

ADOLESCENT FEMALE AGGRESSION: MEASUREMENT, RELATIONAL RISK AND
PROMOTIVE FACTORS, AND RISK PATHWAYS

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ABSTRACT

KATIE L. COTTER: Adolescent Female Aggression: Measurement, Risk and Promotive Factors, and Risk Pathways
(Under the direction of Paul R. Smokowski)

Despite evidence of increasing prevalence of adolescent female aggression (Puzzanchera, Adams, & Hockenberry, 2012), much of the extant research on aggression has focused on all-male or mostly-male samples. Particularly lacking in the current literature is an understanding of the extent to which measures of aggressive/violent behavior function equivalently across genders and the identification of female-specific risk factors for aggression. The following three-paper dissertation addresses these issues.

The first paper examines the measurement invariance of the Violent Behavior Checklist-Modified across genders and race/ethnicities. Using multiple group confirmatory factor analysis, configural and metric invariance are assessed in a sample of racially/ethnically diverse middle and high school students (N=4,128) in two rural counties. Results indicated that the Violent Behavior Checklist-Modified had partial measurement invariance across genders and race/ethnicities. Findings suggest that the latent factor of violence may be qualitatively different across males and females.

The second paper uses relational cultural and social role theories as a framework for exploring relational risk and promotive factors associated with adolescent female aggression. A two level hierarchical linear model (HLM) was estimated using four waves of data on an ethnically diverse sample of female adolescents. Teacher support was identified as a significant promotive factor against adolescent female aggression. In addition to internalizing

symptoms, results revealed that association with delinquent friends and peer pressure were salient risk factors for adolescent female aggression.

The third paper examines risk pathways between relational risk factors and direct and indirect aggression for male and female adolescents. Using multiple group structural equation modeling, internalizing symptoms was tested as a mediator of the relationship between relational risk factors and aggression. Results indicated that internalizing symptoms played a mediating role for two out of three relational risk factors for both male and female adolescents. Implications of the central role of internalizing symptoms as a risk factor for aggression were highlighted.

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INTRODUCTION

AN EXPLORATION OF RELATIONAL RISK FACTORS ASSOCIATED WITH ADOLESCENT FEMALE AGGRESSION

Intervention research on aggression and violence during adolescence has continued to grow in recent years. The development of these prevention and intervention programs is based on existing literature on adolescent aggression and violence. Although a wealth of research focuses on aggression and violence during adolescence, much of this research focuses on mostly male or exclusively male samples (Valois, MacDonald, Bretous, Fischer, & Drane, 2002). This creates a dearth of knowledge regarding female-specific aggression and violence. There are two main areas that are particularly lacking in the extant adolescent aggression literature: the extent to which measures of aggressive/violent behavior function equivalently across genders and the identification of female-specific risk factors for aggressive/violent behavior. These areas are the focus of the current dissertation.

Paper 1, “Measuring Adolescent Violent Behavior across Groups: Assessing Measurement Invariance of the Violent Behavior Checklist-Modified,” tests the measurement invariance of a violent behavior scale (Violent Behavior Checklist – Modified) across genders and racial/ethnic groups using multiple group confirmatory factor analysis (MG-CFA). Although establishing measurement invariance is a necessary prerequisite for any cross-group comparison, few researchers adequately test for measurement invariance prior to drawing conclusions based on cross-group comparisons. For instance, mean aggression or violence scores are often compared across groups (e.g. genders and racial/ethnic groups;

Felson, Deane, & Armstrong, 2008; Frisell, Pawitan, Langstrom, & Lichtenstein, 2012; Peterson, Esbensen, Taylor, & Freng, 2007; Topitzes, Mersky, & Reynolds, 2012; Zheng & Cleveland, 2013), however only a small minority report results on measurement invariance. Paper 1 presents the concept of measurement invariance within the substantive framework of adolescent violent behavior and provides a step-by-step process for invariance testing. The potential bias that could result from non-invariance and potential options for dealing with partial measurement invariance are highlighted.

Paper 2, “An Investigation of Relational Risk and Promotive Factors Associated with Adolescent Female Aggression,” uses a relational orientation framework to identify the risk and promotive factors associated with adolescent female aggression. A two-level hierarchical linear model (HLM) incorporating change over time in both aggression and the associated relational risk and promotive factors was estimated to model the dynamic and fluctuating aspects of development. This study fills a critical gap in the adolescent aggression literature: the uncertainty with which risk factors that have been identified with mostly male samples can be applied to female adolescents (Odgers & Moretti, 2002). By identifying and testing risk and promotive factors using the relational orientation framework (i.e., relational risk and promotive factors), this study contributes to a shift in focus from aggression as a primarily male issue to an adolescent issue. Further, the findings from Paper 2 can be used as a guide for the development of interventions targeting female-specific interventions.

Paper 3, “Relational Risk Pathways for Direct and Indirect Aggression during Adolescence,” expands upon Paper 2 by identifying specific risk pathways between relational risk factors and direct and indirect aggression for male and female adolescents. Specifically, internalizing symptoms are explored as a mediator of the relationship between relational risk

factors among peers and direct and indirect aggression. A multiple group structural equation model (SEM) is estimated to test for gender differences in risk pathways. By further explicating the more complex pathways that lead to aggression, the results of Paper 3 can be used to develop and modify interventions to prevent adolescent aggression.

As a whole, the three papers that constitute the current dissertation fill significant gaps in the literature on aggressive/violent behavior and gender. The significance of these papers for intervention and prevention programming is clear. The accuracy of program evaluations depends on the accuracy of the measurement tools used to assess them. Thus, in order to ensure the validity of cross-group comparisons, it is necessary to establish measurement invariance. In addition, the exploration of gender-specific risk and promotive factors and risk pathways provide intervention researchers with guidance as to which malleable factors to target in intervention and prevention efforts. By comparing risk pathways separately for males and females, it is possible to move beyond the uncertainty associated with the practice of applying male developed risk models to females.

REFERENCES: INTRODUCTION

- Felson, R. B., Deane, G., & Armstrong, D. P. (2008). Do theories of crime or violence explain race differences in delinquency? *Social Science Research, 37*, 624-641. doi:10.1016/j.ssresearch.2007.08.001
- Frisell, T., Pawitan, Y., Langstrom, N., & Lichtenstein, P. (2012). Heritability, assertive mating, and gender differences in violent crime: Results from a total population sample using twin, adoption, and sibling models. *Behavioral Genetics, 42*, 3-18. doi:10.1007/s10519-011-9483-0
- Odgers, C. L., & Moretti, M. M. (2002). Aggressive and antisocial girls: Research update and challenges. *International Journal of Forensic Mental Health, 1*, 103-119. doi:10.1080/14999013.2002.10471166
- Peterson, D., Esbensen, F., Taylor, T. J., & Freng, A. (2007). Youth violence in context: The roles of sex, race, and community in offending. *Youth Violence and Juvenile Justice, 5*, 385-410. doi:10.1177/1541204006297369
- Topitzes, J., Mersky, J. P., & Reynolds, A. J. (2012). From childhood maltreatment to violent offending: An examination of mixed-gender and gender-specific models. *Journal of Interpersonal Violence, 27*, 2322-2347. doi:10.1177/0886260511433510
- Valois, R. F., MacDonald, J. M., Bretous, L., Fischer, M. A., & Drane, J. W. (2002). Risk factors and behaviors associated with adolescent violence and aggression. *American Journal of Health Behavior, 26*, 454-464. doi:10.5993/AJHB.26.6.6

PAPER I

MEASURING ADOLESCENT VIOLENT BEHAVIOR ACROSS GROUPS: ASSESSING MEASUREMENT INVARIANCE OF THE VIOLENT BEHAVIOR CHECKLIST MODIFIED

Adolescence is a tumultuous developmental period. Perhaps it is best summarized by Erikson (1962), who wrote: “In no other stage of the lifecycle [...] are the promise of finding oneself and the threat of losing oneself so closely allied” (p. 13). The burgeoning autonomy associated with adolescence results in a deluge of new experiences, including the exposure to risk factors that may increase vulnerability. Youth violence perpetration is one such risk factor that has major developmental consequences. While a single concerted definition of violence does not currently exist, the following definition provided by the World Health Organization is commonly cited: “the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation” (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002, p. 5).

The consequences associated with youth violence have spawned a significant amount of intervention research in recent years. It is imperative that these interventions are accurately evaluated, which depends on the accuracy of the measurement tools used to assess them. Despite its importance, there is a particular dearth of research on whether different groups (e.g., genders and race/ethnicities) interpret violent behavior constructs and/or violent behavior survey items in the same way. According to social role theory, attitudes and behaviors are influenced in part by social norms (Eagly, 1987), suggesting that gender or

cultural norms may influence individual's responses to survey questions. Measurement non-invariance refers to differential functioning of measures across groups. Measurement non-invariance is problematic because in order to directly compare multiple groups, it is necessary to assume that measures perform identically across the groups (DeVellis, 2003).

Multiple group confirmatory factor analysis with latent variables allows researchers to test for measurement invariance across groups prior to testing substantive hypotheses. However, few researchers implement this strategy. Gregorich (2006) suggests that this may be due to a lack of awareness that measurement non-invariance threatens meaningful quantitative comparisons. Establishing measurement invariance for violence measures is particularly important given that many researchers compare rates of violence across genders and race/ethnicities (Frisell, Pawitan, Longstrom, & Lichtenstein, 2012; Peterson, Esbensen, Taylor, & Freng, 2007; Topitzes, Merskey, & Reynolds, 2012; Zheng & Cleveland, 2013).

The current study tests for measurement invariance of the Violent Behavior Checklist-Modified across gender and racial/ethnic groups using multiple group confirmatory factor analysis. A detailed description of this process is provided.

Measurement Invariance Across Groups

A measure is considered to be invariant if respondents from different groups, with the same true score, also have the same observed score (i.e., an individual's probability of an observed score does not depend on group membership; Wu, Li, & Zumbo, 2007). When measures lack invariance, the term non-invariance is commonly used. In a factor analysis framework, a factor is used as a proxy for a person's true score and the items are the observed variables (Wu et al., 2007). Evidence of measurement invariance exists if the relationships among observed variables and factors are equivalent across groups. This

indicates that a given measure functions the same way across groups. Partial measurement invariance exists when these relationships are equivalent across groups for some (but not all) items in a measure.

Measurement invariance is a necessary prerequisite for comparisons across groups. In practice, this means that without evidence of measurement invariance, cross-group comparisons can result in inaccurate conclusions. For instance, in a study on attitudes toward teen-dating violence researchers found evidence of measurement non-invariance across gender (Edelen, McCaffrey, Marshall, & Lisa, 2009). Specifically, adolescents indicated more acceptance of retaliatory hitting when the victim was of his or her own gender. After accounting for this non-invariance, results indicated that compared to females, males were more accepting of cross gender violence, which was not initially evident. These findings highlight that the existence of measurement non-invariance can lead to inaccurate findings.

Measurement non-invariance may result from construct bias, item bias, or method bias (Byrne & Watkins, 2003). Construct bias indicates that the construct of interest has differential meaning across groups. Item bias refers to differential interpretations across groups at the item level. Finally, method bias refers to differential responses across groups due to aspects of the assessment (e.g., certain groups may be more familiar with likert scales) or aspects of administration (e.g., certain groups were given more guidance than others). When measurement non-invariance occurs, researchers should consider the source of the non-invariance and correct for it in future studies, if possible.

Measurement Invariance in Violent Behavior Across Genders

Although measurement invariance is a prerequisite for meaningful cross-group comparisons, few studies have tested for measurement invariance of adolescent violence

measures. In a longitudinal study, the “anti-social conduct” of 1,037 participants was assessed at eight time points using a six-item scale that included three violent behavior items (i.e., physical fighting, bullying others, destroying property; Odgers et al., 2008). Focusing on the five data collection points that occurred in childhood and adolescence (i.e., between the ages of 7-15), researchers tested the scale for measurement invariance. Findings indicated that the scale was invariant across genders and concluded that it measured the same antisocial construct for males and females.

Another group of researchers tested for invariance of the Crime and Violence Scale (CVS) using a sample of 7,435 youth, the majority of whom (i.e., 73%) were under the age of 18 (Conrad, Riley, Conrad, Chang, & Dennis, 2010). Invariance was tested using differential item functioning (DIF). In contrast to the findings of Odgers and colleagues (2008), results showed that the CVS was non-invariant across genders based on the seriousness of the violent and criminal behavior. Females’ scores tended to be composed of less violent crimes (e.g., slapping a person), whereas males’ scores tended to be composed of more violent crimes (e.g., hurt another person resulting in the need for medical attention). These discrepant findings indicate the need for additional research.

Measurement Invariance in Violent Behavior Across Racial/Ethnic Groups

Given the importance of establishing measurement invariance prior to making cross-group comparisons, researchers have tested for measurement invariance based on race/ethnicity across a broad range of topics, such as school engagement (Glanville & Wildhagen, 2007), childhood trauma (Thombs, Lewis, Bernstein, Medrano, & Hatch, 2007), and obsessive compulsive symptoms (Garnaat & Norton, 2010). Despite this body of research, minimal research examining invariance across racial/ethnic groups on violent

behavior scales exists. One group of researchers attempted to test for measurement invariance of a violence scale across racial/ethnic groups, but they were unable to complete the analysis due to the low response rates of select groups (Conrad et al., 2010). Another group of researchers tested for and reported evidence of measurement invariance in the externalizing behavior subscale of The Diagnostic Interview Schedule for Children across African American, Caucasian, and Hispanic adolescents (Feaster et al., 2010). Given the lack of studies in this area, additional research is needed to explore whether violent behavior measures function differently across racial/ethnic groups.

Based on social role theory (i.e., gender or cultural norms influence attitudes and beliefs) and given the previous work of Conrad et al. (2010), it was hypothesized that results of the current study would reveal partial measurement invariance across genders on the Violent Behavior Checklist-Modified. Specifically, it was hypothesized that items assessing more severe forms of violence (i.e., “beaten somebody up,” “used any weapon in a fight,” “gotten involved in a fight with one group of kids fighting another group of kids”) would be non-invariant across genders. Given the lack of studies assessing invariance across race/ethnicity, this research question was considered exploratory and no specific hypotheses were delineated for invariance across race/ethnicity.

Method

Participants

The United States Centers for Disease Control and Prevention funded the current study through a cooperative agreement with the North Carolina Academic Center for Excellence in Youth Violence Prevention (NC-ACE). The sample data came from the NC-ACE’s Rural Adaptation Project (RAP), a 5-year longitudinal panel study of more than 5,000

middle-school students from 28 public schools in two rural and economically disadvantaged counties in North Carolina. The data used in the current study were collected in spring 2013 (i.e., year 3 of the 5-year project). All middle-school students in grade 6 through grade 8 in county 1 were included in the sample. Because county 2 had a larger student population, a random sample of 40% of middle-school students was included from county 2.

In both counties, data were collected using an online assessment tool that students completed in school computer labs that were closely monitored by research staff. Following school district policies, county 1 adopted the assessment as a part of normal school procedures and all students were included on the study roster. Parents from county 2 received a letter explaining the study; if they did not want their child(ren) to participate, they returned the letter requesting nonparticipation and their child was removed from the study roster. Students assented to participate by reading and electronically signing an assent screen prior to completing the online assessment and were informed that they were free to decline participation at any time. Each student received a \$5 gift card for his or her participation. To maintain confidentiality, student assessments had an identification number attached and no identifying data were collected.

The initial sample consisted of 5,371 participants, but some participants were removed because their assessments were missing data for all variables of interest. In addition, participants self-identifying their racial/ethnic status as Hispanic/Latino, Asian, other, or mixed race were removed due to small sample sizes. The final analytic sample included 4,128 participants. A series of bivariate analyses (i.e., t-tests, chi-square tests) were performed to identify demographic differences between students included in the analysis and students removed from the analysis. The results indicated no significant differences between

the two groups in terms of age or gender. However, the unanalyzed sample was more likely to receive free/reduced price lunch than the analyzed sample (i.e., 11.62% more likely, $p < .001$). In addition, the unanalyzed sample was slightly less likely to live with a family with two adults than the analyzed sample (i.e., 4.78% less likely, $p < .01$). Finally, the unanalyzed sample was more likely to speak a language other than English at home than the analyzed sample (i.e., 13.73% more likely, $p < .001$).

The racial/ethnic composition of the final sample mirrored the diversity of the community: 37.06% ($n = 1,530$) of participants identified as Caucasian, 31.88% ($n = 1,316$) identified as American Indian (Lumbee), and 31.06% ($n = 1,282$) identified as African American. The sample was nearly evenly divided by gender, with 51.09% ($n = 2,109$) of participants identifying as female. The mean age of the sample was 14.03 years. More than half of the sample (63.69%; $n = 2,585$) received free/reduced price lunch, and 99.03% ($n = 4,077$) spoke English at home.

Measures

The School Success Profile (SSP; Bowen & Richman, 2008) is a youth self-report survey that measures adolescent's perceptions about their health and well-being, school experiences, friends, family, neighborhood, and self. A modified version of the SSP, the SSP+ was used for the RAP study. The SSP+ includes 25 of the subscales from the SSP, plus five additional subscales that measured constructs that were not captured by the SSP subscales. One such subscale (Violent Behavior Checklist; Dahlberg, Toal, Swahn, & Behrens, 2005; Nadel, Spellmann, Alvarez-Canino, Lausell-Bryant, & Landsberg, 1996) was used to measure violent behavior (perpetration) in the RAP study and is the focus of the current analysis.

Specifically, a modified version of the Violent Behavior Checklist (Dahlberg et al., 2005; Nadel et al., 1996) was used to measure adolescent violent behaviors. Six out of 14 items were selected for this study due to the length of the SSP+ assessment. The items were selected based on relevance to physical violence (rather than verbal or emotional abuse) and the wording of some of the items was changed slightly for clarity. The six items asked adolescents how often on a Likert-type scale (i.e., never, once, sometimes, or often) they engaged in the following violent behaviors in the previous 12 months: “hit or kicked someone,” “pushed or shoved someone,” “beaten somebody up,” “used any weapon in a fight,” “gotten involved in a fight with one group of kids fighting another group of kids,” and “used physical force to get others to do what you want.” Cronbach’s alpha reliabilities were .83 for males, .81 for females, .83 for African Americans, .83 for American Indians, and .81 for Caucasians.

Multiple Group Confirmatory Factor Analysis

Multiple group confirmatory factor analysis was carried out in several stages. First, configural invariance was tested. Configural invariance indicates that the same factor model exists across groups (Wu et al., 2007). To test configural invariance, the single factor, six indicator model was constrained to be the same across groups. Following Cheung and Rensvold (2002), the overall Root Mean Square Error of Approximation (RMSEA) was used to assess configural invariance. The Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) were used as supplemental indices. These indices assess the relative improvement in fit of the specified model compared to a baseline model. Before running the analyses, cutoff values that indicated good model fit, were established for each fit index. In accordance with

best practice, RMSEA values of .06 or lower and CFI and TLI values of .95 or higher were considered indicative of good model fit (Hu & Bentler, 1999).

In the second stage of analysis, metric invariance (i.e., that all factor loadings or lambdas are equivalent across groups) was tested. Metric invariance was tested by constraining all lambdas to be equal across groups and using a chi-square difference test (i.e., the DIFFTEST option in MPLUS) to compare the constrained-lambda model with the unconstrained-lambda model. A statistically significant chi-square value would indicate that model fit got significantly worse after constraining the lambdas indicating the absence of metric invariance. Some researchers have argued that the metric invariance assumption is difficult to achieve and that cross-group comparisons can still be made if the non-invariant items make up only a small portion of the model (Byrne, Shavelson, & Muthén, 1989; Cheung & Rensvold, 2002). Therefore, the next step involved testing each lambda individually in order to determine which specific items were non-invariant.

In stage three, each lambda was constrained individually and chi-square difference tests were used to gauge changes in model fit. Again, a statistically significant chi-square value would indicate that the individual factor loading was non-invariant across groups. These stages were executed to test for invariance across genders (i.e., male and female) and then repeated to test for invariance across the three racial groups (i.e., African American, Caucasian, and American Indian). Analysis was conducted in Mplus version 7.0 (Muthén & Muthén 1998-2012) using the mean and variance-adjusted weighted least squares [WLSMV] estimator given ordinal variables.

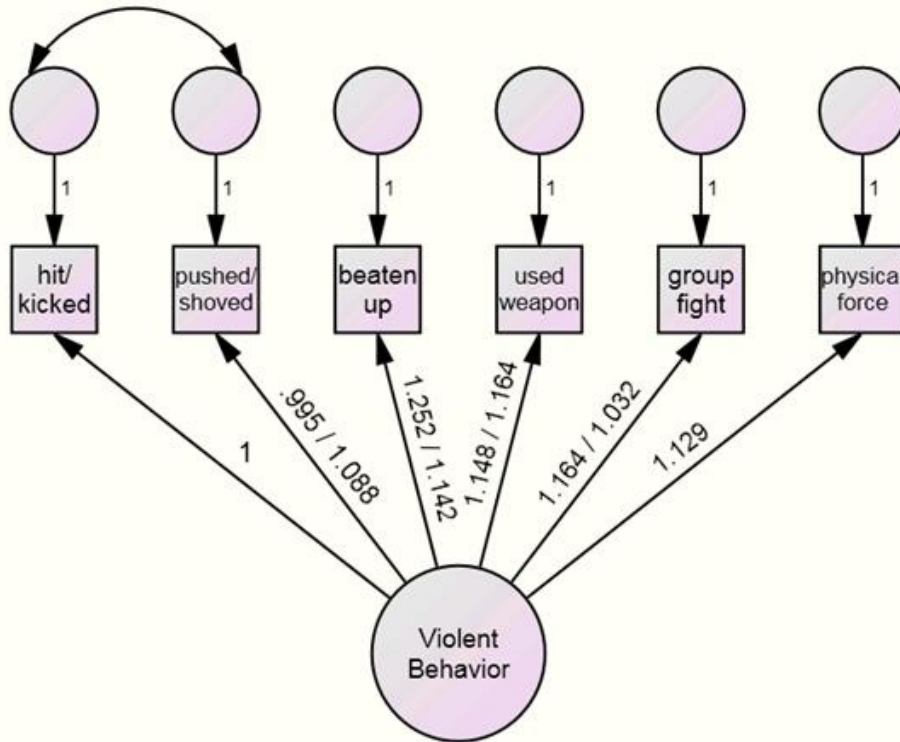
Results

Upon specification of the measurement model in stage 1, modification indices indicated significant improvement in the model X^2 value if the errors of two observed variables “hit or kicked someone” and “pushed or shoved someone” were free to correlate. Minimal model modifications based on empirical evidence is considered defensible if they are theoretically sound and do not result in significant changes to the model parameters (Byrne, Shavelson, & Muthén, 1989). Each of these requirements was met. After constraining the single factor model to be equal across genders, the overall RMSEA was .052 with a 90% confidence interval between .046 and .058. The CFI and TLI values were both .996. These results suggest that configural invariance existed across genders. After constraining the single factor model to be equal across racial/ethnic groups, the overall RMSEA value was .043 with a 90% confidence interval between .037 and .050. In addition, the CFI and TLI values were both .997. This suggests that configural invariance can be assumed across racial/ethnic groups as well.

After testing for metric invariance across genders, in stage 2 (i.e., constraining all of the lambdas to be equal across genders), the chi-square difference test was statistically significant [$X^2(5) = 17.77, p < .001$]. This indicates that the model fit got significantly worse when all of the lambdas were constrained to be equal and that all factor loadings were not equivalent between males and females. After testing for metric invariance across racial/ethnic groups (i.e., constraining all of the lambdas to be equal across racial/ethnic groups), the chi-square difference test was statistically significant [$X^2(5) = 23.15, p < .001$]. This indicates that model fit got significantly worse when all of the lambdas were constrained to be equal and that all factor loadings were not equivalent across groups.

In stage 3, in order to determine which lambda(s) was (were) non-invariant, each lambda was tested individually by comparing a model with the lambda freely estimated to a model with the lambda constrained to be equal across groups. In terms of gender differences, chi-square difference tests indicated non-invariance in the following four items: “pushed or shoved someone,” “beaten somebody up,” “used any weapon in a fight,” and “gotten involved in a fight with one group of kids fighting another group of kids.” Specifically, the strength of the relationships between the following items and the latent variable were stronger for males compared to females: “beaten somebody up,” “used any weapon in a fight,” and “involved in a group fight.” On the other hand, the relationship between the item “pushed or shoved someone” and the latent variable was stronger for females compared to males. The final model results are displayed in Figure 1.1. The final model had adequate model fit. The chi-square value was 222.266 (28), $p < .001$. The obtained RMSEA was .058 with a 90% confidence interval between .051 and .065. The model had a CFI and TLI of .996 and .995, respectively.

Figure 1.1
Multiple Group Confirmatory Factor Analysis for Males and Females

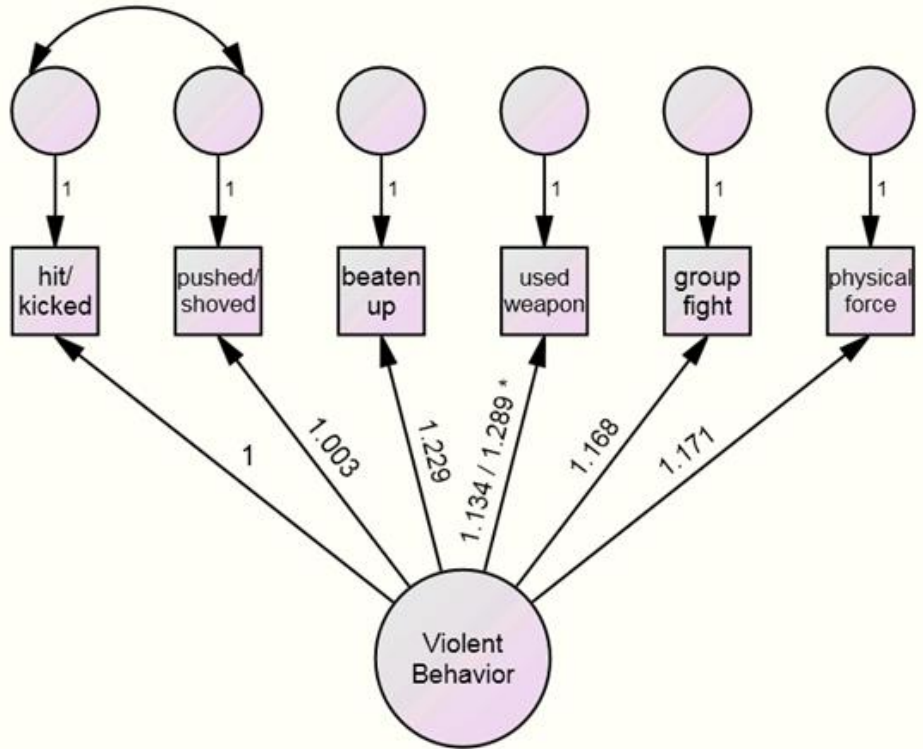


Note: Path coefficients are unstandardized. A single parameter denotes a constrained path. For unconstrained paths, male parameters are listed first, followed by female parameters.

In terms of differences across racial/ethnic groups, in stage 3, chi-square difference tests indicated non-invariance in a single item: “used a weapon in a fight.” This indicates that the strength of the relationship between this item and the latent factor is different for at least one racial/ethnic group. Additional chi-square difference tests were used to determine which racial/ethnic group(s) differed on this item. Results indicated that non-invariance existed for Caucasian students on this item; the relationship between the item and the latent variable was weaker for Caucasian adolescents compared to African American and American Indian adolescents. The final model had good model fit. The chi-square value was 199.348 (55), $p < .001$. Although a non-significant chi-square value is desirable, non-significant results are not uncommon, especially with large sample sizes. The obtained RMSEA was 0.044 with a 90%

confidence interval between .037 and .050. The model had a CFI and TLI of 0.997. The final model results are displayed in Figure 1.2.

Figure 1.2
Multiple Group CFA for African American, American Indian, and Caucasian Groups



Note: Path coefficients are unstandardized. A single parameter denotes a constrained path. * indicates the unconstrained parameter value for Caucasian adolescents.

Discussion

Despite the proliferation of studies assessing measurement invariance, few studies have tested the measurement invariance of violent behavior scales. The current study examined measurement invariance of the Violent Behavior Checklist-Modified across genders and three racial/ethnic groups. In line with the study hypothesis, findings indicated that partial invariance existed across genders. Partial invariance existed across race/ethnicities as well, although the partial invariance across genders was more “severe” than the partial invariance across race/ethnicities. Four out of six factor loadings (or lambdas)

were non-invariant across genders, while only one of six factor loadings was non-invariant across race/ethnicities.

In line with our hypothesis regarding gender, items assessing more severe forms of violence (i.e., “beaten somebody up,” “used any weapon in a fight,” “gotten involved in a fight with one group of kids fighting another group of kids”) were non-invariant across groups, such that stronger factor loadings were observed for males compared to females. However, contrary to our hypothesis, the item “pushed or shoved someone” was also non-invariant across genders. This less severe form of violence showed the opposite trend compared to the more severe items: factor loadings were stronger for females than males. As a whole, these results coincide with existing research, which has documented partial invariance across genders on another crime/violence scale (Conrad et al., 2010).

The existence of non-invariance (or partial invariance) indicates that the observed scores are being influenced by something other than the latent construct. The source of this non-invariance can be at the construct, item, or method levels. Given that males and females were treated identically during the data collection procedures and that each gender is equally likely to have completed similar surveys in the past, method bias can be ruled out. After careful consideration, we also determined that it was unlikely that particular items were interpreted differently based on gender. The items describe behaviors using straightforward language that describe specific acts (e.g., hitting or kicking, pushing or shoving) that leave little room for interpretation. It is, however, possible that the construct of violent behavior has different qualitative meaning for males and females based on gender norms. According to social role theory, gender norms influence behavior and beliefs (Eagly, 1987). Gender norms may create unequal thresholds dictating what kind of behavior is acceptable for males versus

females. For instance, males engaging in relatively less serious behaviors such as pushing/shoving may be considered normative “roughhousing” (the “boys will be boys” adage). At the same time, these same behaviors among females may be considered egregious. Thus, while this less serious form of violence is a strong indicator of “violent behavior” for females, pushing/shoving is a weaker indicator of “violent behavior” for males because it is a socially acceptable behavior for males. At the same time, the more serious behaviors such as beating others up and engaging in group fighting were stronger indicators of violent behavior for males compared to females.

Recommendations on dealing with non-invariance remain largely unresolved in the literature. In practice, four major options for dealing with partial invariance are: (1) allow cross-group comparisons on all items despite lack of measurement invariance, (2) restrict cross-group comparisons to those items that were invariant, (3) avoid cross-group comparisons on all items (Gregorich, 2006), or (4) constrain the invariant items to be equal and allow non-invariant items to vary (Byrne et al., 1989). Unfortunately, guidelines for choosing an appropriate option are lacking. Option 1 is probably least desirable as it ignores the evidence that a measure is functioning differently across groups. Although less problematic, option 2 may lead to several different versions of a scale for multiple cross-group comparisons and the potential for incomplete coverage of the construct (Chen, 2008). Option 3 advocates that the presence of one or more non-invariant items suggests that the latent factor has different meaning across groups and therefore the measure cannot be used for cross-group comparisons (Gregorich, 2006). Option 4 appears to introduce less bias than option 1, but it creates questions as to why the non-invariant items are different and what the implications are for conceptualization of the construct. Chen (2008) suggests comparing the

groups on the statistic of interest after constraining all items to be equal and after allowing non-invariant items to vary.

A lack of invariance in factor loadings can lead to artificial interaction effects in predictive relationships and inaccurate differences in means (Chen, 2008). Most often, biases in the means are such that the means of the group with the higher factor loadings are inflated and the means of the group with the lower factor loadings are deflated. This indicates that, at least in the current study, violent behavior among males is upwardly biased (i.e., a mean score higher than the “true” mean score) whereas violent behavior among females is downwardly biased (i.e., a mean score lower than the “true” mean score). In the current model, the mean violent behavior score was constrained to 0 for males for identification purposes. After constraining all items to be equal, the mean score for females was -0.227 (S.E.=.045), which is significantly different than 0 ($p < .001$). After allowing non-invariant items to vary, the mean score for females was -0.211 (S.E.=.044), which is also significantly different than 0 ($p < .001$). In this case, the same conclusion (i.e., that male and female mean scores were significantly different) remained whether the items were constrained to be equal or the invariant items were allowed to vary. However, the extent of the difference between means was slightly exaggerated when all items were constrained to be equal. Future studies using the Violent Behavior Checklist should use a similar approach before making cross-gender comparisons.

The second research question related to the invariance of the Violent Behavior Checklist across racial/ethnic groups. In contrast to the results based on gender, only a single item was non-invariant: “used any weapon in a fight.” Specifically, the factor loading was weaker for Caucasian adolescents compared to African American and American Indian

adolescents. Compared to the invariance testing across genders, the partial invariance across race/ethnicities is less problematic. It is reasonable to follow the second option and exclude this single item from cross-group comparisons and conduct additional tests to determine the validity of the remaining five items. The minimal non-invariance suggests that the construct of violent behavior functions similarly across racial/ethnic groups.

Overall, the current study has salient implications for adolescent violence research. Prior to testing substantive hypotheses regarding cross-group differences, it is imperative to test for measurement invariance. Failure to assess measurement invariance yields cross-group comparisons that may be biased. This is particularly important for researchers making cross-gender comparisons for violence perpetration. Additional research is needed to test for measurement invariance on victimization measures, aggression measures, and additional violent behavior measures. In addition to gender and racial/ethnic groups, invariance can be tested across age groups, socioeconomic statuses, and other demographics.

Limitations

The findings of the current study must be understood in light of its limitations. Generalizability of the results is limited as the current study took place in two rural, ethnically diverse, socioeconomically disadvantaged communities in the Southeastern United States. Although there is high external validity to the communities in which the study took place, caution is warranted when generalizing beyond the study context. In addition, the version of the Violent Behavior Checklist used in the current study is a shortened, slightly modified version of the original measure. While the findings of this study are certainly relevant for researchers using the Violent Behavior Checklist, these analyses should be replicated using the full version of the measure. Finally, the Violent Behavior Checklist is

only one of many instruments used to measure violent behavior. Additional research is needed to assess the measurement invariance of other adolescent violence measures. It would also be ideal to test the measurement invariance of measures that capture the gender of the victim of violence as this information could introduce additional differences in the way in which the measure functions. Nevertheless, the findings of the current study emphasize the need for testing measurement invariance prior to comparing violent behavior across groups.

REFERENCES: PAPER I

- Bowen, G. L., & Richman, J. M. (2008). *The School Success Profile*. Chapel Hill, NC: University of North Carolina.
- Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological Bulletin, 105*, 456-466. doi:10.1037//0033-2909.105.3.456
- Byrne, B. M., & Watkins, D. (2003). The issue of measurement invariance revisited. *Journal of Cross-Cultural Psychology, 34*, 155-175. doi:10.1177/0022022102250225
- Chen, F. F. (2008). What happens if we compare chopsticks with forks? The impact of making inappropriate comparisons in cross-cultural research. *Journal of Personality and Social Psychology, 95*, 1005-1018. doi:10.1037/a0013193
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233-255. doi: 10.1207/S15328007SEM0902_5
- Conrad, K.J., Riley, B.B., Conrad, K.M., Chan, Y., & Dennis, M.L. (2010). Validation of the crime and violence scale (CVS) against rasch measurement model including differences by gender, race, and age. *Evaluation Review, 34*, 83-115. doi: 10.1177/0193841X10362162
- Dahlberg, L. L., Toal, S. B., Swahn, M., & Behrens, C. B. (2005). *Measuring violence-related attitudes, behaviors, and influences among youths: A compendium of assessment tools*, (2nd ed.). Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.
- DeVellis, R. F. (2003). *Scale development: Theory and applications*. Thousand Oaks, CA: Sage Publications.
- Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Edelen, M. O., McCaffrey, D. F., Marshall, G. N., & Jaycox, L. H. (2009). Measurement of teen dating violence attitudes: An item response theory evaluation of differential item functioning according to gender. *Journal of Interpersonal Violence, 24*, 1243-1260. doi:10.1177/0886260508322187
- Erikson, E. (1962). Youth: Fidelity and diversity. *Daedalus, 91*(1), 5-27. Retrieved from <http://www.jstor.org/stable/20025167>
- Feaster, D. J., Robbins, M. S., Henderson, C., Horigian, V., Puccinelli, M. J., Burlew, A. K., & Szapocznik, J. (2010). Equivalence of family functioning and externalizing in adolescent substance users of different race/ethnicity. *Journal of Substance Abuse Treatment, 38*(S1), S113-S124. doi:10.1016/j.jsat.2010.01.010

- Frisell, T., Pawitan, Y., Langstrom, N., & Lichtenstein, P. (2012). Heritability, assertive mating, and gender differences in violent crime: Results from a total population sample using twin, adoption, and sibling models. *Behavioral Genetics, 42*, 3-18. doi: 10.1007/s10519-011-9483-0
- Garnaat, S. L., & Norton, P. J. (2010). Factor structure and measurement invariance of the Yale-Brown Obsessive Compulsive Scale across four racial/ethnic groups. *Journal of Anxiety Disorders, 24*, 723-728. doi: 10.1016/j.janxdis.2010.05.004
- Glanville, J. L., & Wildhagen, T. (2007). The measurement of school engagement: Assessing dimensionality and measurement invariance across race and ethnicity. *Educational and Psychological Measurement, 67*, 1019-1041. doi:10.1177/0013164406299126
- Gregorich, S. E. (2006). Do self-report instruments allow meaningful comparisons across diverse population groups? Testing measurement invariance using the confirmatory factor analysis framework. *Med Care, 44* (11 Suppl 3), S78-S94. doi:10.1097/01.mlr.0000245454.12228.8f
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55. doi:10.1080/10705519909540118
- Krug, E. G., Dahlberg, L. L., Mercy, J. A., Zwi, A. B., Lozano, R. (2002). *World report on violence and health*. Geneva: World Health Organization.
- Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide*. (7th ed.). Los Angeles, CA: Muthén & Muthén.
- Nadel, H., Spellmann, M., Alvarez-Canino, T., Lausell-Bryant, L., & Landsberg, G. (1996). The cycle of violence and victimization: A study of the school-based intervention of a multidisciplinary youth violence-prevention program. *American Journal of Preventive Medicine, 12*, 109-119. Retrieved from <http://www.sciencedirect.com/science/journal/07493797>.
- Odgers, C.L., Moffitt, T.E., Broadbent, J.M., Dickson, N., Hancox, R.J., Harrington, H...Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and Psychopathology, 20*, 673-716. doi:10.1017/S095457908000333
- Peterson, D., Esbensen, F., Taylor, T.J., & Freng, A. (2007). Youth violence in context: The roles of sex, race, and community in offending. *Youth Violence and Juvenile Justice, 5*, 385-410. doi:10.1177/1541204006297369
- Thombs, B. D., Lewis, C., Bernstein, D. P., Medrano, M. A., & Hatch, J. P. (2007). An evaluation of the measurement equivalence of the Childhood Trauma Questionnaire—Short Form across gender and race in a sample of drug-abusing adults. *Journal of Psychosomatic Research, 63*, 391-398. doi:10.1016/j.jpsychores.2007.04.010

- Topitzes, J., Mersky, J.P., & Reynolds, A.J. (2012). From childhood maltreatment to violent offending: An examination of mixed-gender and gender-specific models. *Journal of Interpersonal Violence, 27*, 2322-2347. doi:10.1177/0886260511433510
- Wu, A. D., Li, Z., & Zumbo, B. D. (2007). Decoding the meaning of factorial invariance and updating the practice of multi-group confirmatory factor analysis: A demonstration with TIMSS data. *Practical Assessment Research & Evaluation, 12*, 1-26. Retrieved from <http://pareonline.net/>
- Zheng, Y. & Cleveland, H.H. (2013). Identifying gender-specific developmental trajectories of nonviolent and violent delinquency from adolescence to young adulthood. *Journal of Adolescence, 36*, 371-381. doi:10.1016/j.adolescence.2012.12.007

PAPER II

AN INVESTIGATION OF RELATIONAL RISK AND PROMOTIVE FACTORS ASSOCIATED WITH ADOLESCENT FEMALE AGGRESSION

A significant number of adolescent females are aggressive. Prevalence rates of behavior disorders and juvenile court caseloads provide a rough estimate of female aggression, given the likelihood of comorbidity with aggressive behavior (Connor, 2002). A recent estimate of the lifetime prevalence of behavior disorders in female adolescents is 15.5% (Merikangas et al., 2010). Although males are more likely to be diagnosed with a behavior disorder in childhood, this differential prevalence narrows significantly in adolescence (Loeber, Burke, Lahey, Winters, & Zera, 2000; Odgers & Moretti, 2002). Juvenile court statistics further illustrate female aggression by describing increases over time. Between 1985 and 2009, the number of female-involved delinquency cases increased 86%, while male-involved cases increased 17% (Puzzanchera, Adams, & Hockenberry, 2012). In fact, in the past two decades, females had a greater average annual growth in all offense categories, including violent offenses, compared to males. Despite these trends, much of the research on adolescent aggression has focused on males.

Unfortunately, despite its prevalence and impact, little is known about the antecedents of female aggression. Consequently, little is known about how to prevent it. Although a large body of research on direct (or physical) aggression exists, these results can be only cautiously generalized to female adolescents given that many studies have focused exclusively on male samples (Valois, MacDonald, Bretous, Fischer, & Drane, 2002). This sentiment is echoed by

Odgers and Moretti (2002), who state “there is simply too little research to confidently conclude that the risk models developed primarily on boys are accurate in predicting onset and developmental course in girls” (pp. 112-113).

Significant consequences are associated with adolescent aggression, including delinquency, conduct problems, poor peer relations, and low prosocial behavior (Card, Stucky, Sawalani, & Little, 2008). These consequences are particularly deleterious for female adolescents. Compared to their non-aggressive peers, women with conduct disorder or delinquency (diagnoses characterized by aggression) in adolescence had a 10- to 40- fold increase in rates of criminal behavior, psychiatric problems, dysfunctional relationships, poor educational achievement, less stable work histories, and higher mortality rates in early adulthood (Pajer, 1998). Evidence indicates that aggression among female adolescents peaks in mid-adolescence (Karriker-Jaffe, Foshee, Ennett, & Suchindran, 2008), suggesting that this is a particularly vulnerable developmental stage.

Overall, the prevalence of behavior disorders in female adolescents, coupled with emerging evidence of the associated negative consequences, warrants further research. Particularly disconcerting is the uncertainty with which research on direct aggression in mostly male samples can be applied to females. The current study seeks to fill this gap in the literature by identifying risk factors (i.e., variables that positively predict aggression) and promotive factors (i.e., variables that negatively predict aggression) associated with adolescent female aggression.

Literature Review

Theoretical Framework: Relational-Cultural Theory and Social Role Theory

Relational-cultural theory provides a lens through which to view adolescent female aggression. Central to this theory is the notion that girls are socialized in a society in which gender norms provide expectations for behavior. Acknowledging this phenomenon and how it relates to the inadequacy of applying male-developed psychiatric models to females, Jean Baker Miller (1976) wrote *Toward a New Psychology of Women*. This work was the foundation of relational-cultural theory, which posits that girls' and women's development is based on connection with others and relationships (Covington, 2008; Jordan & Hartling, 2002). From infancy, females are socialized to be empathic and to prioritize interpersonal connections. In adolescence, relationships become even more important. In fact, female adolescents often define their personal identities in terms of their close relationships (Cairns, Cairns, Neckerman, Gest, & Garipey, 1988). Relational-cultural theory posits that female relationships are potential strengths towards healthy growth and development (Covington, 2008; Jordan & Hartling, 2002). According to relational-cultural theory, positive relationships are sources of strength and prosocial growth for females, which may buffer against female aggression.

Social role theory complements relational-cultural theory in that it further explicates the importance of relationships for females. Social role theory considers aggression to be a role behavior dictated by social norms and social status (Eagly, 1987). Male versus female gender norms differ in terms of the characteristics that are valued and expected. The female gender norm emphasizes caring and *communal* characteristics, which encourages females to be pleasant, to show sensitivity, and to value interpersonal relationships (Eagly, Wood, & Diekman, 2000). The male gender norm, on the other hand, emphasizes *agentic* characteristics, which encourages individual achievement and assertiveness. Whereas agentic

characteristics are consistent with aggressive behavior, communal characteristics tend to be incompatible with aggressive behavior.

Given the incompatibility between the female gender norm and aggression, prior to engaging in aggressive behavior, aggressive girls must reject implicit social roles, the most fundamental of which is concern for relationships with others. Although aggressive females may prioritize relationships with other aggressive and delinquent peers, the act of engaging in aggressive behavior constitutes a lack of concern for the victim, which is a violation of the female social role. This social role violation likely results in relationships characterized by conflict and dysfunction, which could serve to fuel aggressive behavior. By emphasizing gender norms and the rejection of implicit social roles, social role theory suggests that negative or conflictual relationships are key risk factors for aggressive behavior.

Indeed, researchers have moved from an assumption that female aggression is the result of a lack of social relationships to examining the characteristics and qualities of those social relationships. Early researchers posited that aggressive and antisocial girls were socially deficient (Konopka, 1966); they behaved aggressively because they lacked the social skills necessary to fulfill their desire for meaningful relationships. More recent studies have found that aggression and antisocial behavior are not the result of a lack of social relationships, but are due to the nature of these relationships. For example, Cairns et al. (1988) found no significant differences in the number of friends between highly-aggressive and non-aggressive girls. However, compared to non-aggressive girls, the highly-aggressive girls were more likely to associate with highly-aggressive peers. In addition, in a qualitative study of court-involved female adolescents, a theme of general distrust of female peers characterized by social exclusion and betrayal emerged (Miller, Winn, Taylor, & Wiki,

2011). However, the female friends who participants felt could be trusted also contributed to their offending behavior. Overall, this literature suggests that aggressive female adolescents' relationships are characterized by dysfunction, which is in line with social role theory.

In sum, relational-cultural theory and social role theory emphasize that relationships are central to the lives of girls and therefore are key predictors of adolescent female aggression. The two theories lead to complementary hypotheses regarding which relational factors are associated with aggression. Relational-cultural theory and social role theory suggest that positive, supportive relationships are key promotive factors against adolescent female aggression and that negative or conflictual relationships are key risk factors for adolescent female aggression. The current study seeks to test these broad hypotheses using several salient promotive and risk factors across the developmental ecology. The following sections summarize previous literature on the relationship between these relational promotive/risk factors and adolescent female aggression. Although relational factors are the main focus of the study given their hypothesized salience for females, promotive and risk factors at the individual and community levels are also included (and reviewed below) as they have been identified as part of the constellation of risk factors for aggression in other, majority male samples (Valois et al., 2002).

Relational Promotive Factors

Parent support. A positive parent-adolescent relationship may be a particularly important promotive factor against aggression for girls. One study of adolescents ages 11 thru 16 revealed that positive family environment was a stronger buffer against aggression for girls than for boys (Lopez, Perez, Ochoa, & Ruiz, 2008). Indeed, Zahn-Waxler et al. (2005) posited that due to their interpersonal orientation, girls spend more time in close

proximity with caregivers and are therefore more receptive to negative emotions in the family environment. This connection to the family could translate into family factors having increased salience among girls such that parent support leads to lower aggression.

Teacher support. Support from other adult figures, such as teachers, may also serve as a promotive factor against aggressive behavior. In a sample of 127 African American youth, teacher support was significantly associated with lower levels of teacher-reported aggression, but was not significantly related to peer- or self-reported aggression (Benhorin & McMahon, 2008). In another study, child-teacher closeness was significantly and inversely associated with teacher-rated aggression (Howes, 2000). These studies suggest that teacher support may be associated with teacher-rated aggression, however further research is needed to determine whether teacher support is a promotive factor against youth-reported aggression.

Friend support. In addition to supportive adults, support from friends can also deter aggressive behavior. For example, in a study of African American youth, friend support was inversely associated with teacher-rated aggression (Benhorin & McMahon, 2008). In this study, however, support from classmates (i.e., peers not labeled as friends) had no significant impact on teacher-, peer-, or youth-reported aggression. This finding suggests that it is necessary to consider the specific nature of the peer relationship when considering the association with aggressive behavior.

Relational Risk Factors

Delinquent friends and peer pressure. During adolescence, girls desire autonomy. Part of that autonomy includes an additional amount of time spent with peers, which increases the likelihood of peer influence. Indeed, a consistent predictor of aggressive behavior for girls (and boys) is association with aggressive and delinquent peers (Cairns et

al., 1988; Espelage, Holt, & Henkel, 2003; Ferguson, Miguel, & Hartley, 2009). The tendency for aggressive girls to band together creates opportunities to reinforce each other's behaviors, which may lead to an increase in the intensity or frequency of aggressive behavior. This reinforcement is known as peer pressure. As aggressive behaviors often occur in a group setting in the presence of other peers rather than in a one-on-one setting (Björkqvist, 2001), female adolescents who succumb to peer pressure may be more likely to exhibit aggression. For example, girls who were delinquent (which is correlated with aggression) were more likely than non-delinquent girls to report peer pressure (Pleydon & Schner, 2001). Further, in a study exploring implicit scripts for situations in which adolescents experience peer pressure to engage in misconduct, girls were more likely than boys to cite friendship disruptions as a possible consequence associated with refusing peer pressure (Pearl, Bryan, & Herzog, 1990). This finding provides further evidence of the centrality of peer relationships as risk factors for negative behavior among female youth.

Peer rejection. The current study follows Dodge et al.'s (2003) conceptualization of peer rejection as an interpersonal stressor rather than a personality trait of the adolescent. Dodge and colleagues assessed the association between rejection during childhood and aggression during adolescence. Results of this study indicated that for those children who were predisposed to aggressive behavior, social rejection during elementary school was associated with later aggressive behavior and this association applied to both boys and girls. Peer rejection in the form of interpersonal victimization has also been associated with aggressive behavior. For instance, African American middle school students who reported victimization were more likely to report physical aggression (Sullivan, Helms, Kliewer, & Goodman, 2006). In another study that used peer nominations to gauge victimization

experiences, sixth graders who were identified as victims were more likely to report aggressive and delinquent behavior (Paul & Cillessen, 2003). In fact, in this study, the association between victimization and disruptive behavior was stronger for girls than boys. The type of peer victimization may be important for gender differences. That is, the relationship between physical victimization and aggression was stronger among males, whereas the relationship between relational victimization and aggression was stronger among females (Sullivan et al., 2006).

Parent-child conflict. Although adolescents spend increasing amounts of time with their peers, the parent-adolescent relationship continues to impact adolescent outcomes. A variety of parent-related risk factors, including parental conflict, exposure to family violence, harsh punishment, and lack of positive parenting are associated with externalizing behaviors (including aggression) in youth (Deater-Deckard, Dodge, Bates, & Pettit, 1998). Parent-child conflict showed a particularly strong association with aggression: rural adolescents who reported more parent-child conflict were 10 times more likely to report high levels of aggressive behavior compared to those who reported lower parent-child conflict (Smokowski, Cotter, Robertson, & Guo, 2013).

Individual Promotive and Risk Factors

Future optimism. Future orientation (or optimism) is a personal assessment of how well one can overcome challenges in the social system and is the foundation for youth to set goals, form plans, and make commitments (Nurmi, 1991; Seginer, 2008). In addition to promoting mental health functioning for at-risk adolescents (McCabe & Barnett, 2000; Polgar & Auslander, 2009), future optimism has been associated with decreased aggression. For instance, teacher-reported student optimism was negatively associated with teacher-

reported student aggression (Benson, 2007). Further, future optimism was associated with decreased aggression in a sample of foster care youth (Cabrera, Auslander, & Polgar, 2009; Polgar & Auslander, 2009) and in a sample of rural adolescents (Smokowski, Evans, Cotter, & Webber, 2014).

Internalizing symptoms (depression and anxiety). Several empirical studies have reported an association between internalizing symptoms and aggression (e.g., Crick, Ostrov, & Werner, 2006; Kofler et al., 2011; Marsee, Weems, & Taylor, 2008; Vitaro, Brendgen, & Tremblay, 2002). According to the “acting out” model, depressive symptoms may manifest behaviorally as aggression and rule breaking (Kofler et al., 2011). That is, internalizing symptoms precede aggressive behavior. Providing support for the acting out model, Zimmerman et al. (2013) conducted a longitudinal study from late childhood to early adolescence and found that initial levels of internalizing and externalizing behaviors were correlated and early depressive symptoms predicted increases in externalizing behaviors over time. The association between internalizing symptoms and aggression may be particularly salient for girls. Although girls are less likely to experience externalizing problems, girls who are aggressive are more likely than their male counterparts to experience comorbid internalizing problems (Loeber & Keenan, 1994).

Indirect (relational) aggression. Direct (or physical) and indirect (or relational) aggression are highly correlated. In a meta-analysis of studies on direct and indirect aggression, the average correlation was .76, indicating that 57% of the variance between indirect and direct aggression is common (Card et al. 2008). As direct and indirect aggression often co-occur, when assessing the risk factors for or consequences of either type of aggression, it is necessary to consider the common and unique variance between the two. For

example, a significant amount of research on indirect aggression has failed to control for direct/physical aggression (Crick, Casas, & Mosher, 1997; Werner & Crick, 1999), suggesting that the negative consequences associated with indirect aggression could, in fact, be due to (unmeasured) direct aggression. In order to parcel out the unique risk factors and consequences associated with direct and indirect aggression, it is necessary to include both variables in analyses.

Community Promotive and Risk Factors

Neighborhood support. Neighborhoods that provide support can buffer against aggressive behavior. The Moving to Opportunity Experiment (MTO) is a prime example of this phenomenon. In MTO, families living in resource-lacking public housing were provided housing vouchers to more affluent neighborhoods (Kling, Ludwig, & Katz, 2005). Results indicated that female youth who were provided vouchers were less likely than control participants to commit violent crimes two years later. The impact of neighborhood support on aggressive behavior was also highlighted in a cross-sectional study of youth. Among youth between the ages of 9 and 15, those who lived in neighborhoods with higher concentrations of youth services and organizations reported lower levels of aggression (Molnar, Cerda, Roberts, & Buka, 2008). In sum, previous research suggests that neighborhood support may be a promotive factor against the development of adolescent female aggression.

Neighborhood crime. In contrast to the impact of supportive neighborhoods, youth who live in neighborhoods characterized by crime and violence have an increased risk for a host of negative developmental outcomes, one of which is aggressive behavior. Compared to middle–socioeconomic status (SES) African American children with similar family economic and social characteristics, those in low-SES neighborhoods displayed significantly

more peer-reported aggression (Kupersmidt, Griesler, DeRosier, Patterson, & Davis, 1995). A possible explanation for the link between community context and aggression is differences in community norms and expectations. For example, in communities in which crime and violence are common, community members may feel that a certain degree of aggression, even among females, is functional. Further, the aggression and violence that girls witness in their neighborhood may serve as a model for their own behavior. For youth living in violent neighborhoods, the relationship between exposure to violence and aggressive behavior was partially mediated by aggressive social cognitions (i.e., perceptions of the world as a hostile place and that aggression is acceptable) among older elementary aged youth (Guerra, Huesmann, & Spindler, 2003). This finding suggests that exposure to violence leads to normative beliefs about aggressive behavior, which in turn increases the likelihood of aggressive behavior.

Demographics

Race. Several studies have documented racial differences in aggressive behavior. For example, in one study of adolescents, compared to their White counterparts, African American and Native American adolescents were twice as likely to report engaging in serious violent offending and attacking someone with a weapon (Peterson, Esbensen, Taylor, & Freng, 2007). In the same sample, compared to White youth, Native American youth were twice as likely to have participated in a gang fight. According to the Youth Risk Behavior Surveillance System (YRBSS; Centers for Disease Control and Prevention, 2014), physical aggression varied by race: compared to 29.4% of White students, 39.1% of African American students and 36.8% of Hispanic students reported being in a physical fight. Although these prevalence rates might suggest significant racial differences in aggressive behavior, it is

possible that these differences could be due to exogenous factors, such as socioeconomic status (SES) or neighborhood and school characteristics. Indeed, in a study that controlled for several SES and school characteristics, there were no significant differences in aggressive behaviors among African American, American Indian, Hispanic, White, and Multiracial youth (Smokowski, Evans, Cotter, & Guo, 2013). Due to a lack of studies, it is unclear whether racial differences are more or less salient for females.

Age. Aggression, a common characteristic of early childhood, is relatively less common in late childhood and adolescence. In one nationally representative, longitudinal sample of youth between the ages of 4 and 18, the normative trajectory of aggressive behavior peaked at age 4 and generally decreased through age 18 (Bongers, Koot, Ende, & Verhulst, 2003). Several studies focusing on childhood to adolescence reported similar declining trajectories (e.g., Miner & Clarke-Stewart, 2008; Williams et al., 2009). However, a study focusing on the trajectory of aggression during adolescence (age 11 thru 18) found a curvilinear trend; aggression increased until it peaked at age 15 and then subsequently declined for both males and females (Karraker-Jaffe et al., 2008). Similar curvilinear trends were reported in other studies of adolescent aggression (Farrell & Sullivan, 2004; Farrell, Sullivan, Esposito, Meyer, & Valois, 2005). Given mixed findings in previous research, additional studies are needed to determine the trajectory of aggression throughout adolescence.

Socioeconomic status and family structure. Low socioeconomic status has been associated with increased aggression. For instance, in one study, income predicted children's aggressive (or externalizing) behaviors (McLeod & Shanahan, 1993). In addition, youth from single parent families tend to have higher rates of aggression (Vaden-Kiernan, Ialongno,

Pearson, & Kellam, 1995) and single parenthood is often associated with limited financial resources. Compared to youth from two-parent families in a diverse sample of urban youth, those with single parents reported significantly higher rates of interpersonal aggression (Griffin, Botvin, Scheier, Diaz, & Miller, 2000).

Method

Current Study

Data for the current study came from the NC-ACE Rural Adaptation Project (RAP), a 5-year longitudinal panel study of more than 6,000 middle-school students from 28 public middle schools and 12 public high schools in two rural, economically disadvantaged counties in North Carolina. Data were collected in spring 2011, 2012, 2013, and 2014, which correspond to years 1 thru 4 of the 5-year project. In Year 1, all Grade 6 thru 8 students in County 1 were included in the sample. Due to the significantly larger student population in County 2, 40% of the student body was randomly selected to participate. Students were tracked annually as they transitioned into high school and a new random sample of sixth graders was added each year. Therefore, the Year 2 sample included students in Grades 6 thru 9, the Year 3 sample included students in Grades 6 thru 10, and the Year 4 sample included students in Grades 6 thru 11.

In each county, data were collected using an online assessment tool. Prior to completing the online assessment, participants were told that their participation was voluntary and were given the opportunity to decline. Students assented to participate by reading and electronically signing an assent screen included in the online assessment. Assessments were completed in school computer labs, which were monitored by research

staff. Each participant received an identification number to maintain confidentiality.

Students received a gift card as compensation for their time.

Participants

Given the goal of the current study to analyze changes in aggressive behavior over a 3-year study period based on 4-wave panel data, students who entered the study in Year 4 were excluded from the analysis. Sample descriptive characteristics are displayed in Table 2.1. The final analysis sample (which was limited to females) was comprised of 2,536 observations at baseline, 3,055 observations at Wave 2 (12 months after baseline), and 3,580 observations at Wave 3 (24 months after baseline) and Wave 4 (36 months after baseline). The racial diversity of the sample mirrors that of the surrounding community: 30% of participants identified as White, 26% as African American, 24% as American Indian, 13% as mixed race/other, and 7% as Latino. Approximately 79% of participants reported living with two parents and 79% received free or reduced price lunch.

Measures

The School Success Profile (SSP; Bowen & Richman, 2008) is a youth self-report assessment that measures perceptions and attitudes about school, friends, family, neighborhood, self, and health and well-being. The reliability and validity of the SSP are well documented (Bowen, Rose, & Bowen, 2005). The current study used a modified version of the SSP, the School Success Profile Plus (SSP+), which included 152 of the SSP items and five additional subscales: (a) a modified version of the Rosenberg Self-Esteem scale (Rosenberg, 1965); (b) the Multigroup Ethnic Identity Measure (Phinney & Ong, 2007); (c) subscales from the Youth Self-Report (YSR), the adolescent version of the Child Behavior Checklist (Achenbach & Rescorla, 2001); (d) the Conflict Behavior Questionnaire (CBQ;

Prinz, Foster, Kent, & O'Leary, 1979) to measure parent-child conflict; and (e) a modified self-report version of Werner and Crick's (1999) Peer Nomination Scale to measure relational aggression (Loudin, Loukas, & Robinson, 2003).

Dependent variable: Aggression (time-varying). Aggression was measured using a 9-item modified version of the aggression subscale from the Youth Self Report (YSR; Achenbach & Rescorla, 2001). Example items included: "I get in many fights" and "I break rules at home, school, or elsewhere." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, and A Lot Like Me*); the Cronbach's alpha reliability was .82 in Year 1, .83 in Year 2, .82 in Year 3, and .88 in Year 4 in this sample.

Control variable: Indirect (relational) aggression. Indirect (relational) aggression was measured using a 5-item modified, self-report version of Werner and Crick's (1999) peer-nomination scale (Loudin et al., 2003). Example items included: "When angry or mad at another student, I spread rumors of gossip about him/her" and "When angry or mad at another student, I exclude him/her from group activities." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, and A Lot Like Me*) and the Cronbach's alpha reliability was .80 in Year 4 in this sample.

Relational promotive factors.

Parent support (time-varying). The five-item Parent Support scale (Bowen & Richman, 2008) measured the frequency over the past 30 days that an adult in the child's home provided emotional support. Example items included: "How often did the adults in your home let you know that you were loved?" and "How often did the adults in your home tell you that you did a good job?" Each item was rated on a 3-point Likert scale (*Never, Once*

or Twice, or More than Twice) and the Cronbach's alpha reliability was .89 in Year 1, .92 in Year 2, .93 in Year 3, and .95 in Year 4 in the current sample.

Teacher support (time-varying). The eight-item Teacher Support scale (Bowen & Richman, 2008) measured students' perceptions of the extent to which teachers offered support. Example items included: "My teachers care about me" and "My teachers give me a lot of encouragement." Each item was rated on a 4-point Likert scale (*Strongly Disagree, Disagree, Agree, or Strongly Agree*). The Cronbach's alpha reliability was .88 in Year 1, .90 in Year 2, .92 in Year 3, and .93 in Year 4 in the current sample.

Friend support (time-varying). Friend Support was measured with a five-item scale (Bowen & Richman, 2008). Example items included: "I can count on my friends for support" and "I can trust my friends." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, or A Lot Like Me*) and the Cronbach's alpha reliability was .89 in Year 1, .91 in Year 2, .92 in Year 3, and .94 in Year 4 in the current sample.

Relational risk factors.

Delinquent friends (time-varying). Association with delinquent friends was assessed using a nine-item scale (Bowen & Richman, 2008) that measured the degree to which the participant's friends engaged in delinquent activities. Example items included: "I have friends who get in trouble with the police" and "I have friends who cut classes." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, or A Lot Like Me*) and the Cronbach's alpha reliability was .90 in Year 1, .91 in Year 2, .91 in Year 3, and .92 in Year 4 in the current sample.

Peer pressure (time-varying). Peer pressure was measured with a five-item scale (Bowen & Richman, 2008). Example items included: "I let my friends talk me into doing

things I really don't want to do" and "I tend to go along with the crowd." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, or A Lot Like Me*). The Cronbach's alpha reliability was .73 in Year 1, .79 in Year 2, .79 in Year 3, and .85 in Year 4 in the current sample.

Peer rejection (time-varying). Peer rejection was measured with a three-item scale (Bowen & Richman, 2008). Example items included: "I am made fun of by my friends" and "I wish my friends would show me more respect." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, or A Lot Like Me*) and the Cronbach's alpha reliability was .70 in Year 1, .74 in Year 2, .75 in Year 3, and .82 in Year 4 in the current sample.

Parent-child conflict (time-varying). Parent-child conflict was measured using 10 of the 20 items from the Conflict Behavior Questionnaire (CBQ; Prinz et al., 1979). Example items included: "At least three times a week, my parent(s) and I get angry at each other" and "My parent(s) put me down." The response options for each item were *True* or *False* and the Cronbach's alpha reliability was .82 in Year 1, .85 in Year 2, .85 in Year 3, and .86 in Year 4 in the current sample.

Individual promotive and risk factors.

Future optimism (time-varying). Future optimism was assessed with the 12-item Future Optimism scale (Bowen & Richman, 2008) that measures expectations for future success. Example items included "When I think about my future, I feel very positive" and "I see myself accomplishing great things in life." Each item was rated on a 4-point Likert scale (*Strongly Disagree, Disagree, Agree, and Strongly Agree*) and the Cronbach's alpha reliability was .93 in Year 1, .95 in Year 2, .95 in Year 3, and .97 in Year 4 in the current sample.

Internalizing symptoms (time-varying). Internalizing symptoms were measured with seven items from the YSR (Achenbach & Rescorla, 2001) that assessed symptoms of anxiety and depression. Example items included: “I often feel sad” and “I often feel nervous or tense.” Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, and A Lot Like Me*) and the Cronbach’s alpha reliability was .89 in Year 1, .90 in Year 2, .91 in Year 3, and .95 in Year 4 in the current sample.

Community promotive and risk factors.

Neighborhood support (time-varying). Neighborhood support was assessed with a 5-item scale (Bowen & Richman, 2008), which assessed the adolescent’s perception of the degree to which adults in the neighborhood are interested in and offer help to young people. Example items included: “Adults in my neighborhood are interested in what young people in the neighborhood are doing,” and “People in my neighborhood really help one another out.” Each item was rated on a 4-point Likert scale (*Strongly Disagree, Disagree, Agree, and Strongly Agree*) and the Cronbach’s alpha reliability was .77 in Year 1, .81 in Year 2, .84 in Year 3, and .86 in Year 4 in the current sample.

Neighborhood crime (time-varying). Neighborhood crime was assessed with a 3-item scale (Bowen & Richman, 2008), which assessed the frequency with which illegal activities occur in the adolescent’s neighborhood. Example items included: “During the past 30 days, how often did someone try to sell you illegal drugs?” and “During the past 30 days, how often did someone try to get you to break the law?” Each item was rated on a 3-point Likert scale (*Never, Once or Twice, and More than Twice*) and the Cronbach’s alpha reliability was .73 in Year 1, .76 in Year 2, .84 in Year 3, and .85 in Year 4 in the current sample.

Analytic Plan

To handle missing data, multiple imputation analyses were completed and subsequent analyses were based on 10 imputed files. An analysis was conducted to gauge the appropriate number of imputations (Rose, 2013). Results of the analysis indicated that ten imputations were sufficient to minimize the impact of missing data. In addition to the previously identified variables used in the current study's analytic model, additional auxiliary variables (i.e., other scales not used for the current analysis) were used to improve the imputation model. The findings presented in Table 2.1 are aggregated results using Rubin's rule (Little & Rubin, 2002).

The next step in the analysis involved testing for measurement invariance across genders. Measurement invariance is a necessary prerequisite for cross-group comparisons. Failure to establish measurement invariance can lead to biased conclusions regarding cross-group differences. The few studies that have assessed invariance across genders on aggression measures have reported mixed results, with some reporting partial invariance (Kim, Kim, & Kamphaus, 2010; Ang, 2007; Marsee et al., 2011) and others reporting full measurement invariance (Vaillancourt, Brendgen, Boivin, & Tremblay, 2003; Odgers et al., 2008). Given the current study's focus on exploring promotive and risk factors associated with adolescent female aggression, it would be ideal to include male participants in the analyzed sample and make cross-group comparisons in subsequent analyses. However, it was determined that if results indicated the existence of measurement non-invariance or partial invariance, subsequent analyses would be limited to females only. Measurement invariance was tested with multiple group confirmatory factor analysis in several stages. Configural invariance (i.e., that the same factor model exists across groups) was tested, followed by metric invariance (i.e. that all factor loadings are equivalent across groups; Wu, Li, &

Zumbo, 2007). Finally, each lambda was constrained individually and chi-square difference tests were used to gauge changes in model fit. This process was completed for each data wave (year 1 thru year 4). Analysis was conducted in Mplus version 7.0 (Muthén & Muthén 1998-2012) using the mean and variance-adjusted weighted least squares [WLSMV] estimator given ordinal level variables.

The third analysis step involved conducting a two-level hierarchical linear model (HLM). The nesting structure of the data included time (i.e., four waves) nested within individuals and individuals nested within schools. Preliminary analysis revealed that the intraclass correlation coefficient (ICC) for individuals nested within schools was .011, indicating that less than 2% of variance in aggression scores existed between schools. Therefore independent observations of individuals within schools were assumed and the HLM was restricted to two levels (i.e., time and individual).

The dependent variable had a skewed distribution and violated the normality assumption embedded in HLM. Therefore, a natural-logarithm (ln) transformation of aggression was used. Thus, exponentiated coefficients were used to display model results in order to ease the interpretability of results. In addition, a series of likelihood ratio tests were used to determine the structure of random effects. The final model included the following random effects: a random intercept, a random slope for time, a random slope for internalizing, a random slope for delinquent friends, and a random slope for peer pressure.

The current study represents a unique opportunity to simultaneously investigate various promotive and risk factors associated with adolescent female aggression. The use of time varying covariates contributes to the dynamic nature of the analysis. All variables except for demographics and indirect aggression (which was only measured at Wave 4) were

included as time varying covariates, which allows for the modeling of the fluctuating aspects of adolescent development. Further, promotive and risk factors can function in two distinct ways. At any point in time, a promotive or risk factor can predict an outcome, such as aggressive behavior. In addition to these main effects, a promotive or risk factor can also impact the change rate of the dependent variable. Interactions (i.e, promotive/risk factor x time) were estimated in order to explore whether various relational promotive/risk factors impacted the change rate of aggressive behavior.

Results

Measurement Invariance across Gender

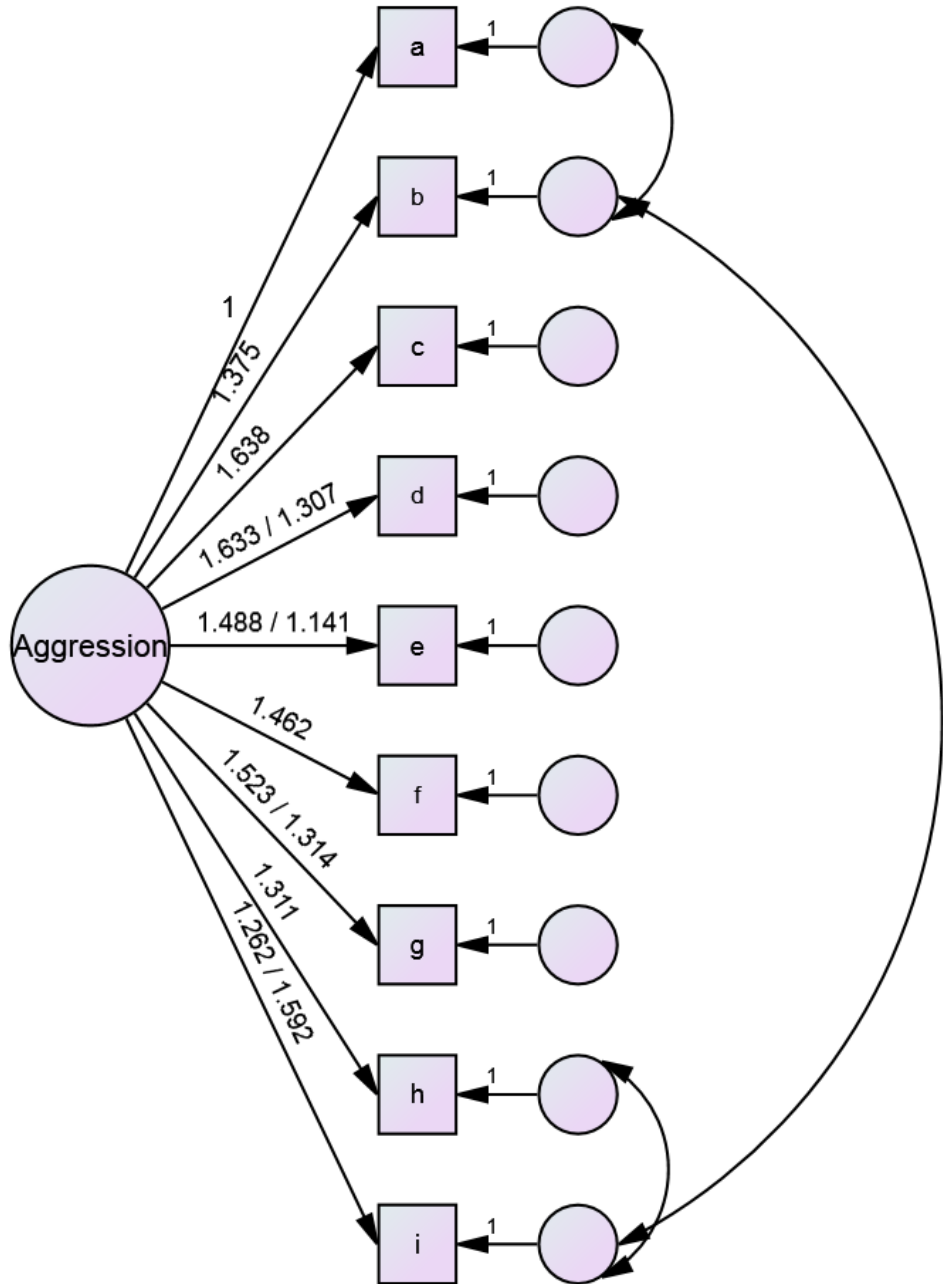
As previously mentioned, measurement invariance analyses of the aggression scale were conducted for each data wave. Given similar results across waves, only year 1 results are presented. Upon specification of the measurement model, modification indices indicated significant improvement in the model X^2 value if the errors of two pairs of observed variables (i.e., “I have a hot temper” with “My moods or feelings change suddenly” and “I don’t get along with other kids” with “I argue a lot”) were free to correlate. In addition, modification indices for females indicated model improvement if another pair of variables (“my moods or feelings change suddenly” and “I argue a lot”) was free to correlate.

According to Byrne and colleagues (1989), minimal model modifications are defensible if they are theoretically sound and do not cause significant changes in parameters. Each of these requirements was met. After constraining the single factor model to be equal across genders, the overall Root Mean Square Error of Approximation (RMSEA) was .057, with a 90% confidence interval between .052 and .062. The Comparative Fit Index (CFI) and

Tucker Lewis Index (TFI) were .98 and .97, respectively. These results suggested that configural invariance existed across groups.

After constraining all factor loadings to be equal across genders, the chi-square difference test was statistically significant ($X^2(8) = 65.12, p < .001$). In other words, model fit got significantly worse when all of the factor loadings were constrained to be equal. Thus, all factor loadings were not equivalent across groups and measurement invariance was not established. In order to assess the extent of measurement non-invariance, each factor loading was tested individually by comparing a model with the factor loading freely estimated to a model with the factor loading constrained to be equal across genders. Results indicated non-invariance in four out of nine items: “I break rules at home, school, or elsewhere,” “I get in many fights,” “I tease others a lot,” and “my moods or feelings change suddenly.” The final model results are displayed in Figure 2.1. For illustrative purposes, each observed variable was labeled as follows: (a) “I don’t get along with other kids,” (b) “I argue a lot,” (c) “I am mean to others,” (d) “I break rules at home, school, or elsewhere,” (e) “I get in many fights,” (f) “I am stubborn,” (g) “I tease others a lot,” (h) “I have a hot temper,” and (i) “My moods or feelings change suddenly.” The final model had adequate model fit. The RMSEA was .050, with a 90% confidence interval between .046 and .055 and the CFI and TFI were both .98. The model chi-square value was 381.76(61), $p < .001$. These results suggested that metric invariance did not exist across genders and cross-gender comparisons could contain bias. Therefore, subsequent analyses were restricted to females.

Figure 2.1
Results of Multiple Group Confirmatory Factor Analysis for Aggression



Notes: Path coefficients are unstandardized. A single parameter denotes a constrained path. For unconstrained paths, male parameters are listed first, followed by female parameters. The correlated error between observed variables b and i was modeled for females only.

Hierarchical Linear Modeling

A fully unconditional two-level HLM was run to determine the amount of variance in aggression that was explained by each level. Results revealed that 56.6% of the variation in aggression is due to temporal change and 43.4% is due to individual students. This indicates that both temporal change and individual differences are important predictors of aggression, although temporal change explains slightly more of the variation.

Table 2.1 displays sample descriptive statistics and the exponentiated coefficients of the analysis. The mean aggression score at baseline was 1.40 (SD = 0.40). The model had excellent fit to the data, indicated by a Wald chi-square statistic of 7421.73 (df = 24), $p < .001$. Over time, students reported slightly decreasing aggression scores, with approximately -0.1% change per month.

Table 2.1
HLM Results for ln(Aggression)

Fixed and Random Effects	Baseline Descriptive Statistics		Estimation based on 10 imputed files (exp(B))	
	% or Mean	S.D.		
Fixed Effects				
Level 1: Time				
Time (Months since baseline)			0.999	***
Relational Promotive Factors				
Parent support (time-varying)	2.686	0.494	1.012	*
Teacher support (time-varying)	3.180	0.568	0.981	***
Friend support (time-varying)	2.579	0.532	0.998	
Relational Risk Factors				
Delinquent friends (time-varying)	1.376	0.433	1.136	***
Peer pressure (time-varying)	1.266	0.373	1.039	***
Peer rejection (time-varying)	1.261	0.436	1.005	
Parent-child conflict (time-varying)	2.199	2.578	1.010	***
Individual Promotive and Risk Factors				
Internalizing symptoms (time-varying)	1.500	0.520	1.257	***
Future optimism (time-varying)	3.490	0.516	0.999	***

Community Promotive and Risk Factors				
Neighborhood crime (time-varying)	1.088	0.280	1.014	
Neighborhood support (time-varying)	3.013	0.620	0.991	*
Interactions				
Delinquent friends x time			0.998	***
Peer pressure x time			1.001	+
Teacher support x time			1.001	*
Level 2: Individual				
Race (White)				
African American	26.06		1.020	*
Hispanic	7.42		0.951	***
American Indian (Lumbee)	24.10		0.997	
Multiracial	10.96		1.019	
Other	1.68		0.994	
Age at baseline	12.035	1.529	0.997	
Receipt of free or reduced price lunch (No)				
Yes	79.13		1.008	
Family structure (Other)				
Two-parent family	78.71	0.006	0.986	*
Relational (Indirect) Aggression	1.349	0.338	1.094	***
Intercept			1.355	***
Random Effects (Variance Component)				
Intercept			1.011	***
Time Slope			1.000	***
Internalizing Slope			1.015	***
Delinquent Friends Slope			1.010	***
Peer Rejection Slope			1.007	***
Model Wald Chi-square (df)			7421.73 (24)	***

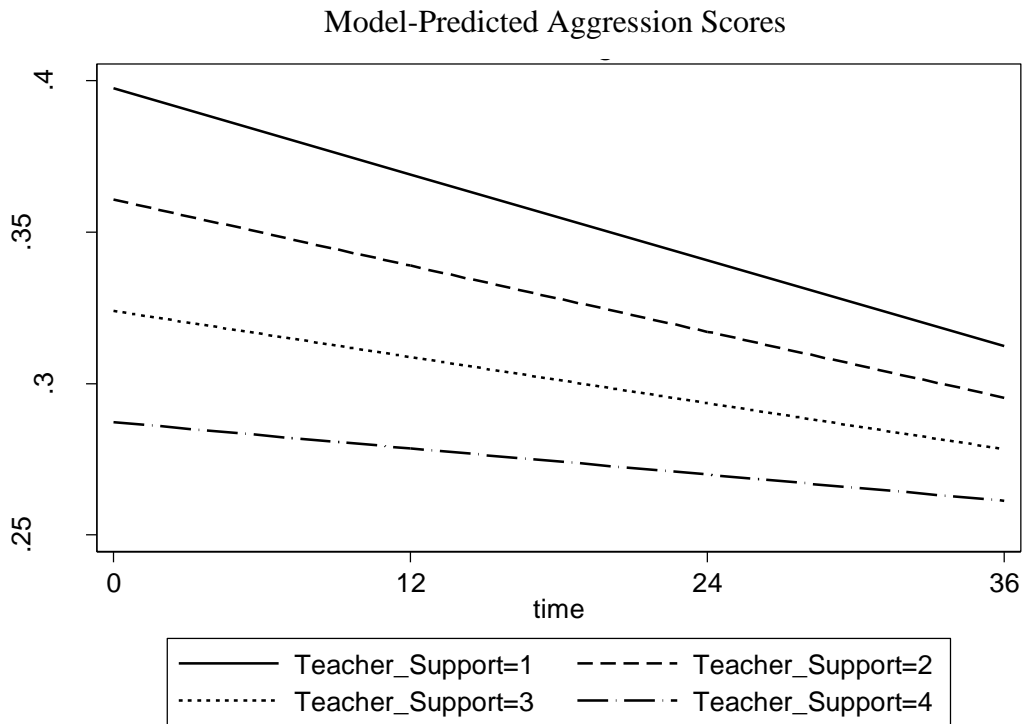
Note: Reference group for categorical variables is shown in parentheses after variable name.

* $p < .05$, ** $p < .01$, *** $p < .001$, + $p < .100$, two-tailed test.

For demographic predictors with all other factors held equal: African American girls' aggression scores were 2% higher ($p < .05$) and Hispanic girls' aggression scores were approximately 5% lower ($p < .001$) than their White counterparts. In addition, girls who lived with two parents had aggression scores that were 1.4% lower than girls who lived in another type of family situation.

For relational promotive factors with all other factors held equal and at any point in time: 1) every one-unit increase in parent support was associated with a 1.2% increase in aggression ($p < .05$); and 2) every one-unit increase in teacher support was associated with a 1.9% decrease in aggression ($p < .001$). In addition, as illustrated in Figure 2.2, results indicated a significant promotive factor-by-time interaction for teacher support ($p < .05$).

Figure 2.2
Teacher Support x Time Interaction



For relational risk factors with all other factors held equal and at any point in time: 1) every one-unit increase in delinquent friends was associated with a 13.6% increase in aggression ($p < .001$); 2) every one-unit increase in peer pressure was associated with a 3.9% increase in aggression ($p < .001$); 3) every one-unit increase in parent-child conflict was associated with a 1.0% increase in aggression ($p < .001$). In addition, results indicated a significant risk factor-by-time interaction for delinquent friends ($p < .001$) and a significant trend for the peer pressure-by-time interaction ($p < .10$; see Figures 2.3 and 2.4).

Figure 2.3
Delinquent Friends x Time Interaction

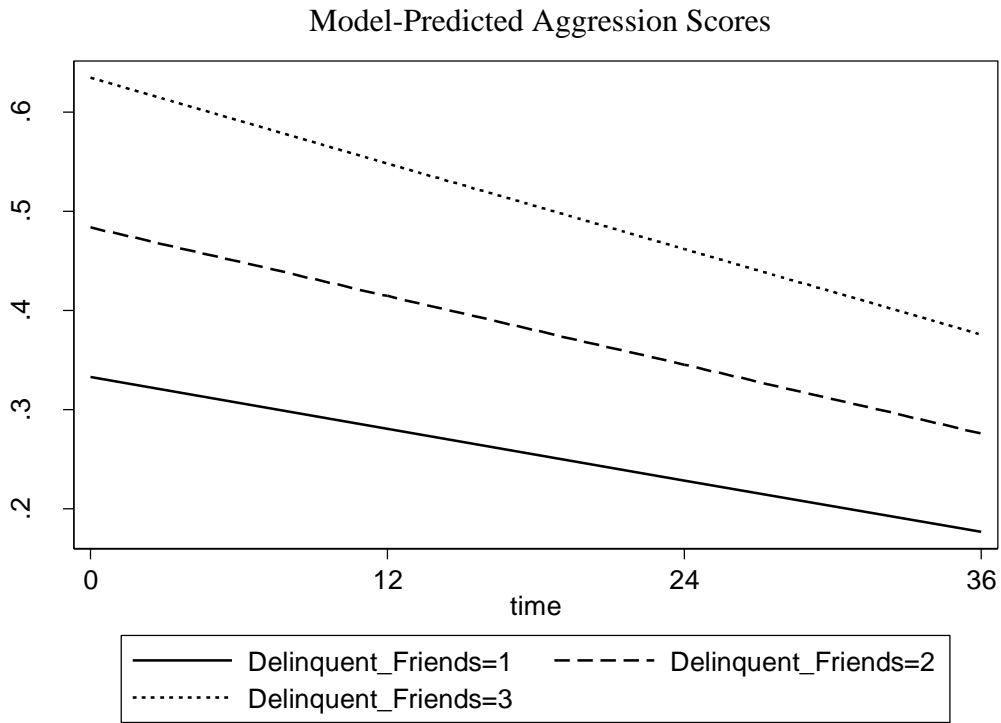
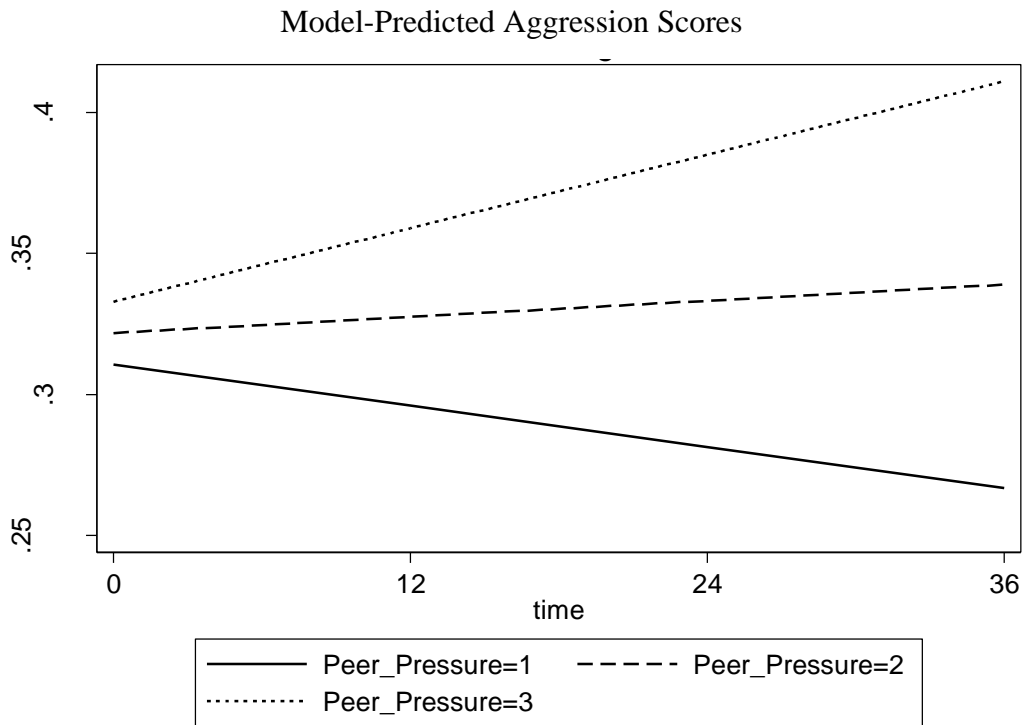


Figure 2.4
Peer Pressure x Time Interaction



For individual promotive and risk factors with all other factors held equal and at any point in time: 1) every one-unit increase in internalizing symptoms was associated with a 25.7% increase in aggression ($p < .001$); and 2) every one-unit increase in future optimism was associated with a 0.1% decrease in aggression ($p < .001$).

For community promotive and risk factors with all other factors held equal and at any point in time, every one-unit increase in neighborhood support was associated with a 0.9% decrease in aggression ($p < .05$).

In addition, with all other factors held equal, every one-unit increase in relational aggression was associated with a 9.4% increase in direct/physical aggression. This finding was expected given a multitude of previous research documenting the co-occurrence of relational and physical aggression (Card et al. 2008) and relational aggression was included in the model to control for the shared variance.

Discussion

Demographics and Adolescent Female Aggression

In terms of race, American Indian, Multiracial, and White female youth displayed similar levels of aggression, whereas African American girls reported higher levels and Hispanic/Latina girls reported lower levels of aggression. This finding differs somewhat from previous research, which has cited higher rates of aggression among minority groups compared to White adolescents in a nationally representative sample (Centers for Disease Control and Prevention, 2014). In the majority-minority sample in the current study, these national trends did not hold. Future research should seek to identify potential explanations for different trends in adolescent female aggression in majority-minority communities. The

lower rates for Hispanic/Latina girls might be due to the amount of time since immigration. The Latino communities in North Carolina where this study was conducted have many more immigrant Latino families compared to U.S. born second and later generations of Latinos. Acculturation researchers have found immigrant youth to be less aggressive than more assimilated youth (Smokowski & Bacallao, 2010). In addition, girls who lived with two parents reported significantly lower levels of aggression compared to those living in other types of family situations, which is in line with previous literature (i.e., Griffin et al., 2000).

Relational Promotive Factors and Adolescent Female Aggression

The hypothesis related to relational promotive factors was partially supported. Teacher support was significantly and inversely related to aggressive behavior. This is a novel finding in that it extends previous research documenting a significant association between teacher support and teacher-rated aggression (Benhorin & McMahon, 2008; Howes, 2000) to include adolescent-reported aggression. As relational-cultural theory suggests, positive relationships with teachers are sources of strength and prosocial growth for females, which buffer against female aggression. In addition, the interaction between teacher support and time was significant. As illustrated in Figure 2.2, compared to those who reported low levels of teacher support, females who reported the highest level of teacher support (i.e., teacher support=4) consistently reported the lowest levels of aggressive behavior over time. Also evident is the difference in the change rate among the four groups. Although aggression decreases over time for all four levels of teacher support, aggression scores decreased faster for those who reported lower levels of teacher support (i.e., teacher support=1 or 2) compared to those who reported higher levels of teacher support (i.e., teacher support=3 or 4). At any point in time, girls who reported less support from teachers reported more

aggressive behavior. Aggressive behavior decreased faster among this group, but these girls have the most aggressive behavior to attenuate. In contrast, girls with high levels of teacher support have the lowest aggression scores and their change rate is essentially flat, remaining low for the duration of the trajectory. In general, the finding that teacher support is a significant relational promotive factor against aggression is encouraging in that it provides direction in the identification of potential intervention programs. Relationships with teachers during adolescence may be particularly important given that they provide a positive adult connection for adolescents who may withdraw from attachments with their parents.

Although teacher support was a significant promotive factor against adolescent female aggression, friend support did not show a significant relationship to aggressive behavior. This finding, in light of the significant peer-related risk factors, suggests that supportive friends cannot counteract the impact of association with delinquent peers and peer pressure (which are discussed below). In terms of intervention planning, these results suggest that peer support interventions may have limited efficacy for decreasing adolescent female aggression. Instead, interventions that seek to decrease association with delinquent friends and increase skills for dealing with peer pressure might be the most effective.

Finally, parent support showed a significant and positive relationship to aggressive behavior, which was contrary to the hypothesized relationship. There are several potential explanations for this finding. First, it is possible that aggressive adolescents receive more attention from their parents due to parental concern with their behavior. Perhaps after receiving negative reports from teachers, parents change their own behavior by providing more support and spending more time with their adolescent in hopes that this will decrease adolescent aggression. It is also possible that parent support is interpreted by adolescents as

overprotective parenting. Given that adolescence is a time of burgeoning autonomy, if an adolescent feels that her parent is disrupting this autonomy, she may act out aggressively. Finally, this finding may be specific to the context in which the current study took place. For instance, in a qualitative study conducted in the target county focused on the experiences of victims of bullying, several respondents indicated that their parents advised them to “fight back” in order to stop the bullying (Evans, Cotter, & Smokowski, under review). In this case, parents are offering support and advice to their adolescents, however that advice is encouraging aggressive behavior. Researchers should examine the relationship between parent support and adolescent female aggression in additional samples in order to further explore this unexpected finding.

Relational Risk Factors and Adolescent Female Aggression

The hypothesis that relational risk factors would predict female aggressive behavior was also partially supported. Consistent with the theoretical framework, association with delinquent friends and peer pressure were particularly salient risk factors. This finding is consistent with previous research on male or mixed gender samples and extends this research to female adolescents. In addition to main effects, results revealed significant interactions with time, indicating that these risk factors impacted the change rate of aggression. As Figure 2.3 illustrates, adolescents who reported associating with delinquent friends consistently reported higher levels of aggressive behavior throughout the study period. It is also evident that although all three lines indicate decreasing trajectories, the slope of the line representing those adolescents who reported high levels of association with delinquent friends (i.e., delinquent friends=3) is slightly steeper than the lines representing adolescents who reported lower levels of association with delinquent friends. Although this effect is modest, it is a

somewhat encouraging illustration of the trajectory of girls who associate with delinquent friends. That is, aggression among girls with many delinquent friends decreases faster than aggression among girls with fewer delinquent friends. Of course, the severity of delinquent friends as a risk factor for aggressive behavior should not be discounted, as is evidenced by the fact that at any point in time, those girls with delinquent friends reported the highest levels of aggression.

Peer pressure, on the other hand, displayed a more disconcerting impact on aggression trajectories. As illustrated in Figure 2.4, aggression scores increased for girls who reported higher levels of peer pressure whereas aggression decreased for those who reported lower levels of peer pressure. This suggests that in addition to a main effect, peer pressure disrupts the direction of the aggression slope and therefore is a particularly strong relational risk factor. This finding builds upon previous research, which has identified peer pressure as a risk factor for aggression among general adolescent and female adolescent samples (Pear et al., 1990; Pleydon & Schner, 2001). The salience of peer pressure in this sample provides some support for social role theory, which highlights dysfunctional relationships as risk factors for female development. Given the importance of relationships for girls, girls may succumb to pressure to engage in aggressive behavior in order to avoid friendship disruptions or severed relationships (Pearl et al., 1990). As girls succumb to peer pressure and engage in aggressive behavior, they may experience approval from peers, which encourages them to continue behaving aggressively. Over time, the severity and frequency of aggression increases as peers encourage increasingly violent behavior.

Parent-child conflict was also a significant relational risk factor. This finding extends previous cross-sectional research (Smokowski, Cotter, Robertson, & Guo, 2013) and

longitudinal research focused on middle childhood (Deater-Deckard et al., 1998) and confirms that parent-child conflict is a significant risk factor for aggressive behavior throughout adolescence. Although occasional disagreements between parents and adolescents are typical during this tumultuous developmental stage, consistent and intense conflict can lead to serious behavioral consequences. The commitment and relationships that serve to constrain deviant behavior (Hirschi, 1969) are weakened during periods of conflict. This lack of social control increases the likelihood that adolescents will choose to engage in deviant behavior, such as aggression. In addition, parents are less able to provide adequate supervision of adolescents during times of conflict, which increases opportunities for aggression and other risk-taking behaviors.

Peer rejection, on the other hand, was not a significant relational risk factor for aggressive behavior. Social role theory, one of the theories guiding the study's hypotheses, can be used to understand this unexpected finding. As previously outlined, social role theory suggests that aggressive girls reject implicit social norms related to concern for interpersonal relationships and that aggressive behavior is incompatible with the female gender norm. Social role theory also posits that when social roles are violated and societal expectations are not met, disapproval and rejection ensue (Eagly et al., 2000). Thus, peer rejection might be a consequence of aggressive behavior rather than a risk factor. Researchers should consider structural equation modeling methods to explore the developmental sequence of aggression and peer rejection for adolescent girls.

Individual Promotive/Risk Factors and Adolescent Female Aggression

One of the two individual risk factors included in the current model, internalizing symptoms, was statistically significant. In fact, internalizing symptoms was the strongest

predictor in the model. This finding mirrors previous research, which has documented the co-occurrence of internalizing and externalizing behavior (Crick et al., 2006; Kofler et al., 2011; Marsee et al., 2008; Vitaro et al., 2002). The strength of internalizing symptoms as a risk factor for aggressive behavior in the current model could be due to the fact that aggressive girls are more likely than their aggressive male counterparts to experience comorbid internalizing problems (Loeber & Keenan, 1994). In addition to symptoms of withdrawal and worry, depressed and anxious girls can also experience irritability. This irritability may manifest as aggression.

It is also worth exploring the possibility that anxiety is fueling aggressive behavior among girls. Perhaps anxious girls have difficulty thinking through conflicts due to anxiety-induced clouded reasoning. This may cause them to act out instinctively, which may result in aggressive outbursts. Further research should explore this possibility. In any case, the co-occurrence of internalizing symptoms and aggression indicates a portion of female adolescents are experiencing a wide range of debilitating symptoms, including hopelessness, pessimism, restlessness, lack of energy, as well as agitation and hyper-arousal. Further, given the propensity for aggressive behavior, some of these females might be involved with the juvenile justice system. Indeed, in a study of incarcerated female juvenile offenders, approximately 28% had clinically significant depression symptoms and 28% had clinically significant anxiety symptoms (Kataoka, Zima, Dupre, Moreno, Yang, & McCracken, 2001). The current study further underscores the need for mental health services for aggressive girls who may or may not be involved in the juvenile justice system. In a review of interventions for delinquent girls, Hipwell and Loeber (2006) concluded that additional rigorous

intervention research is needed and that multi-modal interventions that target multiple domains of risk, such as co-morbid mental health issues, have shown some potential.

Community Promotive /Risk Factors and Adolescent Female Aggression

In terms of community factors, neighborhood support was a significant promotive factor against aggression whereas neighborhood crime did not significantly predict aggression. Adolescents likely feel more supported in neighborhoods that provide adequate resources for positive youth development, such as after-school programming, recreational spaces, and enrichment opportunities. These resources may lower aggressive behavior by encouraging social networks within the neighborhood (Molnar et al., 2008). According to social control theory, social bonding and attachment are integral to constraining deviant behavior, such as aggression (Hirschi, 1969).

Limitations

Despite the strengths of the study including a large, ethnically diverse sample, the recognition of and control for shared variance between direct (physical) and indirect (relational) aggression, and rigorous analyses, a few limitations should be noted. First, given partial invariance of the aggression measure, the analysis was restricted to females. Ideally, the model would have included both male and female adolescents and therefore allowed cross-group comparisons; however, this was not possible in the presence of partial measurement invariance. Second, although researchers emphasized the confidential nature of the assessment, adolescents' responses could have been influenced by the presence of peers in school computer labs where the assessment was administered. In addition, given the unique racial/ethnic makeup of the rural sample, results should be cautiously generalized to other settings. Finally, additional data points would have added to the study's strengths.

Conclusion

Using social role theory and relational-cultural theory as lenses, the current study identified salient relational promotive and risk factors in a large sample of ethnically diverse female adolescents. Teacher support was identified as a promotive factor against adolescent female aggression. In addition to internalizing symptoms, results revealed that association with delinquent friends and peer pressure were salient risk factors for adolescent female aggression. The identification of female-specific risk factors is a priority given increasing prevalence rates (Puzzanchera et al., 2012) and the uncertainty with which aggression models based on male samples can be applied to female adolescents (Odgers & Morretti, 2002). The current study addressed this gap and can be used to guide the development of interventions targeting adolescent female aggression.

REFERENCES: PAPER II

- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for ASEBA school-age forms and profiles*. Burlington, VT: Univ. of Vermont, Research Center for Children, Youth & Families
- Ang, R. P. (2007). Factor structure of the 12-item aggression questionnaire: Further evidence from Asian adolescent samples. *Journal of Adolescence*, *30*, 671-685. doi: 10.1016/j.adolescence.2006.05.003
- Benhorin, S. & McMahon, S. D. (2008). Exposure to violence and aggression: Protective roles of social support among urban African American youth. *Journal of Community Psychology*, *36*, 723-742. doi:10.1002/jcop.20252
- Benson, H. P. (2007). *Children's dispositional optimism and pessimism: Social and emotional Outcomes* (Doctoral Dissertation). Retrieved from ProQuest Dissertation & Theses Full Text. (3333027).
- Björkqvist, K. (2001). Different names, same issue. *Social Development*, *10*, 272-274. doi:10.1111/1467-9507.00164
- Bongers, I. L., Koot, H. M., van der Ender, J., & Verhulst, F. C. (2003). The normative development of child and adolescent problem behavior. *Journal of Abnormal Psychology*, *112*, 179-192. doi:10.1037/0021-843X.112.2.179
- Bowen, G. L., & Richman, J. M. (2008). *The School Success Profile*. Chapel Hill, NC: University of North Carolina.
- Bowen, G. L., Rose, R.A., & Bowen, N.K. (2005). *The reliability and validity of the school success profile*. Philadelphia, PA: Xlibris.
- Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological Bulletin*, *105*, 456-466. doi:10.1037//0033-2909.105.3.456
- Cabrera, P., Auslander, W., & Polgar, M. (2009). Future orientation of adolescents in foster care: Relationship to trauma, mental health, and HIV risk behaviors. *Journal of Child and Adolescent Trauma*, *2*, 271-286. doi:10.1080/19361520903317311
- Cairns, R. B., Cairns, B. D., Neckerman, H. J., Gest, S. D., & Garipey, J.-L. (1988). Social networks and aggressive behavior: Peer support or peer rejection? *Developmental Psychology*, *24*, 815-823. doi:10.1037/0012-1649.24.6.815
- Card, N. A., Stucky, B. D., Sawalani, G. M., & Little, T. D. (2008). Direct and indirect aggression during childhood and adolescence: A meta-analytic review of gender differences, intercorrelations, and relations to maladjustment. *Child Development*, *79*, 1185-1229. doi:10.1111/j.1467-8624.2008.01184.x

- Centers for Disease Control and Prevention. (2014). *Youth Risk Behavior Surveillance-United States, 2013*. Retrieved from <http://nccd.cdc.gov/youthonline/App/Default.aspx>
- Connor, D. F. (2002). *Aggression and antisocial behavior in children and adolescents: Research and treatment*. New York: The Guilford Press.
- Covington, S. (2008). The relational theory of women's psychological development: Implications for the criminal justice system. In R. Zaplin (Ed.), *Female offenders: Critical perspectives and effective interventions* (pp. 135-159). Sudbury, MA: Jones and Bartlett Publishers.
- Crick, N. R., Casas, J. F., & Mosher, M. (1997). Relational and overt aggression in preschool. *Developmental Psychology, 33*, 579-588. doi:10.1037/0012-1649.33.4.579
- Crick, N. R., Ostrov, J. M., & Werner, N. E. (2006). A longitudinal study of relational aggression, physical aggression, and children's social-psychological adjustment. *Journal of Abnormal Child Psychology, 34*, 131-142. doi:10.1007/s10802-005-9009-4
- Deater-Deckard, K., Dodge, K. A., Bates, J. E., & Pettit, G. S. (1998). Multiple risk factors in the development of externalizing behavior problems: Group and individual differences. *Development and Psychopathology, 10*, 469-493. doi:10.1017/S0954579498001709
- Dodge, K. A., Lansford, J. E., Burks, V. S., Bates, J. E., Pettit, G. S., Fontaine, R., & Price, J. M. (2003). Peer rejection and social information-processing factors in the development of aggressive behavior problems in children. *Child Development, 74*, 374-393. doi:10.1111/1467-8624.7402004
- Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Eagly, A. H., Wood, W., & Diekmann, A. B. (2000). Social role theory of sex differences and similarities: A current appraisal. In T. Eckes, & H. M. Trautner (Eds.), *Developmental social psychology of gender* (pp. 123-174). Mahwah, NJ: Lawrence Erlbaum Associates.
- Espelage, D. L., Holt, M. K., & Henkel, R. R. (2003). Examination of peer-group contextual effects on aggression during early adolescence. *Child Development, 74*, 205-220. doi:10.1111/1467-8624.00531
- Evans, C. B. R., Cotter, K. L., & Smokowski, P. R. (under review). Giving victims of bullying a voice: A qualitative study of post bullying coping strategies in rural youth.
- Farrell, A. D., & Sullivan T. N. (2004). Impact of witnessing violence on growth curves for problem behaviors among early adolescents in urban and rural settings. *Journal of Community Psychology, 32*, 505-525. doi:10.1002/jcop.20016

- Farrell, A. D., Sullivan, T. N., Esposito, L. E., Meyer, A. L., & Valois, R. F. (2005). A latent growth analysis of the structure of aggression, drug use, and delinquent behaviors and their interrelations over time in urban and rural adolescents. *Journal of Research on Adolescence, 15*, 179-204. doi:10.1111/j.1532-7795.2005.00091.x
- Ferguson, C. J., Miguel, C. S., & Hartley, R. D. (2009). A multivariate analysis of youth violence and aggression: The influence of family, peers, depression, and media violence. *The Journal of Pediatrics, 155*, 904-908. doi:10.1016/j.jpeds.2009.06.021
- Griffin, K. W., Botvin, G. J., Scheier, L. M., Diaz, T., & Miller, N. L. (2000). Parenting practices as predictors of substance use, delinquency, and aggression among urban minority youth: Moderating effects of family structure and gender. *Psychology of Addictive Behaviors, 14*, 174-184. doi:10.1037//0893-164X.14.2.174
- Guerra, N. G., Huesmann, L. R., & Spindler, A. (2003). Community violence exposure, social cognition, and aggression among urban elementary school children. *Child Development, 74*, 1561-1576. doi:10.1111/1467-8624.00623
- Hipwell, A. E., & Loeber, R. (2006). Do we know which interventions are effective for disruptive and delinquent girls? *Clinical Child and Family Psychology Review, 9*, 221-254. doi:10.1007/s10567-006-0012-2
- Hirschi, T. (1969). *Causes of Delinquency*. Los Angeles, California: University of California Press.
- Howes, C. (2000). Social-emotional classroom climate in child care, child-teacher relationships and children's second grade peer relations. *Social Development, 9*, 191-204. doi:10.1111/1467-9507.00119
- Jordan, J. V., & Hartling, L. M. (2002). New development in relational-cultural theory. In M. Ballou and L. S. Brown (Eds.). *Rethinking mental health and disorder: Feminist perspectives*, (pp. 48-70). NY: Guilford Press.
- Karriker-Jaffe, K. J., Foshee, V. A., Ennett, S. T., & Suchindran, C. (2008). The development of aggression during adolescence: Sex differences in trajectories of physical and social aggression among youth in rural areas. *Journal of Abnormal Child Psychology, 36*, 1227-1236. doi:10.1007/s10802-008-9245-5
- Kataoka, S. H., Zima, B. T., Dupre, D. A., Moreno, K. A., Yang, X., & McCracken, J. T. (2001). Mental health problems and service use among female juvenile offenders: Their relationship to criminal history. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 549-555. doi:10.1097/00004583-200105000-00014
- Kim, S., Kim, S.-H., & Kamphaus, R. W. (2010). Is aggression the same for boys and girls? Assessing measurement invariance with confirmatory factor analysis and item response theory. *School Psychology Quarterly, 25*, 45-61. doi:10.1037/a0018768

- Kling, J. R., Ludwig, J., & Katz, L. F. (2005). Neighborhood effects on crime for female and male youth: Evidence from a randomized housing voucher experiment. *Quarterly Journal of Economics*, *120*, 87-130. Retrieved from <http://qje.oxfordjournals.org/>
- Kofler, M. J., McCart, M. R., Zajac, K., Ruggiero, K. J., Saunders, B. E., & Kilpatrick, D. G. (2011). Depression and delinquency covariation in an accelerated longitudinal sample of adolescents. *Journal of Consulting and Clinical Psychology*, *79*, 458-469. doi:10.1037/a0024108
- Konopka, G. (1966). *The adolescent girl in conflict*. Englewood Cliffs, NJ: Prentice Hall.
- Kupersmidt, J. B., Griesler, P. C., DeRosier, M. E., Patterson, C. J., & Davis, P. W. (1995). Childhood aggression and peer relations in the context of family and neighborhood factors. *Child Development*, *66*, 360-375. doi:10.2307/1131583
- Little, R. A., & Rubin, D. B. (2002). *Statistical analysis with missing data* (2nd ed.). NY: Wiley.
- Loeber, R., Burke, J. D., Lahey, B. B., Winters, A., & Zera, M. (2000). Oppositional defiant and conduct disorder: A review of the past 10 years, part I. *Journal of the American Academy of Child & Adolescent Psychiatry*, *39*, 1468-1484. doi:10.1097/00004583-200012000-00007
- Loeber, R., & Keenan, K. (1994). Interaction between conduct disorder and its comorbid conditions: Effects of age and gender. *Clinical Psychology Review*, *14*, 497-523. doi:10.1016/0272-7358(94)90015-9
- Lopez, E. E., Perez, S. M., Ochoa, G. M., & Ruiz, D. M. (2008). Adolescent aggression: Effects of gender and family and school environments. *Journal of Adolescence*, *31*, 433-450. doi:10.1016/j.adolescence.2007.09.007
- Loudin, J. L., Loukas, A., & Robinson, S. (2003). Relational aggression in college students: Examining the roles of social anxiety and empathy. *Aggressive Behavior*, *29*, 430-439. doi:10.1002/ab.10039
- Marsee, M. A., Barry, C. T., Childs, K. K., Frick, P. J., Kimonis, E. R., Munoz, L. C., ... Lau, K. S. L. (2011). Assessing the forms and functions of aggression using self-report: Factor structure and invariance of the peer conflict scale in youths. *Psychological Assessment*, *23*, 792-804. doi:10.1037/a0023369
- Marsee, M. A., Weems, C. F., & Taylor, L. K. (2008). Exploring the association between aggression and anxiety in youth: A look at aggressive subtypes, gender, and social cognition. *Journal of Child and Family Studies*, *17*, 154-168. doi:10.1007/s10826-007-9154-1
- McCabe, K., & Barnett, D. (2000). First comes work, then comes marriage: Future orientation among African American young adolescents. *Family Relations*, *49*, 63-70. doi:10.1111/j.1741-3729.2000.00063.x

- McLeod, J. D., & Shanahan, M. J. (1993). Poverty, parenting, and children's mental health. *American Sociological Review*, *58*, 351-366. doi:10.2307/2095905
- Merikangas, K. R., Jian-ping, H., Berstein, M., Swanson, S. A., Avenevoli, S., Cui, L., ... Swendsen, J. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: Results from the national comorbidity survey replication-adolescent supplement (NCS-A). *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*, 980-989. doi:10.1016/j.jaac.2010.05.017
- Miller, J. B. (1976). *Toward a new psychology of women*. Boston, MA: Beacon Press.
- Miller, S., Winn, D.-M., Taylor, J., & Wiki, T. (2011). Girls relational orientation and interpersonal dynamics of delinquency. In S. Miller, L. D. Leve, & P. K. Kerig (Eds.) *Delinquent girls: Contexts, relationships, and adaptation* (pp. 85-104). New York: Springer.
- Miner, J. L., & Clarke-Stewart, A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. *Developmental Psychology*, *44*, 771-786. doi:10.1037/0012-1649.44.3.771
- Molnar, B. E., Cerda, M., Roberts, A. L., & Buka, S. L. (2008). Effects of neighborhood resources on aggressive and delinquent behavior among urban youths. *American Journal of Public Health*, *98*, 1086-1093. doi:10.2105/AJPH.2006.098913
- Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide*. (7th ed.). Los Angeles, CA: Muthén & Muthén.
- Nurmi, J. E. (1991). How do adolescents see their future? A review of the development of future orientation and planning. *Developmental Review*, *11*, 1-59. doi:10.1016/0273-2297(91)90002-6
- Odgers, C.L., Moffitt, T.E., Broadbent, J.M., Dickson, N., Hancox, R.J., Harrington, H...Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and Psychopathology*, *20*, 673-716. doi:10.1017/S095457908000333
- Odgers, C. L., & Moretti, M. M. (2002). Aggressive and antisocial girls: Research update and challenges. *International Journal of Forensic Mental Health*, *1*, 103-119. doi:10.1080/14999013.2002.10471166
- Pajer, K. A. (1998). What happens to "bad" girls? A review of the adult outcomes of antisocial adolescent girls. *The American Journal of Psychiatry*, *155*, 862-870. Retrieved from <http://ajp.psychiatryonline.org/journal.aspx?journalid=13>
- Paul, J. J., & Cillessen, A. H. (2003). Dynamics of peer victimization in early adolescence: Results from a four-year longitudinal study. *Journal of Applied School Psychology*, *19*, 25-43. doi:10.1300/J008v19n02_03

- Pearl, R., Bryan, T., & Herzog, A. (1990). Resisting or acquiescing to peer pressure to engage in misconduct: Adolescents' expectations of probable consequences. *Journal of Youth and Adolescence*, *19*, 43-55. doi:10.1007/BF01539444
- Peterson, D., Esbensen, F., Taylor, T. J., & Freng, A. (2007). Youth violence in context: The roles of sex, race, and community in offending. *Youth Violence and Juvenile Justice*, *5*, 385-410. doi:10.1177/1541204006297369
- Phinney, J. S. & Ong, A. D. (2007). Conceptualization and Measurement of Ethnic Identity: Current Status and Future Directions. *Journal of Counseling Psychology*, *54*, 271-281. doi:10.1037/t00335-000
- Pleydon, A. P., & Schnier, J. G. (2001). Female adolescent friendship and delinquent behavior. *Adolescence*, *36*, 189-205. Retrieved from http://www.vjf.cnrs.fr/clt/php/va/Page_revue.php?ValCodeRev=ADO#InfosEditeur
- Polgar, M., & Auslander, W. (2009). HIV prevention for youths in foster care: Understanding future orientation and intended risk behaviors. *Journal of HIV/AIDS & Social Services*, *8*, 397-413. doi:10.1080/15381500903417646
- Prinz, R. J., Foster, S., Kent, R. N., & O'Leary, K. D. (1979). Multivariate assessment of conflict in distressed and nondistressed mother-adolescent dyads. *Journal of Applied Behavior Analysis*, *12*, 691-700. doi:10.1901/jaba.1979.12-691
- Puzzanchera, C., Adams, B., & Hockenberry, S. (2012). *Juvenile court statistics 2009*. Pittsburgh, PA: National Center for Juvenile Justice.
- Rose, R. A. (2013). Report on NC-ACE missing data imputation and guide to imputed data. Unpublished technical research report.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton Univ. Press.
- Seginer, R. (2008). Future orientation in times of threat and challenge: How resilient adolescents construct their future. *International Journal of Behavioral Development*, *32*, 272-282. doi:10.1177/0165025408090970
- Smokowski, P. R., & Bacallao, M. (2010). Influence of risk factors and cultural assets on Latino adolescents' trajectories of self-esteem and internalizing symptoms. *Child Psychiatry & Human Development*, *41*, 133-155. doi:10.1007/s10578-009-0157-6
- Smokowski, P. R., Cotter, K. L., Robertson, C. I., & Guo, S. (2013). Anxiety and aggression in rural youth: Baseline results from the rural adaptation project. *Child Psychiatry and Human Development*, *44*, 479-492. doi:10.1007/s10578-012-0342-x
- Smokowski, P. R., Evans, C. B. R., Cotter, K. L., & Guo, S. (2014). Ecological correlates of depression and self-esteem in rural youth. *Child Psychiatry and Human Development*, *45*, 500-518. doi:10.1007/s10578-013-0420-8

- Smokowski, P. R., Evans, C. B. R., Cotter, K. L., & Webber, K. C. (2014). Ethnic identity and mental health in American Indian youth: Examining mediation pathways through self-esteem and future optimism. *Journal of Youth and Adolescence, 43*, 343-355. doi:10.1007/s10964-013-9992-7
- Sullivan, T. N., Helms, S. W., Kliever, W., & Goodman, K. L. (2010). Associations between sadness and anger regulation coping, emotional expression, and physical and relational aggression among urban adolescents. *Social Development, 19*, 30-51. doi:0.1111/j.1467-9507.2008.00531.x
- Vaden-Kiernan, N., Ialongo, N. S., Pearson, J., & Kellam, S. (1995). Household family structure and children's aggressive behavior: A longitudinal study of urban elementary school children. *Journal of Abnormal Child Psychology, 23*, 553-568. doi:10.1007/BF01447661
- Valois, R. F., MacDonald, J. M., Bretous, L., Fischer, M. A., & Drane, J. W. (2002). Risk factors and behaviors associated with adolescent violence and aggression. *American Journal of Health Behavior, 26*, 454-464. doi:10.5993/AJHB.26.6.6
- Vaillancourt, T., Brendgen, M., Boivin, M., & Tremblay, R. E. (2003). A longitudinal confirmatory factor analysis of indirect and physical aggression: Evidence of two factors over time? *Child Development, 74*, 1628-1638. doi:10.1046/j.1467-8624.2003.00628.x
- Vitaro, F., Brendgen, M., & Tremblay, R. E. (2002). Reactively and proactively aggressive children: Antecedents and subsequent characteristics. *Journal of Child Psychology and Psychiatry, 43*, 495-505. doi:10.1111/1469-7610.00040
- Werner, N. E., & Crick, N. R. (1999). Relational aggression and social-psychological adjustment in a college sample. *Journal of Abnormal Psychology, 108*, 615-623. doi:10.1037/0021-843X.108.4.615
- Williams, L. R., Degnan, K. A., Perez-Edgar, K. E., Henderson, H. A., Rubin, K. H., Pine D. S., Steinberg, L., & Fox, N. A. (2009). Impact of behavioral inhibition and parenting style on internalizing and externalizing problems from early childhood through adolescence. *Journal of Abnormal Child Psychology, 37*, 1063-1075. doi:10.1007/s10802-009-9331-3
- Wu, A. D., Li, Z., & Zumbo, B. D. (2007). Decoding the meaning of factorial invariance and updating the practice of multi-group confirmatory factor analysis: A demonstration with TIMSS data. *Practical Assessment Research & Evaluation, 12*, 1-26. Retrieved from <http://pareonline.net/>
- Zahn-Waxler, C., Park, J.-H., Essex, M., Slattery, M., & Cole, P. M. (2005). Relational and overt aggression in disruptive adolescents: Prediction from early social representations and links with concurrent problems. *Early Education & Development, 16*, 259-282. doi:10.1080/10409289.2005.10472870

Zimmerman, F., Schutte, K., Taskinen, P., & Koller, O. (2013). Reciprocal effects between adolescent externalizing problems and measures of achievement. *Journal of Educational Psychology, 105*, 747-761. doi:10.1037/a0032793

PAPER III

RELATIONAL RISK PATHWAYS FOR DIRECT AND INDIRECT AGGRESSION DURING ADOLESCENCE

Aggression is a broad term used to describe acts intended to cause harm (Dodge, Coie, & Lynam, 2006). Direct aggression, also referred to as “overt aggression,” includes physical and verbal behaviors that involve direct confrontation. Indirect aggression, also referred to as “social,” “relational,” or “covert” aggression, involves behaviors intended to cause harm without directly confronting the victim. More specifically, the aim of these behaviors is to socially exclude or harm the social status of the victim (Archer & Coyne, 2005).

As direct and indirect aggression peak in mid-adolescence for both males and females (Karriker-Jaffe, Foshee, Ennett, & Suchindran, 2008), prevention and intervention efforts for both genders are imperative during this vulnerable developmental stage. However, despite evidence that both males and females engage in both types of aggression and that indirect and direct aggression co-occur, research on direct aggression has largely focused on males while females tend to be the focus of indirect aggression literature (Card, Stucky, Sawalani, & Little, 2008).

This gender-divided literature has contributed to a gap in our knowledge of risk pathways to direct and indirect aggression among males and females, which has impeded the development of comprehensive interventions that address both types of aggression. The current study seeks to address this gap by exploring gender differences in risk pathways for

direct and indirect aggression. Relational-cultural and social role theories are applied as a theoretical framework to guide the current study.

Literature Review

Theoretical Framework: Relational-Cultural Theory and Social Role Theory

Relational-cultural theory stems from the work of Jean Baker Miller (1976) in *Toward a New Psychology of Women*. In acknowledgement of the inadequacy of applying male-developed psychiatric models to females, Miller posited that girls' and women's development is based on interpersonal relationships (Covington, 2008; Jordan, 2008). Girls are socialized to value connection with others. Therefore, positive relationships among females can lead to healthy growth and development (Covington, 2008; Jordan, 2008). On the other hand, negative or conflictual relationships may impede healthy growth and development.

Although relational-cultural theory is grounded in feminism and was developed specifically to understand female development, more recent work has applied the theory to boys and men as well (Hartling, 2008; Jordan, 2008). Thus, more recent developments in relational-cultural theory suggest that relationships are central to human development and that interpersonal relationships are potential sources for growth and development among both females and males.

Social role theory, on the other hand, posits that social norms influence aggression. (Eagly, 1987; Eagly, Wood, & Diekmann, 2000). The female gender norm values characteristics such as sensitivity, kindness, and concern for interpersonal relationships whereas the male gender norm values individual achievement. Given societal gender norms

emphasizing relationships, social role theory suggests that relationships have more salience for females.

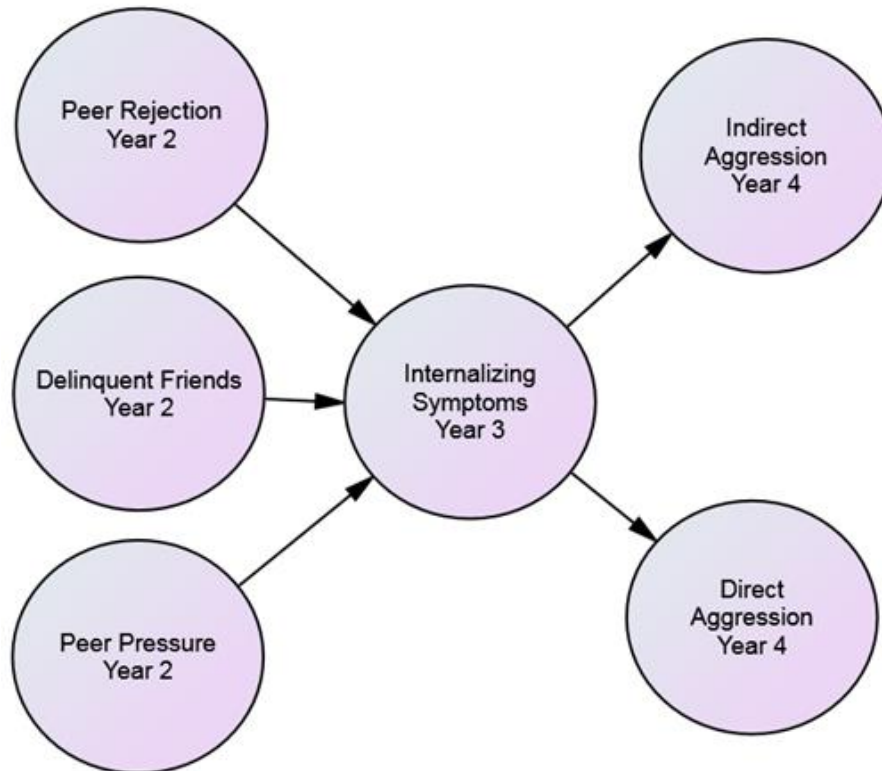
Overall, these theories highlight two potential pathways to aggressive behavior. First, because relationships are central for human development, relationships characterized by negativity and coercion (i.e., relational risk factors) may directly lead to aggression. For instance, if an adolescent is faced with peer pressure to engage in delinquent or aggressive acts, he or she may succumb to that peer pressure to avoid severed friendships. In this scenario, the risk of losing a friend outweighs the potential consequences associated with engaging in delinquent or aggressive behavior.

In the second pathway, relational risk factors lead to internalizing symptoms, which, in turn, lead to aggressive behavior. Because interpersonal relationships are a priority, negative or seemingly unsuccessful relationships can cause a severe emotional reaction, including symptoms of anxiety or depression. These internalizing symptoms then manifest as aggression. These pathways between relational risk factors and aggression may function equivalently for males and females (as suggested by relational-cultural theory) or may be more salient for females (as posited by social role theory).

The current study seeks to investigate these two distinct pathways separately for males and females. The conceptual model for the current study is displayed in Figure 3.1. In addition to direct pathways between relational risk factors (i.e., peer pressure, peer rejection, association with delinquent peers) and aggression, internalizing symptoms were tested as a mediator. It was hypothesized that relational risk factors would be directly and indirectly associated with (direct and indirect) aggression (i.e., internalizing symptoms would serve as a

partial mediator). The following sections summarize previous literature on the relationship between relational risk factors, internalizing symptoms, and aggression.

Figure 3.1
Conceptual Model



Note: Direct effects from exogenous variables to indirect and direct aggression are not shown, but were tested.

Pathway 1: Relational Risk Factors → Aggression

Peer pressure. Susceptibility to peer pressure is defined as the tendency to follow in a peer-directed behavior or activity (Sim & Koh, 2003). As aggression and peer pressure both tend to occur in group settings (Björkqvist, 2001), peer pressure likely plays a role in aggressive behavior. Indeed, observed susceptibility to peer pressure among adolescents was predictive of a host of problems in functioning, including externalizing behaviors (Allen, Porter, & McFarland, 2006). The relationship between peer pressure and direct aggression

may be particularly salient among girls. Compared to non-delinquent girls, girls who reported delinquency (which is highly correlated with aggression) were more likely to report peer pressure (Pleydon & Schner, 2001). Less research examines the relationship between peer pressure and indirect aggression. However, one study reported that peer pressure significantly predicted indirect aggression in a teen dating context (Schad, Szwedo, Antonishak, Hare, & Allen, 2008). Further research is needed to explore the association between peer pressure and indirect aggression within the nonromantic peer group.

Peer rejection. In a study assessing the association between rejection during childhood and aggression during adolescence, Dodge et al. (2003) found that rejection during elementary school was associated with later direct aggression. Peer rejection as a form of interpersonal victimization has also been linked to direct aggression. For example, compared to their non-aggressive counterparts, adolescents who reported previous victimization were more likely to report direct aggression (Paul & Cillessen, 2003; Sullivan, Helma, Kliewer, & Goodman, 2006). In the study conducted by Sullivan and colleagues (2006), type of peer victimization played an important role. That is, the relationship between direct victimization and aggression was significantly stronger among males and the relationship between indirect victimization and aggression was stronger among females.

Delinquent friends. During adolescence, peers have a strong influence on behavior (Bagwell & Schmidt, 2011). Indeed, association with delinquent friends is a consistent predictor of direct aggression (Cairns, Cairns, Neckerman, Gest, & Garipey, 1988; Espelage, Holt, & Henkel, 2003; Ferguson, Miguel, & Hartley, 2009). In fact, in a longitudinal study that followed males through childhood and adolescence, those who affiliated with delinquent peers during pre-adolescence and adolescence committed more violent acts compared to

those who never or temporarily affiliated with delinquent peer groups (Lacourse, Nagin, Tremblay, Vitaro, & Claes, 2003). Less is known about trajectories of affiliation with delinquent peer groups among female adolescents. However, there is evidence to suggest that association with aggressive friends and subsequent indirect aggression varies by gender. Werner and Crick (2004) reported that higher levels of friends' indirect aggression were associated with increases in indirect aggression only among girls, whereas friends' direct aggression was associated with increases in direct aggression among boys and girls.

Pathway 2: Relational Risk Factors → Internalizing Symptoms → Aggression

Peer pressure. In addition to evidence of a direct relationship between peer pressure and aggression, some research suggests that peer pressure is related to internalizing symptoms, which could serve as a mediator. Susceptibility to peer pressure has been associated with depressive symptoms (Allen et al., 2006). In addition, in a study exploring implicit scripts for situations in which adolescents experienced peer pressure to engage in misconduct, girls were more likely than boys to predict negative feelings as a result of giving in to the peer pressure as well as refusing the peer pressure (Pearl, Bryan, & Herzog, 1990). This study provides some evidence that peer pressure may result in internalizing symptoms particularly among female adolescents.

Peer rejection. Several empirical studies have documented that peer rejection can lead to internalizing symptoms, including symptoms of depression (Beeri & Lev-Wiesel, 2012; Boivin, Poulin, & Vitaro, 1994; Kiesner, 2002; Ladd & Troop-Gordon, 2003; Lopez & DuBois, 2005) and anxiety (Ladd & Troop-Gordon, 2003; Lopez & DuBois, 2005; Pedersen, Vitaro, Barker, & Borge, 2007). Peer rejection may be especially deleterious for female adolescents. In a study of adolescents between the ages of 12 and 17, females not only

reported more experiences with peer rejection, but rejected females also reported more psychological distress than rejected males (Beerli & Lev-Wiesel, 2012).

Delinquent friends. Mrug and colleagues (2004) investigated the relationship between aggressive peers and internalizing problems using peer nomination procedures. Results indicated that those children who chose more aggressive peers as friends on the nomination procedure were more likely to report depressive symptomology over time. The link between associations with delinquent friends and internalizing symptoms has also been demonstrated in studies of early adolescents (Brendgen, Vitaro, & Bukowski, 2000; Simons, Whitbeck, Conger, & Melby, 1991).

Internalizing symptoms and aggressive behavior. According to the “acting out” model, depressive symptoms (particularly irritability) may manifest behaviorally as aggression and therefore internalizing symptoms precede aggressive behavior (Kofler et al., 2011). Several studies have provided support for this model by establishing an association between internalizing symptoms and direct aggression (e.g., Crick, Ostrov, & Werner, 2006; Marsee, Weems, & Taylor, 2008; Vitaro, Brendgen, & Tremblay, 2002). In a longitudinal study from late childhood through early adolescence, Zimmerman et al. (2013) reported that depressive symptoms in early childhood predicted increases in externalizing behavior over time. Another longitudinal study during middle childhood suggested that increases in indirect aggression over time were positively associated with increases in internalizing symptoms for both males and females (Murray-Close, Ostrov, & Crick, 2007).

Based on relational-cultural and social role theories as well as the empirical research reviewed above, the current study seeks to investigate direct and indirect pathways between relational risk factors and aggression. It was hypothesized that relational risk factors (i.e.,

peer pressure, peer rejection, delinquent friends) would be directly and indirectly associated with (direct and indirect) aggression. Internalizing symptoms were expected to partially mediate this relationship.

Method

Current Study

Data for the current study came from the NC-ACE Rural Adaptation Project (RAP), a 5-year longitudinal panel study of more than 6,000 middle school students from 28 public middle schools and 12 public high schools in two rural, economically disadvantaged counties in North Carolina. Data were collected in spring 2011, 2012, 2013, and 2014, which correspond to years 1 thru 4 of the 5-year project. In Year 1, all Grade 6 thru 8 students in County 1 were included in the sample. Due to the significantly larger student population in County 2, 40% of the student body was randomly selected to participate. Students were tracked annually as they transitioned into high school and a new random sample of sixth graders was added each year. The analysis for the current study is focused on Years 2 through 4. Therefore, the Year 2 sample included students in Grades 6 thru 9, the Year 3 sample included students in Grades 6 thru 10, and the Year 4 sample included students in Grades 6 thru 11.

Data were collected using an online assessment tool. Participants were told that their participation was voluntary and were given the opportunity to decline participation. Students assented to participate by reading and electronically signing an assent screen prior to beginning the online assessment. Assessments were completed in school computer labs, which were monitored by research staff. Each participant received an identification number to maintain confidentiality and received a gift card as compensation for their participation.

Participants

The final analysis sample included 3,668 males and 3,769 females. The sample was exceptionally racially/ethnically diverse: 31% White, 26% African American, 23% American Indian, 12% Mixed Race / Other, and 8% Hispanic/Latino. Approximately 81% of participants reported living with two parents and 78% received free or reduced price lunch.

Measures

The School Success Profile (SSP; Bowen & Richman, 2008), a youth self-report assessment that measures perceptions and attitudes about school, friends, family, neighborhood, self, and health and well-being, has been administered to tens of thousands of students since its creation in 1993. The reliability and validity of the SSP are well documented (Bowen, Rose, & Bowen, 2005). The current study used a modified version of the SSP, the School Success Profile Plus (SSP+), which included 152 of the SSP items and five additional subscales: (a) a modified version of the Rosenberg Self-Esteem scale (Rosenberg, 1965); (b) the Multigroup Ethnic Identity Measure (Phinney & Ong, 2007); (c) subscales from the Youth Self-Report (YSR), the adolescent version of the Child Behavior Checklist (Achenbach & Rescorla, 2001); (d) the Conflict Behavior Questionnaire (CBQ; Prinz, Foster, Kent, & O'Leary, 1979) to measure parent-child conflict; and (e) a modified self-report version of Werner and Crick's (1999) Peer Nomination Scale to measure indirect aggression (Loudin, Loukas, & Robinson, 2003).

Peer pressure. Peer pressure (Year 2) was measured with a five-item scale (Bowen & Richman, 2008). Example items included: "I let my friends talk me into doing things I really don't want to do" and "I tend to go along with the crowd." Each item was rated on a

3-point Likert scale (*Not Like Me, A Little Like Me, or A Lot Like Me*). The Cronbach's alpha reliability was .79 in Year 2 for the current sample.

Peer rejection. Peer rejection (Year 2) was measured with a three-item scale (Bowen & Richman, 2008). Example items included: "I am made fun of by my friends" and "I wish my friends would show me more respect." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, or A Lot Like Me*) and the Cronbach's alpha reliability was .74 in Year 2 for the current sample.

Delinquent friends. Association with delinquent friends (Year 2) was assessed using a nine-item scale (Bowen & Richman, 2008) that measured the degree to which the participant's friends engaged in delinquent activities. Example items included: "I have friends who get in trouble with the police" and "I have friends who cut classes." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, or A Lot Like Me*) and the Cronbach's alpha reliability was .91 in Year 2 for the current sample.

Internalizing symptoms. Internalizing symptoms (Year 3) were measured with seven items from the YSR (Achenbach & Rescorla, 2001) that assessed symptoms of anxiety and depression. Example items included: "I often feel sad" and "I often feel nervous or tense." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, and A Lot Like Me*) and the Cronbach's alpha reliability was .91 in Year 3 for the current sample.

Direct aggression. Direct aggression (Year 4) was measured using a 9-item modified version of the aggression subscale from the Youth Self Report (YSR; Achenbach & Rescorla, 2001). Example items included: "I get in many fights" and "I break rules at home, school, or elsewhere." Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, and A Lot Like Me*); the Cronbach's alpha reliability was .88 in Year 4 for this sample.

Indirect aggression. Indirect aggression (Year 4) was measured using a 5-item modified, self-report version of Werner and Crick's (1999) peer-nomination scale (Loudin et al., 2003). Example items included: "When angry or mad at another student, I spread rumors of gossip about him/her" and "When angry or mad at another student, I exclude him/her from group activities." Each item was rated on a 3-point Likert scale (*Not Like Me*, *A Little Like Me*, and *A Lot Like Me*) and the Cronbach's alpha reliability was .80 in Year 4 for this sample.

Analytic Plan

Multiple group structural equation modeling (SEM) was used to compare model parameters for the hypothesized model for males and females. An advantage of SEM is its ability to model equations simultaneously, which is ideal for mediation analyses and multiple outcome variables (Hoyle, 2012). The SEM analysis followed recommendations by Cole and Maxwell (2003) and Byrne (2012) and was conducted using Mplus version 7.0 (Muthén & Muthén, 2012). Given the ordinal nature of the data, weighted least squares means and variances adjusted (WLSMV) estimation was used.

The SEM analysis was conducted in two stages: first, invariance of the measurement model was tested and second, the equivalence of the structural model parameters (i.e., gammas and betas) across genders was tested. In order to test the measurement invariance of the model, an unconstrained measurement model (i.e., a model in which factor loadings were allowed to vary between the two groups) was compared to a constrained measurement model (a model in which factor loadings were constrained to be equal for the two groups).

Invariance of the measurement model suggests that the latent variable constructs function

equivalently across groups and is a necessary prerequisite to testing the structural components of the model.

In the second stage of the SEM analysis in which equivalence of the structural model parameters across genders was tested, gammas (i.e., parameter estimates of the paths between exogenous and endogenous variables) were constrained to be equivalent for the two groups. This model was compared to an unconstrained model (i.e., a model that allowed the gammas to be freely estimated for each group). The beta parameters (i.e., parameter estimates of paths between endogenous variables) were constrained and the resulting model was compared to an unconstrained model. Changes in the chi-square statistic (calculated by the DIFFTEST procedure in Mplus) were used to determine if each constraint in the model resulted in significantly worse fit than the less constrained model (Byrne, 2012). For the final model, only those parameter constraints that did not yield a significantly worse fit were included. Full information maximum likelihood (FIML) was used to handle missing data.

Results

Measurement Model

Prior to testing the structural model, invariance of the measurement model was tested. In terms of model fit, nonsignificant chi-square values are desirable; however these statistics are sensitive to large sample sizes (Hoyle, 2012). For this reason, fit of the measurement model was assessed using several additional fit indices (i.e., Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and Tucker Lewis Index (TLI)). RMSEA values of .06 or lower and CFI and TLI values of .95 or higher are considered indicative of adequate model fit (Hu & Bentler, 1999). The measurement model had

excellent model fit: $X^2 = 4523.31$ (1259), $p < .001$, with an RMSEA value of 0.026 and a 90% confidence interval of (0.026, 0.027); the CFI and TLI were .980 and .979, respectively.

Table 3.1
Measurement Difference Test Results

	Chi-Square Difference Test
Peer Pressure	5.11 (4) $p=.28$
Peer Rejection	4.69 (2) $p=.10$
Delinquent Friends	69.63 (8) ***
Internalizing Symptoms	43.42 (6) ***
Direct aggression	140.42 (8) ***
Indirect aggression	11.86(3) *

Note: * denotes $p < .05$; ** denotes $p < .01$; *** denotes $p < .001$

Next, all factor loadings were constrained to be equal across genders and chi-square difference test statistics were used to gauge change in the chi-square value. Each latent variable was tested sequentially. A statistically significant chi-square difference test indicates that model fit got significantly worse when all of the factor loadings were constrained to be equal whereas a non-significant chi-square difference test indicates that model fit did not get significantly worse when factor loadings were constrained. The chi-square difference results are displayed in Table 3.1. Four out of the six measures (delinquent friends, internalizing symptoms, direct aggression, and indirect aggression) yielded significant chi-square difference tests, indicating measurement non-invariance between males and females.

In order to assess the extent of measurement non-invariance, each factor loading was tested individually by comparing a model with the factor loading freely estimated to a model with the factor loading constrained to be equal across genders. Results indicated non-invariance in the following items: (a) for delinquent friends, “I have friends who get in trouble with the police,” “I have friends who belong to gangs,” “I have friends who drink alcoholic beverages (beer, wine, or liquor),” “I have friends who carry a weapon, such as a

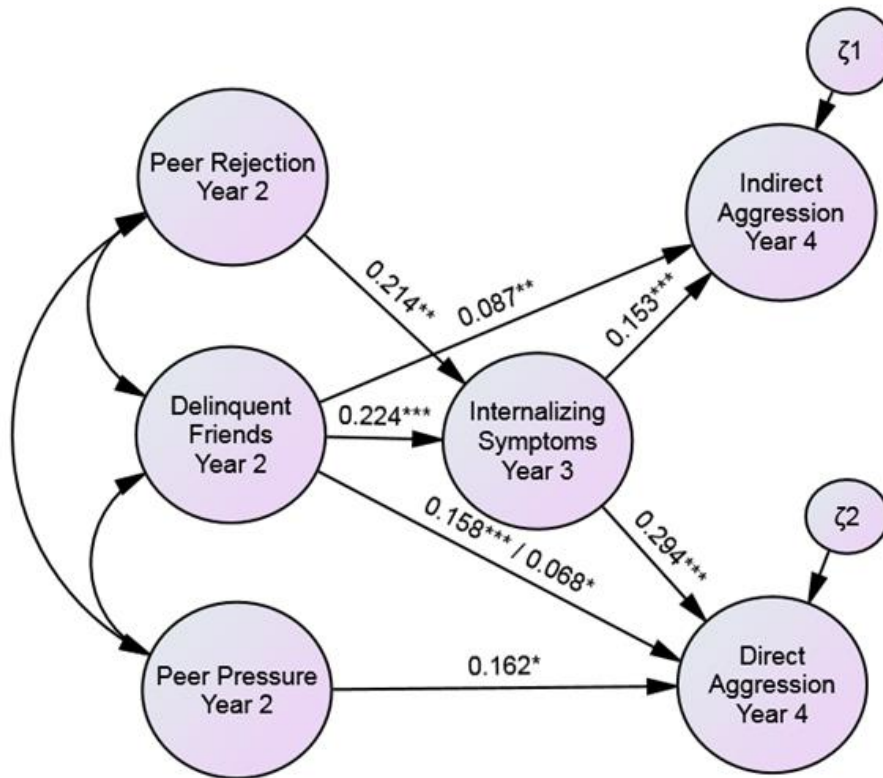
knife, gun, or club,” and “I have friends who get in trouble at school”; (b) for internalizing symptoms, “I often wonder whether anyone really cares about me,” “I often feel lost or confused,” “I often feel all alone in the world,” “I often worry about my future,” and “I often feel nervous or tense”; (c) for direct aggression, “I break rules at home, school, or elsewhere,” “I get in many fights,” “I tease others a lot,” and “My moods or feelings change suddenly”; (d) for indirect aggression, “When angry or mad at another student, I exclude him/her from group activities” and “I ignore other students on purpose until s/he agrees to do something I want them to do.” Given measurement invariance on these items, we followed the option presented by Byrne et al. (1989) to constrain the invariant items to be equal and allow non-invariant items to vary prior to estimating the full SEM model. A table displaying values of invariant and non-invariant factor loadings is available upon request.

Full Structural Equation Model

A full structural equation model was run to test the conceptual model illustrated in Figure 3.1. The model had excellent model fit: $X^2 = 2993.79$ (1274), $p < .001$, with an RMSEA value of 0.019 and a 90% confidence interval of (0.018, 0.020); the CFI and TLI were .990 and .989, respectively. A chi-square difference test was used to evaluate the invariance of gamma and beta parameters across groups: $X^2 = 99.01$ (19), $p < .001$. The significant chi-square difference test suggested non-invariance somewhere in the structural model. Therefore, the next step involved a sequence of chi-square difference tests to test each gamma and beta individually. As displayed in Figure 2, a single path parameter was found to be non-invariant across genders (i.e., delinquent friends → direct aggression) and therefore required separate (unconstrained) parameter estimates. The other paths were found to be invariant across genders and thus were constrained to be equal.

Mediation relationships were evaluated by testing indirect effects using the IND command in MPlus. Results indicated that internalizing symptoms significantly and fully mediated the relationships between peer rejection and direct aggression ($p < .01$) and between peer rejection and indirect aggression ($p < .01$). Internalizing symptoms significantly and partially mediated the relationships between delinquent friends and direct aggression ($p < .001$) and between delinquent friends and indirect aggression ($p < .001$). However, internalizing symptoms was not a significant mediator for the relationships between peer pressure and direct or indirect aggression. Peer pressure displayed a significant direct relationship to direct aggression, but was not significantly associated with indirect aggression. The structural portion of the SEM model is displayed in Figure 3.2. The measurement portion of the model was not included in Figure 3.2 due to space limitations.

Figure 3.2
Structural Equation Model



Note: Path coefficients are unstandardized. A single parameter denotes a constrained path. For unconstrained paths, male parameters are listed first, followed by female parameters. * $p < .05$, ** $p < .01$, *** $p < .001$. Measurement portion of the model and correlation among disturbance terms are absent from the figure.

Discussion

Pathway 1: Negative Peer Relationships → Aggression

Direct pathways between relational risk factors and aggression were revealed for peer pressure and direct aggression as well as for delinquent friends and both types of aggression. This finding is in line with relational-cultural theory, which emphasizes the centrality of relationships for male and female development (Hartling, 2008; Jordan, 2008), and therefore predicts a direct relationship between negative peer relationships and aggressive behavior. In the case of peer pressure, when faced with pressure to engage in delinquent or aggressive behavior, adolescents may succumb to the peer pressure in order to maintain peer relationships. That is, given the importance of relationships, the potential consequence of losing a friend as a result of refusing peer pressure is perceived as more severe than the consequences associated with engaging in delinquent or aggressive behavior (Pearl et al., 1990). This particular pathway to aggressive behavior seems to function equivalently for male and female adolescents.

The pathway from association with delinquent friends to direct aggression, however, was slightly stronger for males. That is, the relationship between delinquent friends and direct aggression was moderated by gender. As structural invariance is analogous to significant interaction terms in linear models, this finding can be understood as a steeper slope representing the relationship between delinquent friends and direct aggression for males compared to females. Association with delinquent friends represents a unique form of peer influence. In contrast to direct pressure from peers, the mere presence of peers engaging in delinquent behavior can cause an adolescent to mirror that behavior. Again, from a relational perspective, adolescents may mirror peer behavior in an attempt to secure the

friendship. The stronger parameter for males may be indicative of the fact that compared to their female counterparts, male adolescents are often provided more freedom to navigate the neighborhood (Bryant, 1985), which creates more opportunities to witness delinquent friends and subsequently model this behavior. Thus, although association with delinquent friends is a significant risk factor for both males and females, it may be particularly important to address peer behavior as a risk factor in interventions targeting male adolescents.

Association with delinquent friends was also directly related to indirect aggression whereas peer pressure was not. Peers may not openly pressure others to spread rumors or gossip about classmates, but a less direct form of peer influence involving association with delinquent peers affects indirect aggression. Engaging in delinquent behavior represents a violation of societal expectations. Therefore, delinquent youth likely violate other set standards for behavior, such as treating others with kindness and respect, which may result in indirect aggression. Indeed, direct and indirect aggression co-occur (Card et al., 2008). Adolescents likely imitate indirect aggression of peers in addition to delinquent / directly aggressive behavior. Perhaps adolescents choose to join in with peers who are targeting a classmate out of fear of becoming a victim of social exclusion, which can be an especially painful experience during adolescence (Lopez & DuBois, 2005).

Pathway 2: Relational Risk Factors → Internalizing Symptoms → Aggression

The pathways from peer rejection to direct aggression and to indirect aggression were fully mediated by internalizing symptoms for both males and females. Again, peer relationships appear to be salient for males and females alike. As adolescents often describe their identities in the context of relationships (McLean, 2005), rejection from peers can threaten personal identity and cause a severe emotional reaction. Providing some support for

the “acting out” model (Kofler et al., 2011), internalizing symptoms were associated with subsequent aggressive behavior. This finding extends literature on the “acting out” model by suggesting that internalizing symptoms may manifest as indirect aggression in addition to direct aggression.

The pathways from association with delinquent friends to direct and indirect aggression were partially mediated by internalizing symptoms. In addition to peer behavior exerting a direct influence on adolescent aggression, interacting with delinquent friends also led to symptoms of depression and anxiety. This finding is consistent with previous work (Brendgen et al., 2000; Mrug et al., 2004; Simons et al., 1991). The indirect pathway suggests that after witnessing peers engaging in delinquent behavior, adolescents experience some inner turmoil as they grapple with the decision whether to join in the behavior that they know is wrong or walk away and risk losing friendships. This anxiety could become so overwhelming that the adolescent lashes out by physically or emotionally harming another individual.

In general, the role of internalizing symptoms in the development of aggressive behavior warrants further attention. Typically, aggressive adolescents are thought to have distorted socio-cognitive processing in which hostile intent is inappropriately attributed to the actions of others (Crick & Dodge, 1994). This hostile attribution bias leads to aggressive behavior. Although largely unexplored, it is possible that internalizing problems play a role in the social information processing framework. In fact, Lemerise and Arsenio (2000) integrated emotion processes into Crick and Dodge’s (1994) social information processing model. Specifically, children’s emotions (e.g., anger, sadness, fear) can impact what is noticed in the social situation, thus impacting the meaning attributed to the situation. Indeed,

overwhelming feelings of anger, sadness, and fear are hallmarks of internalizing symptoms among adolescents; thus, youth suffering from internalizing symptoms are likely at increased risk for misinterpreting neutral actions as hostile and thus behaving aggressively. Future researchers should explore the role of internalizing disorders within the social information processing framework as anxiety management may be a key supplement to social skills training in prevention and intervention programs for aggressive youth.

Gender Differences

Results revealed that all but one path functioned equivalently for males and females. This finding adds to relatively nascent work that promotes the application of relational-cultural theory to males as well as females (Hartling, 2008; Jordan, 2008). However, it is important to consider the possibility that the salience of relationships for male and female adolescents in the current study could be due in part to our exceptionally racially/ethnically diverse sample. The relational orientation emphasized by relational-cultural theory may be particularly relevant for women and persons in other devalued cultural groups (Comstock et al., 2008). In order to explore this possibility, researchers should test the equivalence of the conceptual model pathways by gender and race/ethnicity in future studies.

Implications for Intervention

Overall, the fact that two out of three relational risk factors for aggressive behavior were at least partially mediated by internalizing symptoms has important implications for intervention. Clearly, interventions targeting physical and/or indirect aggression need to target internalizing symptoms as well. Given the centrality of internalizing symptoms in the current model, if internalizing symptoms remain unaddressed, interventions may not significantly impact aggression. Unfortunately, the inclusion of a component addressing

internalizing symptoms is not currently common practice in aggression interventions. A meta-analysis of school-based interventions targeting aggression revealed that the vast majority of interventions utilize one of three modalities: behavioral (e.g., token economies), cognitive (changing thinking or cognitive skills), or social skills (increase understanding of social behavior and increase specific skills; Wilson & Lipsey, 2007). Although a minority of interventions used a mental health treatment modality (i.e., counseling), the findings of the current study suggest that addressing mental health concerns of aggressive youth may increase the effectiveness of intervention and prevention programs.

Given that aggressive youth interface with several settings, including schools, community organizations, and the juvenile justice system, interventions targeting internalizing symptoms are needed for each of these distinct settings. Encouragingly, the juvenile justice system has acknowledged the need for such interventions and in 2000 the Federal Office of Juvenile Justice and Delinquency Prevention developed a task force aimed at providing guidance to address the well-being of youth with mental health needs who end up in the juvenile justice system. This task force identified the following critical areas of improvement to guide change efforts: improved collaboration between the juvenile justice and mental health systems, improved strategies for identifying mental health needs among juvenile justice-involved youth, more opportunities for youth to be diverted into community-based mental health treatment, and increased access to effective treatment (Skowrya & Cocozza, 2007).

In addition to the juvenile justice system, prevention and intervention strategies are needed in other settings, such as schools and community organizations. However, at this time, intervention programming that targets both aggression and internalizing symptoms is

not readily available (Swearer, Grills, Haye, & Cary, 2004). Intervention researchers should consider developing such programming. Further, given the similarity in risk pathways to both physical and indirect aggression identified in the current study, interventions should also address both types of aggression.

The analytic model also supports interventions that target peer influence, including direct peer pressure as well as the more subtle form of peer influence in which peers display a given behavior, which is then modeled. Whereas much of the research on peer influence has focused on direct peer pressure, the more subtle form of peer influence is likely a more common occurrence (Brown, Bakken, Ameringer, & Mahon, 2008). Intervention and prevention programs can provide adolescents with effective strategies for dealing with peer influence in a way that does not necessarily lead to severed friendships, which are of utmost concern to adolescents.

Limitations

The results of the study should be considered in light of the study's limitations. Generalizability of the findings is limited given the unique context in which the study was conducted. Given the rural, low-income, ethnically diverse community in which the current study took place, caution is warranted in applying the findings to other samples. Additional research is needed to confirm the applicability of the conceptual model to other contexts.

In addition, the assessment tools used to measure internalizing symptoms, direct aggression, and indirect aggression were only one of several tools available to measure these constructs. Although the measures used in the current study have been proven reliable and valid and have been widely used, researchers should seek to replicate the analysis with other assessment instruments.

Conclusion

This study examined two theory-driven pathways from relational risk factors to aggressive behavior, which were supported for both males and females. Results indicated that internalizing symptoms was a significant mediator for two out of three relational risk factors, suggesting internalizing symptoms play a key role in the development of direct and indirect aggression among adolescents. All but a single path parameter were equivalent for males and females, which provides some empirical support for the relational-cultural notion that relationships are central for male as well as female development. Overall, these findings contribute to the literature on adolescent aggression by delineating the relationships among relational risk factors, internalizing symptoms, and aggression in a diverse sample of adolescents. The identified pathways can be used to develop and modify interventions to prevent adolescent aggression.

REFERENCES: PAPER III

- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for ASEBA school-age forms and profiles*. Burlington, VT: Univ. of Vermont, Research Center for Children, Youth & Families
- Allen, J. P., Porter, M. R., & McFarland, F. C. (2006). Leaders and followers in adolescent close friendships: Susceptibility to peer influence as a predictor of risky behavior, friendship instability, and depression. *Development and Psychopathology, 18*, 155-172. doi:10.1017/S0954579406060093
- Archer, J., & Coyne, S. M. (2005). An integrated review of indirect, relational, and social aggression. *Personality and Social Psychology Review, 9*, 212-230. doi:10.1207/s15327957pspr0903_2
- Bagwell, C. L., & Schmidt, M. E. (2011). *Friendships in childhood and adolescence*. New York, NY: Guilford Press.
- Beeri, A., & Lev-Wiesel, R. (2012). Social rejection by peers: A risk factor for psychological distress. *Child and Adolescent Mental Health, 17*(4), 216-221. doi:10.1111/j.1475-3588.2011.00637.x
- Björkqvist, K. (2001). Different names, same issue. *Social Development, 10*, 272-274. doi:10.1111/1467-9507.00164
- Boivin, M., Poulin, F., & Vitaro, F. (1994). Depressed mood and peer rejection in childhood. *Development and Psychopathology, 6*, 483-498. doi:10.1017/S0954579400006064
- Bowen, G. L., & Richman, J. M. (2008). *The School Success Profile*. Chapel Hill, NC: University of North Carolina.
- Bowen, G. L., Rose, R.A., & Bowen, N .K. (2005). *The reliability and validity of the school success profile*. Philadelphia, PA: Xlibris.
- Brendgen, M., Vitaro, F., & Bukowski, W. M. (2000). Deviant friends and early adolescents' emotional and behavioral adjustment. *Journal of Research on Adolescence, 10*, 173-189. doi:10.1207/SJRA1002_3
- Brown, B. B., Bakken, J. P., Ameringer, S. W., & Mahon, S. D. (2008). A comprehensive conceptualization of the peer influence process in adolescence. In M. J. Prinstein and K. A. Dodge (eds.) *Understanding peer influence in children and adolescents* (pp. 17-44). New York, NY: The Guilford Press.
- Bryant, B. K. (1985). The neighborhood walk: Sources of support in middle childhood. *Monographs of the Society for Research in Child Development, 62*, 1114-1135. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1467-8624](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-8624)

- Byrne, B. M. (2012). *Structural equation modeling with MPlus*. New York, NY: Routledge.
- Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological Bulletin*, *105*, 456-466. doi:10.1037//0033-2909.105.3.456
- Cairns, R. B., Cairns, B. D., Neckerman, H. J., Gest, S. D., & Garipey, J.-L. (1988). Social networks and aggressive behavior: Peer support or peer rejection? *Developmental Psychology*, *24*, 815-823. doi:10.1037/0012-1649.24.6.815
- Card, N. A., Stucky, B. D., Sawalani, G. M., & Little, T. D. (2008). Direct and indirect aggression during childhood and adolescence: A meta-analytic review of gender differences, intercorrelations, and relations to maladjustment. *Child Development*, *79*, 1185-1229. doi:10.1111/j.1467-8624.2008.01184.x
- Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology*, *112*, 538-577. doi:10.1037/0021-843X.112.4.558
- Comstock, D. L., Hammer, T. R., Strentzsch, J., Cannon, K., Parsons, J., & Salazar, G., II. (2008). Relational-cultural theory: A framework for bridging relational, multicultural, and social justice competencies. *Journal of Counseling & Development*, *86*, 279-287. doi:10.1002/j.1556-6678.2008.tb00510.x
- Covington, S. (2008). The relational theory of women's psychological development: Implications for the criminal justice system. In R. Zaplin (Ed.), *Female offenders: Critical perspectives and effective interventions* (pp. 135-159). Sudbury, MA: Jones and Bartlett Publishers.
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social-information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*, 74-101. doi:10.1037/0033-2909.115.1.74
- Crick, N. R., Ostrov, J. M., & Werner, N. E. (2006). A longitudinal study of relational aggression, physical aggression, and children's social-psychological adjustment. *Journal of Abnormal Child Psychology*, *34*, 131-142. doi:10.1007/s10802-005-9009-4
- Dodge, K. A., Coie, J. D., & Lynam, D. (2006). Aggression and antisocial behavior in youth. In W. Damon, R. M. Lerner, & N. Eisenberg (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (6th ed., pp. 721-788). Hoboken, NJ: Wiley.
- Dodge, K. A., Lansford, J. E., Burks, V. S., Bates, J. E., Pettit, G. S., Fontaine, R., & Price, J. M. (2003). Peer rejection and social information-processing factors in the development of aggressive behavior problems in children. *Child Development*, *74*, 374-393. doi:10.1111/1467-8624.7402004

- Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Eagly, A. H., Wood, W., & Diekmann, A. B. (2000). Social role theory of sex differences and similarities: A current appraisal. In T. Eckes, & H. M. Trautner (Eds.), *Developmental social psychology of gender* (pp. 123-174). Mahwah, NJ: Lawrence Erlbaum Associates.
- Hartling, L. M. (2008). Strengthening resilience in a risky world: It's all about relationships. *Women & Therapy, 31*, 51-70. doi:10.1080/02703140802145870
- Muthén, L. K., & Muthén, B. O. (2012). *Mplus user's guide* (7th ed). Los Angeles, CA: Muthén & Muthén.
- Espelage, D. L., Holt, M. K., & Henkel, R. R. (2003). Examination of peer-group contextual effects on aggression during early adolescence. *Child Development, 74*, 205-220. doi:10.1111/1467-8624.00531
- Ferguson, C. J., Miguel, C. S., & Hartley, R. D. (2009). A multivariate analysis of youth violence and aggression: The influence of family, peers, depression, and media violence. *The Journal of Pediatrics, 155*, 904-908. doi:10.1016/j.jpeds.2009.06.021
- Hoyle, R. H. (2012). Introduction and overview. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp. 3-16). New York, NY: Guilford Press.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55. doi:10.1080/10705519909540118
- Jordan, J. V., (2008). Recent development in relational-cultural theory. *Women & Therapy, 31*, 1-4. doi:10.1080/02703140802145540
- Karriker-Jaffe, K. J., Foshee, V. A., Ennett, S. T., & Suchindran, C. (2008). The development of aggression during adolescence: Sex differences in trajectories of physical and social aggression among youth in rural areas. *Journal of Abnormal Child Psychology, 36*, 1227-1236. doi:10.1007/s10802-008-9245-5
- Kiesner, J. Depressive symptoms in early adolescence: Their relations with classroom problem behavior and peer status. *Journal of Research on Adolescence, 12*, 463-478. doi:10.1111/1532-7795.00042
- Kofler, M. J., McCart, M. R., Zajac, K., Ruggiero, K. J., Saunders, B. E., & Kilpatrick, D. G. (2011). Depression and delinquency covariation in an accelerated longitudinal sample of adolescents. *Journal of Consulting and Clinical Psychology, 79*, 458-469. doi:10.1037/a0024108
- Lacourse, E., Nagin, D., Tremblay, R. E., Vitaro, F., & Claes, M. (2003). Developmental trajectories of boys' delinquent group membership and facilitation of violent

- behaviors during adolescence. *Development and Psychopathology*, *15*, 183-197. doi:10.1017.S0954579403000105
- Ladd, G. W., & Troop-Gordon, W. (2003). The role of chronic peer difficulties in the development of children's psychological adjustment problems. *Child Development*, *74*, 1344-1367. doi:10.1111/1467-8624.00611
- Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development*, *71*, 107-118. doi:10.1111/1467-8624.00124
- Loudin, J. L., Loukas, A., & Robinson, S. (2003). Relational aggression in college students: Examining the roles of social anxiety and empathy. *Aggressive Behavior*, *29*, 430-439. doi:10.1002/ab.10039
- Lopez, C. & DuBois, D.L. (2005). Peer victimization and rejection: Investigation of an integrative model of effects on emotional, behavioral, and academic adjustment in early adolescence. *Journal of Clinical Child & Adolescent Psychology*, *34*(1), 25-36. doi:10.1207/s15374424jccp3401_3
- Marsee, M. A., Weems, C. F., & Taylor, L. K. (2008). Exploring the association between aggression and anxiety in youth: A look at aggressive subtypes, gender, and social cognition. *Journal of Child and Family Studies*, *17*, 154-168. doi:10.1007/s10826-007-9154-1
- McLean, K. C. (2005). Late adolescent identity development: Narrative meaning making and memory telling. *Developmental Psychology*, *41*, 683-691. doi:10.1037/0012-1649.41.4.683
- Miller, J. B. (1976). *Toward a new psychology of women*. Boston, MA: Beacon Press.
- Mrug, S., Hoza, B., & Bukowski, W. M. (2004). Choosing or being chosen by aggressive-disruptive peers: Do they contribute to children's externalizing and internalizing problems? *Journal of Abnormal Child Psychology*, *32*, 53-65. doi:10.1023/B:JACP.0000007580.77154.69
- Murray-Close, D., Ostrov, J. M., & Crick, N. R. (2007). A short-term longitudinal study of growth of relational aggression during middle childhood: Associations with gender, friendship intimacy, and internalizing problems. *Development and Psychopathology*, *19*, 187-203. doi:10.1017/S0954579407070101
- Paul, J. J., & Cillessen, A. H. (2003). Dynamics of peer victimization in early adolescence: Results from a four-year longitudinal study. *Journal of Applied School Psychology*, *19*, 25-43. doi:10.1300/J008v19n02_03

- Pearl, R., Bryan, T., & Herzog, A. (1990). Resisting or acquiescing to peer pressure to engage in misconduct: Adolescents' expectations of probable consequences. *Journal of Youth and Adolescence, 19*, 43-55. doi:10.1007/BF01539444
- Pedersen, S., Vitaro, F., Barker, E. D., & Borge, A. I. H. (2007). The timing of middle-childhood peer rejection and friendship: Linking early behavior to early-adolescent adjustment. *Child Development, 78*, 1037-1051. doi:10.1111/j.1467-8624.2007.01051.x
- Phinney, J. S. & Ong, A. D. (2007). Conceptualization and Measurement of Ethnic Identity: Current Status and Future Directions. *Journal of Counseling Psychology, 54*, 271-281. doi:10.1037/t00335-000
- Pleydon, A. P., & Schnier, J. G. (2001). Female adolescent friendship and delinquent behavior. *Adolescence, 36*, 189-205. Retrieved from http://www.vjf.cnrs.fr/clt/php/va/Page_revue.php?ValCodeRev=ADO#InfosEditeur
- Prinz, R. J., Foster, S., Kent, R. N., & O'Leary, K. D. (1979). Multivariate assessment of conflict in distressed and nondistressed mother-adolescent dyads. *Journal of Applied Behavior Analysis, 12*, 691-700. doi:10.1901/jaba.1979.12-691
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton Univ. Press.
- Schad, M. M., Szewedo, D. E., Antonishak, J., Hare, A., & Allen, J. P. (2008). The broader context of relational aggression in adolescent romantic relationships: Predictions from peer pressure and links to psychosocial functioning. *Journal of Youth and Adolescence, 37*, 346-358. doi:10.1007/s10964-007-9226-y
- Sim, T. N., & Koh, S. F. (2003). A domain conceptualization of adolescent susceptibility to peer pressure. *Journal of Research on Adolescence, 13*, 57-80. doi:10.1111/1532-7795.1301002
- Simons, R. L., Whitbeck, L. B., Conger, R. D., & Melby, J. N. (1991). The effects of social skills, values, peers, and depression on adolescent substance use. *The Journal of Early Adolescence, 11*, 466-481. doi:10.1177/0272431691114005
- Skowrya, K. R., & Coccozza, J. J. (2007). *Blueprint for change: A comprehensive model for the identification and treatment of youth with mental health needs in contact with the juvenile justice system*. Delmar, NY: The National Center for Mental Health and Juvenile Justice, Policy Research Associates.
- Sullivan, T. N., Helms, S. W., Kliewer, W., & Goodman, K. L. (2010). Associations between sadness and anger regulation coping, emotional expression, and physical and relational aggression among urban adolescents. *Social Development, 19*, 30-51. doi:10.1111/j.1467-9507.2008.00531.x

- Swearer, S. M., Grills, A. E., Haye, K. M., & Cary, P. T. (2004). Internalizing problems in students involved in bullying and victimization: Implications for intervention. In D. L. Espelage and S. M. Swearer, *Bullying in American schools: A social-ecological perspective on prevention and intervention* (pp. 63-84). Mahway, NJ: Lawrence Erlbaum Associates, Inc.
- Vitaro, F., Brendgen, M., & Tremblay, R. E. (2002). Reactively and proactively aggressive children: Antecedents and subsequent characteristics. *Journal of Child Psychology and Psychiatry*, *43*, 495-505. doi:10.1111/1469-7610.00040
- Werner, N. E., & Crick, N. R. (2004). Maladaptive peer relationships and the development of relational and physical aggression during middle childhood. *Social Development*, *13*, 495-514. doi:10.1111/j.1467-9507.2004.00280.x
- Wilson, S. J., & Lipsey, M. W. (2007). School-based interventions for aggressive and disruptive behavior: Update of a meta-analysis. *American Journal of Preventive Medicine*, *33*, S130-S143. doi:10.1016/j.amepre.2007.04.011
- Zimmerman, F., Schutte, K., Taskinen, P., & Koller, O. (2013). Reciprocal effects between adolescent externalizing problems and measures of achievement. *Journal of Educational Psychology*, *105*, 747-761. doi:10.1037/a0032793

SUMMARY

Despite increasing prevalence rates and documented consequences associated with adolescent female aggression (Card, Stucky, Sawalani, & Little, 2008; Pajer, 1998; Puzzanchera, Adams, & Hockenberry, 2012), the literature on female-specific aggression remains scarce. Moreover, the research that does exist tends to focus mostly on the associated consequences. Thus, little is known about the antecedent factors that contribute to or mitigate adolescent female aggression. Also disconcerting is the lack of attention given to measurement issues that arise with cross-gender comparisons. The three papers that constitute the current dissertation addressed these gaps in the current knowledge base on adolescent female aggression.

Specifically, in cross-gender analyses, evidence of non-invariance was indicated for four out of six items of the Violent Behavior Checklist-Modified, which suggests that the violent behavior construct may be qualitatively different for males and females. This finding underlines the importance of testing for measurement invariance prior to making cross-group comparisons in order to avoid potential bias. As testing measurement invariance is not currently common practice in adolescent violence research, these results are particularly informative.

The second gap in the literature addressed in the current dissertation was the identification of risk and promotive factors associated with adolescent female aggression. Association with delinquent friends, peer pressure, and internalizing symptoms were identified as salient risk factors for adolescent female aggression. Teacher support was

identified as a promotive factor against adolescent female aggression. In addition, the exploration of risk pathways indicated that internalizing symptoms significantly mediated the relationship between peer rejection and direct and indirect aggression as well as the relationship between delinquent friends and direct and indirect aggression. This is a novel finding that makes a significant contribution to the literature.

Application to Social Work

Application to social work practice. Together, these findings have direct implications for social work practice. Given that research and evaluation are necessary components of evidence-based practice, the relatively recent push for evidence-based social work practice has made program evaluation increasingly important for social work practitioners. Accuracy in program evaluation depends on the accuracy of the measurement tools used to evaluate them. In order to avoid potentially biased cross-group comparisons, program evaluators must test invariance of their measures. The finding that the Violent Behavior Checklist – Modified had a high proportion of non-invariance can be used in the decision making process for identifying appropriate measurement tools. This study also has the potential to increase awareness regarding the consequences of failing to test for measurement invariance within the substantive area of adolescent violence.

In addition to program evaluation, the current findings have important implications for intervention programming. Specifically, delinquent friends, peer pressure, peer rejection, and internalizing symptoms are key risk factors for aggression and therefore represent key targets for intervention and prevention programming. The central role that internalizing symptoms played in the relational risk pathways suggests that aggression interventions would likely benefit from the addition of a mental health component. Teacher support can also be

incorporated into prevention programming as it significantly buffered against aggression.

Using this empirical evidence, social work practitioners can identify appropriate intervention methods to address adolescent aggression.

Application to social work research. This dissertation identified a number of areas for future social work research. The need for testing measurement invariance of additional violent behavior scales is a crucial area for research. Currently, this is a rare practice, which calls into question the validity of cross-group comparisons in adolescent violence research. In addition to testing across genders and race/ethnicities, researchers can test for measurement invariance across other salient demographics (e.g., age, SES, urban/rural).

It is also necessary to test the relationship between parent support and aggression in multiple contexts. As it stands, it is unclear whether the positive relationship between parent support and aggression is specific to the unique community in which the data were collected. Qualitative analyses in multiple communities could yield interesting comparisons regarding the nature of parent support around issues of victimization. It is possible that in communities such as the one in which the current study took place, parents could benefit from guidance on how to offer effective support to their adolescents when they are faced with difficult situations involving victimization.

Researchers should also explore the role of internalizing disorders within the social information processing framework. By expanding upon Lemerise and Arsenio's (2000) integration of emotion processes into the social information processing model (Crick and Dodge, 1994), it will be possible to ascertain whether youth suffering from internalizing symptoms are more likely to misinterpret neutral actions as hostile and thus more likely to

behave aggressively. This is a key research question that has the potential to impact the way in which aggressive behavior is treated.

Strengths and Limitations of Current Work

There are many notable strengths of this dissertation. The unique sample included exceptional racial/ethnic diversity and multiple data collection points, which resulted in dynamic and relevant research questions. For example, the large samples of multiple racial/ethnic groups allowed for measurement invariance testing across White, African American, and American Indian groups. Further, the inclusion of many time-varying covariates in the HLM analysis yielded a model that captured the fluctuating dynamics of relationships for adolescents during middle and high school.

The strong theoretical framework that guided this dissertation is an additional strength. Relational-cultural and social role theories highlight social norms and expectations that influence behavior, which provided a unique lens through which to examine gender differences in aggression. The use of these theories across three unique studies speaks to their potential widespread applicability to the field of gender-specific aggression.

In addition to these strengths, a few weaknesses should be mentioned. Caution is warranted in generalizing the results of this dissertation to other contexts. As previously mentioned, the community in which the data were collected is unique in terms of ethnic diversity, geographic classification (i.e., rural), and a predominantly low-income population. In addition, in some cases, modified subscales were used instead of full measures due to the time limitations associated with administering the survey during the school day. The constructs explored in this dissertation were complex and although the research team cautiously chose items to include in the survey, it is possible that important aspects of these

complex constructs were not fully captured. Thus, these results should be replicated in additional contexts using additional measures.

REFERENCES: SUMMARY

- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social-information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*, 74-101. doi:10.1037/0033-2909.115.1.74
- Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development*, *71*, 107-118. doi:10.1111/1467-8624.00124
- Pajer, K. A. (1998). What happens to "bad" girls? A review of the adult outcomes of antisocial adolescent girls. *The American Journal of Psychiatry*, *155*, 862-870. Retrieved from <http://ajp.psychiatryonline.org/journal.aspx?journalid=13>
- Puzzanchera, C., Adams, B., & Hockenberry, S. (2012). *Juvenile court statistics 2009*. Pittsburgh, PA: National Center for Juvenile Justice.