

SCHOOL ENGAGEMENT, RISKY PEERS, AND STUDENT–TEACHER RELATIONSHIPS AS MEDIATORS OF SCHOOL VIOLENCE IN TAIWANESE VOCATIONAL VERSUS ACADEMICALLY ORIENTED HIGH SCHOOLS

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Educational tracking based on academic ability accounts for different school dynamics between vocational versus academically-oriented high schools in Taiwan. Many educational practitioners predict that the settings of vocational schools and academic schools mediate school violence in different ways. Alternatively, some researchers argue the actual mediating mechanism may not vary significantly between the different school types in different cultures. The purpose of this study was to examine how within-school variables (school engagement, risky peers, and student–teacher interaction) mediate external-school variables (personal traits, parental monitoring, and victimization) and school violence in Taiwanese vocational and academically-oriented schools. Structural equation modeling analysis, based on a national representative sample (N=7,841), suggested school violence was mediated through school variables. Similar mediational findings were found between academic and vocational schools as well as between males and females. Findings suggest that school violence is mediated by within-school variables in similar ways across different school types, genders, and cultures. © 2010 Wiley Periodicals, Inc.

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INTRODUCTION

Little is known about how school variables mediate between personal and family factors and school violence, and even less is known about the patterns of relationships among these factors in Asian cultures (Benbenishty & Astor, 2005). Furthermore, it is not clear how the patterns of relationships differ between school types and between genders. This study expands the literature on school violence by examining how school experiences mediate the influence of personal and family factors on school violence in Taiwanese vocational and academically oriented high schools.

There are few nationally representative studies on school violence in Asian cultures. Research on school violence conducted in Western cultures has demonstrated how students' personal, family, and school experiences are independently associated with students' perpetration of violence against other students (Baldry & Farrington, 2005; Brockenbrough, Cornell, & Loper, 2002). In general, these studies have examined each risk factor separately, rather than collectively. In addition, international studies have shown the vast majority of perpetrators of violence against teachers are students (Dinkes, Cataldi, Kena, & Baum, 2006; Lyon & Douglas, 1999). Far less research exists, however, on how risk factors contribute to student perpetration of violence against teachers (Chen & Astor, 2009a; Khoury-Kassabri, Astor, & Benbenishty, 2009).

Although centered on Taiwan, findings from this study may have implications for other Asian cultures. Taiwan is typical of many Asian cultures. Despite the growing influence of globalization, the Taiwanese people are still guided by Confucianism, Taoism, and Buddhism (Nisbett, 2003). Although school violence has been a major public concern for many years, for political reasons (China's lack of recognizing Taiwan as an independent country), Taiwan has never been part of any large-scale, cross-national studies on these topics (Akiba, LeTendre, Baker, & Goesling, 2002). Relationship patterns among risk factors and school violence have also never been explored in Taiwan or other Asian societies.

Overview of the Taiwanese Education System

There are three major systems of basic and intermediate education in Taiwan: elementary school (grades 1 to 6), junior high school (grades 7 to 9), and high school (grades 10 to 12). High schools can be further divided into academic and vocational. In the academic year of 2006, there were about 0.42 million students in 314 academic high schools and about 0.33 million in 157 vocational high schools in Taiwan (Taiwan Ministry of Education [TME], 2006).

Attending a nine-year compulsory education program from elementary to junior high school is mandatory. A competitive joint high school entrance exam must be taken if junior high school graduates seek higher education. Students are then assigned to either an academic or a vocational high school based on their exam results (TME, 2006). This is similar to how middle school students in Western countries apply to elite private schools, competitive magnet schools, or national blue ribbon, college preparatory high schools. Generally, students with higher scores are encouraged to attend academic high schools, while those with lower scores attend vocational or less rigorous high schools. This separation by academic ability could account for different school structures and social climates.

The three-year academic high school programs aim to prepare students for specialized learning as well as college study, focusing on training for the joint university entrance examination. As a result, academic high school students are offered intense coursework and concentrate on academic development. The goal of vocational high schools, however, is to provide students with professional competencies and technical skills to help these students enter the workforce. Most vocational high school graduates start a business or become employed by companies based on the technical skills that they learn in high school (TME, 2006). Vocational high schools in Taiwan are similar to those in Europe and the Middle East. In the United States, most high schools offer only a few vocational components. Except for some alternative schools for “at risk” students, it is rare in the United States to find high schools exclusively devoted to vocational training. Moreover, the separation of students based on academic ability does not occur as frequently in the United States. The boundaries and distinctions between academic and vocational high schools are much stronger in Taiwan.

School Variables as Mediators of School Violence

Literature on school violence indicates that most previous studies have examined, in separate studies, how students’ experiences in each ecological context are independently related to perpetration of school violence (Alikasifoglu et al., 2004; Brockenbrough et al., 2002; Chapell et al., 2006; O’Keefe, 1997). How multiple ecological risk factors and nested contexts mediate student violence against students and teachers have not yet been explored in depth in either the West or the East.

Benbenishty and Astor (2005) addressed this lack of theoretical integration surrounding the nested contexts of school violence. They proposed a theoretical model in which school violence is influenced by a combination of numerous within-school variables (e.g., teacher-child relationships) as well as other external variables (e.g., students’ personal and family characteristics). In the heuristic model proposed by Benbenishty and Astor, schools mediate, moderate, and attenuate contributions from external contexts. School subcontexts also generate their own direct contributions to different forms of violence. In contrast with earlier psychological models that center exclusively on the individual, Benbenishty and Astor stressed that when looking at “school violence,” the school itself as a social context should be the center of the theoretical model.

This model has been used to examine school violence across different cultures with Jewish secular, Jewish Orthodox, Arabic, and American students (Astor, Benbenishty, Vinokur & Zeira, 2006; Astor, Benbenishty, Zeira, & Vinokur, 2002; Benbenishty & Astor, 2005; Benbenishty, Astor, Zeira, & Vinokur, 2002; Khoury-Kassabri et al., 2009). Using this theoretical model, this is the first study that examines how the complex patterns among social contexts influence school violence in Taiwanese high schools.

Patterns of Relationships Between School Types and Genders

School type. Junior high school students in Taiwan are systemically assigned to either an academic high school or vocational high school based on the results of comprehensive academic exams. Some educational researchers predict that the patterns of relationships and school mediating mechanism should differ between academic and vocational schools, because educational tracking based on academic ability accounts for different students’ personal characteristics, family backgrounds, and school dynamics (Chang, 1992; Gang & Klaus, 2000; Hsieh, 2003). Others have argued, however, that the

patterns of relationships may not differ because of similar class structures, peer group influence, and teaching styles in both types of schools (Astor & Meyer, 2001; Benbenishty & Astor, 2005; Chen & Astor, 2010).

To date, several empirical studies have suggested that patterns of relationships are similar in victimization among primary, middle, and high schools (Astor et al., 2002, 2006; Benbenishty & Astor, 2005; Benbenishty et al., 2002). No strong empirical evidence has emerged, however, to suggest similarities or differences in the kinds of perpetration. It is unclear how overarching patterns of relationships differ between academic and vocational high schools, where personal, family, and school variables are presumed to be entirely different.

Clarifying the similarities or differences in these patterns of relationships in perpetration is meaningful for intervening in and preventing violence. If patterns of relationships differ between school types, then this may suggest that new school violence intervention programs must be developed to address the specific needs of each school type. Alternatively, if the patterns are similar between school types, then it may mean that the “face value” of school differences is not prominent in influencing patterns of relationships.

Gender. Many international studies suggest boys engage in more aggressive behavior in schools than girls (Baldry, 2003; Chen & Astor, 2009a,b, 2010; Nansel et al., 2001; Rigby, 2005; Zeira, Astor, & Benbenishty, 2003). Based only on these studies, however, it is not clear if the patterns of relationships between risk factors and perpetrating school violence differ across gender. Thus, the current study examines how gender differences impact the pattern of relationships between factors and school violence committed by students against other students and teachers.

Risk Factors of School Violence in High School

Student violence against students. In the literature of youth violence, negative personal traits, including positive attitudes toward violence, poor impulsive control and anger temperament, poor parenting, victimization experiences, weak social bonds, and persistently negative school social relationships, have been commonly discussed as major factors related to adolescent perpetration of violence and delinquent behavior (e.g., Hawkins et al., 2000; Wallace, 1999). In fact, Western studies also have shown that negative personal traits (e.g., Brockenbrough et al., 2002), parental monitoring and involvement (Baldry & Farrington, 2005), victimization (Alikasifoglu et al., 2004; Brockenbrough et al., 2002; Chapell et al., 2006; O’Keefe, 1997), and low school engagement and poor relationships with peers and teachers (Alikasifoglu et al.; Desouza & Ribeiro, 2005) are important factors associated with high school students’ violence against other students.

Few Asian studies report risk factors of school violence, such as negative personal traits, victimization, poor school engagement, involvement with at-risk peers (Ando, Asakura & Simons-Morton, 2005; Chen & Astor, 2010; Hu & Lin, 2001), a low level of parental monitoring, and poor student–teacher relationships (Chen & Astor, 2010; Hu & Lin, 2001; Ma, Shek, Cheung, & Tam, 2002; Yoneyama & Naito, 2003; Wong, 2004). Most of these studies were conducted using nonrepresentative samples in junior high school contexts, so it is not clear how generalizable these Western findings are for Asian high school students.

Student violence against teachers. Students' perpetrating violence against teachers has negatively impacted teachers' personal safety, mental health, and their quality of teaching (Astor, Meyer, Benbenishty, Marachi, & Rosemond, 2005; Lyon & Douglas, 1999). To date, there have been far fewer reports on how risk factors contribute to students' perpetrating violence against teachers. Recently, Khoury-Kassabri et al. (2009) indicated that student violence against teachers is influenced by students' individual factors (i.e., gender, age, perception of school climate, and intervention) and school contextual factors (i.e., cultural affiliation, socioeconomic status, family, school, class size, school climate, and intervention). It is still unclear, however, how students' personal traits, parental monitoring, victimization, school engagement, and school social dynamics contribute to students' perpetrating violence against teachers.

Some smaller scale studies in Taiwan have shown how students' negative personal traits, parental involvement, victimization, risky behavior in school (Chen, 1999), school climate, school engagement (Chen, 1989, 1999), and poor student-teacher relationships (Huang & Hsien, 1987; Lin, 1986) were related to student violence against teachers. Most of these studies in Taiwan were analyzed, however, based on teachers' reports and were conducted using nonrepresentative samples. It is unknown how students' personal, family, and school experiences contributed to students' perpetrating violence against teachers in Asian cultures.

Theoretical Model for This Study

Based on previous literature and theory, this study proposes that the students perpetrating school violence against peers and/or teachers is directly associated with negative personal traits, parental monitoring, victimization, a low level of school engagement, involvement in at-risk peers, and poor student-teacher relationships. Most important, diverging from some prior studies, this model proposes that student perpetration is indirectly associated with negative personal traits, parental monitoring, and victimization mediated through a low level of school engagement, involvement in at-risk peers, and poor student-teacher relationships. This study expected that the model fit both male and female students as well as academic and vocational high school students, but certain paths within the model may differ based on these variables.

METHODS

The data used in this study was part of a large-scale project of the Prevention and Control of School Violence in Taiwan (Wu, Lee, Yin, & Hu, 2000). The survey was conducted throughout Taiwan among more than 14,000 students from elementary schools (grades 4 to 6), junior high schools (grades 7 to 9), and vocational high schools and academic high schools (grades 10 to 12). Students were given a structured questionnaire in classrooms under the guidance of professionally trained survey monitors. Respondents were assured of anonymity and were encouraged to respond truthfully. Participants were free to withdraw from the study at any time and for any reasons. This study was supported by Taiwan's National Science Council (NSC). The questionnaires, procedures, informed consent forms, and other ethical concerns were reviewed and supervised by NSC.

This sample was designed to represent all students from 4th to 12th grades in Taiwan. The students' response rate was over 98%. The probability sampling method

was a two-stage stratified cluster sample. The strata were northern/central/southern/eastern, urban/rural, and elementary/junior/vocational/academic. Current study examined only students from academic and vocational high school. In the first stage, schools were randomly selected from the sampling frame according to those appropriate strata. In the next stage, two classes were randomly selected according to each grade in selected schools. All students in that class were included in the sample. Overall, 7,841 students participated in this study. 48.4% of the students were boys, 51.3% were girls, and 0.3% did not indicate gender; 48.1% of the students were in the academic high school and 51.9% were in the vocational high school.

The questionnaire was developed on the basis of current school violence studies and theories from both Taiwan and Western countries, and validated by Wu et al. (2000). It included over 150 items in eight domains regarding students' basic demographic background and other information in their personal, family, and school experience. Each of the student questionnaires took approximately 30 minutes to complete. Before this survey was conducted, the Mandarin Chinese questionnaire was adjusted and adapted based on two pilot studies conducted in the Tainan metropolitan areas in Taiwan (Wu et al., 2000).

Measurement

To measure the latent variables in our model, several scales containing a number of subscales were constructed. Table 1 represents the means and standard deviations of the variables included in the model, broken down by genders and school types. Table 2 represents the intercorrelations matrix among the variables. For the purpose of structural equation modeling analyses, several subscales were constructed based on conceptual and theoretical constructs. Each of these subscales creates the overall factor composites that represents of the more general theoretical concepts discussed in literature review of this study. Appendix A lists the domains, questions items, factor loadings, and alphas for the theoretically created subscales.

Dependent Variables

Student violence against students. This domain involves asking students how many times they perpetrated violent behavior in school against other students during the last academic year. The variables in this domain were recorded into "never" and "at least once." This domain included three subscales on the basis of their content according to type of violence. It included physical violence, vandalism, and verbal violence/threat/harassment. The score of each subscale was the sum of the items included in the subscale.

Student violence against teachers. This domain involved asking students to indicate how many times they perpetrated violent behavior in school against teachers during the last year. The variables in this domain were recorded as "never" and "at least once." This domain included three subscales on the basis of their content according to type of violence. It included physical violence, verbal violence/threat, and emotional

Table 1. Means and Standard Deviations of Subscales by Genders and School Types

<i>Scales/subscales</i>	<i>Overall</i>	<i>Male</i>	<i>Female</i>	<i>Academic</i>	<i>Vocational</i>
Violence against students ^a	1.64 (2.09)	2.28 (2.33)	1.02 (1.61)	1.44 (1.94)	1.82 (2.21)
Physical	0.33 (0.73)	0.52 (0.87)	0.15 (0.49)	0.26 (0.65)	0.39 (0.79)
Vandalism	0.29 (0.59)	0.38 (0.67)	0.19 (0.49)	0.26 (0.56)	0.32 (0.62)
Verbal/threat	1.02 (1.21)	1.38 (1.31)	0.68 (1.00)	0.92 (1.16)	1.11 (1.25)
Violence against teachers ^a	0.50 (0.87)	0.58 (0.95)	0.42 (0.77)	0.47 (0.83)	0.53 (0.90)
Physical	0.02 (0.18)	0.03 (0.22)	0.01 (0.13)	0.02 (0.17)	0.02 (0.19)
Verbal/threat	0.08 (0.33)	0.10 (0.37)	0.06 (0.27)	0.07 (0.30)	0.09 (0.35)
Emotional	0.39 (0.59)	0.45 (0.61)	0.34 (0.57)	0.38 (0.58)	0.41 (0.60)
Negative personal traits ^b	51.33(13.69)	54.46(14.18)	48.40(12.52)	50.53(13.26)	52.07(14.04)
Violence attitudes	17.04 (6.12)	19.25 (6.45)	14.96 (4.95)	16.60 (5.93)	17.44 (6.26)
Impulsive control	12.66 (3.88)	13.06 (3.97)	12.28 (3.75)	12.59 (3.78)	12.71 (3.96)
Anger temperament	21.63 (5.92)	22.14 (6.00)	21.15 (5.80)	21.35 (5.77)	21.87 (6.05)
Parental monitoring ^b	28.38 (5.68)	27.67 (5.53)	29.05 (5.73)	28.67 (5.66)	28.11 (5.68)
Father	13.88 (3.09)	13.62 (2.98)	14.12 (3.17)	13.99 (3.11)	13.77 (3.06)
Mother	14.48 (2.88)	14.03 (2.80)	14.90 (2.89)	14.65 (2.87)	14.31 (2.88)
Victimization ^c	1.68 (2.61)	2.17 (2.85)	1.21 (2.25)	1.51 (2.48)	1.84 (2.71)
Direct	0.64 (1.42)	0.89 (1.63)	0.40 (1.13)	0.59 (1.35)	0.69 (1.48)
Witness	1.04 (1.70)	1.28 (1.81)	0.81 (1.55)	0.93 (1.59)	1.15 (1.78)
Low school engagement ^b	7.36 (2.41)	7.76 (2.48)	6.98 (2.28)	7.28 (2.36)	7.43 (2.45)
Doze off or skip	1.70 (0.82)	1.79 (0.86)	1.62 (0.78)	1.63 (0.79)	1.77 (0.85)
Forget bringing material	2.03 (0.80)	2.07 (0.80)	2.00 (0.80)	2.04 (0.80)	2.03 (0.80)
Seldom turn in homework	1.91 (0.81)	2.02 (0.84)	1.81 (0.78)	1.94 (0.82)	1.89 (0.80)
Bring prohibited material	1.72 (0.79)	1.89 (0.83)	1.56 (0.72)	1.68 (0.77)	1.76 (0.81)
Risky peers ^b	9.89 (3.42)	10.64 (3.68)	9.19 (2.96)	9.65 (3.24)	10.12 (3.56)
Risky friendship	7.36 (2.82)	7.90 (2.99)	6.85 (2.54)	7.20 (2.72)	7.51 (2.90)
Risky acts	2.54 (1.02)	2.47 (1.17)	2.34 (0.81)	2.45 (0.95)	2.61 (1.08)
Poor student–teacher relation ^b	8.82 (3.27)	9.24 (3.40)	8.43 (3.09)	8.68 (3.21)	8.95 (3.33)
Teachers punish	1.68 (0.73)	1.77 (0.77)	1.58 (0.67)	1.63 (0.70)	1.72 (0.75)
Teachers dislike	1.69 (0.75)	1.78 (0.79)	1.60 (0.71)	1.65 (0.74)	1.72 (0.77)
Teachers mock	1.64 (0.74)	1.73 (0.78)	1.56 (0.70)	1.62 (0.74)	1.66 (0.75)
Teachers distrust	1.75 (0.81)	1.84 (0.84)	1.66 (0.76)	1.71 (0.78)	1.78 (0.83)
Observe and snitch	2.07 (0.97)	2.12 (0.97)	2.03 (0.96)	2.07 (0.97)	2.07 (0.97)

^aScale: 0 (never) and 1 (at least once in the past year).

^bScale: 1 (strongly disagree) to 4 (strongly agree).

^cScale: 1 (*never*), 2 (*sometimes*), 3 (*often*), and 4 (*almost every day*).

violence/harassment. The score of each subscale was the sum of the items included in the subscale.

Independent Variables

Negative personal traits. This latent variable asked students about their personal characteristics related to aggression. Three subscales were constructed on the basis of their content. These subscales were students' attitude towards violence, impulsive control, and trait anger temperament. The rating for each item in this scale ranged from 1 (*strongly disagree*) to 4 (*strongly agree*). The score of each subscale was the sum of the items included in the subscale.

Parental monitoring. This latent variable consisted of two subscales: father monitoring and mother monitoring. Respondents were asked about parental monitoring of them

Table 2. Matrix of Correlations Among School Violence Subscales

Subscale	A1	A2	A3	B1	B2	B3	C1	C2	C3	D1	D2	E1	E2	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4	H5
A1 Student physical	-	0.43	0.51	0.27	0.36	0.36	0.4	0.27	0.25	-0.13	-0.16	0.23	0.26	0.24	0.13	0.16	0.26	0.39	0.36	0.19	0.18	0.16	0.18	0.15
A2 Student vandalism		-	0.53	0.16	0.28	0.39	0.28	0.23	0.22	-0.12	-0.13	0.17	0.23	0.18	0.13	0.16	0.23	0.26	0.21	0.16	0.15	0.15	0.16	0.17
A3 Student verbal/threat			-	0.21	0.32	0.47	0.35	0.3	0.31	-0.15	-0.16	0.22	0.27	0.2	0.14	0.16	0.26	0.34	0.25	0.18	0.18	0.17	0.19	0.19
B1 Teacher physical				-	0.52	0.2	0.16	0.11	0.1	-0.03	-0.03	0.13	0.11	0.12	0.07	0.08	0.13	0.16	0.23	0.11	0.1	0.1	0.11	0.07
B2 Teacher verbal/threat					-	0.4	0.23	0.19	0.18	-0.06	-0.09	0.16	0.19	0.2	0.12	0.14	0.2	0.25	0.28	0.2	0.19	0.16	0.18	0.12
B3 Teacher emotional						-	0.26	0.26	0.25	-0.12	-0.13	0.14	0.23	0.24	0.15	0.18	0.25	0.29	0.2	0.24	0.23	0.21	0.22	0.24
C1 Violence attitudes							-	0.54	0.57	-0.17	-0.21	0.15	0.24	0.28	0.18	0.23	0.32	0.45	0.4	0.3	0.3	0.27	0.3	0.26
C2 Impulsive control								-	0.71	-0.22	-0.22	0.1	0.19	0.32	0.26	0.27	0.32	0.37	0.3	0.26	0.26	0.25	0.27	0.26
C3 Anger temperament									-	-0.17	-0.17	0.1	0.18	0.25	0.2	0.19	0.24	0.32	0.26	0.22	0.23	0.22	0.23	0.23
D1 Father monitoring										-	0.81	-0.07	-0.08	-0.2	-0.14	-0.19	-0.18	-0.12	-0.13	-0.12	-0.14	-0.14	-0.15	-0.11
D2 Mother monitoring											-	-0.09	-0.09	-0.22	-0.14	-0.21	-0.2	-0.14	-0.17	-0.16	-0.17	-0.17	-0.19	-0.11
E1 Direct victimization												-	0.39	0.07	0.07	0.09	0.11	0.12	0.17	0.11	0.1	0.11	0.1	0.07
E2 Witness victimization													-	0.11	0.08	0.1	0.15	0.25	0.18	0.12	0.12	0.11	0.14	0.14
F1 Dose off or skip material														-	0.36	0.4	0.42	0.28	0.32	0.3	0.29	0.28	0.3	0.22
F2 Forget bringing material															-	0.55	0.33	0.15	0.17	0.23	0.23	0.22	0.22	0.17
F3 Seldom turn in homework																-	0.4	0.17	0.21	0.26	0.25	0.25	0.27	0.19
F4 Bring prohibited material																	-	0.3	0.3	0.33	0.32	0.32	0.32	0.26
G1 Risky friendships																		-	0.46	0.23	0.22	0.19	0.22	0.26
G2 Risky acts																			-	0.26	0.26	0.25	0.25	0.18
H1 Teachers punish																				-	0.78	0.68	0.64	0.44
H2 Teachers dislike																					-	0.75	0.69	0.45
H3 Teachers mock																						-	0.67	0.42
H4 Teachers distrust																							-	.49
H5 Observe and snitch																								-

in daily life. The rating for each item ranged from 1 (*strongly disagree*) to 4 (*strongly agree*). Both subscales of father and mother monitoring consisted of five items, and each subscale score was the sum of these five items.

Victimization. This latent variable asked students if they had experienced victimization surrounding their life in the past year. The rating for each item ranged from 1 (*never*) to 4 (*almost every day*). This latent variable consisted of two subscales on the basis of their content. The two subscales were direct victimization and witness victimization. The score of each subscale was the sum of the items included in the subscale.

School engagement. This domain comprised four items, and students were asked questions to measure their level of school engagement. The ratings were provided on a 4-point scale and were coded from 1 (*strongly disagree*) to 4 (*strongly agree*).

Risky peers. In this domain, students were asked questions to determine the quality of their group of friends. The ratings ranged from 1 (*strongly disagree*) to 4 (*strongly agree*). The score of each subscale was the sum of the items included in the subscale. This domain was divided into two subscales based on preliminary factor analysis. The two subscales were risky friendships and risky acts.

Poor student–teacher relationships. This domain comprised five items about whether the respondents experienced a poor relationship between teachers and themselves. The ratings for each item were provided on a 4-point scale from 1 (*strongly disagree*) to 4 (*strongly agree*).

Analytical Plan

The primary analysis method in this study is latent variables structural equations modeling (SEM) with maximum likelihood (ML) estimation using AMOs program. SEM is a statistical methodology that takes a confirmatory approach to the analysis of structural theory describing relationships among endogenous factors (Bentler, 1988). The structure/hypothesized model can be tested statistically in a simultaneous analysis of an entire system of variables to determine the extent to which it is consistent with the data. Confirmative factor analysis (CFAs) was first to be conducted to ensure the measurement model as a good fit. Following the CFAs, the final SEM model including the full dataset of all high school students was tested. Next, comparative analyses were conducted in order to determine whether patterns of relationships and mediating effects are different between two types of high school students and between male and female students. In this comparative analysis, all the factor loadings, the paths, and the covariances are constrained to be equal simultaneously to the same model across school types and genders. Then, the model was tested by releasing path constraints one at a time to find out if releasing equality constraints could significantly improve the fit.

There are various indicators of the goodness of fit for a specific model. The chi-square coefficient is used to assess the size of discrepancies between the relationships in the original data matrix from those implied by the model. A low chi-square measure reveals nonsignificant discrepancies, and means that the data “fit” the theoretical model. However, because of the sensitivity of the chi-square coefficient to sample size, it is not a preferred fit index for large samples such as those in this study. Indeed, researchers have addressed the chi-square limitation by developing goodness-of-fit indices that take a more pragmatic approach to the evaluation process. More

commonly used fit indices include Bentler and Bonnett’s (1980) normed fit index (NFI), Bollen’s (1989) incremental fit index (IFI), and Bentler’s (1990) compared fit index (CFI). Typically, these three fit indices consider a model to be a good fit when the value is above .90 (Bentler, 1992), and a superior fit when it is close to .95 (Hu & Bentler, 1999). A common misfit measure, the root mean square error (RMSEA), is also reported in the SEM analysis. The RMSEA considers a mediocre fit to range from .08 to .10 and a good fit to be below .06 (Hu & Bentler, 1999).

RESULTS

Overall Model

The results of the analysis, based on the total sample, provided a good fit to the data: $\chi^2(224, N = 7,841) = 5,405.04, p < .001$, and with NFI = .93, IFI = .93, CFI = .93, and RMSEA = .05. This suggested that the model is a good one. Figure 1 illustrates the paths in this model.

Figure 1 depicts that student violence against students was directly associated with negative personal traits ($\beta = .14$) and victimization ($\beta = .28$). Risky peers and school engagement had a mediating effect on student violence against students for negative personal traits and victimization. This mediating effect was stronger for risky peers. Parental monitoring had little direct effect on student violence against students ($\beta = -.04$), but it did have an indirect effect mediated through risky peers and school engagement. Contrary to previous literature on school violence, the risk factor of poor student–teacher relationships was a poor predictor of student violence against students ($\beta = -.02$).

For student violence against teachers, there is no significant direct effect from negative personal traits ($\beta = .00$) or parental monitoring ($\beta = .03$). Prior victimization,

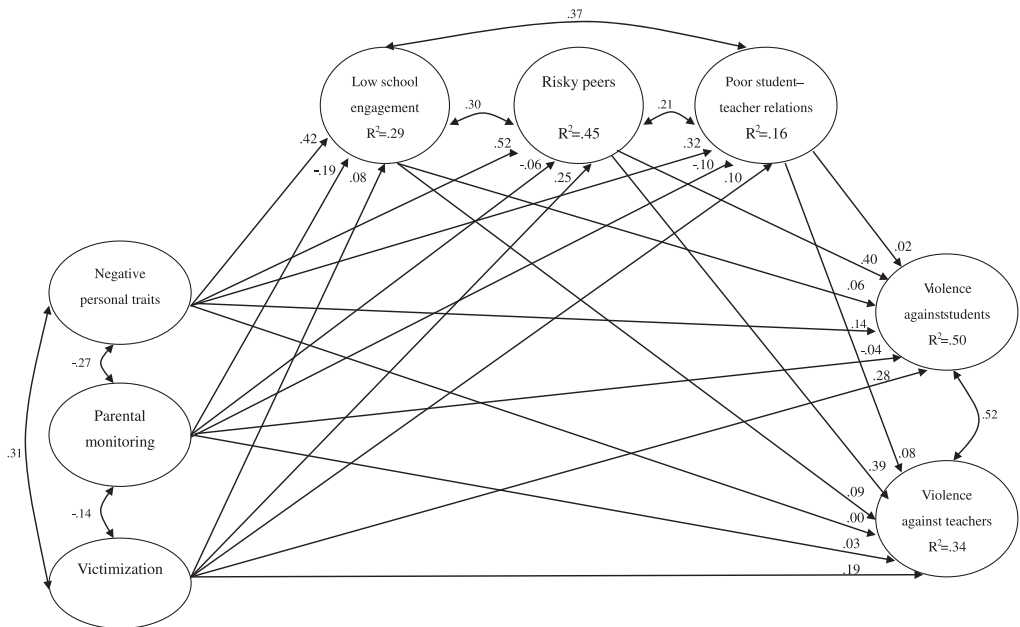


Figure 1. Structural equation modeling of direct and mediating effects on high school students’ violence against students and teachers.

however, had a direct association with student violence against teachers ($\beta = .19$). A low level of school engagement, risky peers, and poor student–teacher relationships had a mediating effect on student violence against teachers from negative personal traits, parental monitoring, and victimization. The mediating effect was stronger for risky peers. Overall, the variable of risky peers was the best predictor of student violence against students ($\beta = .40$) as well as student violence against teachers ($\beta = .39$). Taken together, all of these variables accounted for one half of the explained variance for student violence against students ($R^2 = .50$) and approximately one third for student violence against teachers ($R^2 = .34$).

School-Type Comparison Analysis

In this analysis, factor loadings, the paths, and the covariances were constrained to be equal to fit the covariance matrices of the academic and vocational subgroups simultaneously to the same model. The analysis provided a good fit to the data: χ^2 (492, N: academic = 3,769, vocational = 4,072) = 5857.28, $p < .001$ and with NFI = .92, IFI = .93, CFI = .93, and RMSEA = .04.

Next, the model was tested to determine if releasing equality constraints on the paths could significantly improve the fit. After releasing path constraints one at a time, it was determined that the release of the constraints between negative personal traits and risky peers, as well as between risky peers and student violence against students, yielded a significantly better fit to the model. Thus, the results for the final model with the two constraints released together were as follows: χ^2 (490, N: academic = 3,769, vocational = 4,072) = 5,834.48, $p < .001$ and with NFI = .92, IFI = .93, CFI = .93, and RMSEA = .04. Figure 2 represents the results of this analysis.

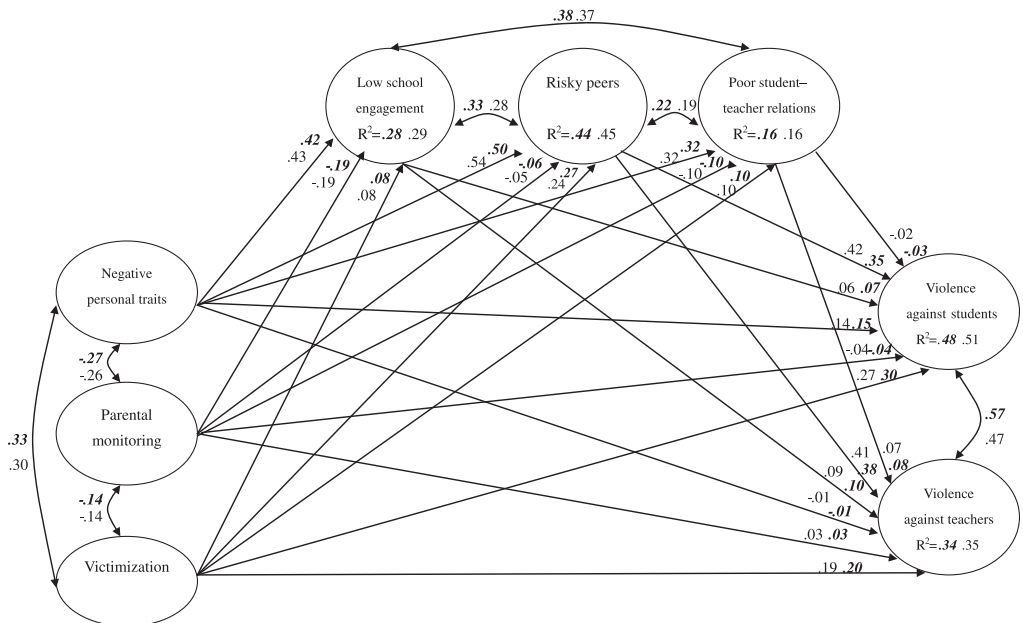


Figure 2. Structural equation modeling of direct and mediating effects on academic and vocational high school students’ violence against students and teachers. The coefficients in regular print and those in bold and oblique print represent, respectively, the results for the vocational and the academic samples.

Figure 2 also shows that the beta coefficients for both the academic and vocational models exhibit remarkable similarities. Negative personal traits, however, had a slightly stronger magnitude of association with risky peers for vocational settings ($\beta = .54$) compared with academic settings ($\beta = .50$). In addition, the influence of risky peers on student violence against students was stronger for vocational schools than for academic schools ($\beta = .35$ for academic vs. $\beta = .42$ for vocational). The overall model explained a similar proportion of variance on violence against students for academic schools ($R^2 = .48$) and vocational schools ($R^2 = .51$). For violence against teachers, the overall model explained approximately one third of variance for both academic schools ($R^2 = .34$) and vocational schools ($R^2 = .35$).

Gender Analysis

The gender analysis was conducted similarly to the procedure for the school comparison analysis. First, factor loadings, the paths, and the covariances were constrained to be equal to fit the covariance matrices of the male and female subgroups simultaneously to the same model. The analysis provided a good fit to the data: $\chi^2(492, N: \text{male} = 3,794, \text{female} = 4,026) = 5807.87, p < .001$ and with NFI = .92, IFI = .93, CFI = .93, and RMSEA = .04.

Next, path constraints were released, one at a time. It was determined that releasing the constraints between negative personal traits and risky peers; between negative personal traits and poor student–teacher relationships; between risky peers and student violence against students; and between victimization and student violence against teachers, yielded a significantly better fit to the model. Thus, the results for the final model, with the four constraints released together, were [$\chi^2(488, N: \text{male} = 3,794, \text{female} = 4,026) = 5736.07, p < .001$ and with NFI = .92, IFI = .93, CFI = .93, and RMSEA = .04]. Figure 3 represents the results of the gender analysis.

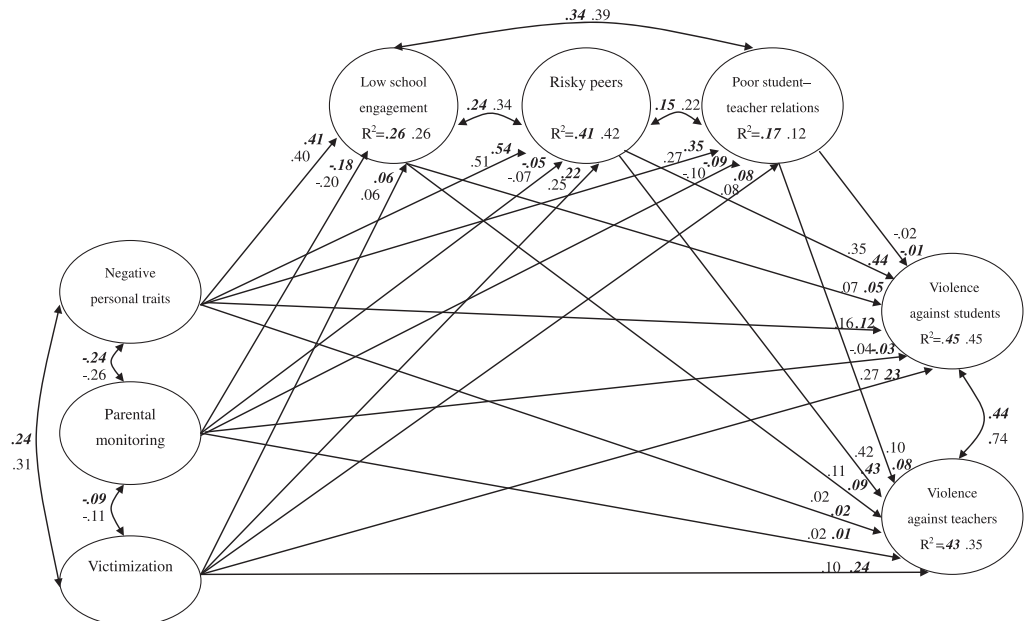


Figure 3. Structural equation modeling of direct and mediating effects on male and female high school students' violence against students and teachers. The coefficients in regular print and those in bold and oblique print represent, respectively, the results for the female and the male samples.

Differences between genders exist on several paths. The influences of negative personal traits on risky peers and on student–teacher relationships are stronger for males ($\beta = .54$ and $\beta = .35$, respectively) than for females ($\beta = .51$ and $\beta = .27$, respectively). For both genders, risky peers had the strongest impact on student violence against students; however, the impact was stronger for males ($\beta = .44$) than for females ($\beta = .35$). Finally, prior victimization showed about a two times stronger impact on student violence against teachers for males than for females ($\beta = .24$ for males vs. $\beta = .10$ for females). The overall model explained the same proportion of variance on violence against students for males and females ($R^2 = .45$). For violence against teachers, the overall model explained 43% of variance for males and 35% for females.

DISCUSSION

This study, using a nationally representative sample in Taiwan, examined how students' personal, family, and school experiences are related to student perpetrating school violence against students and teachers in Asian high school settings. The study proposed that negative personal traits, parental monitoring, and victimization would be mediated through a low level of school involvement, risky peers, and poor student–teacher relationships. The study also examined if the overarching patterns of relationships between risk factors and perpetrating school violence are similar or different between school types and between genders. This study expected that the model would fit males and females as well as academic and vocational high school students.

Overall Model

The results of this study showed good indices of model fit. This suggested that the theoretical model of how patterns of relationships among students' personal, family, and school experiences associated with perpetrating school violence is supported. Furthermore, the influence of the variables in this model account for a relatively large amount of the explained variance for student violence against students and student violence against teachers. This suggested that the patterns of relationships between students' personal traits, parental monitoring, personal victimization, school engagement, risky peers, and student–teacher relationships contribute greatly to student violence against students and teachers.

The results showed that student violence against students is directly associated with students' negative personal traits and is indirectly mediated through school engagement and risky peers. The variable of negative personal traits has no direct association with violence against teachers, but has stronger indirect effects mediated through school engagement, risky peers, and student–teacher relationships. Parental monitoring is not directly associated with student violence against students and teachers in a significant way. Instead, the effect of parental monitoring is mediated by within school variables. Students' prior victimization has direct links to both types of school violence. Prior victimization also has indirect effects on violence against students mediated through school engagement and risky peers and indirect effects on violence against teachers mediated through all school variables. These findings support Benbenishty and Astor's (2005) theoretical model that school violence is influenced by a combination of within-school and external-school variables, and within-school variables can mediate the contributions from external contexts. In addition, these

mediation findings provide empirical evidence supporting the idea that school environment is a unique and independent developmental setting that contributes directly and indirectly to school violence in high school context (Astor et al., 2002; Benbenishty et al., 2002).

The results show that compared with the low level of school engagement and poor student–teacher relationships, risky peers had much stronger mediating effect on student violence against both students and teachers. The findings indicate that school peers play a more important role than teachers in mediating school violence in high school. The findings mirror the current developmental theory and adolescent behavior literature, which indicate that peers are central influences on student behavior during adolescence (e.g., Alexander, Piazza, Mekos, & Valente, 2001; Bollmer, Milich, Harris, & Maras, 2005; Espelage & Holt, 2001; Huttunen, Salmivalli, & Lagerspetz, 1996; Papalia, Olds, & Feldman, 2009). This finding suggests that improving students' school experiences could show a strong effective on response to violence. Most important, interventions that focused on decreasing students' involvement with at-risk peers may lead to significantly reducing student violence against students and teachers. In addition to school factors, interventions strategies geared toward decreasing school violence for high school students should also target students' negative personal traits and their overall experiences of victimization, because the findings suggest that these two variables have important direct and indirect influences that fuel both types of violence.

The overall results of this study show that most of the same relationships between risk factors and school violence reported in studies from Western countries are also found in Asian cultural contexts, especially in Taiwan. The findings provide useful information for school policy makers or clinicians in Asia, who are developing or adapting school-based school violence prevention and intervention strategies.

Student violence against students is not strongly predicted by parental monitoring and poor student–teacher relationships. Negative personal traits and parental monitoring are also weak predictors of student violence against teachers. These findings were unexpected, because previous studies and theories suggested that those variables should be strong predictors of school violence. Possible explanations for these inconsistent findings may be our more comprehensive model, type of sample, and/or data analysis approach. Future research should include a more detailed contextual analysis to clarify whether these results are because of the sample or the methodology (or perhaps a new finding). Future researchers may apply this theoretical model in other countries to further confirm the similarities or differences across cultures in school violence findings.

School Type Differences

Educational tracking based on academic ability accounts for different school structures and social dynamics between vocationally versus academically oriented high schools in Taiwan (Chang, 1992; Gang & Klaus, 2000; Hsieh, 2003). Many educational practitioners have predicted that the settings of vocational and academic schools mediate school violence in different ways. Alternatively, some researchers have argued that the actual mediating mechanism may not vary significantly between the different school types in different cultures (Astor & Meyer, 2001; Benbenishty & Astor, 2005).

The results of this study show that the overall theoretical model is applicable across school types. For both academic and vocational high schools, a low level of school

engagement, risky peers, and poor student–teacher relationships had similar mediating effects on violence against both students and teachers. These findings imply that the school mediating mechanism is similar between these two different school types. These findings suggest that Taiwan’s educational tracking system by academic ability does not account for different students’ perpetration patterns.

We find it interesting to note, however, that the links from both negative personal traits to risky peers and from risky peers to student violence against students are slightly stronger for vocational students. This suggested that risky peers had a stronger mediating effect from negative personal traits to student violence against students for vocational high school students. The findings imply that interventions aimed at eliminating negative personal traits and reducing risky peers would lessen student violence against students and would be more likely to affect vocational high school students.

Gender Differences

The results show that the overall theoretical model is applicable across both genders. Although many international studies suggest that male students have higher rates of perpetrating school violence than females in high school (Baldry, 2003; Chen & Astor, 2009a,b; Nansel et al., 2001; Rigby, 2005), these findings suggested that how males’ and females’ personal, family, and school experiences affect violence against students and teachers are quite similar. This finding also indicates that school violence interventions or policies incorporated at a national level could be affective across genders.

We find it interesting to note, however, that students’ negative personal traits have a stronger association with risky peers for male students. The link between risky peers and student violence against students are also stronger for male students. These findings suggested that risky peers had a stronger mediating effect from negative personal traits to violence against students for male students. It is possible that boys are more likely than girls to be influenced by at-risk peers (Alexander et al., 2001; Bollmer et al., 2005; Heinze, Toro, & Urberg, 2004; Papalia et al., 2009; Selfhout, Branje, & Meeus, 2008). If boys with positive attitudes toward violence and poor impulsive controls affiliate with their peers with similar personal characteristics, they may be more likely than girls to reinforce their learning of violent behavior in school (Capaldi, Dishion, Stoolmiller, & Yoerger, 2001; Heinze et al., 2004; Selfhout et al., 2008; Solomon, 2006; Sutherland, 1947; Sutherland and Cressy, 1978).

The findings imply that interventions aimed at negative personal traits and reducing risky peers would reduce student violence against students and would be more likely to affect male students. Risky peer groups at school, however, are a key mediator in this process. In addition, prior victimization had a slightly stronger impact on student violence against teachers for males. This finding suggested that intervention aimed at decreasing or dealing more effectively with student victimization could reduce student violence against teachers. Our model suggests this strategy would be more effective for male students than for female students.

Overall, this study should be replicated with a longitudinal sample that can better determine the direction of effects and causal relationships. It suggests that interventions aimed both at the students (ones traditionally used) and those aimed at the school site (mediational) could be a key at disrupting the trajectories of violence at school toward teachers and students. School risky peer groups appear to be the

strongest mediator for all school types and across genders. Finally, the patterns of relationships that exist in Taiwan appear theoretically and empirically similar to those found in the Western countries. This raises theoretical questions that need to be explored surrounding the commonality between school variables and family or personality variables in different cultures across the globe.

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APPENDIX

Theoretical Domains, Subscales, and Items for High School

<i>Domain (Alpha's)</i>	<i>Subscales (Loadings)</i>	<i>Items</i>
Violence against students (Alpha = .79)	Physical (loading = .70)	Students beat or kick other students (by group) to hurt him/her/them. Students beat or kick other students (by individual) to hurt him/her/them. Students use dangerous objects or instruments to harm students.
	Vandalism (loading = .64)	Students intentionally destroy or break school public belongings. Students intentionally destroy or break other students' belongings.
	Verbal/threat (loading = .75)	Students verbally threaten or intimidate other students. Students curse or insult other students. Students threaten or blackmail other students. Students tease, mock, or play physically harmful tricks on other students on purpose. Students threaten or force others to buy things.
Violence against teachers (Alpha = .58)	Physical (loading = .55)	Students beat or kick teacher(s). Students use dangerous objects or instruments to harm teacher(s).
	Verbal/threat (loading = .75)	Students curse or insult teacher(s). Students threaten or intimidate teacher(s). Students extort or blackmail teacher(s).
	Emotional (loading = .60)	Students tease, mock, or play physically harmful tricks on teacher(s). Students oppose teacher(s) to cause them psychological harm.
Negative personal traits (Alpha = .92)	Attitude toward violence (loading = .70)	If someone insulted me or my family, beating him/her will make me feel better.

<i>Domain (Alpha's)</i>	<i>Subscales (Loadings)</i>	<i>Items</i>
Negative personal traits (Alpha = .92)	Impulsive control (loading = .82)	If someone disrespects me, I will beat him/her to regain honor
		I will feel unhappy if I do not beat someone who cursed me.
		A coward is a person who never retaliates when he/she is insulted.
		If someone impedes my plans, he/she will pay for it.
		If someone tries to hurt me, I will take vengeance on him/her.
		Violence is the best way to resolve any problem.
		Violence is justice.
		If someone makes me unhappy, beating him is what he/she deserves.
		Violence is better than negotiation.
		I often make mistakes due to uncontrolled anger.
I often feel regretful about the things I do.		
When I feel angry, no one can control me.		
I have some bad habit that I always fail to change.		
I can not help violating school rules.		
I can not tolerate when others look down on me.		
Parent monitoring (Alpha = .89)	Trait anger temperament (loading = .83)	I loose my temper easily.
		I am an irritable person.
		I am easily agitated.
		I feel anger if someone's mistakes disturb my work.
		I often can not control my anger.
	Father (loading = .95)	When I feel angry, I will curse or use dirty words, such as fuck.
		I will feel angry if someone criticizes me.
		Beating others will make me feel better if I feel unhappy.
		I feel upset if the work is done worse than I expect.
		I feel angry if my work is criticized.
Mother (loading = .86)	My father (or father figure) knows my friends.	
	My father (or father figure) knows my conduct.	
	If I am not at home, my father (or father figure) will know where I am.	
	My father knows my schedules.	
	My father (or father figure) often takes activities with me.	
Victimization (Alpha = .86)	Direct (loading = .55)	My mother (or mother figure) knows my friends.
		My mother (or mother figure) knows my personality and general conduct.
		If I am not at home, my mother (or mother figure) knows where I am.
		My mother knows my schedule.
		My mother (or mother figure) often does activities with me.
		Have you been beaten or kicked by others?
		Has someone hit and hurt you with an object of any kind?
		Have you been beaten or kicked by groups of people after class or school?
		Have you been blackmailed by others?
		Have you been verbally threatened by others?
		Have you been intimidated by others?

<i>Domain (Alpha's)</i>	<i>Subscales (Loadings)</i>	<i>Items</i>
Victimization (Alpha = .86)	Witness (loading = .72)	Has someone threatened or intimidated you by passing a slip of paper?
		Have you seen anyone verbally threatened by others? Have you seen anyone threatened by weapons? Have you seen anyone destroy public belongings on purpose? Have you seen anyone beaten by others or participating in group fights? Have you seen anyone robbed by others? Have you seen anyone insulted by others? Have you seen anyone blackmailed by others?
Low school engagement (Alpha = .74)	Doze off or skip (loading = .64)	I often doze off in class or skip class.
	Forget bringing (loading = .62)	I often forget to bring required materials (textbooks/homework) to school.
	Seldom turn in homework (loading = .68)	I seldom turn in homework.
	Prohibited material (loading = .64)	I often bring prohibited materials to school.
Risky peers (Alpha = .76)	Risky friendship (loading = .71)	I have friends who are school gang members. I have friends who dropped out due to problem behavior in school. When I have conflicts with others, my friends will help me beat them or fight with them.
	Risky acts (loading = .65)	My friends are always on my side no matter what bad things I do. My friends and I often stay up all nights to drink, to gamble or to do illegal activities. My friends and I are often involved in fights or use our fists to protect our territory.
Poor student-teacher relationship (Alpha = .87)	Punish (loading = .84)	My teacher often punishes me for no reason.
	Dislike (loading = .90)	I feel that my teacher does not like me.
	Mock (loading = .83)	My teachers like to mock me.
	Distrust (loading = .78)	Even though I tell the truth, my teacher still distrusts me.
	Snitch (loading = .53)	Teachers often ask students to observe on what I am doing and snitch on me.

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