Beliefs about Fighting and Their Relations to Urban Adolescents' Frequency of Aggression and Victimization: Evaluation of the Beliefs about Fighting Scale

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Abstract

This study investigated the structure and concurrent validity of the Beliefs About Fighting Scale (BAFS). Participants were 2,118 students from three urban middle schools who completed measures of their beliefs, frequency of physical aggression, victimization, and nonviolent intentions. Ratings of students' frequency of physical aggression, physical victimization, and nonviolent behavior were also obtained from their teachers. The majority of the sample was African American (81%). Confirmatory factor analyses supported a model with separate factors representing beliefs against fighting, beliefs that fighting is sometimes necessary, beliefs supporting reactive aggression, and beliefs supporting proactive aggression. Support was also found for strong measurement invariance across sex, grade, and groups that differed in whether a violence prevention program was being implemented at their school. The four BAFS factors were associated with adolescents' frequency of aggression, victimization, and nonviolent behavior. This study underscores the importance of assessing multiple aspects of beliefs associated with aggressive behavior.

Keywords

beliefs; aggression; fighting; nonviolent behavior; early adolescence; measurement

Engaging in aggression places adolescents at risk for a host of negative outcomes in adulthood, including substance use, delinquency, justice system involvement, mental health problems, limited educational attainment, and poor economic self-sufficiency (e.g., Fite, Raine, Stouthamer-Loeber, Loeber, & Pardini, 2010; Huesmann, Eron, & Dubow, 2002). Early adolescence is a particularly important time to investigate factors that influence the development of aggressive behavior. During the transition to the larger and less structured context of middle school, adolescents encounter changes in social norms and peer relations

that influence their beliefs and behavior (Craig, Pepler, Connolly, & Henderson, 2001; Nansel, Haynie, & Simons-Morton, 2003). This highlights the need for a clear understanding of the factors that increase adolescents' risk for engaging in aggression to guide the development of effective violence prevention efforts (Farrell & Vulin-Reynolds, 2007).

There is both theoretical and empirical evidence to suggest that beliefs play a particularly important role in the development of aggressive behavior during adolescence. Adolescents may have both general beliefs about aggression (e.g., fighting is acceptable or unacceptable), and more specific beliefs about the appropriateness of using aggression in response to provocation (reactive aggression) or for instrumental gain (Huesmann, 1998). This has led to the development of measures of normative beliefs, which represent injunctive norms that reflect behaviors individuals believe are acceptable and appropriate (e.g., Huesmann & Guerra, 1997). Although researchers have consistently found evidence of relations between normative beliefs and aggressive behavior (e.g., Henry et al., 2000; Nash & Kim, 2007; Slaby & Guerra, 1988), current measures of beliefs may not adequately capture the complexity of adolescents' beliefs about the use of aggression.

Normative beliefs about aggression are nuanced and vary across situations. This was demonstrated by Farrell and colleagues (2008), who conducted a qualitative study in which they interviewed 106 adolescents in an urban school system. They presented participants with specific problem situations involving peers and asked them to discuss the factors that would influence their response to each situation. Participants described a range of beliefs that would influence whether they would use physical aggression or a nonviolent response in each situation. More than half the participants indicated that fighting is the best choice under specific circumstances, citing rules of engagement (such as someone spreading rumors about them) or the need for revenge or retaliation as factors supporting aggressive behavior. Beliefs may also influence the efficacy of prevention efforts. For example, Farrell, Mehari, Kramer-Kuhn, Mays, and Sullivan (2015) assessed adolescents' use of nonviolent problem-solving strategies following participation in a violence prevention curriculum. Some participants explained that they chose not to use skills taught by the intervention due to these rules of engagement, such as the belief that fighting is necessary if someone insulted their family. These findings highlight the need for measures that capture multiple dimensions of adolescents' beliefs about when they feel it is appropriate or necessary to engage in physical aggression. Such measures may be used to guide efforts to address individual and contextual factors that may impact the effectiveness of prevention efforts attempting to reduce aggressive behavior.

Farrell et al. (2012) developed the Beliefs About Fighting Scale (BAFS) to assess four key themes that emerged from the prior qualitative study (Farrell et al., 2008). The first theme, *beliefs against fighting*, was represented by items that reflected general beliefs that fighting is not appropriate, violates personal standards (e.g., "Fighting is just wrong; it's a bad thing to do") or is generally not very effective (e.g., "Fighting usually causes more problems than it solves"). A second theme, *fighting is sometimes necessary*, included items to capture adolescents' beliefs that fighting may not be desirable, but is sometimes unavoidable (e.g., "Sometimes a person doesn't have any choice but to fight") or is necessary to avoid further

problems or loss of social status (e.g., "If you don't fight some kids, they'll just keep picking on you"). The two remaining themes were consistent with theoretical and empirical work that has established the importance of differentiating between reactive and proactive aggression (Card & Little, 2006). Items representing *beliefs supporting reactive aggression* included beliefs that fighting is justified in response to a perceived offense (e.g., "It's okay to fight someone if they call you names or tease you") or frustration (e.g., "Its usually okay to push or shove other people around if you're mad"). Items representing *beliefs supporting proactive aggression* reflected beliefs that fighting is a legitimate approach to achieve a particular goal (e.g., "It's okay to fight someone if they have something you want").

Farrell et al. (2012) found support for their hypothesized four-factor structure based on a confirmatory factor analysis of data from 477 sixth graders attending two urban schools and a school in a nearby county. The four-factor structure fit the data significantly better than a competing model that specified an overall Beliefs About Fighting factor. The Beliefs Against Fighting factor had small to moderate negative correlations with the other three factors ($rs = -.38$ to $-.14$), suggesting that beliefs against fighting are not simply the opposite of beliefs that support fighting. Although the Beliefs Supporting Reactive Aggression factor was highly correlated with the Fighting is Sometimes Necessary and Beliefs Supporting Proactive Aggression factors ($rs = .75$ and $.71$, respectively), the latter two factors were only moderately correlated ($r = .28$). Moreover, Farrell at al. (2012) did not find support for a second-order factor model in which the four factors loaded on a higher-order factor representing Overall Beliefs Supporting Fighting. In general, these findings supported the notion that adolescents' beliefs about fighting are best represented by multiple factors and that prior measures that represent beliefs by a single overall factor (e.g., Huang, Cornell, & Konold, 2015) may not adequately capture their complexity.

Although the BAFS appears to capture the multiple dimensions of adolescents' general beliefs about aggression and when they consider it appropriate, further work is needed to evaluate its concurrent validity and to establish measurement invariance. There has been increasing recognition of the importance of measurement invariance, or the extent to which relations between the items on a measure and the latent variables they represent are consistent across different groups of individuals or contexts. Although measurement invariance is a prerequisite to making meaningful comparisons across groups (Widaman & Reise, 1997), it is more often assumed than explicitly tested. Establishing measurement invariance is critical for studies that compare groups that differ on characteristics such as sex and grade. One aspect of measurement invariance that is particularly neglected is the extent to which an intervention might alter the properties of measures used to evaluate its impact. For example, an intervention that focuses on reducing bullying or aggression might alter participants' beliefs about aggression. Such an intervention might not only change their overall level of beliefs (i.e., means), but could also alter their belief structure (i.e., the relation between individual items and the latent variables they are intended to represent). Establishing measurement invariance across groups that differ in their exposure to an intervention is thus a basic requirement necessary for making comparisons across groups and for assessing pre-to-post intervention effects.

The purpose of this study was to conduct further analyses of the BAFS to investigate its structure, its measurement invariance and concurrent validity. We hypothesized that the four-factor model based on Farrell et al. (2012) would represent the data better than competing models that assumed fewer dimensions. These included a single factor model, that specified a single overall Beliefs Against Fighting factor similar to that used by many other measures of beliefs (e.g., Huang et al., 2015), and a two-factor model that differentiated between beliefs supporting fighting and beliefs against fighting. We also hypothesized that support would be found for strong measurement invariance such that the structure and measurement parameters of the BAFS would not differ across sex or grade. This project involved secondary analysis of data collected from a study that evaluated school-wide implementation of a bullying prevention program. This provided an opportunity to evaluate measurement invariance across groups that differed in intervention status, more specifically whether the intervention was being implemented at the school when students completed the measure. We considered it plausible that exposure to the intervention could alter the structure of the measure, but hoped that would not be the case as such a finding would compromise the use of the measure in studies evaluating the impact of interventions on beliefs.

We also examined mean differences across sex and grade. We hypothesized that boys would be more likely to hold beliefs supporting aggression and less likely to hold beliefs against aggression compared with girls. This is consistent with studies of elementary school students that found that boys endorsed greater approval of aggression (Huesmann & Guerra, 1997). We also hypothesized that beliefs supporting aggression and beliefs that fighting is sometimes necessary would increase across middle school. We assumed that increasing exposure to peer models of aggression and contingencies for aggression that occur during adolescence (Moffitt, 1993) would alter adolescents' beliefs about the circumstances under which fighting is necessary or appropriate. We did not examine mean differences based on intervention status in this study, because intervention effects were confounded with school and time effects that were not addressed by our cross-sectional models of the structure of the BAFS.

A further objective was to assess concurrent relations between the dimensions of beliefs measured by the BAFS and adolescents' frequency of aggression, victimization, and prosocial behavior. We hypothesized that each of the four dimensions of the BAFS would be uniquely associated with physical aggression. We also hypothesized that adolescents who endorsed beliefs in support of retaliatory aggression or in support of the necessity of fighting under certain conditions would be more likely to report higher levels of victimization. Finally, we expected that adolescents who endorsed beliefs against the use of aggression would be more likely to engage in nonviolent behavior. This represents a shift in the focus of most prior work, which has focused on identifying factors that are related to aggressive behavior rather than those that are associated with effective nonviolent alternatives to addressing problem situations. We based this hypothesis on the social-information processing model (Crick & Dodge, 1994), which maintains that how individuals respond in a particular situation is influenced by their beliefs and values associated with different response options.

Method

Setting and Participants

Participants were students at three urban public middle schools in the southeastern United States who participated in a six-year study (author reference) to evaluate school-level implementation of the Olweus Bullying Prevention Program (Olweus & Limber, 2010). The majority of students at these schools were African American adolescents from low-income families, most of whom (i.e., 74% to 85%) were eligible for the federal free lunch program. The evaluation study involved a multiple baseline design that used randomization to determine the order and timing of initiating intervention activities in each school. Based on this randomization schedule, the intervention was implemented at one of the schools beginning in the project's second year, at a second school beginning in the project's third year, and at a third school beginning in the project's sixth year. About 630 students were randomly selected from the sixth, seventh, and eighth grade rosters at each school in the fall of 2010. During each of the five subsequent school years, a new random sample of sixth graders was recruited along with a random sample of seventh and eighth graders to replace those who left the school (15%) or withdrew from the study (4%) before completing the eighth grade. Active parental permission and student assent were obtained from approximately 80% of all eligible students. Data were collected every three months in the fall (late October through early November), winter (late January through early February), spring (late April through early May), and in the summer between school years (late July through early September). The evaluation study used a planned missing-data design (Graham, Taylor, & Cumsille, 2001) such that each participant was randomly assigned to complete two of four waves of data during each year they participated.

For the present study, we created a cross-sectional dataset by randomly sampling one wave from each participant using an algorithm that provided about the same number of participants from each grade and time of year. The final sample of 2,118 students included 703 to 709 students from each grade. These represented 98% of all those from whom parental consent and student assent were obtained. Their mean ages were 11.7 (SD = 0.66), 12.7 (SD = 0.69), and 13.8 (SD = 0.70), for sixth, seventh, and eighth graders, respectively. The sample was 52% female. Seventeen percent of the sample identified their ethnicity as Hispanic or Latino. Students were asked to identify their race by endorsing one or more categories. The majority (81%) self-identified as Black or African American. This included 73% of the total sample who endorsed it as the sole category and 8% who endorsed it as one of several categories. The remainder of the sample included 5% who identified themselves as White, 10% who did not endorse any racial category, and 3% who endorsed one of the remaining categories. Most (i.e., 91%) of those who did not endorse any of the racial categories were Hispanic or Latino. Single mother was the most frequently reported family structure (41%), 25% lived with both biological parents, 21% lived with a parent and stepparent, 6% lived with a relative without a parent, and 3% with a father without a mother or stepmother. More than half (58%) completed the measures during a year when the Olweus Bullying Prevention Program was being implemented at their school.

Procedures

Research staff described the study to potential participants and gave them student assent and parental consent forms to review with their parents. Staff followed up with parents via phone and home visits as needed. Students received a $5 gift card for returning consent forms whether or not they participated. Research staff informed participants of their rights as research participants, including the option to decline or limit participation at any time. Participants received a $10 gift certificate for completing any portion of the survey. Research assistants administered the measures using a computer-aided personal interview to small groups of students in the schools during the school years and in individual student's homes or community locations during the summers. Core education teachers completed ratings of each student's behavior during the three waves of data collection that took place during the school year. The University's Institutional Review Board reviewed and approved all procedures.

Beliefs Measure

The Beliefs About Fighting Scale (BAFS; Farrell et al. 2012) instructs adolescents to rate their level of agreement with 23 items representing general beliefs about the use of aggression and the appropriateness of using fighting or aggression in various contexts (see Table 1). Items were written to represent four themes that emerged from a qualitative study in which adolescents described beliefs that influenced whether they would use physical aggression or a nonviolent response in situations that involved conflicts with peers (Farrell et al., 2008). Additional items were based on a review of other measures of adolescents' beliefs about aggression. Respondents rated each item on a 4-point anchored scale: 1 - *Strongly disagree*, 2 - *Disagree*, 3 - *Agree*, 4 - *Strongly agree*. As previously noted, participants were given the option of skipping items. Participants completed 94.5% of the total possible responses.

Measures of Aggression, Victimization, and Prosocial Behavior

The Problem Behavior Frequency Scale – Adolescent Report (PBFS-AR; Farrell et al., 2016).—We used the PBFS-AR to provide a self-report measure of adolescents' frequency of physical aggression and victimization. The PBFS-AR has separate scales to assess physical aggression, relational aggression, delinquent behavior, substance use, and victimization. Recent analyses of the structure of the PBFS-AR have found support for distinct factors representing physical and relational aggression, but a single overall factor that subsumes physical, verbal and relational victimization experiences (Author reference). Adolescents rate how frequently they engaged in each behavior or experienced each item on the victimization scale in the past 30 days on a 6-point frequency scale, ranging from 1 – *Never* to 6 - *20 or more times*. Farrell et al. (2016) evaluated the PBFS-AR based a sample of 5,532 adolescents from 37 schools in four states. They found support for the structure of the PBFS-AR, and for strong measurement invariance across gender, grades, settings, and time. They also found evidence of concurrent validity based on the BAFS's pattern of correlations with teacher ratings of adolescents' adjustment and self-reports of related constructs. A more recent evaluation of the PBFS-AR based on the data set that provided data for the current study found support for strong measurement invariance across gender

and intervention status, and concurrent validity based on correlations with teacher ratings and school office disciplinary referrals (Author reference). The internal consistencies (coefficient alpha) for the physical aggression and victimization scales in the current study were .77 and .90, respectively. Participants completed 98.6% of the total possible responses.

The Behavioral Intentions Scale.—We used the Effective Nonviolent Intentions scale from the Perceptions of Responses to Problem Situations Scale (Author reference) to assess participants' propensity to use nonviolent responses in peer conflict situations. The scale describes six problem situations, each of which is followed by an aggressive and a non-aggressive response. Respondents are asked to rate their likelihood of making each response in that situation on a 5-point rating scale from 1 - *Definitely would not* to 5 - *Definitely would*. Problem situations and responses were based on a qualitative study that asked urban adolescents, parents, teachers, and community members to identify relevant and difficult situations faced by adolescents (Farrell et al., 2008). The five items in the Effective Nonviolent Intentions scale are responses that received high ratings of effectiveness from a sample of community youth and adults. For example, an effective nonviolent response for a situation where the adolescent was blamed for starting a rumor was: "Talk it out with the person the rumor was about and explain that you didn't start it?" Because this scale was only administered during the first four years of data collection, data on this measure were available for only 1,353 participants. Coefficient alpha for this measure based on data for the current study was .70. Participants completed 93.9% of the total possible responses.

Problem Behavior Frequency Scale – Teacher Report Form (PBFS-TR; Farrell, Goncy, Sullivan, & Thompson, 2018).—The PBFS-TR is a teacher report form of the PBFS with separate factors representing physical, verbal, and relational forms of aggression and victimization, prosocial behavior, and effective nonviolent behavior. Teachers rate how frequently the identified adolescent engaged in each behavior in the past 30 days on a 4-point scale, where 1 - *Never*, 2 - *Sometimes*, 3 - *Often* and 4 - *Very Often*. Farrell et al. (2018) established the PBFS-TR's overall structure and measurement invariance over time and across gender and grade. They also found evidence supporting its concurrent validity based on strong correlations with teachers' ratings on the Social Skills Improvement System (Gresham & Elliott, 2008) and student ratings on the PBFS-AR. The current study used the Physical Aggression, Physical Victimization, and Effective Nonviolent Behavior scales. Alpha coefficients for these scales using data from the present study were .89, .88, and .85, respectively. Teachers completed 95.6% of the total possible number of ratings.

Analyses

We conducted confirmatory factor analyses to compare competing models of the structure of the BAFS. We conducted all analyses in Mplus 8 using weighted least squares mean- and variance-adjusted estimators (WLSMV) that treated scores on each item as ordered categorical variables. Although WLSMV makes use of all available data, it uses a pairwise present approach, which is more restrictive than maximum likelihood estimation. Unfortunately, maximum likelihood estimators are computationally intensive, particularly with models involving more than three or four factors and with large sample sizes (Muthén & Muthén, 2012). For this reason, WLSMV is often the best option for analysis of

categorical variables (Brown, 2006). This analysis is comparable to a graded response item-response theory model. We compared competing models based on the difference test function in Mplus (Muthén & Asparouhov, 2006) where applicable, and measures of overall model fit. We used Hu and Bentler's (1999) recommendation as general guidelines for evaluating model fit. We considered models to have a good fit based on cutoffs of close to .95 or higher for the comparative fit index (CFI) and Tucker-Lewis fit index (TLI), and close to .06 or lower for the root mean square error of approximation (RMSEA). We conducted multiple group analyses to test for measurement invariance across sex, grade, and intervention status. This involved comparing an unconstrained model that specified the same structure for each group (i.e., configural invariance) to a model that constrained corresponding factor loadings and thresholds for each factor to the same values across groups (i.e., scalar or strong factorial invariance). We followed recommendations by Cheung and Rensvold (2014) who argued that a change in the CFI (i.e., CFI) of less than .01 is a more appropriate test of model invariance than the chi-squared difference test because the latter may detect very minor differences in fit in large samples such as in the present study.

A final set of analyses examined relations between the BAFS factors and student and teacher measures of physical aggression, victimization, and nonviolent behavior. Analyses were based on structural equation models that included latent variables representing BAFS factors and concurrent measures based on student or teacher report. We first examined correlations with the BAFS factors. We then used latent variable regression models to determine the extent to which each BAFS factor was uniquely related to the concurrent measures controlling for sex, grade, and intervention status. We evaluated statistical significance based on $p < .05$.

Results

Structure of the Beliefs Measure

Our initial analysis evaluated three models of the structure of the BAFS: (a) the hypothesized four-factor model; (b) a two-factor model with separate factors representing beliefs against fighting and beliefs supporting fighting; and (c) a single-factor model. Although the four-factor model fit the data significantly better than the two competing models, its overall fit was marginal (see Model 1 in Table 2). We therefore conducted exploratory analyses to identify items that may not have fit well within the four-factor structure. We investigated this by testing an exploratory structural equation model (Asparouhov & Muthen, 2009; Marsh et al., 2009) that allowed each item to load on all of the factors and used a target rotation based on the hypothesized four-factor structure. Within this model all of the items had their strongest loading on their hypothesized factor (i.e., λs = .47 to .91). However, five of the items had cross-loadings of .30 or higher on a second factor (see Table S1). These items also had the lowest loadings on their hypothesized factor (i.e., λs = .47 to .64).

Based on these findings we re-ran the three competing models after excluding one item from each factor that showed the poorest discrimination in the exploratory analyses. The four-factor model again fit the data significantly better than the two competing models, and had a more acceptable overall fit (see Model 5 in Table 2). Standardized loadings for this model

were all significant, ranging from .72 to .86, with an average value of .79 (see Table 1). Within this model, correlations among the four factors were generally as expected, with significant positive correlations among the three factors representing beliefs supporting aggression (rs = .43 to .73, see Table 3). As expected, the Beliefs Against Fighting factor was negatively correlated with the Beliefs Supporting Proactive Aggression factor ($r = -.16$). However, it was not significantly correlated with the Beliefs Supporting Reactive Aggression factor, and was positively correlated with the Fighting is Sometimes Necessary factor ($r = .32$). The Beliefs Supporting Reactive Aggression factor was highly correlated with the Fighting is Sometimes Necessary and Beliefs Supporting Proactive Aggression factors (rs = .71 and .60, respectively).

We assessed the local fit of the four-factor model by examining correlation residuals that represented the difference between the correlations obtained for the sample and correlations estimated by the model (Goodboy & Kline, 2017). Residuals ranged from .00 to .26 in absolute value (see Table S2). Of the 171 residuals, 24 had absolute values that exceeded .10, 6 exceeded .15, and 2 exceeded .20. Goodboy and Kline (2017) suggested that values exceeding .10 may indicate poor prediction for a pair of variables, but noted that there is no "magic number" of absolute correlation residuals exceeding .10 that would invalidate a model. Within the current study the pattern of residuals suggested that the model did the poorest job of accounting for relations between items in the Fighting is Sometimes Necessary factor and those in the other three factors. Residuals for these correlations included 17 of the 24 values exceeding .10.

Measurement Invariance

We conducted further analyses of the four-factor model using multiple group models to determine the extent to which there was support for measurement invariance across sex, grade, and intervention status (i.e., whether they completed measures while at a school where the intervention was being implemented). Models specifying configural invariance across sex, grades, and intervention status all fit the data well, as did models based on separate analyses of each group (see models 8, 10, and 12 in Table 2). Imposing strong measurement invariance resulted in a statistically significant decrease in model fit based on the difference test for sex ($p = .003$), but not for grade or intervention status (see Table 2). However, in no case did imposing strong measurement invariance result in a reduction in model fit based on comparison of the RMSEA, CFI, and TLI as measured to two decimal places. In fact, in most cases the more parsimonious models imposing measurement invariance resulted in improvements in fit indices. The only decrease in the CFI occurred for sex, but the decrease (i.e., .001) fell well below the cutoff of .01 recommended by Cheung and Rensvold's (2014).

Establishing strong measurement invariance made it possible to compare mean scores across groups. We estimated effect sizes for mean comparisons by calculating Cohen's d based on the pooled standard deviations from each group. As hypothesized, girls endorsed stronger beliefs against the use of aggression than did boys ($d = 0.34$, $p < .001$; see Table 3). However, there were no significant sex differences on the other three BAFS factors (ds = −0.04 to 0.02). Consistent with our hypotheses, compared with sixth grade students, seventh

and eighth grade students were less likely to endorse beliefs against fighting and more likely to endorse beliefs that fighting is sometimes necessary and beliefs supporting both reactive and proactive aggression (ds = .29 to .53). However, mean comparisons did not reveal any significant differences between seventh and eighth grade students at $p < .05$.

Relations between Beliefs and Adjustment

We conducted a series of analyses to examine relations between the BAFS factors and concurrent measures of aggression, victimization, and nonviolent behavior. Models included the four BAFS factors, and latent variables representing factors based on items from the adolescent and teacher report measures. By convention, all latent variables were constrained to have a mean of 0 and SD of 1.00. Separate models were tested for student reports on the PBFS-AR ($N = 2,118$), student ratings on the Effective Nonviolent Intentions scale ($N = 1,353$), and teacher ratings on the PBFS-TR ($N = 1,576$). The sample size was lower for the Effective Nonviolent Intentions Scale because it was not administered during the last two years of the project, and for the PBFS-TR because data were not collected from teachers during the summer waves. We also ran a model to evaluate correlations between the PBFS-AR, Effective Nonviolent Behavior Scale, and PBFS-TR. This revealed small, but significant cross-informant correlations between student and teacher measures of physical aggression scales ($r = .23$, $p < .001$), victimization ($r = .09$, $p < .019$), and effective nonviolent behavior ($r = .18$, $p < .001$).

The measurement models used to estimate correlations between the BAFS and student and teacher ratings on the PBFS fit the data well, with a somewhat poorer fit for the analysis of the intentions for nonviolent behavior scale (see models 1 to 3 in Table 4). Figure 1 provides point estimates and 95% confidence intervals for correlations between the four BAFS factors and other measures. Within this figure, a different marker and line represent each BAFS factor. The measures they are correlated with are depicted on the horizontal axis with student and teacher measures on the left and right sides of the figure, respectively. These correlations are also reported in Table S3. As expected, whereas the PBFS-AR Physical Aggression factor was negatively correlated with the Beliefs Against Fighting factor, it was positively correlated with all three factors supporting the use of aggression ($rs = .32$ to .41). Adolescents' report of their frequency of experiencing victimization was positively correlated with all four BAFS factors ($rs = .11$ to .26). However, counter to our hypothesis, this correlation was not stronger for beliefs supporting reactive aggression than for beliefs supporting proactive aggression. Adolescents' report of their intention to use nonviolent responses in problem situations was positively correlated with beliefs against fighting ($r = .61$), was not significantly correlated with beliefs that fighting is sometimes necessary ($r = .04$), and was negatively correlated with beliefs supporting the use of reactive and proactive aggression ($rs = -.23$ and $-.33$, respectively). As would be expected, there were weaker associations between the BAFS factors and teacher ratings of student behavior (see right half of Figure 1). The strongest associations were for the BAFS Beliefs Against Fighting factor, which was negatively correlated with teacher ratings of physical aggression and physical victimization ($rs = -.26$ and $-.23$, respectively), and positively correlated with the PBFS-TR Effective Nonviolent Behavior factor ($r = .18$). We found small significant correlations between the Beliefs Supporting Proactive Aggression factor and teacher ratings of physical

aggression and physical victimization. The remaining correlations were less than .10 in absolute value with the exception of a negative correlation between beliefs supporting reactive aggression and teacher ratings of nonviolent behavior ($r = -.11$).

We next examined the relations between each of the BAFS factors and adolescent and teacher ratings of physical aggression, victimization, and nonviolent behavior within a regression model that included all four BAFS factors and controlled for sex, grade, and intervention status (see Table 4 for fit indices and Table 5 for regression coefficients). The four BAFS factors accounted for 22.4% of the variance in adolescents' reports of their frequency of physical aggression after controlling for the covariates. Each of the factors except for Beliefs Supporting Reactive Aggression accounted for a unique portion of the variance in physical aggression with coefficients in the expected direction. The BAFS factors accounted for 11.7% of the variance in adolescent reports of their frequency of victimization. Within this model, the Beliefs That Fighting Is Sometimes Necessary and Beliefs Supporting Proactive Aggression factors were positively related to the frequency of victimization. In contrast, the Beliefs Supporting Reactive Aggression factor was negatively related to the frequency of victimization and The Beliefs Against Fighting factor was not related to victimization. The BAFS factors accounted for 38.4% of the variance in student reports of their intentions to use nonviolent strategies in conflict situations. The majority of this variance was accounted for by the Beliefs Against Fighting factor, with significant but smaller contributions from the Beliefs Supporting Reactive Aggression and Beliefs Supporting Proactive Aggression factors. The Fighting is Sometimes Necessary factor was not related to nonviolent intentions after controlling for the other BAFS factors.

The four BAFS factors accounted for 4.5% to 6.4% of the variance in the teacher ratings of physical aggression, physical victimization, and nonviolent behavior (see Table 4 for fit indices and Table 5 for regression coefficients). The Beliefs Against Fighting factor emerged as a significant predictor in each case and in the expected direction with negative associations with physical aggression and victimization, and positive relations with effective nonviolent behavior. It was the only one of the four BAFS factors uniquely related to teacher ratings of students' frequency of physical aggression. The Fighting is Sometimes Necessary factor did not emerge as a significant predictor of any of the three teacher report variables. The Beliefs Supporting Reactive Aggression factor was negatively associated with the frequency of nonviolent behavior, and the Beliefs Supporting Proactive Aggression factor was negatively associated with teacher ratings of the frequency of physical victimization.

Discussion

The purpose of this study was to examine the structure of a measure designed to assess adolescents' general beliefs against the use of aggression and to differentiate among beliefs supporting the use of aggression under different circumstances. We also evaluated its measurement invariance and concurrent validity based on its associations with adolescent self-report and teacher ratings of physical aggression, victimization, and nonviolent behavior. Confirmatory factor analyses supported the four-factor structure with strong measurement invariance across sex, grade, and intervention status. In general, the four BAFS

factors showed the expected patterns of correlations with both adolescent and teacher ratings of adolescents' behavior.

One of the unique aspects of the BAFS was its inclusion of a scale to assess beliefs that fighting is sometimes necessary. We based this scale on a qualitative study with a sample of urban adolescents who expressed ambivalence regarding the use of aggression (Farrell et al., 2008). They were generally opposed to aggression, but indicated that sometimes it was simply unavoidable or inevitable. This factor showed an interesting pattern of relations with the other BAFS factors. It was most strongly related to the Beliefs Supporting Reactive Aggression factor, which included items supporting the use of aggression in retaliation for acts of provocation such as being called names or being teased. However, it was also positively related to beliefs against fighting. Moreover, it showed an interesting pattern of correlations with student and teacher ratings. As with beliefs supporting reactive and proactive aggression, it was positively correlated with student reports of their frequency of physical aggression and victimization. However, whereas the other factors supporting aggression were negatively related to nonviolent intentions, it had a slight positive correlation. The positive correlation between beliefs that fighting is sometimes necessary with both beliefs against fighting and with intentions to behave nonviolently reveals a critical dialectic. Youth may believe that fighting is wrong and desire to behave nonviolently, but then feel compelled by certain contextual factors to engage in aggression. This may not be as paradoxical as it sounds; for example, although most adolescents may agree that violence is wrong, they might still choose to fight in self-defense or to protect another person or their property. The ambiguous nature of this construct made it difficult to assess. Our evaluation of local fit indicated that our model had the most difficulty accounting for relations between items on the Fighting is Sometimes Necessary factor and the Beliefs Against Fighting factor. Further work is needed to clarify the nature of this construct and to develop items that more adequately capture its subtleties.

Clarifying the situational factors that activate a belief that fighting is necessary among youth in urban areas is vital to implementing effective prevention. Prior research suggests that youth in environments with high rates of violence may be socialized by parents and peers to believe that presenting a tough image by behaving aggressively is essential to protecting themselves from future harm (e.g., Copeland-Linder et al., 2007). Similar notions about fighting to protect one's image and ward off further victimization by peers are at play in the school context (Bettencourt & Farrell, 2013; Farrell et al., 2010). Whereas these studies indicate that youth are socialized to believe fighting is necessary, more research is needed to understand what specific characteristics of the social context lead youth to perceive that such a defensive strategy is required.

This study provided support for the value of differentiating between beliefs against aggression and beliefs supporting aggression. This suggests that beliefs supporting fighting are not simply a mirror image of beliefs against fighting. All four factors represented distinct constructs. This was reflected in the non-significant correlation between beliefs against fighting and beliefs supporting reactive aggression and the small negative correlation between beliefs against fighting and beliefs supporting proactive aggression. This was also reflected in the positive correlations between beliefs against fighting and both student and

teacher ratings of nonviolent behavior. This suggests that efforts to promote nonviolent behavior may require more than simply reducing beliefs that support the use of aggression, but also require promoting beliefs that support nonviolent responses. Beliefs against fighting also uniquely contributed to predicting both student and teacher ratings of the frequency of physical aggression. A surprising finding was its positive correlation with the student measure of victimization, but negative correlation with teacher ratings of students' physical victimization. This finding is somewhat consistent with prior research that found that youth involved in peer victimization primarily as victims reported similar levels of beliefs against fighting to those who had no involvement in peer victimization (Bettencourt & Farrell, 2013). The pattern of correlations between teacher and student ratings of victimization and beliefs about fighting found in this study may be evidence that youth who hold beliefs against fighting reflect a heterogeneous group. This includes some youth who tend to get along with others and are therefore not victimized, and others who may believe strongly that fighting is wrong, but nevertheless find themselves on the receiving end of victimization and believing that fighting is sometimes necessary to defend or protect themselves.

Our findings supported measurement invariance across male and female adolescents, but revealed some interesting mean differences across groups. Although we had hypothesized that boys would endorse stronger beliefs supporting aggression than would girls, this did not prove to be the case. There was one small gender difference such that girls reported stronger beliefs against fighting, but did not differ from boys in their beliefs that fighting was sometimes necessary or justified in certain circumstances. These findings are inconsistent with prior studies that have identified gender differences in beliefs about aggression, with boys holding stronger beliefs supporting aggression in general (Huesmann & Guerra, 1997) and beliefs supporting retaliatory aggression in particular (Bellmore, Whitkow, Graham, & Juvonen, 2005; Felix & McMahon, 2007). However, the lack of gender differences found in this study is consistent with studies of predominantly African American samples from urban environments that have found similar rates of aggressive behavior among boys and girls (Bettencourt & Farrell, 2013; Miller-Johnson, Moore, Underwood, & Coie, 2005). The absence of gender differences in these samples may be explained by the use of aggression among African American boys and girls as a means of survival in disadvantaged contexts marked by greater exposure to drugs and violence and decreased access to necessary social and educational resources (Miller-Johnson et al., 2005).

We also found support for measurement invariance across grades, which allowed us to examine mean differences across grades. We found mixed support for our hypothesis that adolescents would increasingly endorse the use of aggression as they progressed through middle school. Compared with sixth graders, both seventh and eighth graders were less likely to endorse beliefs against fighting and more likely to endorse beliefs supporting aggression. Most of these differences were small to medium sized effects, with stronger differences in beliefs that supported the use of proactive aggression. In contrast, there were no differences between seventh and eighth graders. Findings are consistent with prior research that has shown that beliefs supporting the use of aggression steadily increase through sixth grade (Huesmann & Guerra, 1997), but remain relatively stable across the remainder of middle school (Nash & Kim, 2007; Werner & Hill, 2010). This pattern of change in beliefs over the course of middle school can be explained by social learning

theories of aggression, which suggest that during the transition to middle school, adolescents are exposed to more aggressive models who appear to be using aggression effectively to maintain social dominance in the peer network (Pelligrini, 2002). Adolescents observing these models may increasingly perceive aggression as acceptable and useful over the course of sixth grade. This pattern highlights how peer influences and school norms about aggression and nonviolence exert their strongest impacts on individual children's beliefs during sixth grade (Henry, Farrell, Schoeny, Tolan, & Dymnicki, 2011; Henry et al., 2000). This emphasizes the need to intervene early before beliefs about fighting become fully formed. Early in sixth grade, adolescents may be more receptive to the notion that there are effective prosocial alternatives to fighting under most circumstances. Moreover, these findings underscore the need for additional research to isolate the factors that place sixth graders in particular at increased risk for developing beliefs supporting the idea that fighting is sometimes necessary.

We found support for measurement invariance between groups of participants that differed in whether their school was implementing a school-wide bully prevention program. Exploring the extent to which interventions affect the measurement properties of potential outcome measures is an important, but generally neglected, focus of research. Such interventions often take a social-cognitive approach that target beliefs or attitudes (Boxer and Dubow, 2002) and it is therefore plausible that implementation of an intervention could influence the structure of participants' beliefs, which would in turn alter the measurement properties of outcome measures. Establishing measurement invariance across sex, grade, and intervention status supports the use of the BAFS for investigating differences across these groups and for evaluating intervention effects.

Limitations

The current study had several limitations that merit consideration. We examined cross-sectional associations between beliefs and measures of aggression, victimization, and nonviolent behavior. This addressed our objectives, which were to evaluate the structure of the BAFS and its concurrent validity with measures of related constructs. However, the cross-sectional design does not clarify whether beliefs are a cause or consequence of adolescents' behavior, or whether the direction of these effects vary across dimensions. For example, the notion that adolescents' beliefs supporting reactive aggression will increase their frequency of aggression is consistent with social-cognitive theory. At the same time, it is quite plausible that beliefs that fighting is sometimes necessary may emerge as a consequence of victimization experiences. Bidirectional effects are also plausible as suggested by ecological models of development (Bronfenbrenner, 1979). Further research examining reciprocal longitudinal relations between beliefs and behavior is needed to clarify the direction of these effects and to explore the underlying mechanisms by which beliefs influence adolescents' behavior. Moreover, our analysis of relations between beliefs and measures of adolescents' frequency of aggression and victimization may not do full justice to the complexity of these relations. There is growing evidence supporting distinct differences in patterns of relations between aggression and victimization such that youth who are both aggressive and victimized may be qualitatively different and hold different

beliefs compared with those who are only aggressive or only victimized (e.g., Bettencourt & Farrell, 2013). .

Although we evaluated the concurrent validity of the BAFS based on adolescent and teacher ratings, both are imperfect criteria. The strong relations between adolescents' reports of their beliefs and their behavior (i.e., R^2 change of .12 to .38) may in part reflect shared method variance. We attempted to address this by examining relations with teacher ratings, but these also have limitations. In particular, they are based on a limited sample of behavior that reflects adolescents' behavior not just at school, but specifically in the presence of teachers. Adolescents are far more likely to engage in nonviolent behavior in these situations. This is reflected in the low correlations we found between student and teacher measures (i.e., rs = .09 to .23). It is therefore not surprising that adolescents' reports of their beliefs were not strongly related to teacher ratings of adolescents' behavior (R^2 change of .04 to .06). Differences in findings may have also been influenced by the fact that whereas the teacher report measure specifically focused on physical victimization, the student measure assessed multiple forms of victimization.

Our sample consisted of students in middle schools that served a predominantly African American population of students, many of whom came from single-parent families in urban communities with high rates of poverty and crime. The BAFS was designed to provide a relevant measure of beliefs among this population and was based on qualitative studies that were conducted with similar populations of adolescents with input from others within the community (Farrell et al., 2008). Although this made our sample relevant to evaluating this measure, it remains to be seen whether this measure would be appropriate for use with other populations of adolescents.

Implications and Future Directions

This study underscored the importance of developing measures of adolescents' beliefs that reflect more than simply supporting or not supporting the use of aggression. Adolescents' beliefs reflect their increased cognitive ability and the complexity of contingencies in their environments and previous experiences. The results of this study suggest that the BAFS is a promising measure of the nuanced array of beliefs that urban adolescents hold about fighting (see supplement for final measure). However, more research is needed to: (a) clarify the contextual factors that activate adolescent's beliefs about fighting, particularly among those youth who also believe that fighting is wrong; (b) examine longitudinal changes in adolescents beliefs about fighting over the course of middle school and into high school; and (c) disentangle the complex relations between beliefs about fighting and behaviors over time among urban adolescents. Social-cognitive interventions that target beliefs and attitudes will likely need to address the multidimensional nature of adolescents' beliefs about aggression to achieve maximum effectiveness. That is, rather than simply having global discussions about the acceptability or effectiveness of aggression, it is important to assess adolescents' beliefs about aggression under varying circumstances and attempt to address those beliefs. There is likely to be dissonance between the goals of the program and adolescents' beliefs, which are likely rooted in their experiences and the norms of their current environment. Incorporating frank conversations about the nuances of adolescents' beliefs about aggression

will likely increase the ecological validity of interventions and the legitimacy of program facilitators in the perceptions of adolescents.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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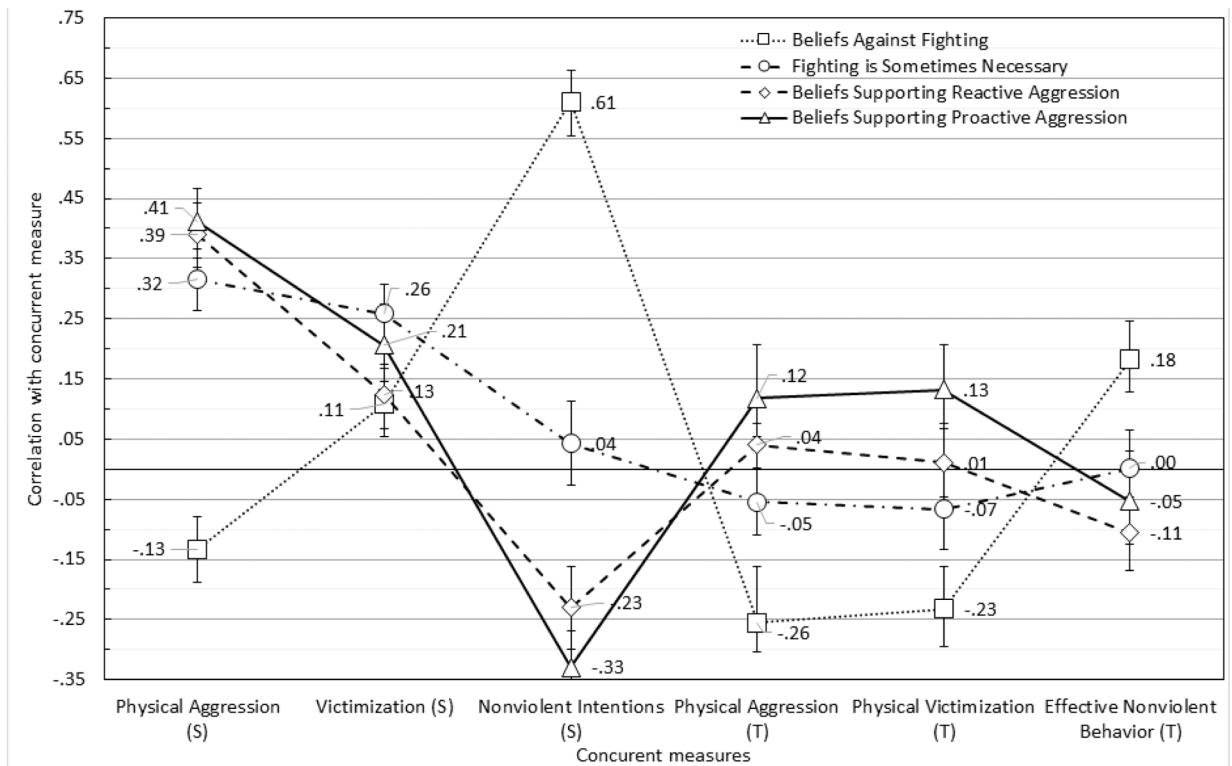
Figure 1:

Correlations between the Beliefs About Fighting Scale factors and factors based on student measures of physical aggression, victimization, and nonviolent intentions, and teacher ratings of adolescents' physical aggression, physical victimization, and nonviolent behavior. S = student report measure. T = teacher report measure. Error bars represent 95% confidence intervals based on bias-corrected bootstrap estimates of standard errors using 1,000 bootstrap draws. $N = 2,118$ for correlations with student measures of physical aggression and victimization. $N = 1,353$ for correlations with student ratings of nonviolent intentions. $N = 1,576$ for correlations with teacher ratings.

Table 1

Prevalence Rates and Standardized Loadings from Final Model for Beliefs About Fighting Scale

Item	% Agree	Loading
Beliefs Against Fighting Scale		
1. Fighting usually causes more problems than it solves	69%	0.76
3. Fighting is a bad way to solve problems because you might get hurt	57%	0.81
6. Fighting is just wrong; it's a bad thing to do	51%	0.72
13. Fighting mostly just leads to more fighting	72%	0.77
16. Most of the things people fight over aren't worth fighting about	70%	*a*
19. There are better ways to solve most problems than fighting	69%	0.77
Fighting is Sometimes Necessary Scale		
8. If you don't fight some kids, they'll just keep picking on you	55%	*a*
11. Sometimes you have only two choices - get punched or punch the other person first	43%	0.77
14. If you back down from a fight, people will think you are a coward	63%	0.77
15. Sometimes a person doesn't have any choice but to fight	57%	0.78
20. If you don't fight someone who picks on you, other kids will never let you hear the end of it	45%	0.75
22. If you don't fight when someone messes with you, other people will pick on you	50%	0.77
Beliefs Supporting Reactive Aggression Scale		
4. It's okay to fight someone if they do something to make you mad	31%	0.75
5. It's okay to fight someone if they call you names or tease you	30%	0.84
7. It's okay to fight someone if they spread a rumor about you	30%	0.86
9. If people do something to make you really mad, they deserve to be beaten up	34%	0.83
21. If someone pushes you, you should push them back	58%	*a*
23. You should fight someone if they say something bad about someone in your family	42%	0.80
Beliefs Supporting Proactive Aggression Scale		
2. It's okay to use physical force to get someone to do what you want	11%	*a*
10. It's okay to threaten someone if they won't do what you want	7%	0.80
12. It's okay to fight someone if they have something you want	10%	0.84
17. It's okay to yell at someone to get them to do things for you	9%	0.84
18. It's okay for you to hit someone to get them to do what you want	7%	0.82

Note. Loadings are based on a four-factor model. All loadings are significant at *p* < .001

[a] Item not included in final model.

Table 2

Fit Indices Based on Confirmatory Factor Analyses of Competing Models of the Beliefs About Aggression Scale

Model	χ^2	df	RMSEA[CI]	CFI	TLI	χ^{2a}	df^a
Full Sample based on all 23 items							
1. 4 factor	2938.99***	224	.076[.073,.078]	.936	.928		
2. 2 factor	7999.50***	229	.127[.124,.129]	.817	.798	1637.24***	5
3. 1 factor	19513.92***	230	.199[.197,.201]	.546	.501	4132.42***	6
4. 4 factor ESEM	1527.93***	167	.062[.059,.065]	.968	.951		
Full sample based on 19 items							
5. 4 factor	1831.61***	146	.074[.071,.077]	.951	.943		
6. 2 factor	5717.71***	151	.132[.129,.135]	.838	.817	1101.30***	5
7. 1 factor	16245.39***	152	.224[.221,.227]	.532	.473	3703.57***	6
Multiple group by sex (4-factor model)							
8. Configural invariance	1893.23***	292	.072[.069,.075]	.954	.946		
8a Girls only	931.15***	146	.070[.065,.074]	.957	.950		
8b Boys only	962.51***	146	.074[.070,.079]	.950	.941		
9. Scalar invariance	1958.49***	341	.067[.064,.070]	.953	.953	81.21**	49
Multiple group by grade (4-factor model)							
10. Configural invariance	2063.68***	438	.073[.069,.076]	.951	.943		
10a Sixth graders only	672.15***	146	.072[.066,.077]	.952	.944		
10b Seventh graders only	698.53***	146	.073[.065,.079]	.948	.939		
10c Eighth graders only	693.23***	146	.073[.067,.078]	.954	.946		
11. Scalar invariance	2170.51***	536	.066[.063,.069]	.951	.953	122.08	98
Multiple group by intervention status (4-factor model)							
12. Configural invariance	1940.50***	292	.073[.070,.076]	.952	.944		
12a Control condition	802.71***	146	.071[.066,.076]	.952	.944		
12b Intervention condition	1139.77***	146	.075[.071,.079]	.952	.944		
13. Scalar invariance	1995.07***	341	.068[.065,.071]	.952	.952	61.28	49

Note. $N = 2,118$. ESEM = Exploratory Structural Equation Model with target rotation. RMSEA = Root mean square error of approximation [90% confidence interval]. CFI = comparative fit index. TLI = Tucker-Lewis fit index. PBFS-AR = Problem Behavior Frequency Scale – Adolescent Report. PBFS-TR = Problem Behavior Frequency Scale – Teacher Report.

[a]Difference in fit for less constrained model versus more constrained model (e.g., four factor model versus two-factor model, configural invariance model versus scalar invariance model).

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.

Table 3

Correlations Among Peer Factors in Four-Factor Model and Mean Gender and Grade Differences From Multiple Group Models

	BAF	FSN	BSR	BSI
Intercorrelations among factors				
Beliefs Against Fighting (BAF)				
Fighting is Sometimes Necessary (FSN)	.32[***]			
Beliefs Supporting Reactive Aggression (BSR)	−.03	.73[***]		
Beliefs Supporting Proactive Aggression (BSI)	−.16[***]	.43[***]	.60[***]	
Mean differences (d-coefficients) from multiple group models				
Boys – Girls	−0.34[***]	0.00	−0.04	0.02
7th – 6th graders	−0.17[**]	0.29[***]	0.34[***]	0.53[***]
8th – 6th graders	−0.15[*]	0.39[***]	0.38[***]	0.51[***]
8th – 7th graders	−0.04	0.10	0.04	−0.02

Note. N = 2,118.

[*] *p* < .05.

[**] *p* < .01.

[***] *p* < .001.

Table 4

Fit Indices for Models Examining Relations Between Beliefs Factors and Concurrent Measures Based on Student and Teacher Report

Model	χ^2	df	RMSEA[CI]	CFI	TLI
Models with correlations					
1. With PBFS-AR	2658.54[***]	687	.037[.035,.038]	.963	.960
2. With nonviolent intentions[a]	1753.27[***]	242	.068[.065,.071]	.937	.928
3. With PBFS-TR[b]	2024.38[***]	443	.048[.046,.050]	.967	.963
Regression models					
4. With PBFS-AR	3257.36[***]	835	.037[.036,.038]	.957	.954
5. With nonviolent intentions[a]	1833.77[***]	334	.058[.055,.060]	.940	.934
6. With PBFS-TR[b]	2483.64[***]	559	.047[.045,.049]	.962	.957

Note. N = 2,118 except where noted. RMSEA = Root mean square error of approximation [90% confidence interval]. CFI = comparative fit index. TLI = Tucker-Lewis fit index. PBFS-AR = Problem Behavior Frequency Scale – Adolescent Report. PBFS-TR = Problem Behavior Frequency Scale – Teacher Report

[a] Measure not given during last two project years. This reduced the sample size to 1,353.

[b] Restricting the sample to waves collected during the school year reduced the sample size to 1,576.

[*] $p < .05$.

[**] $p < .01$.

[***] $p < .001$.

Table 5

Summary of Regression Analyses of Beliefs Factors Measures (rows) as Predictors of Student and Teacher Measures of Problem Behavior and Prosocial Behavior (columns)

Predictors	Student Report Measures			Teacher Report Measures		
	Physical Aggression[a]	Victimization[a]	Nonviolent Intentions[b]	Physical Aggression[c]	Physical Victimization[c]	Nonviolent Behavior[c]
Beliefs Against Fighting	−0.18***	0.00	0.50***	−0.22***	−0.19***	0.16***
Fighting is Sometimes Necessary	0.21***	0.38***	0.12	−0.01	0.00	0.04
Beliefs Supporting Reactive Aggression	0.08	−0.28***	−0.15*	0.00	−0.05	−0.18*
Beliefs Supporting Proactive Aggression	0.25***	0.23***	−0.17***	0.09	0.14**	0.05
Male gender	−0.07**	−0.04	−0.20***	0.14***	0.21***	−0.13***
Grade is 7	0.06	−0.03	−0.09*	−0.02	−0.03	−0.02
Grade is 8	0.05	−0.09**	−0.01	−0.01	−0.13***	0.09**
Intervention implemented in school	−0.04	−0.08**	−0.02	−0.11***	−0.13***	−0.06*
R^2 covariates only	0.011*	0.011*	0.044***	0.029**	0.069***	0.031***
R^2 full model	0.235***	0.128***	0.428***	0.093***	0.124***	0.076***
R^2 change	0.224***	0.117***	0.384***	0.064***	0.055***	0.045***

Note. Values are standardized regression coefficients except where noted.

[a] $N = 2,118$.

[b] $N = 1,353$ because nonviolent intentions measure not given during last two project years.

[c] $N = 1,576$ because teacher ratings not collected during summer waves.

* $p < .05$.

** $p < .01$.

*** $p < .001$.