

in internalizing problems, as well as significant associations between internalizing problems and subsequent increases in peer victimization. These reciprocal influences suggest a vicious cycle that contributes to the high stability of peer victimization.

Although researchers have primarily examined relationships between victimization and internalizing problems, victimization in the peer group may also lead to increases in externalizing problems such as aggression, truancy, and delinquency. For instance, children who are often the target of peer victimization are at risk to develop hostile social-cognitive biases [e.g., Dodge et al., 1990], which may drive aggressive behaviors [Dodge and Schwartz, 1999]. Victims of peer torment may also use aggression to defend themselves against their bullies. Moreover, recurrent peer victimization is a common childhood stressor that has been shown to be associated with a variety of behavioral problems [Compas et al., 1989].

Although victimization may lead to increases in externalizing problems, theorists have asserted that externalizing problems can also serve as antecedents of victimization [e.g., Hodges et al., 1999]. Proponents of this latter view assert that children who often exhibit behaviors such as disruptiveness, aggression, and argumentativeness irritate and provoke other children, which may invite bullying. Victimized children that display a hostile-aggressive style of social interaction are sometimes coined “provocative victims” [Hodges et al., 1999].

During the past decade, several longitudinal studies have examined linkages between indices of externalizing problems and peer victimization, with time frames ranging from 6 months–2 years [e.g., Dhami et al., 2005; Hanish and Guerra, 2000; Kochenderfer-Ladd, 2003; Ladd and Burgess, 2001; Schwartz et al., 1998]. Some studies have found that peer victimization predicts significant increases in externalizing problems over time. For instance, Schwartz et al. [1998] followed up third- and fourth-grade children for 2 years and showed that peer victimization was a significant predictor of increases in externalizing problems. However, other studies have failed to chronicle such linkages [e.g., Ladd and Burgess, 2001]. With regard to the reverse pathway, some studies have demonstrated that externalizing problems predict significant increases in peer victimization [e.g., Hanish and Guerra, 2000], but others have observed no such association. For example, Dhami et al. [2005] found no support for a linkage between externalizing problems and subsequent increases in peer victimization.

This study sought to provide a quantitative review of studies examining the prospective linkages

between peer victimization and externalizing problems (e.g., aggression, delinquency). Only prospective studies that followed the same group of children over two or more points in time were included. A quantitative analysis examining the mean effect sizes associated with both directions of influence allows for the strongest inferences with regard to the temporal sequence of possible changes in peer victimization and possible changes in psychological maladjustment. Hence, two prospective paths were examined: (a) peer victimization at Time 1 predicting residualized changes in externalizing problems from Time 1 to Time 2 (i.e., differences in Time 2 externalizing problems after controlling for Time 1 externalizing problems) and (b) externalizing problems at Time 1 predicting residualized changes in peer victimization from Time 1 to Time 2 (i.e., differences in Time 2 peer victimization after controlling for Time 1 peer victimization).

Our secondary aim was to examine factors that may moderate the prospective relations between peer victimization and externalizing problems. In view of the many significant developmental events that occur between early childhood and adolescence, we examine whether linkages between victimization and externalizing problems are moderated by age. In addition, we examine the potential moderating role of several study design characteristics, including sample size, gender composition, information source for victimization and maladjustment, time interval between baseline and follow-up assessment, and years since publication.

METHOD

Study Selection

Multiple sources were used to identify potentially eligible studies. First, a large set of studies was retrieved by searches in PsycLIT, PsycInfo, Web of Science, PubMed, and Dissertation Abstracts International. No specific year was indicated, and the following keywords were used in varying combinations: peer victimization, peer harassment, peer aggression, bullying, children, youth, adolescence, and names of authors in the field. Second, the references in the retrieved studies were examined for other potentially eligible studies. We also used the “cited by” research tool. Third, researchers in the field were contacted to obtain other relevant studies.

Next, a selection was made from the retrieved articles. To be included, studies had to control for the initial value of the outcome under study (i.e., peer victimization or externalizing problems).

Moreover, only prospective studies presenting data on both peer victimization and one or more measures tapping symptoms of externalizing problems were included. Noteworthy, no unpublished studies were found that met these criteria. The decision to employ the broad-band dimension of externalizing problems, as opposed to more narrow-band clusters such as aggression and delinquency, was based on the relatively large number of studies that only reported findings at this level of aggregation. Peer victimization could include both direct and indirect manifestations. Studies focusing exclusively on the linkage between peer victimization and variables not directly tapping externalizing problems (e.g., academic performance, interpersonal difficulties such as peer rejection or a lack of friends) were excluded. The reason for this exclusion was that relatively few ($n=4$) studies were retrieved that prospectively examined these linkages. According to Rosenthal [1995], meta-analytic results lack stability when they are based on a limited number of studies.

The final sample of the current meta-analysis included 14 published studies that met the criteria for inclusion. Of these, ten examined the prospective effects of victimization on residualized changes in externalizing problems over time; eight studies examined externalizing problems predicting residualized changes in victimization over time. The Appendix presents the measures that were used to assess externalizing problems. Table I presents a list of the included studies and their characteristics.

Coding of Study Characteristics

All eligible studies were coded using a detailed coding scheme. Measures indexing externalizing problems included aggression, delinquency, attention problems, antisocial behaviors, behavioral misconduct, or combinations thereof. With regard to sample characteristics, we recorded gender composition (as indexed by percentage males) and the mean age of participants at baseline. As can be seen in Table I, the variability in range with regard to gender composition was very limited (percentage males ranged from 46 to 54%). Hence, the potential moderating effects of gender composition could not be tested adequately with the present set of studies.

Age was converted to a three-level classification that included early childhood (age 0–6 years), middle childhood (age 7–12 years), and adolescence (older than 12 years). Most of the studies examined children in early or middle childhood, with only one exemplar of the adolescent age group (Table I).

TABLE I. Summary of Studies Examining Externalizing Problems and Peer Victimization

Study	Sample size	% Male	Age	Externalizing problems assessed	Interval between Time 1 and Time 2 (Months)	Peer victimization informant	Peer victimization measure	Shared method variance	SEM	Effect size victimization to externalizing	Effect size externalizing to victimization
Dhami et al. [2005]	423	51	6.3	Behavior problems	6	Self-Report	Continuous	No	No	N/A	-.01
Hanish and Guerra [2000]	1,068	N/R	7.3	Aggression	24	Peers	Continuous	No	No	N/A	.24***
Hanish and Guerra [2002]	1,469	50	7.3	Aggression delinquency	24	Peers	Continuous	No	No	.21***	N/A
Hanish et al. [2004]	126	54	4.4	Attention problems anger	6	Teacher	Continuous	No	No	N/A	.25*
Hodges and Perry [1999]	173	50	11.3	Externalizing	12	Peers	Continuous	Yes	No	.05	.12*
Hodges et al. [1999]	393	48	10.7	Externalizing	12	Peers	Continuous	No	No	.19***	N/A
Khatri et al. [2000]	471	46	11.5	Aggression delinquency	12	Peers	Continuous	No	No	.10*	N/A
Kim et al. [2006]	1,666	50	13.5	Aggression externalizing	10	Peers	Categorical	No	Yes	.26***	.31
Kochenderfer-Ladd [2003]	379	50	5.9	Aggression antisocial	12	Self-Report	Continuous	No	No	N/A	.12*
Ladd and Burgess [2001]	396	50	5.3	Behavior misconduct	20	Self-Report	Continuous	No	No	.06	N/A
Lamarque et al. [2007]	479	50	6.0	Proactive aggression	12	Peers	Continuous	No	No	.14**	N/A
Rusby et al. [2005]	182	55	10.9	Reactive aggression deviant peers antisocial	18	Self-Report	Categorical	Yes	No	.20**	N/A
Schwartz et al. [1998]	330	52	9.0	Externalizing attention problems	24	Peers	Continuous	No	No	.09*	N/A
Snyder et al. [2003]	266	51	5.5	Antisocial	18	Observer	Continuous	No	Yes	.04	.06

* $P < .05$; ** $P < .01$; *** $P < .001$.

Several design and measurement characteristics were also coded. These included: (a) period of time between baseline (Time 1) and follow-up assessment (Time 2); (b) information source of peer victimization assessment (i.e., participants themselves, peers, teacher, or observer); (c) whether victimization was indexed continuously or categorically; and (d) whether or not the same informants were used to provide information on both victimization and externalizing problems.

Studies were also classified as to whether or not they used structural equation modeling (SEM). One widely acknowledged advantage of SEM techniques relative to more conventional techniques is the reduction of measurement error. In most of the included studies hierarchical multiple regression analyses were used, with standardized beta's expressing the strength of the relationship between peer victimization and one or more indices of externalizing problems. For studies comparing different groups (e.g., victims vs. no-victims), the reported statistics were either odds ratios or incident cases. Finally, we coded the number of years since publication.

All studies were coded by the first author. Seven randomly selected studies were also coded by the second author. Cohen's κ was computed for the categorical variables included in the meta-analysis. Results revealed good between rater agreement; all κ s exceeded .85.

Data Analysis

Consistent with Hawker and Boulton [2000] and Reijntjes et al. [2010], Pearson's r was used as the effect size metric. Several studies provided direct estimates of r [e.g., partial correlations in Hanish and Guerra, 2002]. Standardized beta coefficients were converted to r 's using the procedures outlined by Peterson and Brown [2005]. The outcomes of studies reporting odds ratios or incident cases were transformed to r 's using the comprehensive meta-analysis (CMA) program—version 2.2—developed by Borenstein et al. [2000].

Mean effect sizes for the total sample were calculated using CMA for those studies reporting separate effect sizes for different informants [e.g., mothers and teachers in Schwartz et al., 1998] or for different measures tapping the same underlying construct [e.g., aggression and delinquency both assessing externalizing problems in Khatri et al., 2000]. In one study [Snyder et al., 2003], separate effect sizes reported for boys and girls were pooled. Because the magnitude of these effects were

very similar (β s .02 and .01, respectively), no potentially relevant gender differences were obscured by pooling.

Effect sizes were analyzed using the random effects model, in which the error term is composed of variation originating from both within-study variability and between-study differences [Cooper and Hedges, 1994]. In contrast to the fixed effects model, which assumes a common underlying effect, the random effects model estimates the average effect size assuming that the studies originate from populations with varying effect sizes [Cooper and Hedges, 1994]. Consequently, the random effects model allows for greater generalizability than the fixed effects model. Specifically, in the random effects model the generalization extends beyond the specific studies to other studies considered to be part of the same population [Rosenthal, 1995].

Two separate effect sizes were computed; i.e., externalizing problems as antecedents of residualized changes in peer victimization, and residualized changes in externalizing problems as consequences of peer victimization. For each effect-size estimate we calculated statistical significance (P) and the 95% confidence interval (CI). Moreover, the minimum number of studies with null results that are needed to reduce significant meta-analytic results to non-significance [Durlak and Lipsey, 1991] was assessed. Meta-analytic findings are considered to be robust if this fail-safe number (FSN) exceeds the critical value recommended by Rosenthal [1991]: five times the number of studies, plus 10. This “file drawer problem” refers to the well-supported suspicion that the studies retrievable in a meta-analysis cannot be assumed to be a random sample of all studies actually carried out, because published studies are more likely to have found significant results than studies put away in the file drawers [Rosenthal, 1991].

The distribution of effect sizes was examined using tests of heterogeneity. Significant heterogeneity indicates that differences across effect sizes are likely due to sources other than sampling error, such as different study characteristics. Moderator analyses were then conducted to examine the variability in effect sizes across studies. Categorical moderator tests are analogous to analysis of variance and yield two homogeneity estimates, a within groups Q (Q_w) and a between groups Q (Q_b). A significant value for Q_w indicates that the effect sizes within a category of the moderator variable are heterogeneous, whereas a significant value for Q_b indicates that the effects sizes are significantly different across different categories of the moderator variable [Lipsey and

Wilson, 2000]. Regression analyses were performed within CMA in instances where the putative moderator variable was continuous.

RESULTS

Peer Victimization Predicting Residualized Changes in Externalizing Problems

The ten studies examining this prospective linkage reported data on 5,825 participants. A list of all studies, including their main characteristics, is presented in Table I. The distribution of effect sizes is presented in Figure 1. As can be seen, r 's ranged from .04 to .26.

Peer victimization significantly predicted increases in externalizing problems over time [$r = .14$ (95% CI $.09 < r < .19$), $Z = 5.64$, $P < .001$]. The FSN of null results needed to overturn this significant result

was 195, which far exceeds the criterion recommended by Rosenthal [1991]; i.e., five times the number of studies in the analysis plus 10; $FSN > 5k + 10$. The results can thus be considered robust against the file drawer effect. The test of homogeneity of variance revealed significant heterogeneity across samples: $Q_{within}(9) = 20.52$, $P < .02$. However, presumably due to the limited number of studies, no significant moderators emerged.

Externalizing Problems Predicting Residualized Changes in Peer Victimization

The eight studies examining this relationship included data on 4,494 participants (Table I). As can be seen in Figure 2, r 's ranged from $-.01$ to $.31$. Externalizing problems at Time 1 significantly predicted increases in peer victimization over time [$r = .13$ (95% CI $.04 < r < .21$), $Z = 3.07$, $P < .01$]. The FSN was 80, suggesting no file drawer effect. The test

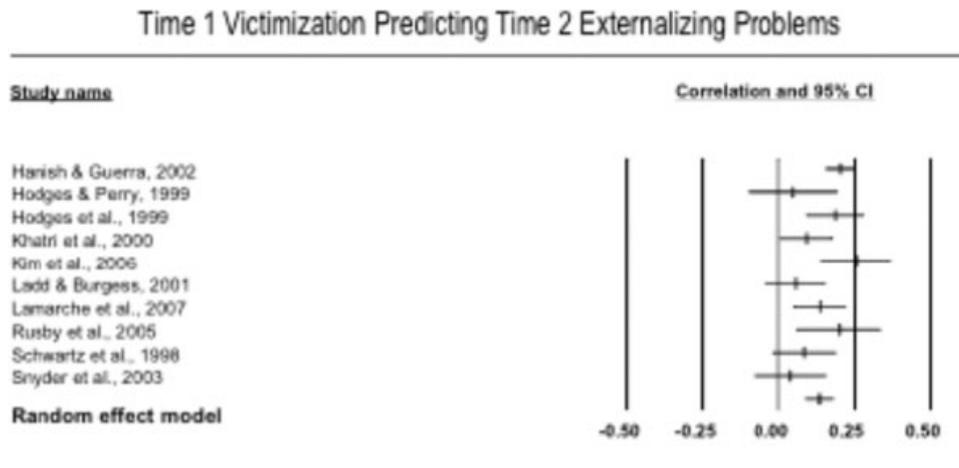


Fig. 1. Effect sizes for studies examining peer victimization at Time 1 predicting externalizing problems at Time 2.

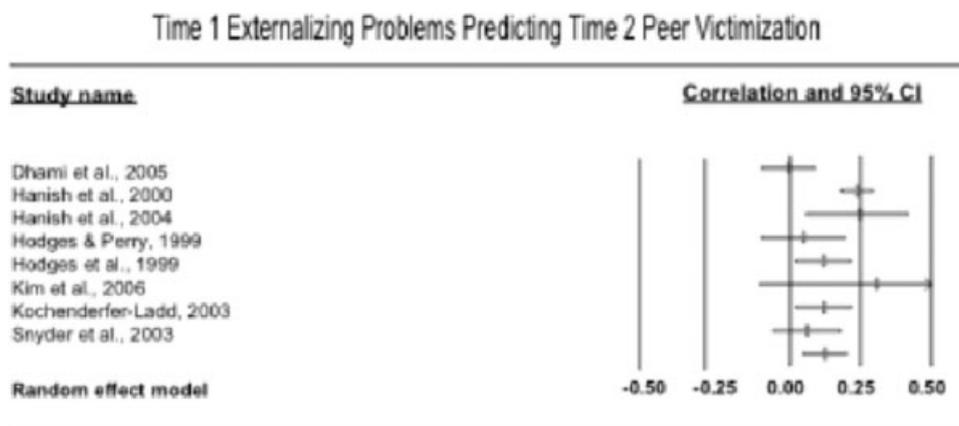


Fig. 2. Effect sizes for studies examining externalizing problems at Time 1 predicting peer victimization at Time 2.

of homogeneity of variance revealed significant heterogeneity across samples: $Q_{\text{within}}(7) = 25.89$, $P < .001$, but no significant moderators emerged.

Peer Victimization and Externalizing Problems: Causes, Consequences, or Both?

To address this question we compared the magnitude of the effect sizes for the two directional paths, namely peer victimization at Time 1 predicting residualized changes in externalizing problems and externalizing problems at Time 1 predicting residualized changes in peer victimization. The predictive effects of peer victimization on residualized changes in externalizing problems and the reverse model were equal in magnitude, as evidenced by overlapping 95% CIs. Taken together, the findings suggest a symmetrical bi-directional relationship between peer victimization and externalizing problems.

DISCUSSION

The present meta-analysis examined the extent to which peer victimization at baseline predicts future residualized changes in externalizing problems, as well as the extent to which externalizing problems at baseline predict future residualized changes in peer victimization. Moreover, moderator analyses were performed to identify variables that may affect the direction and/or strength of these linkages.

Mean effect sizes showed that after controlling for externalizing problems at baseline, peer victimization at Time 1 was significantly associated with higher levels of externalizing problems at follow-up. Fail safe number analyses revealed that the significant path from peer victimization to subsequent changes in externalizing problems is unlikely due to a publication bias. Similarly, the reverse path of externalizing problems leading to subsequent residualized changes in peer victimization was also significant and robust against publication bias. It thus appears that externalizing problems are not only a consequence of peer victimization, but also maintain and solidify children's standing as a victim of peer torment. The findings suggest the existence of an escalating cycle of peer victimization, in which children who display externalizing problems behave in ways that appear to further elicit attacks against them. The experience of peer victimization, in turn, leads to increases in these behaviors (e.g., use of aggression to defend oneself against peer torment). These effects are likely to cumulate over time in a compounding fashion. In other domains, such

psychological processes have been dubbed "cumulative and interactive continuity" [Caspi et al., 1987], "risk amplification" [Whitbeck et al., 1999], and "downward spiral" [Mullings et al., 2001].

Taken together, our findings are at odds with the prevailing view that externalizing problems are only important for a subgroup of victims (i.e., "aggressive victims"), whereas internalizing problems in particular play a central role in the emergence and sequelae of peer victimization. In fact, although several researchers [e.g., Olweus, 1978; Perry et al., 1988] have asserted that apart from a small subset of "aggressive victims," peer victimization and externalizing problems/aggression are orthogonal dimensions of peer group difficulties, the present findings suggest that the reciprocal linkages between peer victimization and externalizing problems are more important than often assumed [Lamarche et al., 2007; Schwartz et al., 1998].

Based on the conventions suggested by Cohen [1988], the observed effect sizes are small to moderate. The modest magnitude of effects is not surprising given that psychological maladjustment is likely governed by a host of other variables, including biological, genetic, and environmental factors [Ahadi and Diener, 1989]. Importantly, the effect sizes obtained in the present research are similar in magnitude to the effects reported in the cross-sectional and longitudinal meta-analyses examining the linkages between peer victimization and internalizing problems [i.e., Hawker and Boulton, 2000; Reijntjes et al., 2010].

Although significant variability in effect sizes was observed across studies, we were unable to detect significant moderators. It seems likely that the power to detect moderator effects was limited by the small number of studies. We can speculate as to what factors may explain the heterogeneity in effect sizes. First, the different informants that were used to provide information on peer victimization as well as externalizing problems may have contributed to the heterogeneity in effect sizes. For instance, teacher and peer evaluations of a child's externalizing behavior may differ from her own evaluations. Moreover, children may over- or under-perceive the extent to which they are victimized by peers. Second, across studies different self- and other-report measures were used to assess peer victimization. Third, differences in indices of externalizing problems across studies (e.g., aggression vs. delinquency) may have also contributed to the observed heterogeneity in effect sizes.

Several limitations of the present meta-analysis deserve comment. First, we focused on predictive

relations between peer victimization and a general grouping of externalizing problems. Hence, our findings do not directly speak to the relationship between peer victimization and more narrow-band problems (e.g., aggression, delinquency). Second, we note that longitudinal studies do not permit causal inferences as to whether victimization leads to externalizing problems or vice versa. Although longitudinal studies clarify whether victimization tends to precede the onset and/or changes in externalizing problems, they do not allow for strong conclusions regarding causal relationships. There may be other variables that lead to both victimization and psychological problems (e.g., adverse parenting practices).

Notwithstanding these limitations, our findings add to the research examining linkages between peer victimization and internalizing problems by showing that externalizing problems also function as both antecedents and consequences of peer victimization. Although our findings do not constitute definite proof of cause effect-relations, they do suggest that both internalizing and externalizing problems play an important role in a vicious cycle contributing to the high stability of peer victimization.

APPENDIX: LIST OF MEASURES USED FOR ASSESSING EXTERNALIZING PROBLEMS

CBCL-Parent = Children Behavior Check List, Parent Report Form; CBCL-TRF and adapted version of the CBCL-TRF = Children Behavior Check List, Teacher Report Form; CBS = Children Behavior Scale; CBQ = Children's Behavioral Questionnaire; ESBS = Early School Behavior Rating Scale; K-YSR = Korean Youth Self Report; adapted version of the PNI = Peer Nomination Inventory; author constructed scale for antisocial behavior and association with deviant peers; reactive-proactive aggression measure.

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