems the next day was stronger among adolescents from Chinese backgrounds (between-group difference, $p < .05$; slope intercepts and significance level by ethnicity: $b_{CA} = .08$, $p < .01$; $b_{EA} = .02$, *ns*; $b_{MA} = .04$, $p < .05$). That is, family stress predicted significantly more attendance and learning problems the following day for students from Chinese backgrounds as compared to those with European backgrounds. There was no substantial variability in 2-day lagged spillover, as indicated by the nonsignificant variance component for family stress predicting school problems 2 days later; therefore, individual-level moderators were not examined for this association.

To test for interactions between gender and ethnicity, an interaction term was added as an additional individual-level predictor to Equations 3 and 4. No significant Gender \times Ethnicity interactions emerged.

Parental Education

In order to determine whether observed ethnic differences were due to variations in socioeconomic background, the analyses involving ethnicity described above were conducted again, this time adding parental education as an additional individual-level predictor in Equations 3 and 4. Parental education did not independently predict average daily academic adjustment ($b = .02$, *ns*). Ethnic differences in the average level of daily academic adjustment remained significant.

In terms of spillover from family stressors to school adjustment, parental education again was not a significant independent predictor of spillover ($b = .00, ns$). The difference in spillover to attendance and learning problems between students from Chinese and European backgrounds remained significant controlling for parent education ($b_{CA} = .07, p < .05$).

Spillover From School to Family

The same plan of analysis was followed in order to examine spillover from school adjustment to family stressors and demands on the following day. The following daily-level equation is the basic model used to predict family stressors from academic adjustment, controlling for family stressors on the prior day:

$$\begin{aligned} \text{Family stress}_{ij} = & b_{0j} + b_{1j}(\text{school problems}_{t-1}) \\ & + b_{2j}(\text{family stress}_{t-1}) \\ & + b_{3j}(\text{week of study}) + e_{ij}. \end{aligned} \quad (5)$$

This model is similar to the model testing spillover in the reverse direction, except here the variables are reversed, with family stressors as the outcome and academic adjustment as the predictor. Family stressors on a given day (i) for a particular adolescent (j) were modeled as a function of each individual's intercept (b_{0j}) and academic adjustment experienced the previous day (b_{1j}). Prior-day family stressors (b_{2j}) were included to control for any prior-day effects and thereby capture the spillover across days resulting from events in the academic domain carrying over to influence changes in family stress on the following day. The week of the study (b_{3j}) was entered as a control variable. The error term in the equation represents unexplained variance (e_{ij}). Data for 9 days of the 14-day study period permitted examination of family stressors as the outcome, predicted by aca-

ademic adjustment on the prior day. The first day of the study was excluded because there was no information about prior-day academic adjustment before Day 1. In addition, Sundays and Mondays were excluded from analyses because no school data were available from the prior day (i.e., Saturdays and Sundays) to predict family stressors.

Two-day lagged spillover was modeled according to the following equation:

$$\begin{aligned} \text{Family stress}_{ij} = & b_{0j} + b_{1j}(\text{school problems}_{t-2}) \\ & + b_{2j}(\text{school problems}_{t-1}) \\ & + b_{3j}(\text{family stress}_{t-1}) \\ & + b_{4j}(\text{family stress}_{t-2}) \\ & + b_{5j}(\text{week of study}) + e_{ij}. \end{aligned} \quad (6)$$

Family stress on a given day (i) for a particular adolescent (j) was modeled as a function of each individual's intercept (b_{0j}) and academic adjustment 2 days earlier (b_{1j}). Prior-day academic adjustment (b_{2j}), prior-day family stress (b_{3j}), and family stress 2 days earlier (b_{4j}) were included as controls to capture spillover of experiences from the school domain to the family domain over a span of 3 days.

At the individual level, the same equations, as described in Equations 3 and 4 above, were used to examine differences in daily family stressors and the spillover from school to family according gender, ethnicity, and parental education.

Results

As shown in Table 2, problems with attendance and learning modestly but significantly predicted an increase in family stressors on the following day. Additional lagged spillover analyses indicated that academic adjustment problems continued to

Table 2
Predicting Daily Family Stress From School Problems 1 and 2 Days Prior

1 day prior		2 days prior	
Daily level	Family stress, b (SE)	Daily level	Family stress, b (SE)
Intercept	.21 (.01)**	Intercept	.14 (.01)**
School problems _(t-1)	.08 (.01)**	School problems _(t-1)	.04 (.01)**
Family stress _(t-1)	.40 (.02)**	School problems _(t-2)	.03 (.01)**
Week of study	-.02 (.01)**	Family stress _(t-1)	.30 (.02)**
		Family stress _(t-2)	.25 (.02)**
		Week of study	-.01 (.01)*

Note. Subscripts: $(t - 1) = 1$ day prior; $(t - 2) = 2$ days prior. Gender coded: $-1 =$ boy; $1 =$ girl. Week of study coded: $-1 =$ Week 1 (Days 1-7); $1 =$ Week 2 (Days 8-14).
* $p < .05$. ** $p < .01$.

independently predict family stress 2 days later. These associations remained significant when controlling for academic adjustment and family stress from the prior day.

Gender and Ethnicity

In terms of gender differences, girls reported experiencing a higher average level of daily family stressors as compared to boys ($b_{\text{girl}} = .36$, $b_{\text{boy}} = .28$, $p < .01$). Gender, however, did not moderate the spillover of prior-day academic adjustment onto family stressors the following day. In terms of ethnic differences, adolescents from Chinese backgrounds generally reported fewer average daily family stressors than adolescents from European and Mexican backgrounds ($b_{\text{CA}} = .24$, $b_{\text{EA}} = .35$, $b_{\text{MA}} = .35$, $p < .01$). There were no significant ethnic differences in the spillover of attendance and learning problems onto family stressors the next day. As indicated by the nonsignificant variance component for academic adjustment, there was no substantial variability in 2-day lagged spillover predicting family stress as the outcome; therefore, individual-level moderators were not examined for this association.

Analyses examining the interaction between gender and ethnicity indicated significant differences in spillover from attendance and learning problems to family stressors the next day. This difference emerged among adolescents from Chinese and Mexican backgrounds as compared to European backgrounds. Girls from Chinese and Mexican backgrounds experienced greater spillover than boys from their respective backgrounds as compared to girls from European American backgrounds, who experienced less spillover than European American boys (interaction terms, $p < .01$; gender differences for each ethnic group with significance levels: $b_{\text{CAgirl}} = .06$, $b_{\text{CAboy}} = -.01$, $p < .05$; $b_{\text{MAgirl}} = .06$, $b_{\text{MAboy}} = .02$, *ns*; $b_{\text{EAgirl}} = -.01$, $b_{\text{EAboy}} = .09$, $p < .01$).

Parental Education

Parental education was associated with higher average daily levels of family stress ($b = .03$, $p < .05$) but was not independently associated with the spillover from school to family ($b = .00$, *ns*). All the previously reported ethnic differences remained significant.

Long-Term Consequences of Stress

Longitudinal spillover between family stress and academic adjustment was examined between 9th and

12th grades using multiple regression. Average family stress in 9th grade was used to predict average academic adjustment in 12th grade while controlling for average academic adjustment in 9th grade. Similarly, average academic adjustment in 9th grade was examined as a predictor of average family stress in 12th grade while controlling for average family stress in 9th grade. As shown in Table 3, more family stress in 9th grade predicted more academic adjustment problems 4 years later. Likewise, a higher level of academic problems in 9th grade predicted more family stress at the end of high school.

Next, the consequences of high levels of family stress and academic adjustment problems at the beginning of high school, for GPA by the end of high school, were examined. As shown in Table 3, higher average levels of family stress in 9th grade predicted lower 12th-grade GPA, controlling for earlier GPA. Additionally, more academic adjustment problems in 9th grade predicted lower GPA in 12th grade, controlling for GPA in 9th grade. These longitudinal associations did not vary by gender or ethnicity.

Discussion

The findings from this study highlight the interconnectivity between school and family functioning in adolescents' daily lives. Even controlling for the recurring nature of daily stressors, family and school experiences are found to reciprocally predict adolescents' functioning across domains. Specifically, family stress predicts more problems with attendance and learning at school the next day, and the effect is still observed 2 days later. Likewise, problems with attendance and learning are related to increased family stress the following day and 2 days later. Thus, family stress and attendance and learning problems are linked to one another, forming a spillover loop that carries across time and settings. Global patterns of spillover were detected across the span of high school, with higher average levels of daily family stress in 9th grade predicting more school problems 4 years later and, conversely, more school problems in 9th grade predicting higher levels of family stress in 12th grade. Furthermore, higher levels of family stress and school problems at the beginning of high school were associated with declines in academic achievement by the end of high school.

Overall, there were remarkable similarities among adolescents, across ethnicity and gender, in patterns of spillover between family and school problems. The modest variation that was evidenced in spillover, however, may shed light onto the adaptation of

Table 3
 Longitudinal Associations Between Family Stress, School Problems, and GPA From 9th to 12th Grades

Predictor variables	Outcome variables				
	12th-grade school problems (N = 501)				
	B	SE B	β	t	ΔR^2
9th-grade family stress	.11	0.051	.10	2.19*	.07
9th-grade school problems	.45	0.055	.37	8.31**	.11
	12th-grade family stress (N = 501)				
	B	SE B	β	t	ΔR^2
9th-grade school problems	.10	0.041	.12	2.53*	.06
9th-grade family stress	.24	0.038	.30	6.40**	.07
	12th-grade GPA (N = 458)				
	B	SE B	β	t	ΔR^2
9th-grade family stress	-.013	0.004	-.13	-3.63**	.04
9th-grade GPA	.640	0.035	.64	18.30**	.41
	12th-grade GPA (N = 458)				
	B	SE B	β	t	ΔR^2
9th-grade school problems	-.012	0.004	-.11	-2.90**	.06
9th-grade GPA	.626	0.036	.63	17.29**	.13

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

adolescents from diverse backgrounds. With regard to ethnicity, family stressors predicted more school adjustment problems for Chinese American adolescents even after controlling for parental education. On average, Chinese Americans reported fewer daily family stressors, but the effect of such stressors was stronger in terms of being associated with more attendance and learning problems the following school day. Perhaps for Chinese Americans, because they tended to experience fewer family stressors, their occurrence was particularly disruptive. Another possible explanation is that a threshold effect is operating, such that Chinese Americans report stressors that are more severe and not readily resolvable. Consequently, they might weigh adolescents down and, thus, be related to more problems with school adjustment. Another possibility is that because Chinese Americans reported far fewer problems with attendance and learning at school than other ethnic groups, this indicator of academic adjustment was more subject to deviation. Although spillover effects are more pronounced among Chinese American adolescents, on average these adolescents experienced less stress on a daily basis; therefore, the stronger propensity

for spillover may be offset by the lower average levels of family and school stress reported by Chinese Americans.

Patterns of spillover were consistent across boys and girls in this study and thus did not reflect the pattern of gender differences previously documented in work–family spillover among adults. Prior studies have assessed spillover of mood, whereas the current study emphasizes family and school behaviors. Perhaps gender differences are more likely to be observed in terms of spillover of emotions. Girls may be more inclined to express or endorse emotions such as sadness or anxiety than boys (Brody, 1985). If adjustment were measured in terms of emotions (e.g., depressed and anxious feelings), a different pattern of gender differences might emerge. Exploring such a possibility could uncover potential differences in spillover processes across gender.

A strength of this study is its focus on adolescence, a developmental period for which remarkably little is known about spillover. The findings from this study demonstrate how spillover operates in adolescents' daily home and school lives. Rather than directly asking adolescents about how events in different

domains are related, using spillover methods enables detecting associations that adolescents may not recognize exist. This is powerful because adolescents may not be fully aware of how they are affected by stressful experiences. Stressful events may manifest across domains and carry across time, even if adolescents themselves are not aware of how stress at home and school is affecting them. Whether or not the relative impact of stressors is discernible on a daily basis, the accumulation of daily stress is perpetuated by the pervasive and cyclical nature of spillover. This may eventually result in even more serious problems, as suggested by the longitudinal findings concerning increases in stress and decrements in academic achievement over time. Overlooking the subtle, yet real, impact that stressful family experiences and academic adjustment problems have on adolescents in their daily lives could be detrimental in the long term. Although these findings highlight possible negative short- and long-term consequences of daily stress, by the same token, they also point to the potential for improvement in adjustment across domains and over time by bolstering adolescents' ability to manage stress in their daily lives.

A limitation and important distinction to make in this study is that although temporal sequencing indicates directionality, it does not determine causality. Therefore, although we can draw conclusions about the timing and order of events, in terms of which preceded and which followed, we cannot infer that an earlier event caused a later event to occur. Other moderators that may alter spillover such as individual coping style should be explored. There are also likely to be other factors at the individual, family, community, and societal levels that influence spillover processes, as these stressors do not exist in isolation but, rather, are embedded within a broader context (Allison et al., 1999). Given that chronic stressors or minor hassles, such as those studied here in the context of daily life, are associated with poorer physical and mental health outcomes (DeLongis, Folkman, & Lazarus, 1988; Larson & Ham, 1993), it will be important to explore whether continuous transmission of stress over time and across domains increases adolescents' vulnerability to negative health outcomes.

This study contributed to the extant literature by focusing on spillover relevant to the daily family and school lives of adolescents. Although some stressful experience may be inevitable in daily life, these findings document the concerning potential for stressors to become compounded as they carry over across time and domains of functioning. In order to attenuate some of the negative effects associated with the

spillover of stress, identifying and understanding how stressful experiences are transmitted are important. The bidirectional process of spillover between family and school identified here suggests that reducing stress in the family may have benefits for adolescents' school adjustment and vice versa. Adolescents' lives are embedded within multiple contexts such that capturing the interactions between them furthers our understanding of processes relevant to adolescents' behavior and adjustment, which may in turn encourage and promote healthy development.

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