EDUCATION AND TREATMENT OF CHILDREN Vol. 22, No. 3, AUGUST 1999

A Structural Analysis of School Violence and Disruption: Implications for Creating Safer Schools

Matthew J. Mayer
Peter E. Leone
University of Maryland

Abstract

This research examines a model of school violence and disruption using structural equation modeling. Data are analyzed from the 1995 School Crime Supplement to the National Crime Victimization Survey which includes 9,954 completed interviews of students age 12 to 19 in schools across the United States. Students were asked questions about school rules and procedures, knowledge of and personal experience with violence against students and teachers, accessibility of drugs, gang presence, other violence or disruption in the school, as well as individual fear relating to being victimized and self-protective actions they had taken. The analysis used a subset of 6947 subjects, age, 12 to 19, all of whom attended public schools for at least five of the last six months prior to the survey. A construct of "System of Law" included a composite (derived) measured variable for student knowledge of school rules and consequences for infractions along with another composite measured variable demonstrating implementation of rules. The "System of Law" construct was shown to lead to less disorder. On the other hand, a construct of "Secure Building," that included composite measured variables showing physical (metal detectors, locked doors, etc.) and personnel-based (security guards, etc.) actions to run a secure building, led to more disorder. Implications for school policy and future research are discussed.

• • *

School violence and disruption is a major concern of parents, students, educators, political leaders and others in the community. The public's understanding of school violence and disruption is a function of fact and perception. Furlong and Morrison (1994) report that data gathering methods to assess school violence vary considerably and that perceived violence is consistently reported at higher levels than self-reports of violent incidents. Methodologically, studies on school violence usually take a [confirmatory] hypothesis verification approach. That is, school violence is assumed to exist and survey questions elicit responses that confirm its existence.

A Congressional Research Service report (1994) identified the following problems in data collection efforts regarding school violence:

Address: Matthew J. Mayer, Department of Special Education, University of Maryand, 1308 Benjamin Building, College Park, MD 20742.

Pages 333-3S6

> "(a) National statistics have not been compiled in a consistent manner; (b) there are differences in the definition and wording of the indicators; (c) survey data are collected from a representative sample of youth rather than reports of actual incidents; (d) few states or local education authorities collect or publicize school violence statistics; (e) the time periods covered by available data differ, often requiring extrapolation to create a consistent frame of reference; and (f) there is a tendency to underreport incidents of crime or violence."

In spite of problems with data collection and analysis, serious acts of violence and disruption occur in schools nationally and in Maryland. Several recent reports support this finding (Bastian & Taylor, 1991; Centers for Disease Control, 1995; Chandler, K.A., Chapman, CD., Rand, M.R., & Taylor, B.M., 1998; GAO, 1995; Gottfredson 1995; Kauffman, Chen, Choy, Chandler, Chapman, Rand, & Ringer, 1998; Maryland State Department of Education, 1997; Metropolitan Life Insurance Company, 1993; National School Boards Association, 1993; U.S. Department of Education, 1998).

Theoretical Links to Prevention and Intervention Planning

Research on aggression and violence uses a variety of different frameworks including individual-centered processes, a public health risk factor approach, environmental contextual schemas, and cognitive-ecological interactions. Tolan, Guerra, and Kendall (1995) argue that a developmental-ecological approach is a useful framework for understanding aggression and violence and say the field is moving from general risk factors to person-environment views of risk in terms of understanding risk as a function of a person's "developmental trajectory." Tolan and Guerra (1994) present a biopsychosocial ecological framework of four nested levels: individual factors, close interpersonal relations, proximal social contexts, and societal macrosystems. A common thread among many approaches is that of the individual-environment interaction. With regard to school violence, *the organization of the school environment plays a critical role as either a facilitator or inhibitor of violence and disruption.*

The organization of the class and school as settings seems to have an impact on incidents of disruption of violence. Conroy and Fox (1994) suggest that setting events should be part of every classroom and school behavior management plan. Specific setting modifications can involve changing the physical layout, making schedule or curriculum changes, or even social interaction modifications. Shores, Gunter, Denny, and Jack (1993) found that more movement around a class lessened disruptive behavior, but few teachers studied had an actual classroom movement plan as part of any organization strategy.

Classroom teacher style and organizational methods can have tremen-

dous impact on high risk students' aggressive responses. Classroom rules should be introduced in the beginning of the year (OERI, 1993), followed consistently, and include a structured program of classroom monitoring. Kadel and Follman (1993) stress the importance of a positive school climate where students, staff, parents, and others feel safe and welcome.

Several researchers have presented concerns about schools being too rigid, stating that excessive structure and control in schools is counterproductive and undesirable. Noguera (1995) sees the existing philosophical framework of schools as a carryover of a turn-of-the century institutional-type thinking of the asylum which focused on control of clients. Likewise, others suggest that many schools have become agents of control often using coercive measures (Colvin, Kameenui, & Sugai, 1993; Noguera, 1995). These coercive measures interfere with learning and result in an atmosphere of mistrust and resentment. A humanization of the school environment with promotion of a sense of community and collective responsibility is called for.

While responding to the individual learning needs of at-risk students and a greater effort towards humanizing schools has been recommended by many, a school discipline code which is clearly communicated as well as consistently and fairly enforced is equally important (Kadel & Follman, 1993; NASSP, 1995; State of Maryland, 1994; New York State Education Dept., 1994; Stephens, 1995). The importance of school-based physical security and a thorough safety assessment procedure prior to implementing prevention/ intervention plans have also been addressed (Kadel & Follman, 1993; NASSP, 1995; Stephens, 1995). Many reports have stressed the importance of well-defined behavioral management policies; good physical security; consistent, firm, yet fair discipline policies; and full staff involvement in schoolwide safety and security procedures (Kadel & Follman, 1993; NASSP, 1995; State of Maryland, 1994; New York State Education Dept., 1994; Stephens, 1995).

The different schools of thought on responses to school violence and disruption discussed above suggest the existence of some type of tradeoffs between offering a more relaxed, friendly, and humanized school setting on the one hand, versus a more tightly regulated, well-structured and controlled atmosphere on the other. Common sense as well as the research literature suggests that some balance between the two is in order (Kadel & Follman, 1993; Stephens, 1994). In response to the public hue and cry for more discipline and control in the schools, data-based support regarding the relationship between imposed structure and discipline, and the accompanying levels of order/disorder in schools; and, the effects on students and staff is critical.

Study objectives and related issues

The objectives of this paper are threefold. First, the authors will argue

that a primary national-level data source on school victimization, the School Crime Supplement (SCS) to the NCVS is partially out-of-synch with the research/practitioner community that deals with this issue. Critical data are not being collected on key variables and these omissions preclude the implementation of important research for broad- and local-scale policy and budgetary decision-making. Second, the researchers will perform a limited analysis on 1995 SCS data, using structural equation modeling methodology to examine relationships among some proposed latent variables. Third, suggestions for future research efforts with a proposed enhanced SCS data collection instrument will be discussed.

The School Crime Supplement to the NCVS is a primary source of national-level data on victimization incidents at school as well as related information on the presence of weapons, gangs, and drugs, and self-protective actions taken by students. The NCVS was redesigned in the late 1980's with field-testing and introduction of the redesign beginning in 1989. Both versions of the survey were used in 1992 and 1993 data collection. The 1995 SCS data collection instrument was also revised with numerous improvements that help provide more meaningful data relating to student awareness of rules and consequences for infractions of rules, school implementation of rules, school efforts to provide physical-based and personnel-based building security, the nature of gang presence, and so forth.

Although these improvements were substantial and help to support higher quality analysis of relationships among important variables influencing school violence and disruption, several critical issue areas are not addressed. While many practitioners and researchers focus on the "control" and "discipline" aspects of school violence prevention, others identify more positive, proactive measures as being equally or even more important in preventing violence. Research discussed above as well as a large part of recent related research on school violence identifies the following areas as playing important roles in preventing school violence: (a) Positive and supportive school climate; (b) Quality academic instruction and proactive measures to minimize academic difficulty; (c) Student and family involvement in school planning and policy-making decisions; (d) Sense of belonging, partnership, and community by students and families; (e) Less control using coercive measures that result in mistrust and resentment; (f) Less of an asylum-type institutional mentality focusing on control of "inmates"; (g) Mental health supports including expanded counseling/crisis intervention services; (h) Prevention programs involving anger management, social skills training, peer mediation, and conflict resolution techniques; and (i) Improved interagency collaboration.

These areas are not addressed in the School Crime Supplement. These themes reappear over and over in many reports and research studies as being critical determinants in school violence and disruption (Colvin, Kameenui, & Sugai, 1993; Conroy & Harader, 1998; Hendrickson et al,

1998; Kadel & Follman, 1993; NASBE, 1994; Noguera, 1995; Prothrow-Stith & Quaday, 1996). The research and practitioner community could learn more about these complex relationships if additional data were collected, concurrently on both an individual student level and a school-based level, as units of analysis. While there have to be stringent limitations on the length of any survey instrument to keep its administration time reasonable, several of these identified areas can be included in future School Crime Supplement data collection instruments.

This research used available information from the 1995 SCS to examine part of the "control" side of school violence. In turn, the researchers addressed the question: What is the relationship among school safety and discipline operations, the level of order/disorder in a school, and students' responses to their environment. A structural equation modeling approach was used to address these questions. While the SCS dataset has limitations, it can be used for model development and testing using SEM methodology. In the present study, composite variables were constructed so that their measurement properties supported SEM analysis and provided meaningful interpretation.

Method

Subjects

This research used survey data from the 1995 NCVS School Crime Supplement (U.S. Department of Justice, Bureau of Justice Statistics, 1998). The principal investigator, the Bureau of Justice Statistics, working with the National Center for Education Statistics and the Census Bureau, collected school crime victimization information from 9,954 completed interviews of students age 12 to 19 in schools across the United States. A stratified multistage cluster sample design was used. Students were asked about school rules and procedures, their knowledge and personal experience with violence against students and teachers, accessibility of drugs, gang presence, other violence or disruption in the school, as well as related information about their family, travel to and from school, and other experiences with crime in their neighborhood. They were also asked about apprehension or fear of being victimized and about a variety of possible self-protective actions they might have taken.

This study used a subset of 6947 subjects from the overall group, including only public school students in grades seven through twelve who responded that they had been in attendance at least five of the last six months of school. Private school students were excluded from this study because analysis and related policy concerns about school violence and disruption have for the most part remained within public education settings; inclusion of private school students might introduce a confounding influence into the analysis. Subjects were restricted to those who had attended school steadily during most of the school year. Students who

had attended fewer than five of the previous six months could represent atypical subjects and could introduce bias into the sample. No proxy interviews were included in the cases analyzed. Cases with missing data were discarded with the exception of two composite measured variables discussed below.

Constructs and Measured Variables

As previously discussed, the organization of the school environment plays a critical role as either a facilitator or inhibitor of violence and disruption. The rationale behind the model developed in this research is that levels of school disorder are related to environmental influences on both a physical and communicative level. On a physical level, school security and control is implemented through person-based and equipment-based interventions (e.g., guards and metal detectors). On a communicative level, a system of rules and law is used to maintain social cohesion and order (e.g., students' acceptance of the legitimacy of school rules). These aspects of the environment may be thought of as inputs in a system, with levels of school disorder and associated self-protective acts by students as outputs in the system.

The research used four constructs: (a) *Secure Building,* (b) *System of Law,* (c) *School Disorder,* and, (d) *Individual Self-Protection."* The first construct, Secure Building, represented the nature of and degree to which the school took extra measures to maintain secure premises. The two measured variables used as indicators are *Ordpers* and *Ordphys.* The measured variable Ordpers is a composite variable derived from the sum of recoded scores on three questions (V220, V221, V224) pertaining to the presence of security guards, hallway supervision by staff, and procedures for visitors to sign in. These are all ways of maintaining secure premises through person-based interventions. The measured variable Ordphys is derived from the sum of recoded scores on three questions (V222, V223, V225) pertaining to the presence of metal detectors, locked doors, and implementation of locker checks. These are all ways of attempting to control the physical environment. A large amount of the Secure Building construct could represent widespread efforts to control and monitor various student activities, movements, and possession of suspect and/or dangerous items.

The second construct, System of Law, represents the understanding students have of rules and consequences for breaking rules along with their understanding of the nature of and degree to which the system of rules is implemented in the school. The two measured variables used as indicators are *Knowlaw* and *Implaw.* The measured variable Knowlaw is a composite variable derived from the sum of recoded scores on two questions (V226 and V230) having to do with students' perceptions of general knowledge of school rules among the student body and perceptions of general awareness by students of consequences for infractions of

rules. The measured variable Implaw is a composite variable derived from the sum of recoded scores on two questions (V228, V229) having to do with consistency and strictness of rule enforcement. A large amount of the System of Law construct would signify an across-the-board awareness by the student body of the rules and their consequences along with a perception by students that rules are consistently and strictly enforced. The third construct, School Disorder, reflects the degree of violence and disruption (or perceived amount thereof) present in the school. The three indicators for this construct are *Gangpres, Drugpres,* and *Percrime.* The measured variable Gangpres is a composite of the recoded scores from three questions (V241, V272, V273) pertaining to the presence of gangs in or around the school. The measured variable Drugpres is derived from the sum of recoded scores of nine questions (V232 to V240) pertaining to availability of various drugs at school. The third indicator, Percrime, is a composite of questions (V242, V245, V248) pertaining to both personal attack and personal theft. Missing and/or indeterminate data problems existed with the indicators for Gangpres and Drugpres. Solutions are discussed further on in this paper. More of the School Disorder construct would be reflected in more instances of gang presence, drug transactions, and personal theft and attacks on students.

The fourth construct, Individual Self-Protection, reflects the feelings experienced and actions taken by students in response to school disorder. The two indicators of this construct are *Stayaway* and *Fearattk.* The measured variable Stayaway is a composite of recoded scores from nine questions (V253 to V261) pertaining to places in and around school that students may avoid due to fear of attack. The composite variable Fearattk represents the sum of recoded scores on two questions (V262, V263) having to do with fear of attack while at school or while in transit to and from school. More of this construct would be reflected by an increased concern for personal safety with more self-protective actions taken. A third indicator for this construct, Bringwep, was initially proposed, but later dropped due to the low percentage (2.8%) of students responding that they had brought something to school with which to protect themselves. Although such information is highly relevant to this construct, the low percentage of definitive responses precludes any meaningful contribution of this type of data to analysis using structural equation modeling techniques.

There were many other questions in the School Crime Supplement which might have proven useful in constructing the composite indicators discussed above as well as additional indicators, but problems with missing data and/or very low percentages of definitive responses precluded the use of these questions in the analysis.

Model Development

The initial model conceptualization (see Figure 1) proposed a relationship among several of the above-described constructs and indicator variables. This model partially paralleled prior model development with the 1989 SCS dataset that led to tentative findings discussed below. As previously mentioned, the indicator Bringwep was dropped because it brought little explanatory power to the analysis. The indicator Ordlaw included questions about knowledge of rules and their consequences (for infractions) as well as knowledge about implementation of school rules. An examination of a correlation matrix including the three indicators suggested that the Ordlaw indicator did not come from a common latent factor that also included Ordpers and Ordphys. Reconsideration of the source questions (which were different from those used in the 1989 SCS) suggested the presence of two distinct types of information emerging from the former Ordlaw indicator. Two survey questions had to do with knowledge of rules and consequences for rulebreaking while the other two questions had to do with how the rules were implemented. When these questions were separated into the two indicators, Implaw and Knowlaw, and a new correlation matrix was examined, it became clear that they represented a common construct. As a result, two latent variables emerged in place of the original Tight Ship construct: Secure Building and System of Law (see Figure 2).

The indicators for School Disorder changed from the initial conceptualization. Drugpres was originally dismissed as an indicator due to extensive missing and/or indeterminate data problems. Solutions allowing for its inclusion as well as that of Gangpres are discussed below. The indicators Perstheft and Persattk were combined into a composite indicator called Percrime. This was done primarily because the relatively low percentages of definitive responses in the separate indicators would make it difficult to obtain meaningful interpretation of their respective contributions within the context of structural equation methodology. The revised model used in the analysis is presented in Figure 2.

Analysis

A structural analysis was performed using the EQS program (EQS for Windows version 5.7). Prior to using EQS, composite variables were constructed from the original dataset using SPSS for Windows. The raw data matrix for the composite variables (N=6947) was used in EQS utilizing the Method = ML, Robust command due to evidence of considerable non-normality in the data. No error covariances were specified in the first steps of the analysis.

A rigorous cross-validation approach as described by Byrne (1994, p. 215) was used. The sample was divided randomly into two groups, a calibration group and a validation group. The calibration group was used

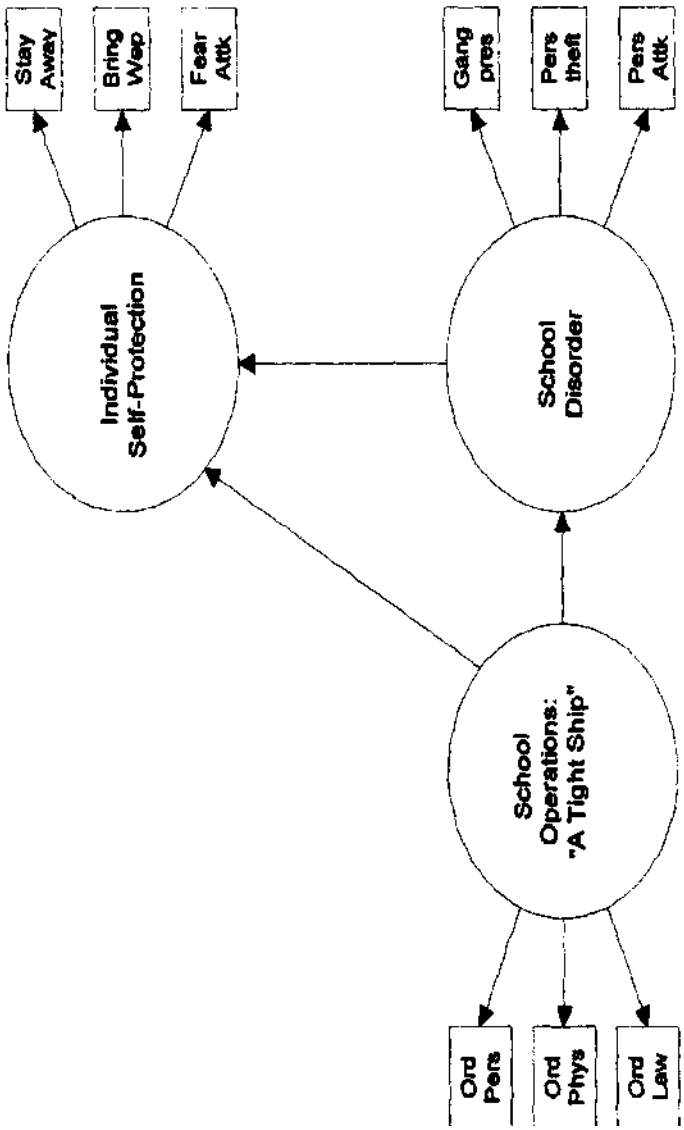

Figure 1. Initial model conceptualization.

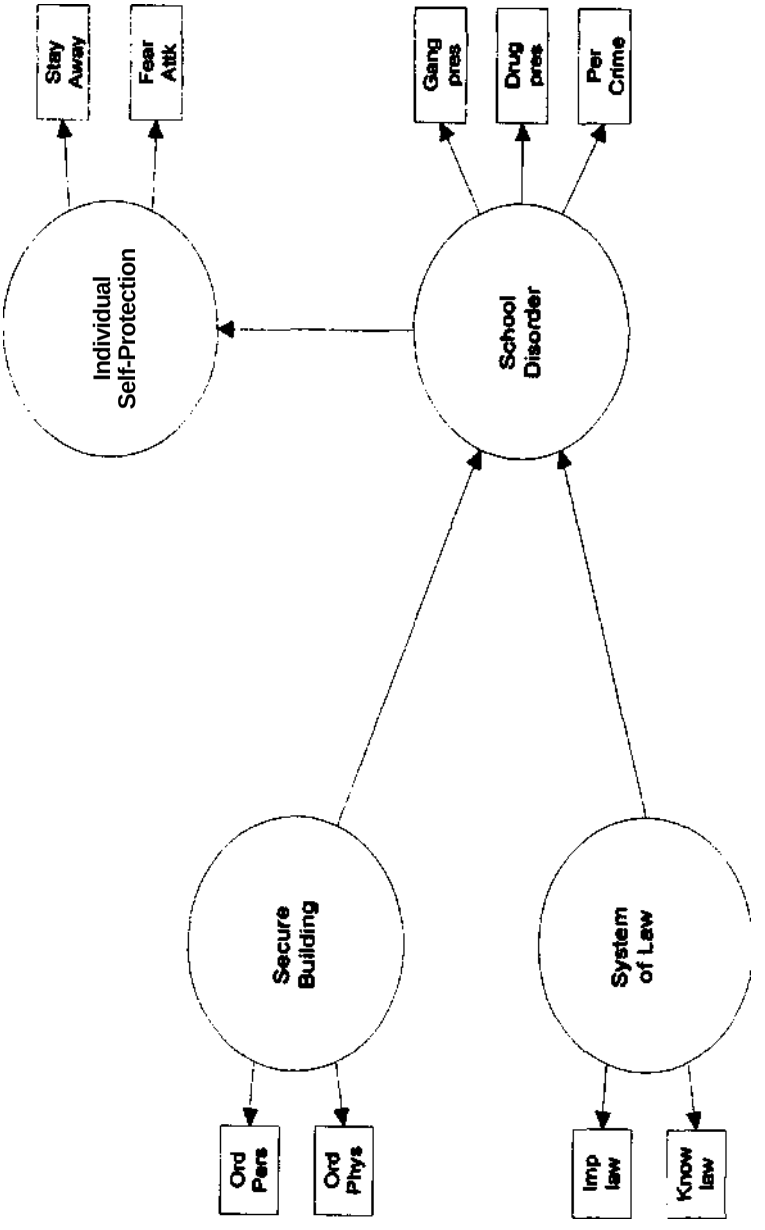

Figure 2. Revised model used in analysis.

for all model development and modification and the final model from the calibration group was imposed on the validation group for cross-validation purposes. A two-step model development procedure was used with the calibration group, where in the first step, a "perfect" structural model (all factors allowed to covary) allowed for possible improvement to the measurement model based on a combination of statistical results, theory, and prior research. The measurement model was refined, following established procedures for adding and deleting paths using the LaGrange and Wald options (Bentler, 1995; Byrne, 1994). The second step of the model fitting procedure involved reimposing the structural model and ascertaining fit. A subsequent further level of cross validation was performed using a subset of the total sample for which no data imputation procedures were used.

As previously mentioned, problems with missing and /or indeterminate data existed with regard to the Drugpres and Gangpres indicator variables. For the indicator Drugpres, 3404 cases could have been discarded because of data problems. About 15% of these involved an "I don't know" response, about 1% involved a "don't know drug" response, and the remainder were listed as "residual" (essentially unusable or missing data). Likewise, for the indicator Gangpres, 2194 cases could have been discarded, mostly, "don't know" responses. If all such cases for these two indicator variables were dropped from the analysis, a total of 4288 would have been discarded, leaving 2659 cases for analysis. For the purposes of this analysis, a response of "don't know" is comparable to having missing data. The researcher cannot presume as to its meaning.

This points to a dilemma often encountered in survey research. On the one hand, it can be risky to engage in data imputation to preserve cases that are complete on many other variables. On the other hand, when large numbers of cases are at risk for deletion, the researcher must consider whether the cases embody some systematic differences that may impair the subsequent analysis. A solution in this case involves the use of data imputation with a saturated regression model (using all other measured variables in the model), preserving the full case count of 6947. Pursuant to the imposition of the final model on the validation group, the same model would be further imposed on the "pure" subset of 2659 cases containing no imputed data. This procedure would help to determine whether in fact, the additional 4288 cases kept in the analysis brought some "different" information to the analysis that was contained within the remaining measured variables for which there was complete data. This approach, in turn, would serve as an additional level of validation of the model and as a check on the imputation procedure being used for so many cases.

Although it is generally recommended that at least three indicator variables accompany each latent variable, this was not feasible in this analysis. No estimation problems emerged as a result, and in every SEM anal-

ysis discussed below, there were no EQS condition codes and EQS provided the message, "no special problems were encountered during optimization." With three or more measured variables per latent construct, and a very high degree of fit, the liklihood of there existing alternative models with a very high degree of fit is relatively small. Conversely, with only two measured variables for a latent construct (as in this research), the liklihood of there existing alternative plausible models is greatly increased.

Visual inspection of the results from an SPSS frequencies procedure on the indicators as well as skewness and kurtosis values produced by the EQS program suggested nonnormality among the data. In turn, the Maximum Liklihood estimation procedure was used, with the "Robust" option, due to its robustness concerning violations of multivariate normality assumptions (Newcomb & Bentler, 1988). These measures facilitated the establishment of more trustworthy parameters and estimates of standard error by EQS. There were no equality constraints imposed.

The SCS survey used a stratified multistage cluster sample design. Complex survey designs are known to produce sampling variances for estimates that are larger than those for simple random samples of the same size (Kish, 1965). Use of standard statistical software, which employs estimation procedures based on simple random sampling, can result in underestimation of standard errors and incorrect decisions based on the results of significance tests. SEM analysis software also estimates standard errors under such assumptions, and typically has no features to take the sample design into account in estimated standard errors. It is possible to compensate by revised estimation of standard errors using bootstrap or jackknife procedures. However, those procedures require special programming to implement. In this case, an ad hoc approach was used. The average increase in sampling variances for estimates (i.e., the design effects) from the 1995 SCS was approximately 2.0, according to a Department of Census statistician familiar with the 1995 SCS (T. Mattingly, personal communication, July 2, 1998). This value varies by variable and by type of statistic, with somewhat lower values for subgroup estimates. The square root of the design effect was multiplied times the critical values used for tests of significance to adjust inferences for the complex sample design. In this case, when we multiply the value of 1.96 (used at the .05 significance level) by 1.41, we arrive at a revised critical value for the .05 significance level of 2.76. Likewise, we can arrive at a revised critical value of 3.64 (multiplying 1.41 times 2.58) for tests of significance at the .01 level and 4.65 (1.41 times 3.30) for tests of significance at the .001 level. These adjustments are somewhat conservative since the effect of the complex sample design on estimated standard errors of path coefficients is known to be smaller than the effect on other statistics (see Kish and Frankel, 1974).

Part of any structural equation analysis involves examination of Chi-square statistics to aid in hypotheses testing to help decide whether to re-

ject or fail to reject the specified model. Fit indices such as the Comparitive Fit Index (CFI) are used to ascertain goodness of fit. A problem with reporting probability estimates based on the model Chi-square values is that the Chi-Square distribution is sensitive to large sample size. As a result, even trivial misspecification of a model with a large N (as is the case in this analysis) will lead the researcher to usually reject the proposed model, because invariably, the p-values will be less than .05. In this case, the Chi-square is really a "badness of fit" test, and ideally, to not reject the proposed model, the researcher would like to see the p-values associated with the model Chi-Square statistic be larger than .05. As a result, this paper will not focus on reporting the p-values associated with model Chi-square statistics, but rather, will focus on discussion of fit indices and tests of significance of model parameters.

Results

Using a cross-validation approach discussed above, the sample of N=6947 was randomly split into a calibration group (N=3473) and a validation group (N=3474). The revised model was imposed on the calibration group with standardized solution results shown in Figure 3. Summary statistics for all EQS runs are displayed in Table 1. The Robust CFI = .904 and robust statistics with z-values for model parameters were all highly significant at the .001 significance level, using the revised critical value of 4.65 previously discussed.

The first part of the two-step analysis utilized a CFA method where all constructs were allowed to covary, while improvements to the measurement model were sought. As a result of the Lagrange Multiplier test for adding possible paths, and consideration of the theoretical justification, two subsequent error covariance paths were added, evaluated one at a time in separate EQS runs (see Figure 4.). It follows that student awareness of school rules pertaining to drugs at school (and other objectionable behaviors) would be correlated with actual presence of drugs at school. Moreso, the degree to which the school is perceived to implement its rules would likely be associated with drug activity. No further modifications were made to the measurement model.

The second step involved possible improvement to the structural model. With the prior structural model reimposed, the fit dropped only slightly from the prior robust CFI= .982 ("perfect" structural model) down to CFI=.977, still indicating a very good fitting model. The results are shown in Figure 4. Both covariances in the final calibration group model were highly significant at the .001 level using the revised critical value of 4.65 and examining the Robust statistics (Implaw, Drugpres = -14.029; Knowlaw, Drugpres = -6.203). The negative correlation between Knowlaw and Drugpres is low (-0.15) while the negative correlation between Implaw and Drugpres is moderate (-0.41). Possible implications are discussed below. All parameter estimates were highly significant at

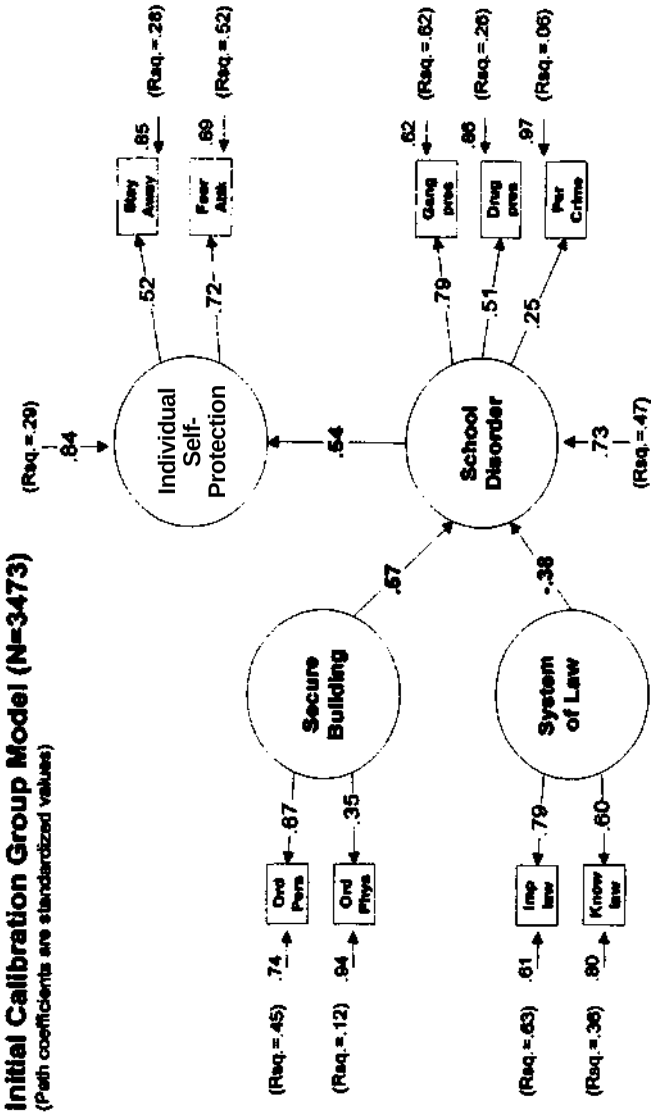

Figure 3. Initial calibration group run prior to model improvement (N=3473).

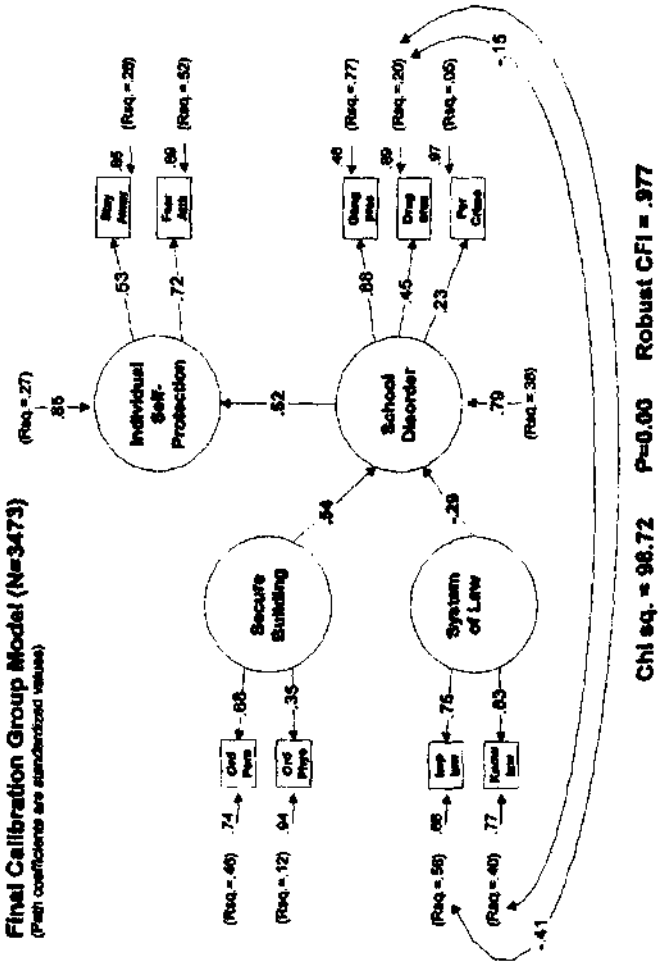

Figure 4. Final calibration group run (N=3473).

Table 1
Model Chi-Square Statistics and Fit Indices Values

Step in Analysis	Figure	N	Model d.f.	Model Chi-Sq. Satorra-Bentler Scaled (Robust)	CFI (Robust)	Model AIC
Calibration Group Initial Model	3	3473	24	300.99	.904	292.23
Calibration Group Final Model	4	• 3473	22	87.64	.977	54.72
Validation Group Final Model	Not shown	3474	22	108.77	.968	83.35
Combined Group Final Model	Not shown	6947	22	185.14	.971	168.67
"Pure" Subset Final Model	Not shown	2659	22	72.76	.971	40.94

the .001 level, using the revised critical value of 4.65. At this point, the researchers felt that no further changes in the structural model were warranted, since the model fit very well and was for the most part in accordance with the a priori hypothesized model.

The final calibration group model was imposed on the validation group, yielding a Robust CFI = .968. All model parameters except that for variance of Gangpres were highly significant at the .001 level using the revised critical value of 4.65. The robust z-value of 4.376 for the test of significance of the variance estimate of the measured variable Gangpres was still significant at the .01 level using a revised critical value of 3.64. The standardized results closely matched the just discussed final calibration group model. Cross-validation of the model was achieved.

Two addition EQS runs were performed, using the recombined group (N=6947) and using the "pure" subset (N=2659) of cases having no data imputation on the variables Gangpres and Drugpres. During all four of these runs, the EQS values for average absolute standardized residuals along with the printout of largest standardized residuals were examined. This information essentially explains the degree of fit or misfit between the sample covariance matrix (from the raw data) and the implied covariance matrix using the model parameters. In all cases (as indicated by high Robust CFI values), the standardized residual values were very low, indicating good fit. The robust CFI = .971 for the recombined group and all parameter estimates were highly significant at the .001 level using the revised critical value of 4.65. The robust CFI = .971 for the "pure" subset with no imputed data (N=2659), and all parameter estimates were highly significant at the .001 level using the revised critical value of 4.65 except for the covariance between Knowlaw and Implaw. The robust z-

value of -3.884 for that covariance was significant at the .01 level using the revised critical value of 3.64. All four runs—calibration group, validation group, recombined group, and "pure" subset group—provided models with excellent fit and very similar model solutions. This provided further validation of the model.

Discussion

The structural model showing the relationships among the latent variables was cross-validated, indicating support in the data for this model. For this discussion, values from the final calibration group model (N=3473) run will be used. Model parameters from the other runs were virtually identical. It is important to note from the outset that in this type of analysis, particularly in view of the way in which the composite measured variables were constructed, that the path values should not be interpreted as embodying a precise meaning. Path parameter fluctuations among the runs of .01 to .07 probably indicate no meaningful differences of explanatory value between standardized path coefficients. It may be more useful to think of the path coefficients as being low, moderate, or high. All reported path coefficients are standardized.

The moderate path value of 0.54 from the latent variable Secure Building to School Disorder suggests that with more efforts to run a secure premise through physical means (metal detectors, locked doors, locker checks) and through personnel-based interventions (security guards, staff watching halls), that more disorder may be present. While this might be viewed as a reciprocal process, there is substantive argument in the literature in support of this interpretation (Baker, 1998; Colvin, Kameenui, & Sugai, 1993; Grant, Van Acker, Guerra, Duplechain, & Coen, 1998; Hyman & Perone, 1998; Noguera, 1995; VanAcker, 1995b; VanAcker, 1996); this finding addresses the possible effect of reactive, school-based policies not solving violence problems.

Creating an unwelcoming, almost jail-like, heavily scrutinized environment, may foster the violence and disorder school administrators hope to avoid. Further investigation of this relationship is warranted. This model used too few latent variables to allow for comparison of alternate directional paths. However, a prior analysis of the 1989 SCS data by these researchers, using a similar structural model, achieved cross-validation of the structural model showing a similar path value going from a Tight Ship construct to a School disorder construct. Limitations in the source data and the measurement model existed in that analysis, so the findings must be considered tentative.

We would argue that although it may be appealing to think of the relationship more as being reciprocal, the present direction of the arrow is most appropriate because the procedures and policies governing the management of the school premises are of a more long-term, stable nature, where incidents of violence and disruption are more varying, short-

term, intermittent phenomena. In turn, it would be the more stable, in-place procedures that would tend to exert some type of controlling or causal influence on the outcome of disorder. The factor loadings of 0.68 and 0.35 going to the measured variables Ordpers and Ordphys, respectively, suggest the relative contributions of the hypothesized construct to the measured variables.

The moderate negative path coefficient of -0.29 going from System of Law to School Disorder suggests that with greater student awareness of school rules and consequences for rule infractions combined with knowledge of the degree to which the school implements its rules, that there is less disorder present in the school. When compared to the findings concerning the factor, Secure Building, this relationship could suggest that schools may be better off focusing on communication of school rules and consequences along with information about consequences for rulebreakers. In this context, the Implaw variable might be thought of as a proxy variable for the Social Learning Theory concept of vicarious learning, since it seems to represent students' perceptions of the how the school deals with the rulebreaking by others. The path value may suggest that student awareness and knowledge of process has an ameliorating effect on disorder, while the results of using more coercive or restrictive means (the factor Secure Building) may lead to negative results. The finding concerning student awareness of rules is in accordance with Jackson Toby's (1993) suggestion that school disorder is a reflection of two basic departures from normality, one of which is that students do not recognize the legitimacy of school rules and procedures. The factor loadings on the two measured variables for System of Law are approximately equal, suggesting that they are of equal importance in measuring this construct.

The question arises: what do these findings mean in view of reports that violence and disorder are the result of actions by a relatively small percentage of students at schools (Futrell, 1996; Gottfredson, 1995; Gottfredson, Gottfredson & Hybl, 1993; Stephens, 1994). While a relatively small percentage of students may engage in troublesome behaviors, they interact with the larger student body (by virtue of being in school) and influence group perceptions of school behavioral norms. While the dynamics of these relationships cannot be addressed within the scope of this paper, group processes involving both the perpetrators and others with whom they associate play a role in subsequent behaviors at school. In turn, processes involving general awareness and perception of school rules and consequences for infractions can be relevant to a smaller group engaging in objectionable behaviors.

The factor loadings from the School Disorder construct to its measured variables suggest that gang presence is a major indicator of school disorder while drug activity plays a lesser role. This result may reflect in part the near doubling of reports of gang presence in schools in the 1995 SCS compared to the 1989 SCS. The relatively low factor loading on Percrime

may be more a statistical artifact, reflecting the relatively low percentage (approximately 15%) of cases in this analysis providing information about some type of personal attack and/or theft. The negative correlations from Drugpres to Implaw and Knowlaw, particularly, the larger value of -0.41 to Implaw, suggests the importance of the student awareness of rules, consequences for infractions, and moreso, a healthy respect for a system that consistently follows through on its rules.

The moderate path value of 0.52 from the School Disorder factor to the Self-Protect factor suggests that with greater disorder, students take more self-protective actions, specifically, avoiding various parts of the school premises and living in a state of fear or heightened anxiety. This is in accordance with previous findings in the 1989 and 1995 SCS surveys and reinforces the importance of addressing student violence and disruption. If students are living in fear of victimization and worrying about where they need to stay away from, it seems likely that they will not be mentally ready and available to fully invest in their academic responsibilities. The factor loadings on the measured variables suggest that fear of attack may contribute somewhat more to this construct.

The R^2 value of .38 suggests that the model helps to explain 38% of the variance in the School Disorder construct. Conversely, this implies that 62% of that variance is yet to be explained by factors outside of this model. Likewise, the R^2 value of .27 for the Self-Protection factor suggests that 73% of that construct variance can be explained by other factors. These R^2 values may indicate the need for examining a more complete model involving additional information such as issues of school climate, student /family involvement in school decision-making, quality of academics, and proactive/positive approaches to violence prevention, as mentioned above.

Overall, the model may suggest that less attention should be paid to running schools in an overly restrictive manner and rather, schools should concentrate more on communicating individual responsibility to students. Viewed in the context of a reciprocal relationship, the data may suggest that disorder and restrictive management of the school premises may go hand in hand and may feed off of each other. This possible "cycle of disorder" would still need to be broken, and if subsequent investigations found the existence of such a cycle, there would be even more reason to find new ways to break this cycle through more positive prevention and intervention efforts.

These findings do not suggest that schools should ignore structure and discipline. The literature clearly shows the importance of firm, fair, and consistently implemented systems of school discipline procedures (Kadel & Follman, 1993; NASSP, 1995; State of Maryland, 1994; New York State Education Dept, 1994; Stephens, 1995). At issue may be the relative merits of more restrictive approaches, those that focus more on communication and understanding, and more positive and proactive approaches that help foster student success and provide a positive school climate.

Further investigation of these findings is certainly warranted using more complete data.

Conclusion and Recommendations

This research used structural equation methodology to model possible relationships among measured and latent variables relating to school violence and disruption. The study used a subset of 6947 cases from the 1995 School Crime Supplement to the National Crime Victimization Survey representing public school students ages 12 to 19 who had attended school at least five of the last six months prior to the survey. A structural model was developed and cross-validated with a high degree of fit and all parameters demonstrated statistical significance at either the .01 or .001 level. The model suggests that a higher level of disorder is associated with and may actually result from more efforts to control school premises in a highly restrictive manner using physical (e.g., metal detectors, locked doors) and personnel-based (e.g., security guards, staff patrolling halls) measures. Alternatively, the model may point to a cycle of disorder where the restrictive control of the premises and disorder demonstrate a reciprocal, destructive relationship. The model also demonstrates that where more disorder exists, students tend to engage in more acts of self-protection and live in a heightened state of fear. Most importantly, the data clearly show that with greater student understanding of the system of law, less disruption exists. This finding points to a critical need for schools to focus their efforts; effective communication rather than control is the best way to establish the legitimacy of the school's system of law in the minds of students.

This study had several limitations that must be kept in mind. The use of two indicator variables instead of the generally recommended minimum of three for the latent constructs may limit the ability to replicate the results with similar data. In this analysis, there were no estimation problems that typically may be associated with such cases. The use of some dichotomous and ordered categorical data with considerable nonnormality may limit the extent to which the researchers can interpret the parameter estimates presented with the models. In turn, it is wiser to view these numerical values more generally in terms of low, moderate, and high categories. The use of the Satorra-Bentler scaled Chi-square values and Robust statistics that are given in EQS output when the Method=ML, Robust command is used are generally seen as providing reasonable protection for nonnormality in the data, particularly in cases such as this, with a large sample size. The use of data imputation by regression for a large number of cases posed a potential threat to the results, but the multiple levels of cross-validation seems to have addressed that issue. The issue of the design effects of a complex sample design affecting the calculations of standard errors and test of significance was not fully addressed, but rather, an ad hoc procedure was used, increasing

critical values for significance tests based on an approximate average design effect for the entire survey. In this case, significance of parameter estimates should not be a problem, since almost every parameter estimate had a reported robust z-value of 10 or greater. The post-hoc modification of the initially conceptualized model, based on inspection of correlation data may have been viewed as a form of "data snooping." However, it is important to understand the relationships in the data as they may relate to alternative models being considered and the typical approach in such cases is to follow a strict cross-validation protocol, which was done in this case.

This study only examined a small part of a larger system of variables related to school violence and disruption. As discussed above, for the purposes of studying national level data, a revision of future SCS instruments to include questions on additional important issue areas would be very helpful. Several of these are: Positive and supportive school climate; Quality academic instruction and proactive measures to minimize academic difficulty; Student and family involvement in school planning and policy; Less of an institutional mentality focusing on control of "inmates"; and Prevention programs involving anger management, social skills training, peer mediation, and conflict resolution techniques.

Structural equation modeling is a technique that has matured since it first gained popularity in the behavioral and social sciences during the early 1980's. It offers new tools to researchers who wish to model and better understand the nature of complex relationships, based on data analysis. In order to perform such analyses, it is imperative that one have quality data, conducive to such methodology. Further research into school violence and disruption using SEM techniques may open doors to improved understanding of the complex nature of this problem area.

Policy and budgetary decisions on a national, state, and local level are regularly made in areas pertaining to addressing the problem of school violence and disruption. Billions of dollars are spent and hundreds of different prevention and intervention programs are in place across the country and many are showing promising results. Questions remain concerning the way schools are run and the relative merits of investing in more structure and control of the schools as well as offering more proactive, positive, and supportive changes to the school environment as discussed above. It is only through more comprehensive study using data representing the many varied aspects of the problem, that researchers, practitioners, policy-makers, and the community in general will come to a better understanding of what needs to be done.

References

American Psychological Association. (1993). Youth & Violence: Psychology's response, Volume I: summary report of the American Psychological commission on violence and youth. Washington, DC: Author.

Baker, J. A. (1998). Are we missing the forest for the trees? Considering the social context of school violence. *Journal of School Psychology, 36(1),* 29-44.

Bandura, A. (1977). *Social Learning Theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bastian, L.D., & Taylor, B. M. (1991, September). School crime: A national crime victimization survey report. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics (#NCJ-131645).

Bentler, P. M. (1995). *EQS structural equations program manual.* Encino, CA: Multivariate Software, Inc.

Byrne, B. M. (1994). *Structural equation modeling with EQS and EQS/Windows.* Thousand Oaks, CA: Sage.

Centers for Disease Control and Prevention (1995). Youth risk behavior surveillance-United States, 1993. *Morbidity and Mortality Weekly Report, 44,* 6-7.

Chandler, K.A., Chapman, CD., Rand, M.R., & Taylor, B.M. *Students' reports of school crime: 1989 and 1995*. U.S. Departments of Education and Justice. NCES 98-241/NCJ-169607. Washington, DC: 1998

Colvin, G., Kameenui, E.J., & Sugai, G. (1993). Reconceptualizing behavior management and school-wide discipline in general education. *Education and Treatment of Children, 16* (4), 361-381.

Conroy, M. A., & Fox, J. J. (1994). Setting events and challenging behaviors in the classroom: Incorporating contextual factors into effective intervention plans. *Preventing School Failure, 38(3),* 29-34.

Conroy, M.A., & Harader, D. (1995). *School aggression and violence: Reactions from practitioners in the field*. Highlights from the working forum on children and youth who have aggressive and violent behaviors, pp. 22-25. Council for Children with Behavioral Disorders. (ERIC Document Reproduction Service No. ED 391 338)

Dodge, K.A. (1991). The structure and function of reactive and proactive aggression. In D.J. Pepler & K.H. Rubin (Eds.), *The Development and Treatment of Childhood Aggression* (pp. 201-218). Hillsdale, NJ: Earlbaum.

Elliot, D. S. (1994). *Youth violence: An overview*. Monograph available from the Center for the Study and Prevention of Violence, University of Colorado, Boulder, CO. Furlong, M, & Morrison, G. (1994). Introduction to miniseries: School violence and safety in perspective. *School Psychology Review,* 23(2), 139-150.

Futrell, M. H. (1996). Violence in the classroom: A teacher's perspective. . In A. M. Hoffman (Ed.), *Schools, violence, and society* (pp. 3-19). Westport, CT: Praeger.

Gottfredson, D.C. (1995, January). *Creating safe, disciplined, drug-free schools.* Paper presented at a conference on "Implementing Recent Federal Legislation", St. Pete Beach, FL.

Gottfredson, D.C, Gottfredson, G.D., & Hybl, L.G. (1993). Managing adolescent behavior: A multiyear, multischool study. *American Educational Research Journal,* 30(1), 179-215.

Grant, S.H., VanAcker, R., Guerra, N., Duplechain, R., & Coen, M. (1998). A school and classroom enhancement program to prevent the development of antisocial behavior in children from high-risk neighborhoods. *Preventing School Failure,* 42(3), 121-127.

Guerra, N.G., Eron, L. D., Huesmann, L. R., Tolan, P.H., & Van Acker, R. (1996). A cognitive/ecological approach to the prevention and mitigation of violenceand aggression in urban minority youth. In Bjorkquist, K. & Fry, D.P. (Eds.), *Styles of conflict resolution: Models and applications from around the world.* New York: Academic Press.

Hyman, I.A., & Perone, D.C (1998). The other side of school violence: Educator policies and practices that may contribute to student misbehavior. *Journal of School Psychology, 36(1),* pp. 7-27.

Kadel, S., & Follman, J. (1993, February). *Reducing school violence in Florida. Hot topics: Usable research.* Greensboro, NC: Southeastern Regional Vision for Education. (ERIC Document Reproduction Service No. ED 355 614).

Kauffman, J. M. (1993). *Characteristics of Emotional and Behavioral Disorders of Children and Youth* (5th ed.). New York, NY: Merrill.

Kauffman, P, Chen, X., Choy, S.P., Chandler, K.A., Chapman, CD., Rand, M.R., and Ringer, C. *Indicators of School Crime and Safety, 1998.* U.S. Departments of Education and Justice. NCES 98-251/NCJ-172215. Washington, DC: 1998.

Kish, L. (1965). *Survey Sampling*. New York Wiley.

Kish, L., & Frankel, M. (1974). Inference from Complex Samples. Journal of the Royal Statistical Society, Series B, Volume 36, pages 1-37.

Maryland State Department of Education. (1993, September). *A comprehensive report on efforts to reduce violence in schools*. Baltimore, MD: Author.

Metropolitan Life Insurance Company. (1993). Metropolitan Life survey of the American teacher, 1993. New York: Author.

NASBE. (1994). Schools without fear: The report of the NASBE study group on violence and its impact on schools and learning. Alexandria, VA: Author.

NASSP. (1995). *Safe schools: A handbook for practitioners*. Reston, VA: Author. National Education Goals Panel. (1994). (ISBN Publication No. 0-16-045194-9). *The national education goals report*. Washington, DC: U.S. Government Printing Office.

National Research Council. (1993). *Understanding and preventing violence*. Washington, DC: National Academy Press.

National School Boards Association. (1993). *Violence in the schools: How America's school boards are safeguarding our children*. Alexandria, Virginia: Author.

Newcomb, M. D., & Bentler, P. M. (1988). Impact of adolescent drug use and social support on problems of young adults: A longitudinal study. *Journal of Abnormal Psychology*, 97(1), 64-75.

New York State Education Department (1994). Violence in the schools: A national, state, and local crisis (report No. UD 029 778). Albany, NY: New York State Education Department, Office for Planning, Research, and Support Services. (ERIC Document Reproduction Service No. ED 367 757).

Noguera, P. A. (1995). Preventing and producing violence: A critical analysis of responses to school violence. *Harvard Educational Review, 65(2),* 189-212.

OERI. (1993). *Reaching the goals: Goal 6—safe, disciplined, and drug-free.schools*. Washington, DC: Author. (ERIC Document Reproduction Service No. ED 357 445).

Osgood, D. W. (1995). *Drugs, alcohol, and adolescent violence*. Monograph available from the Center for the Study and Prevention of Violence, University of Colorado, Boulder, CO.

Prothrow-Stith, D., & Quaday, S. (1996). Communities, schools, and violence. In A. M. Hoffman (Ed.), *Schools, violence, and society* (pp. 153-161). Westport, CT: Praeger.

Shores, R. E., Gunter, P. L., Denny, R. K., & Jack, S. L. (1993). Classroom influences on aggressive and disruptive behaviors of students with emotional and behavioral disorders. *Focus on Exceptional Children*, 26(2), 1-9.

State of Maryland. (1994, September), *The report of the governor's commission on disruptive youth*. Annapolis, MD: Author.

Stephens, R.D. (1994). Planning for safer and better schools: School violence prevention and intervention strategies. *School Psychology Review*, 23(2), 204-215.

Stephens, R. D. (1995). *Safe schools: A handbook for violence prevention.* Bloomington, IN: National Education Service.

Toby, J. (1993-94, Winter). Everyday school violence: How disorder fuels it. *American Educator*. 4-9,44-48.

Tolan, P. H. & Guerra, N.G. (1994). *What works in reducing adolescent violence: An empirical review of the field*. Monograph available from the Center for the Study and Prevention of Violence, University of Colorado, Boulder, CO.

Tolan, P.H., Guerra, N.G., & Kendall, P.C. (1995). A developmental-ecological perspective on antisocial behavior in children and adolescents: Towards a unified risk and intervention framework. *Journal of Consulting and Clinical Psychology*, 63(4), 579-584.

U.S. Department of Education, NCES. *Violence and discipline problems in U.S. public schools: 1996-1997*. NCES 98-030, Washington, DC: Author.

U.S. Department of Justice, Bureau of Justice Statistics (1997). *Criminal victimization 1996: Changes 1995-96 with trends 1993-96*. NCJ-165812, Washington, DC: Author.

U.S. Department of Justice. Bureau of Justice Statistics. (1998). *National crime surveys: School crime supplement, 1989.* (ICPSR 6739).

U.S. General Accounting Office. (1995). *School safety: Promising initiatives for addressing school violence.* (GAO Publication No. GAO/HEHS-95-106). Washington, DC: Author.

U.S. Library of Congress. Congressional Research Service. *Violence in schools: An overview.* (CRS Report for Congress No. 94-141 EPW). Washington, DC: Author.

Van Acker, R. (1995a). A close look at school violence. *Update on Law-Related Education, 19* (2), 4-8.

VanAcker, R. (1995b). *School-based programs for the prevention and treatment of aggression and violence: Why aren't they more effective?* Highlights from the working forum on children and youth who have aggressive and violent behaviors, pp. 9-17. Council for Children with Behavioral Disorders. (ERIC Document Reproduction Service No. ED 391 338)

VanAcker, R. (1996). *Types of youth aggression and violence and implications for prevention and treatment.* Council for Children with Behavioral Disorders. (ERIC Document Reproduction Service No. ED 391 307)