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The Link between Harsh Home Environments and Negative Academic Trajectories is Exacerbated by Victimization in the Elementary School Peer Group

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Abstract

This paper presents a prospective investigation focusing on the moderating role of peer victimization on associations between harsh home environments in the preschool years and academic trajectories during elementary school. The participants were 388 children (198 boys, 190 girls) who we recruited as part of an ongoing multisite longitudinal investigation. Preschool home environment was assessed with structured interviews and questionnaires completed by parents. Peer victimization was assessed with a peer nomination inventory that was administered when the average age of the participants was approximately 8.5 years. Grade point averages (GPA) were obtained from reviews of school records, conducted for seven consecutive years. Indicators of restrictive punitive discipline and exposure to violence were associated with within-subject declines in academic functioning over seven years. However, these effects were exacerbated for those children who had also experienced victimization in the peer group during the intervening years.

As researchers have sought to identify factors that are linked to academic problems during the elementary school years, one important area of inquiry has been the role of early home environment (Aunola & Nurmi, 2004; Davis-Kean, 2005; Jimerson, Egeland, & Teo, 1999; Morrison, 2009). Investigators have focused, in particular, on stressful experiences in the home that are presumed to be predictive of deficient academic functioning at school (e.g., Pettit, Yu, Dodge, & Bates, 2009). An emerging theme from this work is the risk associated with family lives characterized by punitive discipline, parental rejection, violence exposure, and frequent stress. Much remains to be learned, but the available findings are indicative of moderately strong links between exposure to these adverse home environments and later academic difficulties in the classroom (Dubow, Boxer, & Huesman, 2009; Morrison, 2009; Pettit et al., 2009; Shonk & Cicchetti, 2001; Shumow, Vandell, & Posner, 1998).

The existing pattern of effects resonates with evidence that children who come from harsh home environments tend to exhibit behavioral orientations (e.g., aggression, hyperactivity,

impulsiveness) that are incompatible with high achievement. In their influential review, Repetti, Taylor, and Seeman (2002) emphasized the implications of risky home environments for atypical development in critical neurochemical systems as well as resulting deficits in self-regulation. Consistent with Repetti et al.'s conclusions, corporal punishment and parental aggression have been linked to dispositions that are characterized by dysregulated affect, over-reactivity, and impulsivity (Schwartz, Dodge, Pettit, & Bates, 1997; Shields & Cicchetti, 2001). Investigators have also described relations between punitive parenting and aggressogenic social cognitive biases (e.g., Fite, Bates, Holtzworth-Munroe, Dodge, Nay, & Pettit, 2008).

A related issue is that stressful home lives are often embedded in larger contexts that present significant threats to children's academic development. Parents' socioeconomic status seems particularly relevant to this discussion insofar as economic distress is both associated with harsh home environments (Dodge, Pettit, & Bates, 1994) and predictive of academic problems in school (Hill, 2001; Hill et al., 2004). As has been well documented by past investigators, children from disadvantaged homes often lack access to critical educational resources (McLoyd, 1998). Moreover, they often encounter other hardships, such as inadequate nutrition, that can interfere with learning in the classroom (Brooks-Gunn & Duncan, 1997).

Regardless of the specific processes through which problematic home environments are predictive of academic difficulties, we suggest that a main-effect model will not be sufficient to describe the full developmental progression. Backgrounds that include adversities in the home can identify a child who is likely to bring behavioral liabilities to the initial school transition. These deficits, in turn, could have a pernicious impact on a child's capacities to remain resilient when facing disruptions in other domains. Indeed, children from harsh home environments are often characterized by a wide array of deficits related to self-regulation and coping (Shields & Cicchetti, 2001). One result may be greater susceptibility to subsequent stress exposure as children negotiate transitions to new contexts. Insofar as the impact of particular home environments is amplified by later experiences, interactive perspectives on risk may begin to offer explanatory power.

With regard to academic development, challenges encountered in the school itself seem critical to consider given the proximal nature of this element of the microsystem. Although there are a number of aspects of the school setting that warrant consideration, we would expect interactions in the peer group to play a particularly central role in shaping classroom performance. Maladjustment with school peers can foster academic disengagement and a sense of alienation from the classroom environment (Kochenderfer & Ladd, 1996a, 1996b). Problems getting along with peers at school could also prove to be highly noxious for those youths whose coping capacities are already compromised following experiences in a difficult home setting. Through these mechanisms, social problems with peers might moderate, and potentially exacerbate, the academic risks associated with early exposure to harsh home environments.

In the current paper, we focused on victimization in the elementary school peer group as a factor that might intensify existing trajectories toward negative academic outcomes. We hypothesized that preschool home environments characterized by high levels of punitive discipline, parental aggression, stress, violence exposure, and economic disadvantage, would be associated with deficient academic performance during the elementary school years. We further predicted that the association between these indicators of harsh home environments and declines in academic functioning would be particularly pronounced for those children who also experienced frequent mistreatment by peers at school.

We chose to emphasize the role of peer victimization, in particular, as a potential moderator variable given the salience of this aspect of peer group experience for determining academic adjustment. The negative implications of victimization in the school peer group for children's attitudes toward learning have been highlighted in a number of existing studies (Kochenderfer & Ladd, 1996a, 1996b). Likewise, investigators have hypothesized that peer victimization can lead to feelings of loneliness and depression that interfere with concentration and focus in the classroom (Juvonen, Nishina, & Graham, 2000; Nishina, Juvonen, & Witkow, 2005; Schwartz, Gorman, Nakamoto, & Toblin, 2005). Consistent with these conceptualizations, researchers have reported bivariate associations between victimization in the peer group and poor academic achievement (Buhs & Ladd, 2001; Glew, Fan, Katon, Rivara, & Kernic, 2005; Juvonen et al., 2000; Nishina et al., 2005). The relevant effect sizes are generally modest but replicate in both cross-sectional (for a review; see Nakamoto & Schwartz, 2010) and short-term longitudinal studies (Buhs, Ladd, & Herald, 2006; Juvonen et al., 2000; Ladd & Burgess, 2001; Ladd, Kochenderfer, & Coleman, 1997; Schwartz et al., 2005).

A concern with interactions between early harsh home environment and later victimization in the peer group would also be consistent with recent theoretical perspectives on "poly-victimization" (i.e., victimization in multiple domains). Finkelhor and colleagues (Finkelhor, Ormrod, & Turner, 2007; Holt, Finkelhor, & Kaufman, 2007) have emphasized the synergistic effects of exposure to violence and interpersonal victimization in more than one setting. These researchers concluded that a child who is mistreated in multiple contexts is at qualitatively higher risk for psychosocial maladjustment than a child whose negative experiences are limited to a specific domain. A central underlying thesis is that a developmental trajectory that has been altered by insults in any one context will not return to baseline if subsequent experiences overwhelm a child's coping capacities. From this vantage point, the effects of victimization across social contexts are best thought of in multiplicative rather than additive terms. Thus, a child who encounters hostility and violence at home would also be expected to exhibit heightened vulnerability to the impact of victimization in the school setting.

Implicit in the concept of poly-victimization is a focus on the specific risks associated with interpersonal victimization. For purposes of the current paper, an issue that could complicate analyses guided by this conceptualization is that children who are frequent targets of their peers tend to experience an array of social problems at school. Insofar as these correlated social difficulties may also accelerate trajectories toward negative academic outcomes, questions about the unique impact of victimization by peers may be raised. That is, it may be that victimization in the peer group serves as a marker of other social stressors. Accordingly, analyses with the impact of hypothesized confounder constructs taken into account could prove informative.

Based on existing patterns in the literature on peer group victimization, we specified exploratory models examining peer victimization as a moderator of early home environment with aggression and social rejection treated as covariates. Predictive links between early displays of externalizing behavior and later victimization by peers have been described by past researchers (Hanish, Eisenberg, Fabes, Spinrad, Ryan, & Schmidt, 2004; Schwartz et al., 1999). Likewise, targeted youths tend to be highly disliked by their peers (Perry, Kusel, & Perry, 1988), and social rejection is one important mediator through which negative peer group attitudes manifest in peer victimization (Boivin, Hymel, & Bukowski, 1995; Hodges, Malone, & Perry, 1997; Schwartz et al., 1999). These associations are significant for the current study because the subgroup of victimized children that is most likely to experience academic problems includes highly rejected and aggressive children (Schwartz, 2000; Toblin, Schwartz, Gorman, & Abouezzedine, 2005). The overlap between rejection and

victimization also merits recognition because rebuff by peers is a marker of other social skills deficits that detract from academic competence (Wentzel, 1991).

We conducted our analyses using data from the Child Development Project (CDP; Schwartz, Gorman, Dodge et al., 2008). The CDP is an ongoing longitudinal investigation in which children have been followed annually from early childhood through to adulthood. Previous reports based on the CDP have yet to consider the interactive pathways proposed in the current investigation. However, this project has been the basis for analyses focusing on the predictors and outcomes associated with both early home environments and victimization in the peer group (Schwartz et al., 1997, 1998, 1999; Schwartz, Dodge, Pettit, Bates, & The Conduct Disorders Prevention Research Group, 2000). To the best of our knowledge, the CDP is the only existing study to incorporate assessments of preschool home environment, peer group victimization in middle childhood and indices of academic functioning from early childhood to adolescence.

To summarize, we examined the moderating role of victimization in the peer group on associations between harsh home environments in the preschool years and academic trajectories during elementary school. Our expectation was that links between harsh home environments and declines in academic functioning would be most pronounced for children who also experienced frequent mistreatment by peers at school. For exploratory purposes, we also conducted additional models examining aggression and social rejection as potential confounders.

Method

Overview

Two separate cohorts, recruited in consecutive years, are participating in the CDP. We recruited the two cohorts from the same school districts, and they did not differ markedly in composition. Moreover, there were no differences across cohorts in the concurrent correlates, predictors, or outcomes associated with peer group victimization (Schwartz et al., 1997).

The CDP is an ongoing prospective study that began in the summer before the participating children entered kindergarten. We assessed preschool home environment with trained interviewers and structured questionnaires completed by parents. We used a peer nomination inventory to assess social adjustment. Peer victimization items were not included until the first cohort ("C1") was in the fourth grade and the second cohort ("C2") was in the third grade. This assessment strategy partially reflects the historical evolution of the CDP, with the first waves of data collection completed before peer nomination assessments of bully/victim problems were well-validated in North American samples (Perry et al., 1988).

We indexed academic functioning with grade point averages (GPA) that were obtained directly from a review of school records in each year of the project. The current report focuses on seven consecutive years of academic data from kindergarten through sixth grade. This period constituted the primary school years for most of the participants in the CDP.

Participant Recruitment and Retention

We recruited the initial sample just prior to kindergarten enrollment in three geographic regions (Bloomington, IN; Knoxville, TN; Nashville, TN). Research staff approached parents and invited them to participate in a longitudinal study of child development. About 75% of the parents consented. A total of 585 children (304 boys, 281 girls) participated in the study, 308 in C1 and 277 in C2. By the time they reached middle childhood, the original participants had been dispersed into a number of different elementary schools over a wide

geographic area. Resource limitations precluded data collection in all of these schools, but we obtained peer nomination data for a representative subsample (388 children; 198 boys, 190 girls) of the initial participants. This subsample has been the subject of a number of previous reports based on the CDP (Schwartz et al., 1997, 1998, 1999, 2000; Schwartz, Gorman, Dodge et al., 2008), and our past analyses have demonstrated similar patterns of attributes to the full sample.

Approximately 24% of the participating children were from minority racial or ethnic backgrounds (almost all African American), and 26% of the children came from economically disadvantaged families (i.e., families classified in the two lowest socioeconomic status groups, using criteria specified by Hollingshead, 1979). These children attended schools located in a range of different contexts, including urban, suburban, and semi-rural environments.

Nearly half of the children had missing academic data in at least one year of the project. Missing data reflected a number of different issues, including difficulties locating children who had moved from the participating school districts, record keeping problems in the schools, or withdrawal from the study. The n with complete data at each wave of data collection was as follows: 313 at kindergarten, 324 at first grade, 324 at second grade, 322 at third grade, 310 at fourth grade, 293 at fifth grade, and 288 at sixth grade.

Assessment of Family Environment

In the summer before the children began kindergarten, a trained interviewer (almost always of the same ethnic background as the participant) visited each child's home to conduct a 150 min interview with the child's mother. Before beginning, the interviewer informed the mother of the range of questions to be asked and the ethical and legal obligation to report any concern of current physical danger to the child. The interview consisted of a series of open-ended and structured questions regarding the child's developmental history, socialization, and family background. Based on the mother's responses, the interviewer was trained to make a series of five-point summary ratings of a number of aspects of the child's preschool home environment. Separate ratings were made for the period from the child's first birthday until 1 year before the interview, and the 1 year period preceding the interview. The analyses presented in this article are based on mean ratings across the two eras. For reliability estimation, a second person accompanied the home interviewer for 56 families and made independent ratings. The following four socialization variables were derived from the interview.

Harshness of discipline—A rating of maternal use of restrictive or punitive discipline, with points ranging from “nonrestrictive, mostly prosocial” to “severe, strict, often physical.” Independent rater agreement was $r = .80$, $p < .001$, and the correlation between ratings for the two eras was $r = .74$, $p < .001$.

Stress—A rating of the level of day-to-day stress experienced by the child's family in terms of major changes or adjustments (e.g., death of family members, divorce, legal difficulties). Points ranged from “minimal challenge” to “severe, frequent challenges.” Independent rater agreement was $r = .79$, $p < .001$, and the correlation between ratings for the two eras was $r = .48$, $p < .001$.

Exposure to violence—The interviewer rated the child's exposure to violence as a witness within and outside the home in each of the two eras. Points ranged from “none” to “physical violence more than once.” The independent rater correlation was $r = .74$, $p < .001$, and the correlation for the two eras was $r = .49$, $p < .001$.

Following the interview, written questionnaires were administered to the mother, with the goal of obtaining a multi-method assessment of home environment (i.e., parent self-report data as well as ratings from trained interviewers). Included among these questionnaires was the Conflict Tactics Scale (Strauss, 1979). This frequently utilized and well-validated device required the mother to rate the frequency with which family members used a number of behavioral strategies during family conflict or disagreements (Strassberg, Dodge, Pettit, & Bates, 1992). For C1, ratings were made on a six-point scale ranging from “never” to “more than once a month.” For C2, ratings were made on a modified seven-point scale, with points ranging from “never” to “once a day.” Scores were standardized within cohort, to equate the scales. We then derived a *parental aggression toward the child* score from the mother’s report of the degree to which she (or her partner) utilized overtly aggressive strategies during conflicts with the child.

Based on information from the interview, we also calculated Hollingshead’s (1979) Four Factor index to assess family SES background. This index is based on level of education and occupation of both the mother and father (or other male partner). In homes in which the mother was the only caregiver, her data were double weighted (as recommended by Hollingshead).

Assessment of Peer Relationships

A peer nomination inventory was group administered to all consenting children in each participant’s classroom. As noted above, the items that were examined in the current study are based on the version of the inventory that was administered when children from C1 were in the fourth grade and children from C2 were in the third grade. Children were given a roster sheet and asked to identify up to three peers who fit a series of descriptors. The interview included one item that assessed social rejection (“kids who you dislike”), three items that assessed aggression (“kids who start fights,” “kids who are mean,” “kids who get angry easily”; $\alpha = .89$), and three items that assessed peer victimization (i.e., “kids who get picked on,” “kids who get teased,” “kids who get hit or pushed”; $\alpha = .82$). For later analysis, we calculated the total number of nominations received for each of these items standardized within class (as per Coie, Dodge, & Coppotelli, 1982). We then generated summary peer victimization and aggression scales from the mean of the relevant items.

Current trends emphasize the assessment of both relational and overt subtypes of peer victimization (Crick & Grotpeter, 1995), whereas the items in the CDP either emphasize overt victimization or are not specific to either subtype of victimization. Nonetheless, in a recent two-study paper (Schwartz, Gorman, Dodge et al., 2008), we used the CDP peer victimization data to replicate findings from a project that was conducted with separate items for relational and overt victimization (Schwartz & Gorman, 2003; Schwartz et al., 2005; Schwartz, Gorman, Duong, & Nakamoto, 2008). Analyses conducted with the CDP scale yielded findings that were nearly identical to the combined relational and overt victimization items.

Assessment of Academic Functioning

To assess academic functioning, we obtained classroom grades directly from a review of school records. We conducted this review in the summer following each school year, with grades based on the full academic year. We recorded letter grades for core subjects (e.g., reading, science, social studies, math, and language arts). We converted the letter grades to a numerical scale and calculated GPA as the mean across all academic subjects for each year. Ratings ranged from 1 to 13, with 1 indicating a failing grade and 13 indicating the highest possible grade (average across years of the project, $M = 8.9$, $SD = 2.6$). A relatively wide

scale was used in order to take into account variability in grading scales across schools and years of the project.

Curriculum will obviously vary considerably across this developmental period. Kindergarten and first grade typically focus on basic school readiness whereas the later years of elementary school emphasize skills that are necessary for the transition to secondary school. Nonetheless, consistency between the individual grades constituting each GPA score was high, exceeding .80 in each year. GPAs were also stable over time with an alpha coefficient across all seven years of .88. Moreover, kindergarten GPA was significantly correlated with sixth grade GPA, $r = .36$, $p < .005$, and the part-whole correlation for kindergarten GPA was $r = .55$, $p < .005$. It is important to emphasize that there can be meaningful intra-individual variability even when inter-individual stability is high (Wohlwill, 1973).

Results

Overview

We examined our primary hypotheses using multilevel models that included both random and fixed effects (Singer, 2002). Our analyses focused on the home environment indicators as between-subjects factors predicting linear within-subject changes in academic functioning. Peer victimization was conceptualized as a between-subjects moderator variable. Guided by Singer and Willett (2003), we implemented our analyses using PROC MIXED in the SAS statistical package (Littell, Milliken, Stroup, & Wolfinger, 1996).

An unstructured error covariance matrix was specified for each of the models (for a relevant discussion, see Long & Pellegrini, 2003). With this method, all parameters are allowed to vary so that model fit (in terms of deviance statistics) can be optimized. More parsimonious structures may be preferable because fewer unknown parameters are estimated (Singer & Willett, 2003). However, we did not achieve notable gains in model fit when we tested alternative error covariance matrix structures.

We conducted separate analyses with and without aggression and social rejection as covariates. This strategy is not parsimonious in terms of the total number of models conducted, but our goal was to make inferences regarding the full sample as well as facilitate conclusions regarding the independent prediction associated with peer victimization. Analyses conducted without covariates are also necessary to facilitate integration with past research on peer victimization and academic outcomes. To the best of our knowledge, there are no existing prospective studies in which victimization, aggression, and social rejection are viewed as simultaneous predictors of academic adjustment. From a more pragmatic perspective, we wanted to minimize the total number of variables included in our final models given the complexity of multilevel modeling.

PROC MIXED relies on pairwise deletion with the underlying correlation matrices estimated based on all available data. We also conducted exploratory analyses using Full Information Maximum Likelihood Estimation (FIML). With this approach, maximum likelihood functions are estimated for each individual based on the variables for which there are valid data (Schafer & Graham, 2002). FIML results in unbiased parameter estimates when data are missing at random or missing completely at random. Nonetheless, analyses conducted with and without FIML yielded identical results.

Preliminary Analyses

Before proceeding with our inferential analyses, we examined the distribution of all variables with univariate statistics and graphical analysis. The distributions were characterized by a modest degree of positive skew, with skewness and kurtosis statistics in

the 1.0 range. To be conservative, we normalized the variables with log transformations (Tabachnik & Fidell, 2001).

Means and standard deviations for all variables are summarized in Table 1. For descriptive purposes, we also examined gender differences on each of the assessed constructs. Girls had higher GPAs than boys in several years of the study, and boys were more aggressive and more socially rejected than girls. There were no gender differences for victimization or any of the home environment variables. In addition, we specified a series of exploratory growth curve models examining gender by victimization and gender by home environment effects in the prediction of changes in GPA. Because these analyses failed to yield any significant interactions, we did not include gender as a factor in our final models¹.

Table 2 summarizes bivariate associations among the predictor and moderator variables. Generally, there were modest relations between the indicators of harsh home environment and the peer nomination scores.

Bivariate correlations between GPA and the predictor and moderator variables are summarized in Table 3. As shown, the indicators of harsh home environment were negatively correlated with academic outcomes in most years of the project. In addition, peer victimization in the middle years of elementary school was negatively correlated with GPA in each year of the project. Likewise, the peer nomination scores for aggression and social rejection, and indicators of harsh home environment, were also negatively correlated with academic outcomes in most years of the project. These effect sizes were generally small in magnitude (Cohen, 1988), but it is notable that the predictor and moderator variables were negatively associated with academic functioning over seven waves.

Baseline Comparison Models

Multilevel models, as implemented in PROC MIXED, do not yield statistics that allow for absolute assessment of fit. Accordingly, Singer and Willet (2003) suggest a series of comparisons in which the improvements in fit associated with progressively more complex models are considered. The first step in this iterative process is to specify an unconditional means model, which does not include any predictor variables and essentially assumes that the outcome construct does not change over time. An unconditional growth model is then specified, in which time is the only predictor variable, implying change in the outcome construct that is not accounted for by substantive predictors. If the unconditional growth model increments the fit associated with the unconditional means model, it can be assumed that the dependent variable changes over time. Moreover, if the unconditional growth model does not fully account for the prediction of the outcome variable, more complex models that include substantive predictors may be appropriate.

Following Singer and Willet's (2003) recommendations, we began with an unconditional means model and an unconditional growth model. In both models, within-subject changes in GPA served as the outcome construct. The results are summarized in Table 4, using the notation described by Singer and Willet. As shown, the unconditional growth model significantly incremented the fit of the unconditional means model, and there was a significant fixed effect for time. The full pattern of findings indicates that GPA is a construct that does vary over time. Table 4 also summarizes the variance components for each model, which index the residual variance in the outcome construct that is not accounted for by the predictors that are already in the model. As depicted, the Level 1 and Level 2 variance

¹In our exploratory models, we also did not find any significant three-way home environment by peer victimization by gender effects (all t s < 1.00). However, interactions of this complexity are likely to be highly conservative in field designs. According, we caution against strong conclusions.

components for each model were significant. In other words, without substantive predictors in the model, there is unexplained residual variability in both the initial level of GPA and changes in GPA over time. This pattern of effects suggests that more complex models are warranted.

We then specified models with single main-effect predictors of within-subject changes in GPA. Each of these models features one of the home environment variables as the sole predictor of GPA. As shown in Table 5, each of the main-effect models incremented the fit associated with the unconditional means and unconditional growth models. Review of the fixed effects in Table 5 indicates that all of the constructs with the exception of parental aggression were linked to initial levels of GPA as indicated by the main-effects for each of the relevant home environment variables. In addition, restrictive discipline, parental aggression toward the child, and exposure to violence were all significantly related to declines in GPA over time as indicated by the negative home environment by time interactions.²

Peer Victimization as a Moderator of the link between Early Home Environment and Academic Trajectories

Next, we specified a series of models testing the moderating role of peer group victimization. In each of these models, within-subject changes in GPA were predicted from the main effects of home environment and peer victimization as well as the two-way effect for home environment variable by peer victimization. As shown in Table 6, the moderator models incremented the fit associated with the unconditional means, unconditional growth, and main-effect models. Examination of the fixed effects revealed significant home environment by peer victimization by time effects for restrictive discipline, parental aggression toward the child, and exposure to violence. The corresponding effects for stress and SES did not reach significance.

To decompose the significant interactions we examined the slope of the relation between the relevant home variables and within-subject changes in GPA with peer victimization algebraically fixed at low (1 *SD* below the mean), medium (the mean), and high levels (1 *SD* above the mean). The results of these follow-up models provided support for our hypothesis. The association between restrictive discipline and declines in GPA grew in magnitude as the level of peer victimization moved from low ($b = -.0297$, $SE = .0895$, ns), to medium ($b = -.1979$, $SE = .0650$, $p < .005$), to high ($b = -.3661$, $SE = .0941$, $p < .005$). A similar pattern was observed for parental aggression toward the child, with the negative slope increasing in magnitude as the level of peer victimization moved from low ($b = -.1427$, $SE = .1397$, ns), to medium ($b = -.3071$, $SE = .0982$, $p < .005$), to high ($b = -.4715$, $SE = .1145$, $p < .005$). Likewise, for exposure to violence, the negative slope increased in magnitude as victimization moved from low ($b = -.0232$, $SE = .0320$, ns), to medium ($b = -.0777$, $SE = .0239$, $p < .005$), to high ($b = -.1323$, $SE = .0390$, $p < .005$).

Social Rejection and Aggression as Potential Confounder Variables

In our final analyses, we examined evidence that the moderating influence of peer victimization reflects the tendency for highly victimized youths to also be rejected, aggressive, or both. We specified exploratory models testing the significant home

²We also specified models that included cohort as a fixed-effect. Within-subject changes in GPA were predicted from home environment variable, cohort, and the home environment by cohort interaction. There were no significant home environment by cohort effects, either in the prediction of initial levels of GPA or changes in GPA over time. We also specified a similar model examining peer victimization by cohort effects, and again, no significant interactions with cohort emerged.

environment by peer victimization interactions with aggression and then social rejection taken into account.

We began with models in which within-subject changes in GPA were predicted from home environment, peer victimization, and aggression as well as the two-way interactions for home environment by aggression, home environment by victimization, and peer victimization by aggression. These analyses yielded significant home environment by peer victimization by time effects for restrictive discipline ($b = -1.1169$, $SE = 0.4427$, $p < .05$) and exposure to violence ($b = -.4000$, $SE = .1829$, $p < .05$). However, the parental aggression toward the child effect was reduced to nonsignificance ($b = -.7972$, $SE = .6116$, ns). Conversely, we did not find any significant home environment by aggression by time interactions. In other words, peer victimization had a moderating effect that was independent of aggression, but aggression did not emerge as a significant moderator independent of victimization.

We found a similar pattern of effects when we specified models examining social rejection as a potential confounder. We specified a series of multilevel models in which within subject differences in GPA were predicted from home environment, peer victimization, social rejection and the two-way interactions for home environment by social rejection, home environment by victimization, and peer victimization by social rejection. Even with social rejection already in the model, we found home environment by peer victimization by time effects for restrictive discipline ($b = -1.0211$, $SE = .4868$, $p < .05$) and exposure to violence ($b = -.4545$, $SE = .1994$, $p < .05$). The corresponding effect for parental aggression toward the child was reduced to nonsignificance ($b = -.3903$, $SE = .6909$, ns). In addition, the models did not yield any significant home environment by social rejection by time effects.

Discussion

Previous investigators have described links between difficult home environments and children's academic problems (Pettit et al., 2009). Through mechanisms that have yet to be fully identified, children who have been exposed to adversities in the home are at risk for later academic maladjustment (Dubow et al., 2009; Shonk & Cicchetti, 2001; Shumow et al., 1998). Our goal, in the current paper, was to extend the existing research on these associations by identifying moderating factors in the school peer group. In particular, we sought to examine evidence that victimization by peers might act to intensify associations between harsh home environments and deficient academic performance. Insofar as we are aware, this study is the first to demonstrate interactions between home environment and peer group victimization in the prediction of academic trajectories.

Consistent with the existing research, we found that indicators of harsh home environments are associated with deficient academic performance. However, the pattern of effects was influenced by the moderating role of victimization in the school peer group. Home environments characterized by restrictive discipline, corporal punishment and exposure to violence were linked to within-child declines in academic performance, but these associations held only for those children who also emerged as frequent targets of their peers. Conversely, problematic early home environments were not significantly associated with negative academic trajectories for children who were infrequent victims of peer mistreatment. Taken together, the full pattern of findings appears to provide evidence that victimization by peers can intensify the risk associated with difficult experiences in the home.

In our view, these results highlight the need to view the developmental pathways examined in this paper within the framework of a stress-vulnerability model. We suggest that a critical

outcome of the underlying processes identified by harsh home environments could be increased vulnerability to subsequent stressors in other domains. In this case, adverse home environments may have pernicious implications for later academic functioning because children from these contexts have difficulty coping efficiently as new social challenges emerge. Children are not passive actors as they attempt to adjust to peer victimization and related difficulties with classmates during their early school years. Instead, they process their experiences within the framework of their own behavioral assets and liabilities.

The progression that we are hypothesizing here for academic development will require further investigation but does have some precedence in related areas of inquiry. For example, in the literature on conduct disorder, complex etiological models have been proposed that emphasize transactions between the home and peer group (Dodge & Pettit, 2003). Susceptible children are presumed to bring specific patterns of liabilities to the initial transition to the school environment (e.g., irritability, impulsivity, social-cognitive biases). These deficits are both associated with problematic home environments (i.e., punitive parenting) and exacerbated by later difficulties in the peer group. In these models, the putative mechanisms are not conceptualized in terms of single main-effect predictors but are rather viewed as products of interactive processes and transactions across domains of development.

Our findings also correspond with perspectives emerging from Finkelhor and colleagues' research on the implications of "poly-victimization" (Finkelhor et al., 2007; Holt et al., 2007). These researchers have examined the adjustment of children who experience interpersonal victimization in multiple contexts. A central conclusion from this work is that harm associated with victimization across settings accumulates in a multiplicative fashion. From this perspective, victimization is presumed to detract from the psychological resources that a child may have available for coping at later stages of development. Victimization in any one domain will therefore interfere with resilience in other domains. Framed within the context of the models examined in this paper, mistreatment in the home and the peer group can be expected to combine synergistically in the determination of academic trajectories.

The "poly-victimization" construct emphasizes the specific role of interpersonal victimization rather than stress exposure as a more generalized process. As we move toward further elaboration of the pathways toward academic difficulties, we will need to consider the possibility that victimization in the peer group may be a manifestation of a broader set of social difficulties with peers. Integrally related aspects of this phenomenon include social rejection (Perry et al., 1998), friendlessness (Hodges & Perry, 1999), and reduced opportunities for play (Schwartz & Badaly, 2010). Similarly, victimized children tend to be characterized by behavior problems and social skills deficits (Hodges & Perry, 1999). Thus, a viable alternative explanation for our findings may be that harsh home environment interacts with peer victimization because the involved children are exposed to a range of stressful experiences with peers.

Our analyses did provide some initial evidence that it is victimization rather than the associated social difficulties that acts to intensify academic risk. We conducted exploratory models examining home environment by peer victimization interactions with aggression and social rejection entered into our models as covariates. Even with our multilevel models specified in this conservative manner, peer victimization continued to serve as a significant moderator. Further tests, conducted with a wider array of social correlates, could prove informative. In the meantime, our findings are consistent with the poly-victimization concept and might provide some indication that interpersonal victimization has specific action on academic trajectories that differs from that of more generalized forms of social

stress. It is victimization by peers, rather than social rejection or related behavior problems, that appears to intensify the academic risks embedded in family contexts.

A related issue is that experiences in both the home environment and school classroom are likely to be reflective of aspects of the proximal social system, including socioeconomic context. Our models did not reveal interactions between socioeconomic status and peer group victimization. Moreover, although there was a strong negative association between socioeconomic status and initial levels of academic competence (i.e., the intercept of GPA), we did not find any evidence of a relation between disadvantage and declines in GPA over time (i.e., the slope of GPA). Despite these findings, we still contend that the impact of the economic resources on the pathways examined in this paper is worthy of further investigation. Children who live in impoverished neighborhoods face a wide array of unique challenges as they negotiate the academic demands of the school classroom (McLoyd, 1998).

In any case, research identifying predictor-moderator interactions should be seen as an early step in a program of investigation that seeks to illuminate the nature of the relation between home environment and academic difficulties. Our findings provide preliminary support for the hypothesis that victimization in the peer group can exacerbate the impact of exposure to harsh disciplinary practices in the home. Nonetheless, our analyses do not support final conclusions regarding causality. Future investigation is needed to understand more fully how interpersonal victimization in distinct domains might interact to affect cognitive and emotional underpinnings of poor academic performance.

Caveats and Future Directions

The findings of this project help shed light on the long-term academic impact of harsh home environments and victimization by peers during elementary school, but a number of caveats should be kept in mind when considering our results. The most significant limitations of the design relate to the timing of our measures. Because we conceptualized the examined dimensions of harsh home life as markers of deficits that children can bring to their early transition to the school setting, a preschool assessment was arguably optimal for tests of our theory. However, the CDP home interview was a resource intensive procedure so that the project did not include assessments of the examined constructs at multiple time points through the elementary school years. Although we would certainly expect a degree of stability in the structure of the home environment over time, we are not in a position to draw any conclusions.

Likewise, we assessed peer victimization at a single point in time. By middle childhood, individual differences in children's propensity to be targeted by peers are moderately to highly stable (e.g., Schwartz et al., 2005; Hanish & Guerra, 2002; Hodges & Perry, 1999). Accordingly, it is likely that our peer nomination inventory assessed a chronic social experience for many children. Nonetheless, victimization can also be transient (Kochenderfer-Ladd & Ladd, 2001), and analyses of multiple waves of data on victimization could provide greater insight into causal processes.

In the absence of full multi-wave designs, a conservative approach to our findings is required. We are not in a position to draw conclusions regarding changes in home environment or changes in peer group experience. Moreover, because peer victimization was not assessed until the third and fourth grade, we are unable to determine the specific point at which children first began to be victimized. For now, we can only conclude that there are meaningful interactions between aspects of the preschool home environment and eventual emergence as a victim of peer mistreatment in the prediction of academic trajectories.

One reason that single point assessments of home environment and peer group victimization may be insufficient is that interactions across these domains are likely to be reciprocal in nature. In the current study, we focused on the potential for victimization in the peer group to alter the trajectories associated with early home environment. Conversely, previous researchers have conducted analyses demonstrating that family context can influence relations between victimization and adjustment outcomes (Issacs, Hodges, & Salmivalli, 2008).

A more complete understanding of the interaction between home environment and peer victimization will also require assessment of the intervening mechanisms. We have speculated that harsh or punitive family systems may have negative implications for the coping skills that will allow children to withstand peer victimization and related stressors (Hodges & Perry, 1999; Kochenderfer-Ladd & Skinner, 2002; Kochenderfer-Ladd, 2004). Full elaboration of the underlying models will require identification of these mediating mechanisms.

Our peer nomination inventory was also not designed to tap relational subtypes of victimization. Findings from research conducted with the CDP assessment yield results that are consistent with studies conducted using measures that tap relational subtypes of the relevant behaviors (Schwartz et al., 2008). Nevertheless, analyses that focus specifically on relational victimization might make important contributions to our understanding of any gender differences in the implications of victimization (Crick & Grotpeter, 1995).

As research on peer victimization continues to evolve, there will no doubt be further advance in assessments that may reveal limitations in earlier approaches. Investigators in this domain have recently begun to move beyond group-based reputational assessment and toward a focus on dyadic processes and specific relationships (Card & Hodges, 2010; Peets, Hodges, & Salmivalli, 2008). There has also been increased interest in victimization that occur through new electronic modalities (Smith & Slonje, 2010).

With regard to our assessments of academic outcomes, there is need for analyses focusing on a wider group of academic indicator variables. Researchers have considered global indicators of academic adjustment, such as GPA and standardized test performance. However, we are unaware of any bully/victim studies, short-term or long-term, that focus on more extreme academic outcomes such as dropout or suspension. Likewise, investigations that focus on more molecular measures of academic engagement could prove informative. For example, investigators could consider day-to-day change in hours spent on homework, attendance in specific classes, or involvement in after-school activities.

A related concern is that estimates of academic functioning based on GPA can be influenced by a variety of factors. Classroom grades could conceivably be indicative of a number of components of academic competence in the classroom. For example, when making grading decisions, teachers' evaluations might be influenced by issues such as a student's effort level, attitude, and behavioral adjustment in the classroom. Therefore, associations between peer victimization and GPA could partially reflect behavioral adjustment problems among frequently victimized youths. Findings from Nakamoto and Schwartz's (2010) meta-analysis of the link between bullying by peers and academic difficulties underscore this concern. These researchers found that effect sizes tend to be highest when bully/victim researchers focused on GPA as an outcome rather than achievement test scores.

We suspect that teachers' evaluations of children's behavior and overall school readiness may underlie the relatively high stability of GPA from kindergarten through sixth grade. Kindergarten obviously will not involve the same academically challenging tasks as the later years of school. Instead, children's performance at this early stage of their education is

likely to rest on aspects of their orientation toward school that may be resistant to change over time.

To summarize, the goal of this paper was to examine the hypothesis that peer victimization can act as a stressor that interacts with underlying vulnerabilities in the prediction of negative academic trajectories. We found that indicators of harsh home environment were predictive of declines in academic functioning over a seven year period. However, the effects were most pronounced for those children who emerged as targets of peer victimization. Overall, these results add to the growing body of evidence validating interactive perspectives on the risk associated with harsh family environments and victimization in the peer group.

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Table 1

Descriptive Statistics for all Variables

Variable	Full Sample Mean (SD)	Gender Means (SD)	
		Boys	Girls
Kindergarten GPA	9.46 (1.90)	9.28 (1.81)	9.64 (1.90)
1st Grade GPA	9.84 (1.51)	9.70 (1.50)	10.07 (1.52) *
2nd Grade GPA	10.30 (2.22)	9.99 (2.18)	10.62 (2.22) **
3rd Grade GPA	10.18 (2.21)	9.92 (2.12)	10.42 (2.26) *
4th Grade GPA	9.93 (2.31)	9.54 (2.43)	10.31 (2.14) ***
5th Grade GPA	9.36 (2.68)	8.71 (2.71)	9.94 (2.51) ***
6th Grade GPA	8.30 (2.77)	7.60 (2.74)	8.94 (2.65) ***
Peer Victimization	-0.01 (0.98)	0.07 (1.01)	-0.09 (0.94)
Aggression	-0.09 (0.77)	0.18 (.84)	-0.39 (0.66) ***
Social Rejection	-0.09 (0.70)	-0.01 (0.70)	-0.18 (0.69) *
Restrictive Discipline	2.71 (0.87)	2.75 (0.90)	2.66 (0.93)
Parental Aggression	0.00 (0.98)	0.11 (1.08)	-0.11 (0.90)
Exposure to Violence	1.78 (0.98)	1.98 (0.99)	1.76 (0.94)
Stress	3.04 (0.97)	3.06 (1.01)	3.03 (0.93)
Socioeconomic Status	38.59 (14.20)	39.34 (13.85)	37.79 (14.55)

Note. Gender comparisons were conducted with a series of paired t-tests.

* $p < .05$.

** $p < .01$.

*** $p < .005$

Table 2

Bivariate Correlations Peer Relationship and Home Environment Indicators

Variable	1	2	3	4	5	6	7	8
1. Peer Victimization	--	.36***	.54***	.18***	.13*	-.02	.16***	.05
2. Aggression	--	--	.53***	.15**	.21***	.15**	.16***	-.20***
3. Social Rejection	--	--	--	.17***	.09	-.01	.15**	-.17***
4. Restrictive Discipline	--	--	--	--	.24***	.31***	.25***	.34***
5. Parental Aggression	--	--	--	--	--	.12*	.12*	-.10
6. Exposure to Violence	--	--	--	--	--	--	.23***	-.41***
7. Stress	--	--	--	--	--	--	--	-.22***
8. Socioeconomic Status	--	--	--	--	--	--	--	--

*
 $p < .05$.**
 $p < .01$.***
 $p < .005$

Table 3

Bivariate Correlations between GPA and the Indicators of Preschool Home Environment, Peer Victimization, Aggression, and Social Rejection

Variable	Grade					
	K	1	2	3	4	5
1. Peer Victimization	-.11	-.16***	-.16***	-.24***	-.20***	-.16**
2. Aggression	-.24***	-.28***	-.29***	-.33***	-.31***	-.34***
3. Social Rejection	-.17***	-.23***	-.24***	-.25***	-.19***	-.25**
4. Restrictive Discipline	-.23***	-.19**	-.29***	-.36***	-.31***	-.29***
5. Parental Aggression	.04	-.06	-.01	-.12*	-.10	-.17**
6. Exposure to Violence	-.27***	-.20***	-.27***	-.36***	-.33***	-.34***
7. Stress	-.13*	-.12*	-.19*	-.21***	-.24***	-.21***
8. Socioeconomic Status	-.49***	-.36***	-.46***	-.50***	-.45***	-.42***

* $p < .05$.

**

$p < .01$.

$p < .005$

Table 4

Summary of Baseline Multilevel Models predicting Changes in GPA

	Model	
	Unconditional Means	Unconditional Growth
Fixed effects		
Time	-----	0.1660 (0.0234) ***
Variance components		
Level 1		
Within-person	1.8835 (0.2451) ***	1.8069 (0.2350) ***
Level 2		
In initial status	-0.03513 (0.0507) ***	-0.0134 (0.0441) ***
In rate of change	0.1152 (0.0169) ***	-0.0840 (0.0147) ***
Goodness of fit		
Deviance	9027.7	8981.3
AIC	9037.7	8993.4
BIC	9057.5	9017.1
Model Comparison		
Δ Unconditional means ^a	-----	45.4 ***

Note

^aImprovement in fit of the specified model versus the unconditional means model, as indicated by the difference in deviance scores.

*
 $p < .05$.

**
 $p < .01$.

 $p < .005$.

Table 5
Summary of Main-Effect Analyses predicting Changes in GPA from Preschool Home Environment

	Home Environment Predictor			
	Restrictive Discipline	Exposure to Violence	Parental Aggression	Stress
Fixed effects				SES
Main-Effects				
Time	−0.1637 (0.0231) ***	−0.1696 (0.0233) ***	−0.1142 (0.0266) ***	−0.1632 (0.0233) ***
Home Environment	−1.1179 (0.2597) ***	−0.4547 (0.0925) ***	0.0902 (0.4077)	−0.2681 (0.0971) ***
Interactions				
HE X Time ^a	−0.1974 (0.0649) ***	−0.0673 (0.0237) ***	−0.3564 (0.0118) ***	−0.0429 (0.0242)
Variance components				
Level 1				
Within-person	1.6380 (0.2232) ***	1.509 (0.2158) ***	1.838 (0.247) ***	1.7385 (0.2305) ***
Level 2				
In initial status	−0.0155 (0.0431)	−0.0062 (0.0428)	0.0120 (0.0439)	0.0005 (0.0438)
In rate of change	0.0786 (0.0142) ***	0.0778 (0.0143) ***	0.0753 (0.0140) ***	0.0822 (0.0145) ***
Goodness of fit				
Deviance	8874.6	8637.1	8719.5	8902.8
AIC	8890.6	8653.1	8735.5	8918.2
BIC	8922.0	8684.5	8766.9	8950.5
Model Comparison				
Δ Unconditional means ^b	153.1 ***	390.6 ***	308.2 ***	124.9 ***
Δ Unconditional growth ^c	106.7 ***	344.2 ***	261.8 ***	78.5 ***

Note

^aHE X Time is the interaction of home environment variable and time, which is indicative of the relation between the home environment and changes in GPA over time.

^bImprovement in fit of the specified model versus the unconditional means model, as indicated by the difference in deviance scores.

^cImprovement in fit of the specified model versus the unconditional growth model.

*
p < .05.

**
p < .01.

$p < .005$

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Table 6
Summary of Home Environment by Peer Victimization Interactions in the Prediction of Changes in GPA

	Home Environment Predictor			
	Restrictive Discipline	Exposure to Violence	Parental Aggression	Stress
Fixed effects				SES
Main-Effects				
Time	−0.1537 (0.0231) ***	−0.1706 (0.0231) ***	−0.1280 (0.0251) ***	−0.1614 (0.0267) ***
Home Environment	−0.9625 (0.2582) ***	−0.4041 (0.0921) ***	0.0646 (0.1771)	−0.2221 (0.0995) *
Peer Victimization	−1.8725 (0.6306) ***	−1.9727 (0.5973) ***	−2.5568 (0.7219) ***	−1.535 (0.6552) ***
Interactions				
HE X PV ^a	6.0230 (1.7159) ***	1.9835 (0.6884) ***	1.9305 (1.0517)	0.0681 (0.7261)
PV X Time ^b	−0.0065 (0.1597)	−0.0220 (0.1561)	−0.0701 (0.1752)	−0.1702 (0.1640)
HE X Time ^c	−0.1979 (0.0650) ***	−0.0773 (0.0239) ***	−0.1319 (0.0424) ***	−0.0403 (0.0248)
PV X HE X Time ^d	−1.367 (0.4381) **	−0.3687 (0.1792) *	−0.5203 (0.2542) *	−0.0964 (0.1838)
Variance components				
Level 1				
Within-person	1.5073 (0.2127) ***	1.3738 (0.2047) ***	1.7102 (0.2307) ***	1.6908 (0.2266) ***
Level 2				
In initial status	−0.0000 (0.0415)	−0.0044 (0.0413)	−0.01487 (0.0428)	−0.0052 (0.0435)
In rate of change	0.0737 (0.0138) ***	0.0742 (0.0140) ***	0.07154 (0.0138) ***	0.0811 (0.0144) ***
Goodness of fit				
Deviance	8851.7	8608.4	8696.7	8891.4
AIC	8875.7	8632.4	8720.7	8915.4
BIC	8923.1	8679.5	8767.7	8962.8
Model Comparison				
Δ Unconditional Means ^e	176.0 ***	419.3 ***	331.0 ***	136.3 ***
Δ Unconditional Growth ^f	66.3 ***	372.9 ***	284.6 ***	90.0 ***
Δ Main-effect ^g	22.2 ***	28.7 ***	22.8 ***	11.4 *

Note

- ^aThe interaction between the home environment variable and peer victimization in the prediction of initial levels of GPA.

^bThe interaction between peer victimization and time, which can be interpreted as the relation between peer victimization and changes in GPA.

^cThe interaction between home environment variable and time.

^dThe interaction of peer victimization and home environment in the prediction of changes in GPA over time.

^eImprovement in model fit, as indicated by differences in deviance scores, from the unconditional means model to the specified model.

^fImprovement in model fit from the unconditional growth model to the specified model.

^gImprovement in model fit from the main-effect model, which includes only the home environment variable as a predictor of changes in GPA over time, to the specified model.

^{*} $p < .05$.

^{**} $p < .01$.

^{***} $p < .005$.