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# Deviant Peer Factors During Early Adolescence: Cause or Consequence of Physical Aggression?

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# Abstract

This study investigated reciprocal relations between adolescents' physical aggression and their perceptions of peers' deviant behaviors and attitudes. Analyses were conducted on four waves of data from 2,290 adolescents from three urban middle schools. Autoregression models revealed reciprocal relations between peer factors (i.e., friends' problem behavior, peer pressure for fighting, friends' support for fighting) and adolescents' reporting of their aggressive behavior. Bidirectional relations were also found between peer pressure for fighting and adolescents' frequency of physical aggression based on teacher ratings. Findings were consistent across sex, grade, and time. Our findings suggest that multiple dimensions of peers' behaviors uniquely play a role in the development of adolescents' aggression, which have important implications for interventions to reduce problem behaviors.

It is widely acknowledged that peers play an integral role in adolescents' development and behavior (Arnett, 2014). A large body of research has examined the role of negative peer influences, such as associations with peers who engage in delinquent (i.e., criminal) or aggressive behavior, on the development of adolescents' problem behaviors (for a review, see Assink et al., 2015). Other forms of peer behavior, such as peer pressure for fighting and friends' reactions to adolescents' aggressive behaviors, have also been related to adolescents' problem behaviors (Farrell, Thompson, & Mehari, 2017). However, there is limited longitudinal research to clarify the unique and cumulative nature of these relations. The purpose of this study was to examine reciprocal relations between several dimensions of deviant peers' influences and adolescents' physical aggression over time within a predominantly African American sample of early adolescents living in a community with high crime rates.

Early adolescence is the peak developmental period for initiation of problem behaviors (e.g., Jennings & Reingle, 2012). Multiple theorists have posited that the interaction between factors unique to adolescent development and adolescents' environment increases their risk of engaging in problem behaviors (Akers, 1998; Bronfenbrenner, 1986; Dishion & Tipsord, 2011). Environmentally, middle schools are generally larger than elementary schools, creating more anonymity (Simmons, Black, & Zhou, 1991). Social groups are often

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disrupted during this transition, requiring adolescents to re-establish their social networks. This social disruption occurs in the context of adolescence, during which a key developmental task is identity formation (Hill & Lynch, 1983). Adolescents begin to establish their identity by exploring possible selves—how they want to present themselves in different contexts (Harter, Bresnick, Bouchey, & Whitesell, 1997). Cognitively, adolescents begin to develop the capacity to imagine how others view them. This results in significant self-consciousness that heightens early adolescents' orientations toward peer feedback and social mobility (Arnett, 2014; Berger & Rodkin, 2012).

As early adolescents begin to rely more on peers as critical sources of identity, selfevaluation, and personal worth, they become more responsive to peer influence (Sumter, Bokhorst, Steinberg, & Westenberg, 2009). The tendency for social mimicry, combined with increased exposure to aggressive peer models, makes adolescents more likely to engage in aggressive behavior and to reinforce each other for aggressive behavior (Akers, 1998; Allen, Porter, & McFarland, 2006; Hoff, Reese-Weber, Schneider, & Stagg, 2009). Youth in underresourced communities may have less exposure to nonfamilial adult mentors, such as through after-school activities, and therefore may be even more susceptible to peer influences (Briggs, Grella, Burton, Yarmuth, & Taylor, 2012). For some youth, early adolescence begins a downward spiral that can lead to additional problem behaviors, academic disengagement, and school dropout (Dishion, Véronneau, & Meyers, 2010; Wigfield, Byrnes, & Eccles, 2006).

# Examining Multiple Forms of Peer Behaviors and Attitudes

Because researchers have tended to focus on a single dimension of peer behavior (e.g., peer delinquency) at a time, the unique and cumulative impact of multiple forms of deviant peer factors is not well understood. According to the social information processing model (Crick & Dodge, 1994), an adolescent's response in a given situation is influenced by their evaluation of a variety of factors, including its perceived consequences. This was supported by a qualitative study in which adolescents discussed how their decision whether to make an aggressive response in a difficult peer situation was influenced by how their peers would respond (Farrell et al., 2010). Farrell and colleagues (2017) found cross-sectional support for differentiating between peers' deviant behaviors and attitudes (i.e., friends' problem behavior, peer pressure for fighting, friends' support for fighting) within a predominantly African American, low socio-economic status sample of adolescents. More specifically, each dimension was uniquely related to adolescent- and teacher-reports of problem behavior. Although this highlighted the multidimensional nature of deviant peer factors, longitudinal research is needed to clarify the unique relations among these multiple dimensions and adolescents' problem behaviors over time.

# Patterns of Peer Behavior and Attitudes over Time

Few studies have explored changes in peer factors over the course of adolescence, and most have not examined changes across brief intervals of time. Because of the dynamic nature of peer groups and significant developmental changes within early adolescence, examining changes across broad spans of time (e.g., from year to year) may obscure important

relations. Longitudinal research suggests that peers' problem behaviors increase during early adolescence, stabilize in mid-adolescence, and decrease in later adolescence (e.g., Lacourse et al., 2006). Although this represents the general trend, studies have also found individual differences that influence this trend. One longitudinal study assessed a predominantly Caucasian American, moderate socio-economic status sample of adolescents in the fall and spring of sixth grade and annually through ninth grade. There was an overall increase in rates of friends with problem behaviors across grades (Simons-Morton & Chen, 2009). Peer influences have been found to be particularly strong when social status is fragile, and social status may be more or less tenuous at different points in time during early adolescence (Allen et al., 2006). Specifically, transitions, such as moving from elementary to middle school, often increase youths' susceptibility to peer influences (Wigfield et al., 2006).

Research is needed to examine changes that occur not just across grades, but also within school years to examine seasonal effects. Collecting data once or twice a year may not provide an accurate picture of peer influences across the school year or during the summer months. Seasonal variations have been noted in the occurrence of problem behaviors and in help-seeking for violent victimization, with higher rates in winter than in other times of the year (e.g., van Dolen, Weinberg, & Ma, 2013). Related to peer factors, one study found that peer selection effects in aggression were more pronounced from the middle (winter) to end of the school year as opposed to other time points (Logis, Rodkin, Gest, & Ahn, 2013). In contrast, another study found no seasonal variations in peer influence (Rudasill, Niehaus, Crockett, & Rakes, 2014). More frequent observations are needed to capture relations between adolescent behaviors and peer factors (Chan & Poulin, 2007), and to explore seasonal variations in patterns of relations.

# **Peers: Selection Versus Influence**

The similarity between adolescents' behavior and the behavior of their close peers has been well documented in the literature on adolescent delinquency (Gifford-Smith, Dodge, Dishion, & McCord, 2005). However, there has been considerable debate about whether this relation is caused by peer selection (choosing friends who are similar to oneself), by peer influence or socialization (becoming more like one's friends over time), or by a combination of selection and influence. It may also be spurious, caused by shared, unmeasured factors such as environmental risk or unsupervised time (Young, Rebellon, Barnes, & Weerman, 2014). Baerveldt, Völker, and Van Rossem (2008) suggested that peer influence may be a universal phenomenon, whereas selection may depend on context. However, the findings of studies representing a range of geographic regions and developmental samples suggest that both selection and influence are dependent on context.

Longitudinal studies that have attempted to disentangle the question of selection versus influence have found mixed results. Two studies of delinquent behavior conducted in the Netherlands found support for peer selection but not for peer influence (Knecht, Snijders, Baerveldt, Steglich, & Raub, 2010; Young et al., 2014). In contrast, a longitudinal study of students in 16 secondary schools in the Netherlands found support for peer influence in the effects of friends' delinquent behavior on adolescents' own delinquent behavior in all schools, but only found support for selection effects in about one-quarter of the schools

(Baerveldt et al., 2008). Influence effects were also found in two U.S. studies with ethnically diverse samples. These include a study focusing on fifth graders in the rural Midwestern United States (Logis et al., 2013), and a sample of fourth graders in New York City (Molano, Jones, Brown, & Aber, 2013). Logis et al. (2013) also found peer selection effects in terms of increased similarity in aggression from the middle to the end of the school year, but not between the beginning and middle of the school year. In a third study conducted in the U.S., Rulison, Gest, and Loken (2013) found support for both peer selection and influence in their study of the aggressive behavior of a sample of predominantly Caucasian American sixth and seventh grade students in rural Pennsylvania. The limited number of longitudinal studies and the inconsistent pattern of findings make it difficult to draw clear conclusions about when peer selection versus peer influence occurs. These differences highlight the need to clarify how adolescents and their peers influence each other over time, particularly in different contexts.

# Gender Differences Among Peer Factors and Adolescent Behavior

There is some evidence of gender differences in adolescents' exposure to different domains of peer factors and the role that peers play in adolescents' behavior. Behavioral and psychological differences between boys and girls become more pronounced during the transition from childhood to adolescence (Arnett, 2014). Although girls have been found to have a greater need for social approval (Rose & Rudolph, 2006), the findings of studies exploring gender differences in the relations among peer factors and adolescent behaviors have been inconsistent. Some studies have not found gender differences in the association between peer factors and adolescent behavior (Véronneau & Dishion, 2011). However, others have found gender differences, with effects in varying directions. For example, studies have found peer pressure to have a stronger influence on boys' problem behavior than on girls' in both predominantly African American (Farrell et al., 2017) and in predominantly Caucasian American samples (Sumter et al., 2009). More longitudinal research in diverse samples is needed to parse out the extent to which gender moderates the relations among multiple peer influences and adolescents' problem behaviors.

# The Present Study

The present study investigated reciprocal relations between adolescents' physical aggression and several dimensions of deviant peer factors (i.e., peer pressure for fighting, friends' delinquent behavior, and friends' support for fighting) within a predominantly African American sample living in an under-resourced community with high crime rates. We also explored how these relations vary across different points in time during early adolescence, including within and across middle school grades (i.e., seasonal and grade effects). We hypothesized that: (1) there would be reciprocal relations between adolescents' frequency of aggression and each of the deviant peer factors, but that relations would be stronger for peer pressure for fighting than for friends' delinquent behavior or friends' support for fighting (Farrell et al., 2017); (2) peer influence effects would generally be stronger in sixth grade, given the fragility of social status at times of transition (Allen et al., 2006; Wigfield et al., 2006); and (3) reciprocal relations between peers' deviant behavior and adolescents' frequency of physical aggression would be stronger among boys due to societal gender

norms. Seasonal effects across the school year (i.e., fall to winter, winter to spring, and spring to summer) were also examined, but were considered exploratory in that no specific hypotheses were proposed.

# Method

#### **Setting and Participants**

Participants were 2,290 students at three urban public middle schools in the southeastern United States who participated in a study evaluating the Olweus Bullying Prevention Program (Olweus & Limber, 2010) using a multiple baseline design in which the implementation of the program was initiated in different years at each school (Farrell, Sullivan, Sutherland, Corona, & Masho, 2018b). The schools were selected based on high rates of truancy and location in neighborhoods with high levels of violence. Based on school records, 100% of the students were eligible for the federal free or reduced lunch program. Student assent and active parent permission were obtained for approximately 80% of those eligible. Students completed self-report measures four times a year every three months (i.e., fall, winter, spring and summer), and teachers completed ratings of students during the school year.

The final sample had a mean age of 12.9 (SD = 1.10) and 53% were female. Seventeen percent identified their ethnicity as Hispanic or Latino/Latina. The majority of participants (i.e., 80%) endorsed African American or Black as the sole category (i.e., 72%) or as one of several categories (8%). Eleven percent did not endorse any of the racial categories; most of these (i.e., 91%) described themselves as Hispanic or Latino. The remainder described themselves as White (5%), Asian (1%), American Indian or Alaska Native (1%), Native Hawaiian or Other Pacific Islander (1%). Over half (58%) of the sample completed measures while at a school that was implementing the intervention.

### Procedures

Students were given information about the study and informed consent forms to take to their parents. Students received a \$5 gift card for returning the consent form whether or not parents provided consent. Participants received a \$10 gift certificate at each wave for completing any part of the survey. Participants completed the surveys on computer-assisted interviews. During the school year, research assistants administered the surveys to small groups of students in the schools during the school year and in participants' homes or public settings during the summer waves. The University's Institutional Review Board reviewed and approved all procedures.

The project used a planned-missing design such that students were randomly assigned to complete two of the four waves each year. Teachers rated each student at the same waves to which the student was assigned. Graham, Taylor, and Cumsille (2001) discussed the benefits of such designs, and argued that not requiring participants to complete measures at every wave could reduce costs, carryover effects, participant burden, fatigue, and attrition. Randomization results in data that are missing completely at random. Graham at al. (2001)

noted that planned missing designs can provide tests of hypotheses that are nearly as powerful as those involving all possible cases.

This study was based on 8 years of data collected between 2010 and 2017. Although some students participated across several grades, four of the nine cohorts were not in the study for all three grades (i.e., entered the study in their seventh or eighth grade, or were in the sixth or seventh grade in the final year of data collection). Rather than attempt to model changes across all 12 waves, we chose to examine changes within each school year as a within-person factor (i.e., within-person changes across the fall, winter, spring, and summer waves), and differences across grades as a between-persons (i.e., group) factor. For students who participated during more than one grade, we randomly selected their data from one of the grades for inclusion in the study to avoid confounding between-person and within-person effects in our cross-grade comparisons. This provided longitudinal data within one grade for each of the 2,290 participants. Analyses of teacher data did not include those students for whom only one wave of data were obtained because they were randomly assigned to complete one of the summer waves when teacher data were not collected. This reduced the sample size for analyses involving teacher ratings to 1,421.

#### **Measures of Peer Factors**

**Perceptions of Friends' Delinquent Behavior.**—The Friends' Behavior Scale (Farrell et al., 2017) was developed to assess participants' perceptions of their friends' delinquent and prosocial behavior. Respondents first indicated their number of close friends to orient them to the task. We used the Friends' Delinquent Behavior scale, which has ten items asking about friends' engagement in activities such as aggression, substance use, and delinquency (e.g., "Hit someone with the idea of hurting that person," "Sold drugs"). Participants indicated how many of their close friends engaged in each activity within the past three months on a 5-point scale, ranging from *None of them* to *All of them*. Farrell et al. (2017) found support for the structure of the scale; strong measurement invariance across gender, grades, settings, time, and intervention conditions; and concurrent validity based on correlations with adolescents' problem and prosocial behaviors. Alpha coefficients for the scale across waves ranged from .80 to .88.

**Perceptions of Friends' Approval of Adolescents' Behavior.**—The Friends' Reaction to Responses in Conflict Situations scale (Farrell et al., 2017) assesses participants' expectations for how their friends would react if they responded nonviolently or aggressively to conflict situations involving other peers (e.g., "You see two people about to start a fight," and "You and another teen get into an argument"). It describes five scenarios that describe a problem situation. Each is followed by an effective non-violent response (e.g., *you went to get an adult; you tried to talk to the person calmly*) and an aggressive response (e.g., *you cheered on the fight; you threw the first punch*). Response choices include a positive reaction (e.g., *they would think that I did the right thing*), a neutral reaction (e.g., *they would not care*), and a negative reaction (e.g., *they would think I was a punk*). Negative, neutral, and positive responses are scored –1, 0 and 1, respectively. These ratings are averaged to create two subscales: Friends' Support for Fighting and Friends' Support for Nonviolence. The Friends' Support for Fighting Scale was used in the current study. Scores thus range from –1

to 1, with scores below 0 indicating some degree of disapproval of responses within the given category, and scores above zero indicating approval. Validity of the measure is supported by correlations with other peer and adolescent factors based on both adolescent-and teacher-report measures (Farrell et al., 2017). Alpha coefficients for the Friends' Support for Fighting ranged from .78 to .79 across waves.

**Perceptions of Peer Pressure for Fighting.**—The Peer Pressure for Fighting scale (Farrell et al., 2017) is a seven-item scale asking youth how frequently they experienced pressure to fight over the past 30 days. It includes items about pressure to fight from both friends (e.g., "A friend wanted you to have their back in a fight") and the larger peer group (e.g., "Other people tried to get you to start a fight with someone"). Participants rated each item on a 6-point rating scale with the anchors 1 - Never, 2 - 1-2 times, 3 - 3-5 times, 4 - 6-9 times, 5 - 10-19 times, and 6 - 20 or more times. Farrell et al. (2017) found support for the concurrent validity of the measure based on its pattern of correlations with other peer and adolescent factors using both adolescent- and teacher-report measures. We calculated a total score by first recoding responses into a 4-point scale by combining the three highest categories based on IRT analyses used in a prior study (Farrell et al., 2017) that suggested little discrimination among those categories. We then calculated the mean across items. Alpha coefficients for each wave ranged from .83 to .87.

#### Measures of Aggression

Adolescents' Physical Aggression .- The Problem Behavior Frequency Scale -Adolescent Report (PBFS-AR; Farrell, Sullivan, Goncy, & Le, 2016) items assess the frequency of physical, verbal, and relational forms of both aggression and victimization, substance use, and other delinquent behaviors. Items are rated on a 6-point frequency scale based on the past 30 days, 1 - Never, 2 - 1-2 times, 3 - 3-5 times, 4 - 6-9 times, 5 - 10-19 times, and 6 - 20 or more times. Farrell et al. (2016) found support for separate factors representing physical aggression, verbal aggression, relational aggression, overt victimization, relational victimization, drug use, and delinquent behavior. They also established strong measurement invariance across gender, location, and grades, and concurrent validity based on teachers' ratings of adolescents' behavior and adolescents' ratings on measures of related constructs. The current study used the Physical Aggression subscale, which consisted of five items (e.g., "Hit or slapped someone" and "Thrown something at someone to hurt them"). The total score was based on the mean after combining responses in the three highest categories based on prior IRT analyses (Farrell, Thompson, Mehari, Sullivan, & Goncy, 2018c), and calculating the mean across items. Alpha coefficients ranged from .76 to .82 across waves.

The Problem Behavior Frequency Scale – Teacher Report (PBFS-TR; Farrell, Goncy, Sullivan, & Thompson, 2018a) is a teacher-report form of the PBFS. We recruited a core education teacher for each student from among those the team of teachers within each grade identified as most familiar with that student. These teachers completed a PBFS-TR for each student they were assigned at the same waves when students completed the self-ratings, except for the summer wave. The same teacher was assigned to rate the same student at each wave as long as she or he continued to teach that student, but was replaced by another

teacher if unable or unwilling to complete the assessment at a given wave. Teachers rated how frequently the identified adolescent engaged in or experienced each behavior in the past 30 days using a 4-point scale, where 1 – *Never*, 2 – *Sometimes*; 3 – *Often*; and 4 - *Very often*. Farrell et al. (2018a) found support for the structure of the PBFS-TR, established strong measurement invariance over gender, grade, intervention condition, and provided evidence of convergent validity based on correlations with student and teacher ratings on other measures of aggression and victimization. The current study used the Physical Aggression subscale, consisting of seven items (e.g., "Hit or slapped someone" and "Shoved or pushed someone"). Alpha coefficients ranged from .89 to .90 across waves.

#### **Data Analyses**

We log transformed scores on measures of adolescent and peer behaviors to reduce their skewness and kurtosis, and then used linear transformations to provide scores with similar means and standard deviation as the original scores. We conducted analyses in MPlus Version 7.11 (Muthén & Muthén, 2015). Data were obtained from students at 88.5% of their scheduled assessments. Missing data on student report measures were the result of students who left the school (4.8%), declined to participate (1.7%), could not be scheduled or located (3.5%), or withdrew from the study (0.3%). An additional 1.3% of the data were missing because of concerns about data quality based on completeness of the survey, the amount time students took to complete the survey, or staff observations of student behavior (e.g., student appeared to be randomly responding). Teacher ratings of students were obtained at 96.5% of the scheduled assessments. Teacher ratings were missing because students left the school (3.1%), or because we were unable to obtain ratings from the teacher (0.4%). We addressed missing data through use of full information maximum likelihood estimation (FIML; Enders, 2013). We conducted analyses using all available data for each participant. This approach is preferred over other alternatives to handling missing data (e.g., listwise deletion, pairwise deletion), even when the assumption of missing at random is not supported (Enders, 2011, p. 344). FIML is particularly effective in longitudinal studies, such as the current study, in which the same measures are given at each wave (Graham et al., 2001).

We used sandwich estimators (i.e., Mplus type=complex and stratification options) to address non-independence resulting from students being clustered by grade, cohort, and school (Muthén & Satorra, 1995). We computed standard errors using a robust estimator (i.e., MLR) to account for non-normality. We ran separate cross-lagged path models to investigate longitudinal reciprocal relations between the three peer factors and adolescent and teacher ratings of physical aggression (see Figure 1). The models examined bidirectional effects controlling for prior levels of all constructs. All models included correlations among variables within each wave. We used Wald tests within unconstrained multiple group models to determine if the relations between adolescents' physical aggression and the three peer factors differed by sex and grade. We evaluated models based on their root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker-Lewis index (TLI), using general guidelines by Hu and Bentler (1999). We also compared models using the scaled chi-square difference test (Satorra & Bentler, 2010). Because the large sample size provided power for the chi-square difference test to detect even small differences in fit,

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we also considered changes in RMSEA, CFI, and TLI. Although recommended for testing measurement invariance rather than stability over time, we followed Cheung and Rensvold's (2002) recommendations and did not favor more complex models unless they improved the CFI by more than .01.

We evaluated effects within the full sample using cross-lagged path models that included covariates to control for intervention status, sex, and grade on all outcomes at each wave in the model. Intervention status was dummy coded to indicate whether the student completed the measures during a year when the intervention was being implemented at his or her school. To test for seasonal effects, we examined the stability of the cross-wave relations by comparing an unconstrained model that allowed the values of each regression coefficient (i.e., paths linking variables across waves and effects of the covariates) to vary across waves with a model that constrained coefficients representing the reciprocal relations between the peer factors and adolescents' physical aggression to the same values across waves. We then compared this partially constrained model to a model that constrained all regression coefficients (i.e., paths linking all variables across waves and effects of the covariates) across time. Given the number of parameters involved, we used Wald tests to reduce the familywise Type I error rate when we examined sets of parameters. Finally, to evaluate the effect size of significant findings, we followed recommendations by Adachi and Willoughby (2015), who suggested interpreting standardized regression coefficients within the context of the concurrent association between the variables (e.g., Wave 1 correlations), the bivariate correlations across waves (i.e., cross-wave correlations), and the stability coefficients (i.e., autoregressive paths).

### Results

#### **Descriptive Statistics**

Means and standard deviations at each wave and correlations among the variables within the first (i.e., Wave 1) and last wave (i.e., Wave 3 for teacher-reports and Wave 4 for adolescent-reports) are reported in Table 1 (see Table S1 within the supplementary materials for correlations at the other waves). As expected, the three peer factors had small-to-moderate positive correlations with each other (rs = .18 to .33). At waves 1 and 4, self-reported physical aggression was positively correlated with peer pressure for fighting (rs = .49 and . 52, respectively), friends' delinquent behavior (rs = .38 and .35, respectively), and friends' support for fighting (rs = .30 and .19, respectively). Their correlations with teacher-reported physical aggression across all waves were lower, but in the expected direction (see tables 1 and S1). Correlations between adolescent- and teacher-ratings of physical aggression were significant but small (Wave 1 r = .11; Wave 3 r = .19), and similar to findings from past studies (e.g., Farrell et al., 2017).

# **Relations Between Student-reported Physical Aggression and Peer Factors**

We used autoregressive path models to examine bidirectional relations between adolescents' physical aggression and the three peer factors. We first evaluated seasonal effects by constraining the six regression coefficients representing the reciprocal relations between the peer factors and adolescents' physical aggression to the same values across waves.

Compared with the unconstrained model, the partially constrained model did not significantly decrease the model fit based on the chi-square difference test (see Model 1 versus 2 in Table 2). Furthermore, the RMSEA and TLI improved, and the CFI only marginally decreased (i.e., CFI = .001) within the partially constrained model. An additional model evaluated whether all 26 regression coefficients, including relations between covariates (i.e., intervention status, sex, and grade) and outcomes, autoregressive paths, and relations among the peer factors could be constrained over time. Results indicated that the partially constrained model that allowed these additional coefficients to vary across waves fit the data significantly better than the fully-constrained model based on the chi-square difference test. It also improved the CFI by over .01 (i.e., CFI = .012; see Model 2 versus 3). This suggested that the reciprocal relations between physical aggression and peer factors were consistent over time, but some of the other relations were not.

The final model (see Model 2), which constrained the cross-lagged paths between the peer factors and adolescents' frequency of physical aggression across time, had an acceptable fit (RMSEA = .027, CFI = .972, TLI = .915). Wald tests indicated that the three deviant peer factors as a set significantly predicted changes in student-reported physical aggression (Wald  $\chi^2$  [3] = 18.06, p < .001), and student-reported physical aggression significantly predicted changes in the three peer factors (Wald  $\chi^2$  [3] = 32.87, p < .001). Follow-up analyses revealed reciprocal relations for each of the peer factors and adolescents' physical aggression, controlling for prior frequencies of each peer construct (see Table 3 and Figure 2a). Friends' delinquent behavior, peer pressure for fighting, and friends' support for fighting each predicted increases in adolescents' physical aggression ( $\beta s = 0.05$  to 0.08, ps <.05). Conversely, adolescents' physical aggression predicted increases in each of the three peer factors ( $\beta s = 0.06$  to .08,  $\rho s < .05$ ). The standardized coefficients linking each peer construct with changes in adolescents' physical aggression did not significantly differ from each other (  $\beta s = -0.02$  to 0.00, p > .617), nor did the standardized coefficients linking adolescents' physical aggression to changes in each peer construct (  $\beta s = 0.02$  to 0.07, p > . 05). Results of Wald tests indicated that there were no sex differences (Wald  $\chi^2$  [18] = 17.57, p = .484) or grade differences (Wald  $\chi^2$  [36] = 31.07, p = .702) in the relations between physical aggression and the three peer factors within unconstrained multiple group models.

Although significant cross-variable relations were small, Adachi and Willoughby (2015) argued that this is often the case for autoregressive models compared with effect sizes based on cross-sectional designs. This is because autoregressive models that control for stability effects typically remove a large portion of the variance that is shared across variables. This means that longitudinal effect sizes are greatly reduced when variables have high stability and when concurrent correlations among variables are high. They suggested that researchers put their findings into context by reporting this information along with cross-wave correlations that do not adjust for stability. Within the current study, stability coefficients were moderate to large across all factors ( $\beta$ s = 0.47 to 0.61; see Table 3), as were correlations among physical aggression and peer factors within each wave (e.g., *t*s = .30 to . 49 at Wave 1; see Table 1). Cross-wave correlations not controlling for stability reported in the top half of Table 3 were fairly high (*t*s = .29 to .35). This suggests that the magnitude of effects based on the autoregressive models were limited by the large amount of variance as

indicated by the stability coefficients and the strong concurrent relations across variables. Adachi and Willoughby (2015) argued that small effects, such as those found in the current study, are meaningful and accumulate over time. This is particularly true for the present study that examined changes across fairly short time intervals (i.e., 3-month periods).

# **Relations Between Teacher-reported Physical Aggression and Peer Factors**

We used similar models to examine the relations between teacher-reported physical aggression and the three peer factors. We again examined the consistency of effects across waves based on the full sample (see Table 2). Compared with the unconstrained model, the partially constrained model did not significantly decrease the model fit based on the chi-square difference test, and the CFI did not change in value (see model 4 versus 5). The fully-constrained model, which imposed additional constraints (Model 6) did not significantly decrease the fit relative to both the partially constrained model (Model 5) and the unconstrained model (Model 4; see Table 2). These findings suggest that the relations between the peer factors and teacher-reported adolescents' physical aggression were consistent across waves. The final model (see Model 6) had an acceptable fit (RMSEA = .033, CFI = .960, TLI = .913).

Within the final model, the overall effect of the three deviant peer factors on changes in teacher-reported physical aggression was significant (Wald  $\chi^2$  [3] = 16.75, p < .001), as was the effect of teacher-reported physical aggression on changes in the deviant peer factors (Wald  $\chi^2$  [3] = 19.37, p < .001). Follow-up analyses revealed reciprocal relations between peer pressure for fighting and adolescents' physical aggression (see Table 4 and Figure 2b). More specifically, peer pressure for fighting predicted increases in physical aggression ( $\beta = 0.08, p = .002$ ), and physical aggression predicted increases in peer pressure for fighting ( $\beta = 0.10, p < .001$ ), after controlling for all other variables in the model. No significant cross-variable relations were found between adolescents' physical aggression and friends' delinquent behavior or support for fighting. Results of Wald tests indicated that there were no sex differences (Wald  $\chi^2$  [12] = 11.21, p = .511) or grade differences (Wald  $\chi^2$  [24] = 34.42, p = .077) in the reciprocal relations between physical aggression and peers' problem behavior.

As in the analyses of adolescent-reported physical aggression, the overall effects were small. However, this is not surprising given the moderate to large stability coefficients ( $\beta s = 0.49$  to 0.66). The concurrent and bivariate cross-lagged associations were smaller than those found in the analyses of adolescent-reported aggression; however, they still contributed to the reduction in variance accounted for by the cross-lagged paths within the final model.

# Discussion

The purpose of this study was to examine bidirectional longitudinal relations between adolescents' physical aggression and peer factors within each grade of middle school. Our intent was to address the ongoing debate (e.g., Logis et al., 2013; Young et al., 2014) regarding whether the associations between peer factors and early adolescents' problem behaviors are the result of peer selection or peer influence within an urban, under-resourced community with high crime rates. Furthermore, we were interested in examining the unique

and combined impact of multiple dimensions of peer deviance on adolescents' behavior. Our findings indicate that multiple forms of peer deviance influence, and are in turn influenced by, adolescents' physical aggression. This is consistent with emerging research that has highlighted the importance of examining multiple peer factors, such as friends' problem behaviors, friends' support of adolescents' fighting, and peer pressure for fighting (Farrell et al., 2017). Overall, our study's findings extend prior research that has found peers to be an integral source of influence for adolescents in urban communities exposed to high levels of violence (Briggs et al., 2012).

#### **Evidence for Reciprocal Effects**

We found evidence supporting bidirectional relations between peer pressure and adolescents' frequency of physical aggression based on both adolescent and teacher ratings. Peer pressure for fighting appears to be particularly salient and was the only peer behavior that emerged as a unique predictor for both adolescent- and teacher-reported physical aggression. The finding of bidirectional effects suggests that peer pressure not only influences but is also influenced by adolescents' aggressive behavior. The unique role of peer pressure for fighting may be due to its proximal influence. That is, peer pressure at the time of conflict or provocation may have a more direct influence on adolescents' decision to aggress or to enact a nonviolent response than the more distal factors of their friends' typical behavior or how their friends might react to their behavior. Given the fact that peer pressure included the behavior of both friends and acquaintances (e.g., "Other people tried to get you to start a fight with someone"), peer selection due to peer similarity may be less of a factor because adolescents cannot choose all of their peers at school. This suggests that adolescents may be able to affect their broader social context based on how they respond to their peers' behavior. In other words, adolescents may play an active part in creating their own environment and overall school climate given their response to peer influences. For example, other students at school may learn which of their peers will fight when pressured, and which will not. Those students will continue to exert peer pressure on adolescents who respond by fighting, and will cease pressuring adolescents who do not fight. Alternatively, it may reflect changes in perceptions, such that adolescents who engage in aggressive behavior change their perceptions of their peers' behavior or use peer influences as a justification for their behavior.

We also found support for reciprocal relations between adolescents' self-report of their frequency of physical aggression and their friends' delinquent behavior and support for fighting. These findings support both peer influence and peer selection. Adolescents who are aggressive are more likely to seek out friends who engage in delinquent behaviors and who support fighting. Furthermore, having friends who engage in delinquent behaviors and support fighting increases the likelihood that an adolescent will be aggressive. We did not find these same effects when physical aggression was assessed by teachers' ratings. Because most problem behavior occurs outside of adult supervision, adolescents and their friends may be influencing one another in contexts that are not observed by teachers. In contrast, teachers may be more aware of adolescents who are fighting in the context of peer pressure to fight, because this may be more likely to occur within the school setting. Previous qualitative research in a similar sample found that peer pressure to fight can often occur in

situations at schools that are loud and crowded, where adolescents feel like they cannot escape (Farrell, Mehari, Kramer-Kuhn, Mays, & Sullivan, 2015). As such, it is more likely that teachers will witness or hear about these events compared with delinquent behavior. Regarding friends' support for fighting, teachers may be less aware of peers' attitudes regarding adolescents' aggression (e.g., "They would think I was cool") compared with peers' behaviors in large crowds (e.g., direct peer pressure), making it less likely to see relations between adolescents' behavior and peers' approval or disapproval within the school context.

Notably, there were no differences in the strength of the bidirectional relations between selfreported physical aggression and the three peer factors. In other words, friends' delinquent behavior, support for fighting, and peer pressure for fighting were equally important, with each uniquely influencing adolescents' subsequent physical aggression, and physical aggression influenced each of the peer factors similarly over time. This is in contrast to our hypothesis and past cross-sectional work that found that adolescents' physical aggression was more strongly associated with friends' delinquent behavior and peer pressure for fighting compared with friends' support for fighting (Farrell et al., 2017). This inconsistency may be due to controlling for prior frequencies of physical aggression in the current study, which reduced the overall effect of friends' delinquent behavior on adolescents' physical aggression, as compared with prior cross-sectional studies that could not control for prior levels. This underscores the importance of conducting longitudinal studies to investigate the relations between peer factors and *changes* in adolescents' behavior. It is also important to acknowledge that our examination of peer influences was based on models that included all three peer factors. This provided a rigorous test of the extent to which each peer construct was uniquely related to physical aggression after controlling for the other peer factors.

#### Stability of Prediction over Early Adolescence and Across Gender

Relations among variables were stable across middle school grades (sixth, seventh, and eighth) and across different times of the year. That is, the patterns of relations among peer factors and adolescent aggression were consistent across the course of early adolescence, and there was no one time period that early adolescents appeared particularly vulnerable to peer influence or were more likely to select friends who were similar to them. This did not support our hypotheses that peer influence would be stronger in sixth grade. This suggests that interventions that target peer interactions could be effective across middle school grades. These findings are also at odds with one study in a rural area that found peer selection effects on aggression to be more pronounced from the middle to end of the school year as opposed to other time points (Logis et al., 2013).

The pattern of relations was also consistent for boys and girls. Previous research has been mixed regarding gender differences in the relations between peer factors and adolescents' behaviors (e.g., Sumter et al., 2009; Véronneau & Dishion, 2010; Wang & Dishion, 2012). Gender differences may be thought to reflect differences in gender socialization, with peer pressure, for example, impacting adolescents more when it is gender salient, such as aggression for boys and prosocial behavior for girls (Rueger, Malecki, & Demaray, 2008). Gender differences among these relations are thought to depend upon the type of peer

construct being examined. The absence of gender differences in the current study may be due to continued gender role flexibility. That is, the gender intensification associated with adolescence may not increase significantly until high school (Alfieri, Ruble, & Higgins, 1996). This suggests that gender differences concerning the impact of negative peer influences on adolescent behavior may be more subtle during the middle school years. Another explanation is that aggression tends to occur at similar rates for boys and girls among mostly African American children in urban, under-resourced schools and in neighborhoods with high rates of violence (Bettencourt & Farrell, 2013; Bradshaw, Schaeffer, Petras, & Ialongo, 2010). In these contexts, there may not be differences in gender socialization related to aggression. Unfortunately, the sample in the current study was not sufficiently diverse to examine race as a moderator of relations between the three peer factors and aggression.

#### Limitations

This study had several limitations that should be noted. Because adolescents reported on their peers' behavior, the measures of peer factors may be more accurately described as adolescents' perceptions of their peers rather than their peers' actual behaviors and attitudes. Researchers have argued that indirectly assessing peers' behaviors artificially inflates the similarities between adolescents' behaviors and that of their peers (Gottfredson & Hirschi, 1990). Empirical research has found that although adolescents' reports of their peers' behavior tap into adolescents' own behaviors, they are also reflective of their peers' behaviors (Boman, Stogner, Miller, Griffin, & Krohn, 2012). This indicates that it is important to assess (and target) adolescents' perceptions of peers' behaviors.

The inclusion of teachers' ratings of adolescents' physical aggression has strengths and limitations. Teachers spend a substantial portion of time with adolescents during the school year, have an opportunity to observe them interacting with peers, and are often the first to identify behavior problems (Orpinas, Raczynski, Peters, Colman, & Bandalos, 2015). This highlights the value of collecting teacher ratings as an additional source of information to supplement adolescents' own ratings (Farrell et al., 2018a). Correlations between adolescents' and teachers' ratings of physical aggression in the present study were low, although not atypical for measures between adolescents and teachers (De Los Reyes, & Kazdin, 2005). Despite their potential value, teacher-report measures of adolescent behavior are limited in the information they can provide. The low level of agreement with adolescent ratings may be more indicative of the context in which aggressive behavior occurs (i.e., school versus home) rather than attributable solely to informant bias. Teachers' interactions with students are generally limited to the school day, and adolescents are less likely to engage in problem behavior when authority figures are present.

Most of our participants were African American adolescents who attended schools within communities with high rates of crime and poverty. We chose to include all adolescents in our sample without restricting by race to provide a more diverse and inclusive sample representative of early adolescents growing up in urban, under-resourced areas. However, our findings may not generalize to other stages of development or to early adolescents in different environments. It is not clear how well our findings represent the experiences of all

youth within our sample, or the specific factors that may influence the relations among adolescents' problem behaviors and their peers' behaviors and attitudes over time. Such efforts will require larger and more diverse samples to provide a basis for examining characteristics of adolescents that moderate such influences.

#### Implications

The longitudinal nature of this study allowed us to control for prior levels of each construct; thus, significant findings indicated changes in behavior relative to their baseline frequencies. Our findings suggest that multiple dimensions of peers' behaviors uniquely play a role in the development of adolescents' physical aggression. This highlights the need to explore relations between multiple deviant peer factors and adolescent behaviors simultaneously. Although a large body of research has examined the integral role peers play in adolescents' development and behavior, previous studies have typically focused on a single dimension of peer influence. This does not address the unique and cumulative impact of multiple forms of peer influence on adolescents' adgressive behavior. Overall, our findings highlight the cyclical nature of adolescents' and peers' problem behaviors. Furthermore, we found that across adolescent and teacher reports, peer pressure for fighting was a consistent predictor of aggressive behavior, and was consistently predicted by adolescents' aggression, even after controlling for other deviant peer behaviors. This illustrates how adolescents shape and are shaped by their context. Prior studies that focus solely on a single dimension of peer factors may miss important sources of influence.

These findings have important implications for programming in schools that focus on reducing problem behaviors or on promoting well-being. Using strength-based models that enhance youth's positive attributes (i.e., their strengths) to promote their resiliency is an important component of positive youth development programming (Lerner, 2017). However, given the influential role of peers, programs should also target youth's problem behaviors even within a positive youth development framework. For example, Farrell and colleagues (2010, 2015) found that adolescents' perceptions of their friends' approval of fighting were a barrier to using nonviolent responses often taught in violence prevention programs. Based on our current findings, it is important that interventions include components that focus specifically on countering peer pressure and friends' support for fighting (e.g., Day, Miller-Day, Hecht, & Fehmie, 2017). The finding of bidirectional relations is particularly troubling as this suggests a cycle whereby peers influence aggressive behavior, which then leads to increased association with deviant peers, which then leads to a further increase in aggressive behavior, and so on. Interventions may also need to focus on changing school climate and addressing bystander behavior (Twemlow et al., 2010).

#### Conclusion

This study addressed gaps in the literature by investigating the extent to which distinct dimensions of adolescents' aggression and their peers' problem behaviors and attitudes influence each other at different points during early adolescence in under-resourced communities. Overall, the findings highlight the unique contribution of peer pressure for fighting across multiple reporters as well as the importance of examining reciprocal relations between multiple dimensions of peers' behaviors and attitudes and adolescents' physical

aggression. Follow-up studies should consider investigating school climate and race as potential moderators of these effects.

# Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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#### Figure 1:

Path model examining reciprocal relations between deviant peer factors and adolescents' report of their frequency of physical aggression across four waves within the school year. Demographic covariates and covariances between measures within each wave were included in the model but not shown in the figure. A similar model was used to examine relations with teacher ratings of adolescents' physical aggression, but did not include the summer wave.



#### Figure 2:

Cross-wave relations between physical aggression and peer factors based on: (a) adolescent reports of physical aggression, and (b) teacher ratings of adolescents' aggression. Values are standardized path coefficients. All wave t+1 variables were regressed on all wave t variables, but only significant paths are shown. Model included four waves of data for adolescents' self-report of physical aggression and three waves of data for teacher ratings of adolescents' physical aggression. Corresponding coefficients for the cross-variable paths between the peer and adolescent factors were constrained to the same values across all waves. \*p < .05. \*\*p < .01. \*\*\*p < .001.

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Means, Standard Deviations, and Correlations Within Wave for Student- and Teacher-Reported Physical Aggression and Deviant Peer Factors

	1	7	o	r	9
Adolescent Behavior					
1. Physical Aggression - AR		.19***	.35 ***	.19 ***	.52 **
2. Physical Aggression - TR	.11**		.12**	.17 ***	.17 ***
Peer Behavior					
3. Friends' Delinquent Behavior	.38	.10**		.21 ***	.27 ***
4. Friends' Support for Fighting	.30 ***	*80.	.24 ***		.18***
5. Peer Pressure for Fighting	.49	.11	.33 ***	.23 ***	ı
Means (SD)					
Fall	1.41 (0.54)	1.31 (0.51)	1.11 (0.27)	-0.16 (0.58)	1.51 (0.64)
Winter	1.37 (0.53)	1.34 (054)	1.12 (0.30)	-0.12 (0.57)	1.46 (0.65)
Spring	1.41 (0.56)	1.38 (0.57)	1.12 (0.30)	-0.11 (0.55)	1.44 (0.63)
Summer	1.32 (0.50)		1.10 (0.25)	-0.20 (0.53)	1.36 (0.58)

*Note.* N = 2,290 for correlations with adolescent-report measures. Correlations with teacher ratings of aggression were based on a reduced sample (N = 1,422) because they were not collected during the summer wave. AR = Adolescent report. TR = Teacher report. Values below the diagonal represent correlations among Wave 1 variables. Values above the diagonal represent correlations among Wave 3 teacher-report variables and Wave 4 student-report variables.

 $_{p < .05.}^{*}$ 

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co > d

p < .01.

p < .001.

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Fit Indices for Competing Models of Bidirectional Relations Between Adolescents' Physical Aggression and Peer Factors

Model	$\chi^{^{2a}}$	df	RMSEA	CFI	TLI	$\chi^{2b}$	df	Comparison Model
Anal	yses of adoleso	cent-re	ported physi	cal aggı	ession			
1. Unconstrained across time	142.33 ***	48	.029	.973	897.	ı	'	
2. Partially constrained across time	<b>157.60</b> ***	60	.027	.972	.915	14.93	12	1
3. Fully constrained across time	253.36 ***	112	.023	960	.934	94.07 ***	52	2
<u>An</u>	alyses of teach	er-repo	orted physics	l aggre	ssion			
4. Unconstrained across time	98.99 ***	20	.053	.961	.776	ı	'	
5. Partially constrained across time	104.47	26	.046	.961	.829	6.22	9	4
6. Fully constrained across time	131.83	52	.033	<b>096</b> .	.913	29.16	26	ŝ

each construct were all constrained across waves. The bolded models were selected as final models. RMSEA = Root mean square error of approximation. CFI = comparative fit index. TLI = Tucker-Lewis were not allowed to vary across waves. Within the fully constrained models, the path coefficients among the peer variables, the autoregressive paths, and those representing the impact of the covariates on Note. N= 2,290 for student-reported outcomes and N= 1,422 for teacher-reported outcomes. Within the partially constrained models, cross-variable coefficients between the peer and adolescent factors Fit index.

<sup>a</sup>Chi-square test of model fit.

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b satorra-Bentler scaled chi-square difference test comparing fit of each model to the comparison model. Significant chi-square difference test values indicate that the comparison model resulted in a significant improvement in fit.

 $_{p < .05.}^{*}$ 

p < .01.

p < .001.

# Table 3

Standardized Parameter Estimates (Standard Errors) for Cross-Variable Correlations and Regression Coefficients for Relations Between Adolescent-Reported Physical Aggression and Peer Factors Across Waves 1 and 2

		Wave	2 Measures	
Wave 1 Measures	Physical Aggression	Friends' Delinquent Behavior	Friends' Support for Fighting	Peer Pressure for Fighting
		Cross wave correlations <sup><math>a</math></sup>		
Physical Aggression	.56 <sup>***</sup> (.04)	.31 *** (.05)	.34 *** (.04)	.30 *** (.06)
Friends' Delinquent Behavior	.29 *** (.07)	.47 *** (.11)	.22**(.07)	.30 *** (.07)
Friends' Support for Fighting	.24 *** (.04)	.24 *** (.04)	.60 *** (.04)	.15 ** (.05)
Peer Pressure for Fighting	.35 *** (.05)	.31 *** (.06)	.19***(.05)	.50 *** (.06)
	Stands	ardized regression coeffic	ients	
Physical Aggression	.54 *** (.04)	.08**(.03)	.06** (.02)	$.06^{*}(.03)$
Friends' Delinquent Behavior	$.06^{*}(.03)$	.47 *** (.09)	.07 (.06)	(90.) 60.
Friends' Support for Fighting	$.05^{*}(.02)$	.05 (.04)	.61 *** (.04)	03 (.04)
Peer Pressure for Fighting	$.08^{**}(.03)$	.11*(.05)	.03 (.05)	.53 *** (.05)

onstrained to the same value across waves.

<sup>a</sup>Indicates correlation between Wave 1 variable (in row) and the Wave 2 variable (in column).

 $_{p < .05.}^{*}$ 

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p < .01.

p < .001.

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# Table 4

Standardized Parameter Estimates (Standard Errors) for Cross-Wave Correlations and Regression Coefficients for Relations Between Teacher-Reported Physical Aggression and Peer Factors Across Waves

		Wave	2 Measures	
Wave 1 Measures	Physical Aggression	Friends' Delinquent Behavior	Friends' Support for Fighting	Peer Pressure for Fighting
	0	Cross wave correlations <sup><math>a</math></sup>		
Physical Aggression	.65 <sup>***</sup> (.04)	.03 (.05)	.03 (.05)	.18 <sup>***</sup> (.05)
Friends' Delinquent Behavior	.08 (.05)	.55 *** (.09)	.18** (.06)	.27 *** (.04)
Friends' Support for Fighting	.05 (.04)	.24 *** (.04)	.57 *** *(.04)	.14 ** (.05)
Peer Pressure for Fighting	.13 ** (.04)	.42 *** (.05)	.20***(.05)	.49 *** (.06)
	Standa	ardized regression coeffic	ients	
Physical Aggression	$.66^{**}(.03)$	02 (.03)	.02 (.02)	$.10^{***}(.03)$
Friends' Delinquent Behavior	.00 (.02)	.49 *** (.06)	01 (.02)	$.08^{**}(.03)$
Friends' Support for Fighting	.03 (.02)	.03 (.02)	.62 *** (.03)	.04 (.03)
Peer Pressure for Fighting	$.08^{**}(.03)$	$.14^{***}(.04)$	.04 (.03)	.49 *** (.04)

<sup>a</sup>Indicates correlation between Wave 1 variable (in row) and the Wave 2 variable (in column).

 $_{p < .05.}^{*}$ 

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p < .01.p < .001.p < .001.