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Longitudinal Mediators of Relations Between Family Violence and Adolescent Dating Aggression Perpetration

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Abstract

Few longitudinal studies have examined the pathways through which family violence leads to dating aggression. In the current study the authors used 3 waves of data obtained from 8th- and 9th-grade adolescents ($N = 1,965$) to examine the hypotheses that the prospective relationship between witnessing family violence and directly experiencing violence and physical dating aggression perpetration is mediated by 3 constructs: (a) normative beliefs about dating aggression (norms), (b) anger dysregulation, and (c) depression. Results from cross-lagged regression models suggest that the relationship between having been hit by an adult and dating aggression is mediated by changes in norms and anger dysregulation, but not depression. No evidence of indirect effects from witnessing family violence to dating aggression was found through any of the proposed mediators. Taken together, the findings suggest that anger dysregulation and normative beliefs are potential targets for dating abuse prevention efforts aimed at youth who have directly experienced violence.

Keywords

dating violence; development; intergenerational transmission; intimate partner violence; longitudinal; path analysis

Theory and empirical evidence suggest that youth who are exposed to family violence are at increased risk for involvement in dating aggression (DA) during adolescence (Jouriles, McDonald, Mueller, & Grych, 2012; Kinsfogel & Grych, 2004; Lichter & McCloskey, 2004; Wekerle et al., 2001; Wolfe, Wekerle, Scott, Straatman, & Grasley, 2004) and young adulthood (Ehrensaft & Cohen, 2012; Magdol, Moffitt, Caspi, & Silva, 1998). Yet few empirical studies have examined the pathways through which family violence may lead to teen DA perpetration (Jouriles, McDonald, et al., 2012), and the methods used by these

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studies constrains our ability to draw strong conclusions. For example, prior research has used correlational (Boivin, Lavoie, Hebert, & Gagne, 2012; Clarey, Hokoda, & Ulloa, 2010; Foshee, Bauman, & Linder, 1999; Kinsfogel & Grych, 2004; Wolf & Foshee, 2003) or two-time-point (Bregnden, Vitaro, Tremblay, & Lavoie, 2001; Jouriles, Mueller, Rosenfield, McDonald, & Dodson, 2012; Lavoie et al., 2002; Simons, Lin, & Gordon, 1998; Wolfe et al., 2004) analytic approaches, precluding the ability to establish temporal relationships between family violence exposure and the mediators and/or between the mediators and DA (Maxwell & Cole, 2007). Furthermore, with one exception (Jouriles, Mueller, et al., 2012), previous mediation studies also have used methods for detecting mediation that have been shown to have low power for detecting indirect effects (MacKinnon, Lockwood, & Williams, 2004). As such, findings from past studies only partially inform the identification of mediators that may inform theory and prevention efforts (Wolfe et al., 2004).

In the current study we addressed these limitations by using longitudinal data to assess multiple mediators of the association between family violence and DA perpetration by means of analytic techniques that appropriately address the temporal ordering of the variables under study and that have high power for detecting indirect effects. We examined the additive (i.e., independent) effects of both witnessing interparental violence and directly experiencing violence perpetrated by an adult. In addition, some research indicates that there may be sex differences in the etiology of dating violence (for a review, see Capaldi, Knoble, Shortt, & Kim, 2012) and specifically suggests that the pathways linking family violence and DA may differ for boys and girls (e.g., Calvete & Orue, 2013; Jouriles, Mueller, et al., 2012; Kinsfogel & Grych, 2004). Therefore, we explored the potential for the mediating pathways to differ for boys and girls.

BACKGROUND

A number of different theoretical perspectives have been invoked in conceptualizing potential pathways through which family violence may lead to DA and other antisocial behaviors (Ehrensaft & Cohen, 2012; Foshee et al., 1999; Jouriles, McDonald, et al., 2012), including social learning theory (Bandura, 1973), stress theory (Cicchetti & Walker, 2001), social control theory (Hirschi, 1969), trauma models (Wekerle et al., 2001), and information-processing models (Huesmann, 1988). Drawing on these theories and empirical research, Jouriles and colleagues (Jouriles, McDonald, et al., 2012) proposed an integrated mediation model, referred to herein as the *cognitive-emotional pathways model* (CEPM), which emphasizes the role of both cognitive and emotional mechanisms that may explain relations between family violence and DA. In the current study we focused on three potential mediators described by the CEPM: normative beliefs that are more accepting of DA and two indicators of emotion dysregulation (anger dysregulation and depressive symptoms). According to the CEPM, witnessing or directly experiencing family violence may lead to changes in these mediating constructs and, consequently, to increased risk for perpetrating DA (Jouriles, McDonald, et al., 2012).

The role of normative beliefs as a mediator is supported by social learning theory (Bandura, 1973) and information-processing models (Huesmann, 1988; Huesmann & Guerra, 1997), both of which suggest that exposure to violent models communicates permissiveness for

aggressive behavior and leads to the development of normative beliefs that are more accepting of DA. Norms, in turn, “regulate corresponding actions by prescribing the range of allowable and prohibited behaviors” (Huesmann & Guerra, 1997, p. 409). As such, adolescents who are more accepting of DA may be more likely to engage in abusive behaviors with romantic partners because they view such behavior as allowable. There is some empirical support for normative beliefs as a mediator of the linkage between family violence and DA, although findings vary by sex (Foshee et al., 1999; Kinsfogel & Grych, 2004; Wolfe et al., 2004). For example, Foshee et al. (1999), using cross-sectional data, found that norms mediated relations between family violence and DA for boys and girls, whereas Kinsfogel and Grych (2004) found evidence of a mediation pathway through norms for boys only.

The role of emotion dysregulation, in particular anger dysregulation, as a mediator of relations between family violence and DA has also been supported. Developmental psychopathology models suggest that the trauma and stress caused by exposure to family violence can overtax an individual’s ability to effectively process, manage, and modulate responses to emotions such as anger (J. Kim & Cicchetti, 2010; H. K. Kim, Pears, Capaldi, & Owen, 2009; Maughan & Cicchetti, 2002). Children and adolescents who are exposed to family violence may also learn destructive or maladaptive responses to anger through caregiver modeling and reinforcement (Ehrensaft & Cohen, 2012; Wolf & Foshee, 2003), and exposure to family violence and harsh parenting have been linked to anger and emotion dysregulation in children (J. Kim & Cicchetti, 2010; Maughan & Cicchetti, 2002) and adolescents (Asgeirsdottir, Sigfusdottir, Gudjonsson, & Sigurdsson, 2011; H. K. Kim et al., 2009). Adolescents who are unable to effectively regulate emotions such as anger may experience conflict in interactions with romantic partners because they tend to become “overly aroused and display inappropriate emotional responses that are likely to cause difficulties in social interactions” (H. K. Kim et al., 2009, p. 586). Consistent with this reasoning, cross-sectional (Clarey et al., 2010; Foshee et al., 1999; Kinsfogel & Grych, 2004; Wolf & Foshee, 2003) and two-time-point longitudinal research (Wolfe et al., 2004) suggests that trauma-related anger and anger regulation (or expression) mediate associations between family violence and DA, although results are inconsistent and vary by sex and the type of family violence examined. For example, Wolfe et al. (2004) found stronger evidence of a mediation pathway from child maltreatment to DA through traumarelated anger for girls than for boys; in contrast, Kinsfogel and Grych (2004) found evidence of a mediation pathway from interparental conflict to DA for boys, but not for girls.

The role of depression, as a potential mediator between family violence exposure and DA, is also consistent with emotion dysregulation theory, in which difficulties in managing negative affect or maintaining positive affect are hypothesized to result in depression (Weinberg & Klonsky, 2009; Yap, Allen, & Sheeber, 2007). Others have suggested that the trauma and stress produced by family violence exposure lead to neurobiological changes that increase depression risk (Ehrensaft & Cohen, 2012; Kessler & Magee, 1993). Margolin and Gordis (2000) suggested that family violence exposure may lead some youth to feel unworthy of being kept safe and blame themselves for the violence, which can contribute to negative self-perceptions and internalizing problems such as depression. Depression, in turn, may increase the risk for poor relationship functioning and DA. Relative to their

nondepressed peers, adolescents with depression may feel less competent and less secure in their peer relationships and may be more likely to react poorly when faced with relationship stress, thereby contributing to poor relationship functioning and interpersonal conflict (Vujeva & Furman, 2011). Consistent with this reasoning, depression has been linked to adolescent relationship conflict (Vujeva & Furman, 2011) and DA (Cleveland, Herrera, & Stuewig, 2003; Foshee, Reyes, & Ennett, 2010; McCloskey & Lichter, 2003).

THE CURRENT STUDY

In the current study we examined hypotheses that the relationship between witnessing family violence and directly experiencing violence perpetrated by an adult and physical DA is mediated by three constructs: (a) normative beliefs about DA, (b) anger dysregulation, and (c) depression (see Figure 1 for the study conceptual model). We also explored the potential for sex differences in indirect effects, but no explicit hypotheses were posited given the inconsistent findings in the extant research described above. Because witnessing and directly experiencing violence co-occur (Herrenkohl, Sousa, Tajima, Herrenkohl, & Moylan, 2008), we examined the additive effects of each exposure type by modeling them simultaneously as separate correlated predictors.

This study builds on previous investigations of the processes linking family violence and DA by using longitudinal panel mediation models to examine study hypotheses across three waves of data. This rigorous methodological approach appropriately addressed the temporality of relations between family violence and the mediators and between the mediators and DA (Cole & Maxwell, 2003). Both single- and multiple-mediator models were estimated, the latter of which appropriately controlled for correlations among the mediators examined (MacKinnon, 2008) and allowed us to pit the cognitive and emotional mediators against one another within a single model. Indirect (mediated) effects for each mediator were assessed using bootstrapping, a powerful technique for detecting indirect effects. Furthermore, because Waves 1 and 2 were separated by a 7-month period, whereas Waves 2 and 3 were separated by a 1-year interval, we were able to examine mediation effects across different lag intervals (defined and described in detail below). Methodologists have noted the importance of considering time lags when examining mediation processes; in particular, Collins and Graham (2002) noted that a mediated effect that is detected using a short time lag between assessments may decay and no longer be detected when assessed across longer intervals.

METHOD

Study Design and Sample

The analyses for this article used data from a randomized control trial of an adolescent dating violence prevention program called *Safe Dates*. All public schools with either eighth or ninth grades in one primarily rural county were randomly assigned to either treatment or control conditions. Wave 1 (Time 1 [T1]) data were collected when participants were in the fall semester of the eighth and ninth grades. Wave 2 (Time 2 [T2]) data were collected approximately 7 months later (1 month after program activities had terminated), and Wave 3 (Time 3 [T3]) data were collected 19 months after baseline. All data were collected in

schools via self-administered questionnaires. See Foshee et al.'s (1996) article for details on study design and data collection procedures.

Adolescents were eligible for the study if they were enrolled in the eighth or ninth grade in the public school system of one primarily rural county. Parental consent for completing questionnaires was obtained from 84% ($n = 2,045$) of the 2,434 eligible adolescents, and T1 questionnaires were completed by 96% ($n = 1,965$) of the adolescents whose parents gave consent. Approximately 90% ($n = 1,759$) of T1 participants completed T3 follow-up questionnaires. Of the 1,965 baseline participants, 49% ($n = 958$) were in the eighth grade, 50% ($n = 989$) were female, 22% ($n = 440$) reported that the highest level of education achieved by either their mother or father was high school or less, 73% ($n = 1,439$) were White, 18% ($n = 363$) were Black, and 8% ($n = 163$) were other race/ethnicity.

Measures

All measures were based on adolescent self-report. Measures of violence exposure and directly experiencing violence perpetrated by an adult were drawn from T1. Measures of the mediators (normative beliefs, responses to anger, and depression) were drawn from T1 and T2, and measures of DA were drawn from T1, T2, and T3. Mediator and outcome measures were log transformed to reduce skew and kurtosis. See Table 1 for descriptive statistics and a correlation matrix of study variables for females (above the diagonal) and males (below the diagonal).

Violence exposure. Witnessing interparental violence (IPV) was measured by one item asking, "How many times have you seen one of your parents hit the other parent?" Response options ranged from *never* (0) to *ten or more times* (3). *Hit by an adult* was assessed by the question, "How many times has an adult ever hit you with the purpose of hurting you?" Response options ranged from *never* (0) to *ten or more times* (3). Child abuse reporting requirements precluded asking about more severe child abuse or the specific relationship between the perpetrator(s) and child (Foshee, Linder, MacDougall, & Bangdiwala, 2001).

Mediators—We assessed three mediators of the relation between family violence and DA. *Normative beliefs* about DA were assessed with eight items that addressed the extent to which adolescents were accepting of physical DA under various circumstances (e.g., "It is OK for a boy/girl to hit their boy/girlfriend if he/she did something to make him/her mad."). Response options ranged from *strongly agree* (3) to *strongly disagree* (0). Items were averaged to create a composite measure (Foshee et al., 2001; Cronbach's $\alpha = .78$). *Anger dysregulation* was measured by asking adolescents, "During the last six months when you were angry with someone how often did you do the following things ...?" Five destructive responses to anger (e.g., "I made nasty comments about the person to others") were listed. Response options ranged from *never* (0) to *very often* (3). Items were averaged to construct a composite response-to-anger variable (Cronbach's $\alpha = .74$). *Depression* was assessed with five items from a scale developed by Kandel and Davies (1982). Adolescents indicated how often in the past 6 months they had felt bothered or troubled by things like feeling unhappy, sad, or depressed. Response options for each item ranged from *never* (0) to *all of the time* (4). Items were averaged to form a composite measure of depression (Cronbach's $\alpha = .87$).

Physical DA—Physical DA was measured with 10 items from the Safe Dates Dating Violence Perpetration scale (Foshee et al., 1996). Adolescents were asked, “How many times have you done the following things to a person that you have been on a date with? Only include when you did it to him/her first. In other words, don’t count it if you did it in self-defense.” Ten acts were listed (e.g., having “hit or slapped,” “bit,” or “tried to choke” a dating partner). Response options ranged from *never* (0) to *ten or more times* (3). Items were summed to create a composite perpetration score for each wave of data (average Cronbach’s $\alpha = .94$); at each wave, nondaters were given a score of 0 on this measure.

Analytic Approach and Model Specification

We tested the hypotheses via path analysis of lagged panel mediation models (Cole & Maxwell, 2003) using a model-building approach recommended by MacKinnon (2008) for multiple-mediator models. Specifically, we first estimated separate “simple” mediation models for each of the three mediators. As depicted in Figure 2, to reflect the hypothesized mediation processes, longitudinal pathways were estimated from the two violence exposure measures (witnessing IPV and having been hit by an adult) to the T2 measure of the mediator (paths a_{x1} and a_{x2} , respectively), from the T1 measure of the mediator (M) to DA (Y) assessed at T2 (path b_{T1}), and from the T2 measure of M to the T3 measure of DA (path b_{T2}). To address the potential for prior levels of the dependent variables (M and Y) to confound associations, the model further included autoregressive (AR) pathways between T1 and T2 measures of the mediator (AR_m), between T1 and T2 DA (AR_{yT1}), and between T2 and T3 DA (AR_{yT2}). In addition, direct pathways were estimated from the two T1 violence exposure measures to T2 and T3 DA (results not shown, for clarity), and covariances (depicted by the curved arrows) were allowed between all variables assessed at the same time point. Pathways were also estimated between dating status, treatment condition, and grade level (control variables) and T2 and T3 outcomes (results not shown for clarity). Finally, on the basis of model modification indices one additional AR pathway was estimated between T1 and T3 DA across all models (results not shown for clarity).

The presence of statistical mediation was determined via assessment of the indirect (mediated) effect of X on Y through M (MacKinnon & Fairchild, 2009; Preacher & Hayes, 2008). Following the recommendations of Cole and Maxwell (2003), we estimated two distinct indirect effects: (a) a half-longitudinal indirect effect (HLIE) and (b) a fully longitudinal indirect effect (FLIE), both of which appropriately address temporality between X and M and between M and Y. Specifically, for each model both HLIEs and FLIEs were calculated as follows: HLIEs were estimated as the product of the parameter estimate for path a (a_{x1} or a_{x2} , reflecting the effect of the T1 violence exposure indicator on the T2 mediator controlling for the T1 mediator score) with path b_{T1} (reflecting the effect of the T1 mediator on T2 DA controlling for the T1 DA score). FLIEs were calculated as the product of the parameter estimate for path a and path b_{T2} (reflecting the effect of the T2 mediator on T3 DA controlling for T2 DA). We calculated both HLIEs and FLIEs because the time lag between measures of the mediator (M) and DA (Y) for the first lag was shorter (7 months) than for the second lag (1 year). On the basis of previous research (Collins & Graham, 2002), we reasoned that it could be possible for a shorter interval to better capture the causal effect of the mediator on DA before it started to decay; estimating both HLIEs and FLIEs

enabled us to assess indirect effects across different M–Y lag intervals. Across all models, standard errors and bias-corrected bootstrapped confidence intervals (CIs) for indirect effects (HLIEs and FLIEs) were based on 5,000 bootstrap resamples. Bootstrapping, which is a nonparametric method of estimating standard errors and CIs, does not make assumptions about the sampling distribution of the indirect effect and provides more accurate Type I error rates and greater power for detecting indirect effects than other competing methods (Hayes, 2013; MacKinnon et al., 2004; Preacher & Hayes, 2008).

After assessing model fit and indirect effects within each single-mediator model, we estimated a multiple-mediator model that combined the single-mediator models to simultaneously include pathways from the violence exposure measures to all three mediators and from the mediators to DA. HLIEs and FLIEs were estimated for each mediator and represent the unique indirect effects of the violence exposure indicator on DA through a particular mediator conditional on the presence of other mediators in the model. Finally, we used a multiple-group approach to assess the potential for sex differences in the indirect effects in the multiple-mediator model. In the first multiple-group model, all structural parameters were free to vary by sex. Next, constraints on parameters were imposed in the following order: (1) a and b pathways (the indirect effects), (2) pathways from the violence exposure indicators to DA (direct effects), (3) autoregressive pathways, and (4) residual variances and covariances. We used a nested chi-square difference test to determine whether these constraints significantly affected model fit.

All models were estimated using Mplus Version 7.11 (Muthén & Muthén, 2012) and controlled for treatment condition, grade level, and dating status. We evaluated model fit with the Tucker–Lewis Index (TLI), the comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA). Models with a TLI and CFI of at least .95 and an RMSEA value of .05 or less were considered to have good fit (Hu & Bentler, 1999). Direct maximum-likelihood estimation was used to deal with missing data (Bollen & Curran, 2006).

RESULTS

Descriptive Statistics

Descriptive statistics are presented in Table 1. The proportion of adolescents who reported any physical DA ranged from 14% to 20%, and prevalence rates were higher for girls than for boys across all time points; at Wave 3, 25% of girls and 15% of boys reported engaging in any physical DA ($p < .001$). Witnessing IPV and having been hit by an adult were significantly correlated with each other ($r = .25, p < .001$, for girls; $r = .33, p < .001$, for boys), suggesting there is significant overlap in exposure to these two types of violence. Witnessing IPV and having been hit by an adult were significantly correlated with T1 and T2 measures of the mediators. Witnessing IPV was correlated with DA at T1 and T2, but not at T3; having been hit by an adult was correlated with DA at all three time points (see Table 1). Preliminary longitudinal models examining the total effects of T1 violence on T3 DA controlling for T1 DA suggested that having been hit by an adult ($b = .51, p = .04$) was longitudinally associated with T3 DA, but having witnessed IPV ($b = -.15, p = .56$) was not.

Model Results

Parameter estimates, bootstrapped standard errors, and 95% CIs for indirect effects for all models are presented in Table 2. Models 1, 2, and 3 correspond to the single-mediator models for norms, anger dysregulation, and depression, respectively. Model 4 corresponds to the multiple-mediator model.

Single-Mediator Models

Each single-mediator model fit the data very well; across all models, the CFI and TLI were greater than .95 and the RMSEA was less than .05. Contrary to the study hypotheses, having witnessed IPV was not found to indirectly influence DA through any of the proposed mediators; none of the HLIEs or FLIEs were statistically significant for witnessing IPV (see Table 2). In addition, findings from each model suggest that having witnessed IPV was not prospectively associated with norms ($p = .84$), anger dysregulation ($p = .80$), or depression ($p = .11$).

Consistent with expectations, the findings suggest that having been hit by an adult indirectly influenced DA through normative beliefs (HLIE = 0.04, 95% CI [0.01, 0.10], FLIE = 0.05, 95% CI [0.01, 0.13]) and anger dysregulation (HLIE = 0.05, 95% CI [0.02, 0.09], FLIE = 0.04, 95% CI [0.01, 0.08]); however, no evidence was found for indirect effects through depression (see Table 2). As expected, having been hit by an adult at T1 predicted increased acceptance of DA (i.e., normative beliefs; $p = .008$), anger dysregulation ($p < .001$), and depression ($p = .02$) at T2. In turn, both norms and anger dysregulation predicted DA across both lag one (path b_{T1} ; $p = 0.004$ for norms and $p < .001$ for anger dysregulation) and lag two (path b_{T2} ; $p = 0.003$ for norms and $p = .02$ for anger dysregulation). Contrary to expectations, depression was not prospectively associated with DA across either lag ($p = .14$ for Lag 1, $p = .70$ for Lag 2).

Multiple-Mediator Model

Model 4 (multiple mediators) also fit the data well (CFI = .98, TLI = .96, RMSEA = .04, 95% CI [.03, .04]). Results from this model are generally consistent with the single-mediator model findings reported above, although some parameter estimates became insignificant or were reduced to marginal significance (see Table 2). Specifically, consistent with the single-mediator model findings, witnessing IPV was not found to indirectly influence DA through any of the proposed mediators. Witnessing IPV was marginally predictive of depression ($p = .09$) but did not predict normative beliefs ($p = .62$) or responses to anger ($p = .89$).

Also consistent with single-mediator model findings was that having been hit by an adult was prospectively associated with normative beliefs ($p = .006$), anger dysregulation ($p < .001$), and depression ($p = .02$). Anger dysregulation ($p = .04$) and normative beliefs ($p = .03$) were significantly prospectively associated with DA across Lag 1 (path b_{T1}); Lag 1 effects for depression ($p = .07$) were marginally significant. Normative beliefs ($p = .007$), however, was the only mediator significantly associated with DA across Lag 2 (path b_{T2}); Lag 2 effects were marginally significant ($p = .096$) for anger dysregulation and not significant for depression ($p = .98$). Consistent with the study hypotheses, half-longitudinal indirect effects of having been hit by an adult on DA were statistically significant through all three

mediators; fully longitudinal indirect effects were significant through norms and marginally significant through anger dysregulation.

Multiple-Group Modeling of Sex Differences

Multiple-group modeling began with a model that allowed all structural parameters to vary for boys and girls. This unconstrained model fit the data well, $\chi^2(72) = 190.03$, CFI = .97, TLI = .95, RMSEA = .04, 95% CI [.03, .05]. We then constrained all a and b pathways to be equivalent for boys and girls and conducted a chi-square difference test to determine whether constraints led to a significant decrement in model fit. The chi-square difference test was not significant, $\chi^2(12) = 13.84$, $p = .31$, indicating that the strength of the indirect effects through each mediator did not differ for boys and girls. Constraints on direct pathways from the family violence indicators to DA at T1 and T2 also did not influence model fit, $\chi^2(4) = 1.37$, $p = .85$; however, constraints on AR pathways, $\chi^2(6) = 18.00$, $p = .006$, and residual variances (RVs), $\chi^2(5) = 180.32$, $p < .001$, were statistically significant. Subsequent post hoc testing of constraints on each individual AR pathway and RV suggested that AR pathways for depression, $\chi^2(1) = 7.43$, $p = .006$, and DA, $\chi^2(3) = 7.88$, $p = .048$, differed for boys and girls, and RVs for all variables differed for boys and girls ($p < .001$ for all RV constraints). Parameter estimates suggested that the AR pathways for depression and DA, which index the relative stability in these constructs over time, were stronger for girls than for boys. In addition, RVs (unexplained variance in the dependent variables) were larger for boys than for girls.

In the final multiple-group model, pathways that were found to be invariant per the tests described above, including all indirect effects of family violence exposure on DA through the proposed mediators, were constrained to be equivalent for males and females. Pathways that were found to differ by sex were allowed to vary across groups. This model fit the data well, $\chi^2(88) = 205.24$, CFI = .97, TLI = .96; RMSEA = .04, 95% CI [.03, .04]; parameter estimates and standard errors from this model are presented in Figure 3. Consistent with the single-group multiple-mediator model, no indirect effects were found for witnessing IPV. Also consistent with the single-group model, having been hit by an adult was found to have an indirect effect on DA through normative beliefs (HLIE = 0.041, 95% CI [0.006, 0.106]; FLIE = 0.034, 95% CI [0.003, 0.096]) and anger dysregulation (HLIE = 0.033, 95% CI [0.007, 0.069]; FLIE = 0.031, 95% CI [0.000, 0.076]), although the fully longitudinal indirect effect for anger dysregulation was only marginally significant; no half- or fully longitudinal indirect effects were found through depression (HLIE = 0.003, 95% CI [-0.017, 0.034]; FLIE = 0.005, 95% CI [-0.020, 0.036]).

DISCUSSION

To our knowledge, this is the first study to undertake an integrated theory-driven examination of multiple mediators of the relationship between direct and indirect violence exposure and DA using an analytic approach that establishes temporality between violence exposure and the proposed mediators and between the proposed mediators and adolescent DA. Consistent with expectations, findings from both single- and multiple-mediator models suggest that having been hit by an adult leads to increases in acceptance of DA, depression,

and anger dysregulation. In turn, acceptance of DA and anger dysregulation predicted DA perpetration, although linkages between anger dysregulation and DA across Lag 2 were marginally significant in the multiple-mediator model. Both FLIEs and HLIEs through normative beliefs and anger dysregulation were also statistically significant, although FLIEs through anger dysregulation were only marginally significant in the multiple-mediator models. Contrary to the study hypotheses, we found no evidence of indirect effects from witnessing IPV to DA through any of the proposed mediators, and we found little evidence of a prospective link between depression and DA. Finally, we found no evidence of sex differences in mediation pathways.

The results of the current study provide consistent evidence that normative beliefs mediate the prospective pathway between having directly experienced violence perpetrated by an adult and DA for boys and girls; both FLIEs and HLIEs through normative beliefs were statistically significant across all single- and multiple-mediator models. This finding is consistent with the predictions of social learning theory and social information-processing models (Bandura, 1973; Guerra, Huesmann, & Spindler, 2003; Huesmann, 1988) that suggest that directly experiencing violence can lead youth to encode social scripts emphasizing aggressive responses to conflict and view the use of aggression in social relationships as acceptable and useful for obtaining certain goals (e.g., respect). These normative beliefs serve a critical role in regulating behavior by establishing what types of behavior are and are not acceptable and under what circumstances (Huesmann, 1988); thus, when faced with relationship conflict, teens who view the use of aggression as acceptable may be more likely to use aggressive tactics against their romantic partners. In terms of prevention implications, this finding suggests that one promising approach for dating abuse programs targeting teens who have experienced family violence would be to focus on changing normative beliefs about DA. For example, interventions might use a cognitive restructuring approach designed to help youth think about the violence they have experienced from a new perspective, emphasize the nonnormative nature of DA and violence, and reinforce nonviolent relationship behaviors (Thompson & Trice-Black, 2012).

Having a more nuanced understanding of the specific types of norms responsible for the mediation and the conditions that may govern the mediation process would be useful for informing prevention efforts and family violence theory. For example, the current study focused exclusively on personal injunctive norms (i.e., beliefs about what is acceptable behavior); future research might also examine descriptive norms (e.g., beliefs about what others are doing) and/or social injunctive norms (e.g., beliefs about what others approve/disapprove of) as potential mediators (Henry et al., 2000). In addition, linkages among violence exposure, norms, and DA may depend on abuse-related characteristics as well as individual (e.g., internal resiliency factors, such as self-esteem) and contextual (e.g., peer support) factors (Herrenkohl et al., 2008). A promising avenue for future research will be to examine factors that may exacerbate or buffer the indirect effect of violence exposure on DA through normative beliefs.

Our results also suggest that anger dysregulation mediates relations between having been hit by an adult and adolescent DA, although fully longitudinal indirect effects became marginally significant in multiple-mediator models. Anger dysregulation may be more of a

proximal precursor to DA, and thus its effects were better captured by the shorter lag; as Collins and Graham (2002) noted, larger measurement intervals can make it difficult to detect linkages between dynamic variables such as anger dysregulation and DA that change over time with development (Reyes, Foshee, Bauer, & Ennett, 2011; Steinberg, 2008). In general, our findings are consistent with theoretical perspectives that suggest that violence exposure can interfere with the normative development of emotion regulation skills such as the ability to control responses to anger (Jouriles, McDonald, et al., 2012). An inability to control or inhibit maladaptive behavior when experiencing negative emotions such as anger may decrease the likelihood of adaptively managing conflict in romantic relationships and increase the risk for DA. Although continued research is needed, these results suggest that, in addition to addressing normative beliefs, programs for youth who have been directly exposed to family violence could include a focus on building skills related to the regulation of anger expression. Such programs typically aim to increase awareness of emotions and teach adaptive coping skills (e.g., Gratz, 2007).

Consistent with expectations, across all models we also found a link between having directly experienced violence perpetrated by an adult and depression; however, we did not find evidence of a significant prospective link between depression and physical DA across either Lag 1 or Lag 2. Longitudinal research on the link between depression and adolescent DA is scarce and inconsistent, with some studies suggesting there is an association only for girls (e.g., Foshee et al., 2010; McCloskey & Lichter, 2003) or only for boys (e.g., Boivin et al., 2012) and others finding no association for boys or girls (Foshee et al., 2001). Consistent with our findings, longitudinal studies that have examined young adults' intimate relationships have not found evidence that depressive symptoms mediate relations between family-of-origin experiences and relationship quality (Ehrensaft, Knous-Westfall, & Cohen, 2011; Johnson & Galambos, 2014). It may be that depression is generally more likely to lead to internalizing problems, such as suicidal behaviors, rather than externalizing behaviors, such as DA (Asgeirdottir et al., 2011). It may also be that depression is predictive of DA only among certain types of youth; for example, researchers have suggested that depression may be more likely to generate stress (and thereby lead to increased conflict and abuse) among individuals experiencing Axis I comorbidity and/or personality dysfunction (Harkness, Lumley, & Truss, 2008).

Contrary to the study hypotheses, we found no evidence that depression, normative beliefs, or anger dysregulation mediated the pathway from witnessing IPV to DA. In fact, in models that did not include the proposed mediators (results not shown), prospective associations between witnessing IPV and DA were reduced to nonsignificance once the measure of having been hit by an adult was controlled for. Given the significant correlations between the two family violence indicators, these results suggest that witnessing IPV did not add to the prediction of physical DA above and beyond the effect of having been hit by an adult (and thus there was no pathway between witnessing IPV and DA to be mediated). This finding is consistent with other research that has found that parent-to-child aggression (or harsh punishment) but not IPV exposure is predictive of DA (Brendgen et al., 2001; Lavoie et al., 2002; Simons et al., 1998). However, we note that the findings of studies that have examined the unique effects of child maltreatment relative to IPV exposure on developmental outcomes are very mixed (Herrenkohl et al., 2008). Moreover, our measure

of witnessing IPV was limited in that it was a one-item measure that assessed one type of physical violence (hitting), did not assess exposure to verbal IPV, and did not comprehensively assess the severity or chronicity of the IPV that was witnessed. Exposure to severe or chronic IPV may be more likely to have an effect on the mediation processes we examined. Thus, it is possible that measurement limitations constrained our ability to detect a pathway between witnessing IPV and DA.

Multiple-group testing did not find evidence of sex differences in the indirect effects examined in the current study. As noted above, evidence for sex differences in the indirect effects of family violence on DA has been mixed (Jouriles, McDonald, et al., 2012), and our findings were no exception. We acknowledge that large sample sizes are needed to have sufficient power to detect moderated mediation. Although we used methodological techniques with high power for detecting indirect effects, it is possible that we did not detect sex differences because of insufficient power, in particular given the complexity of the models we examined.

This study has several limitations that should be acknowledged, in addition to those noted above. First, although we addressed temporality and controlled for several confounders in our analysis, including prior levels of the dependent variables (M and Y), our ability to infer causal associations among the variables was limited by the fact that this was an observational rather than an experimental study. Second, adolescents who participated in this study were from a rural county; therefore, the findings may not be generalizable to other contexts. Third, all measures were based on adolescent self-report and thus potentially prone to social desirability bias. Fourth, most empirical and theoretical work examining associations between violence exposure and DA has focused on family violence. The current study was designed to build on this work; however, our measure of direct violence exposure (having been hit by an adult) was broader and may have captured experiences of being hit by nonfamily members. Finally, we note that in the current study we did not examine whether and/or how these mediating processes may work differently depending on relationship characteristics or patterns of relationship formation over time.

Despite these limitations, the current study has numerous strengths that provide a robust test of study hypotheses and lend credence to our findings. It is the first study to use three waves of data to rigorously examine mediation processes by means of methods that establish temporality across the mediation pathways. In addition, we examined both direct and indirect violence exposure indicators as well as multiple mediators simultaneously, allowing us to establish the unique indirect effects of each violence exposure on DA through each mediator, controlling for the other mediators being examined. Finally, we assessed sex differences in mediation pathways and used state-of-the-art methods (i.e., bootstrapping) to assess the significance of indirect effects.

Conclusion

We found that direct exposure to violence led to increased acceptance of DA and anger dysregulation, which in turn led to increased risk for adolescent DA perpetration. This research is timely and relevant given that youth who are exposed to family violence and engage in DA are likely to engage in these behaviors during adulthood, thereby potentially

exposing a new generation of youth to family violence (Ehrensaft & Cohen, 2012; H. K. Kim et al., 2009; Magdol et al., 1998). There have been recent calls for a greater understanding of the processes mediating the intergenerational transmission of partner violence that could inform family violence theory and interventions designed to interrupt this cycle (Jouriles, McDonald, et al., 2012). The results from this study point to the importance of examining both cognitive and emotional processes early in adolescence as potential mediators of family violence and DA relationships. More specifically, the findings suggest that normative beliefs about DA and anger dysregulation may be two modifiable and potent targets for prevention efforts aimed at youth who have been directly exposed to violence.

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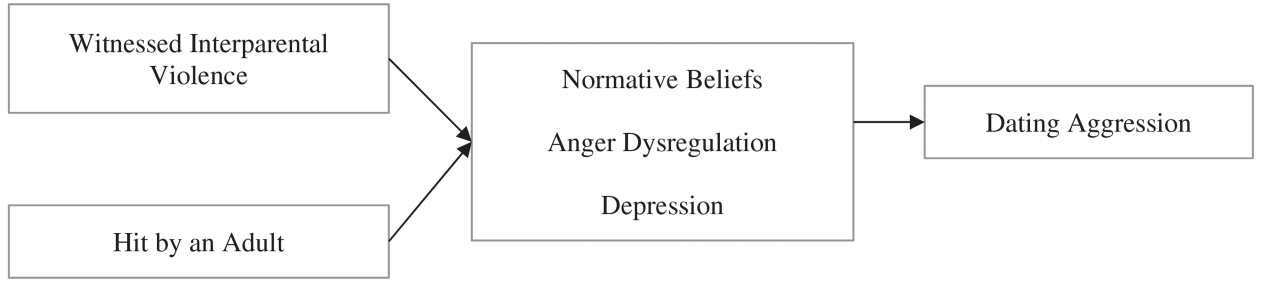


Figure 1.
Conceptual Model of Mediation Hypotheses.

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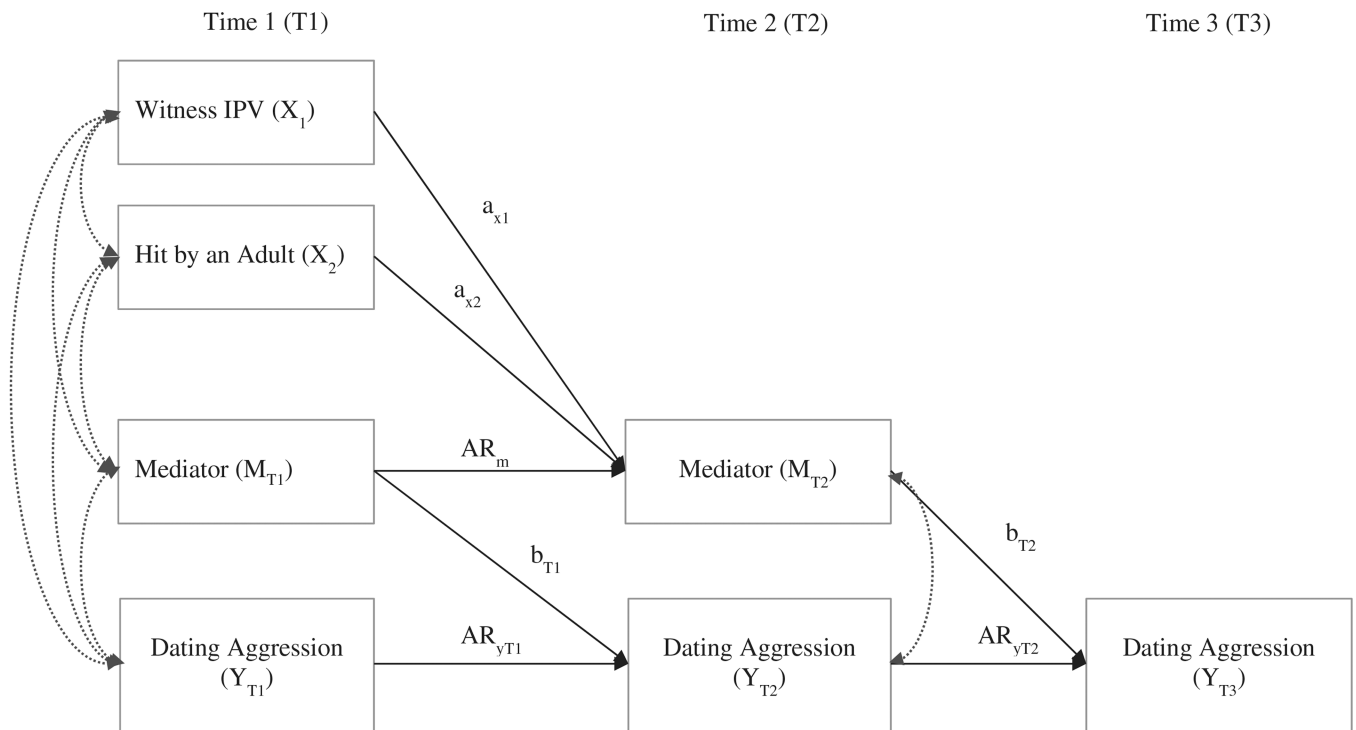


Figure 2.
Longitudinal Simple Mediation Model.

Note: For clarity, control variables and direct pathways from the family violence indicators (X_1 and X_2) to dating aggression (Y_{T2} and Y_{T3}) and from T1 dating aggression (Y_{T1}) to T3 dating aggression (Y_{T3}) are not depicted. IPV = interparental violence; AR =autoregressive pathway.

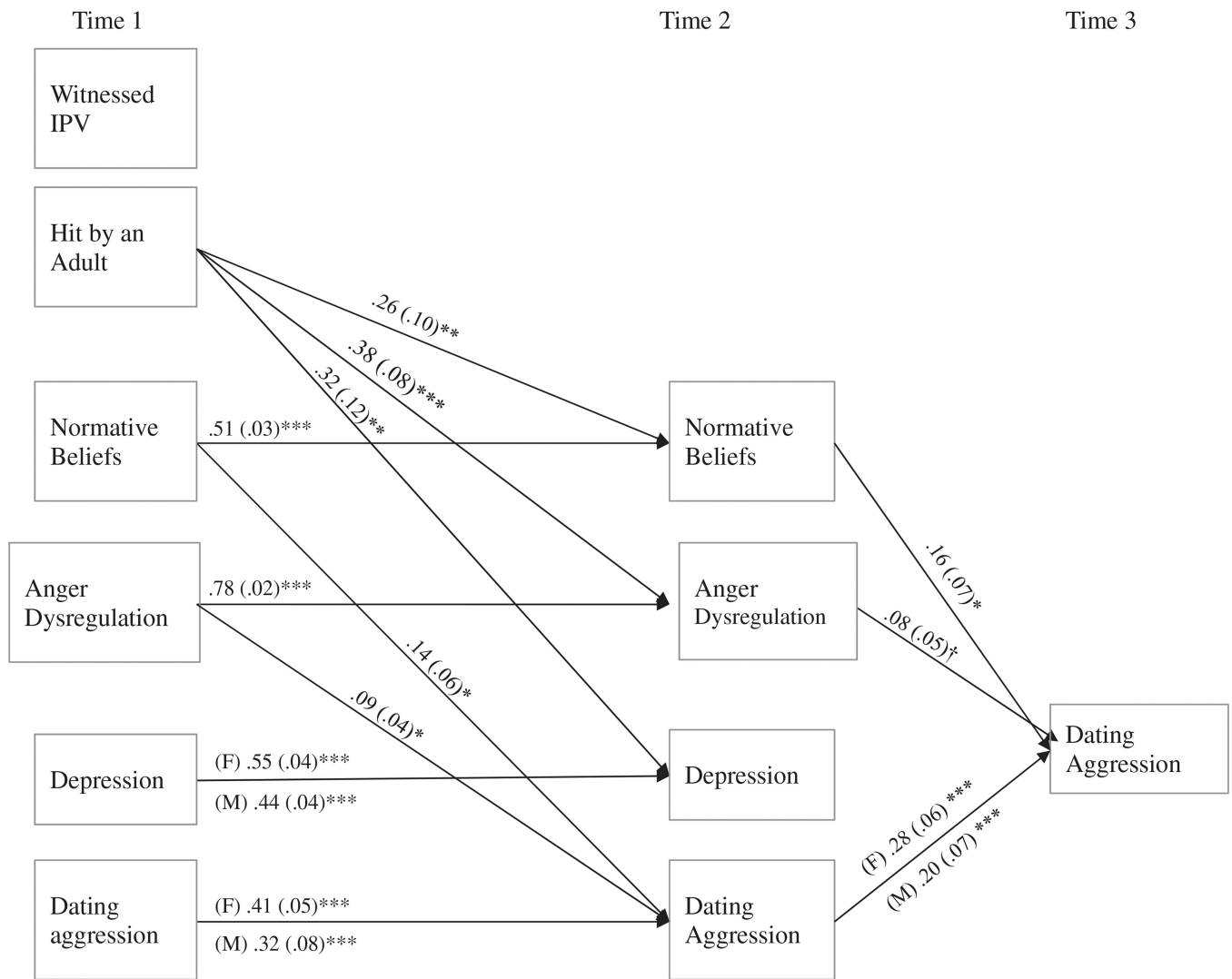


Figure 3. Longitudinal Multiple Mediation Model Predicting Dating Aggression ($n=1,965$).
Note: For clarity, control variables, covariances between variables measured at the same time point, and parameter estimates for pathways that were not statistically significant at $p < .10$ are not shown. Parameter estimates for pathways that were found to differ by sex are provided above and below pathway lines for females (F, $n = 989$) and males (M, $n = 976$) respectively. † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1

Correlation Matrix of Primary Study Variables ($n = 1,965$)

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Witnessing IPV	—	.25	.18	.13	.13	.11	.14	.13	.09	.09	.04
2. Hit by an adult	.33	—	.19	.17	.10	.06	.12	.24	.11	.07	.08
3. Depression (T1)	.13	.20	—	.25	.12	.18	.57	.25	.07	.14	.08
4. Anger dysregulation (T1)	.14	.16	.30	—	.23	.29	.26	.79	.20	.27	.22
5. Normative beliefs (T1)	.14	.13	.13	.35	—	.32	.08	.19	.50	.21	.14
6. Dating aggression (T1)	.16	.11	.15	.20	.19	—	.13	.23	.27	.47	.39
7. Depression (T2)	.11	.20	.44	.24	.13	.09	—	.29	.12	.20	.12
8. Anger dysregulation (T2)	.13	.15	.18	.73	.30	.14	.26	—	.25	.32	.22
9. Normative beliefs (T2)	.10	.14	.03	.21	.48	.18	.12	.33	—	.36	.16
10. Dating aggression (T2)	.11	.11	.10	.16	.16	.18	.08	.22	.36	—	.36
11. Dating aggression (T3)	.03	.08	.01	.10	.15	.19	.02	.08	.17	.12	—
<i>M</i>	1.32	1.35	1.73	0.81	0.53	0.67	1.65	0.85	0.49	0.71	1.21
<i>SD</i>	0.70	0.73	1.04	0.70	0.47	2.62	1.05	0.71	0.52	2.82	4.19
%	22	25			14				14	14	20

Note: Correlations for females ($n = 989$) and males ($n = 976$) are above and below the diagonal, respectively. Italicized correlations are statistically significant at $p < .05$. Means, standard deviations, and prevalences (%) are for the full sample. IPV = interparental violence; T1 = Time 1; T2 = Time 2; T3 = Time 3.

Table 2

Unstandardized Path Coefficients, Bootstrapped Standard Errors (in Parentheses), Indirect Effects, and 95% Bias-Corrected Bootstrapped Confidence Intervals (in Brackets) From Mediation Models of Relations Between Family Violence and Physical Dating Aggression ($n = 1,965$)

	Path				Indirect effect	
	a	b ₁	b ₂	HLIE a × b ₁ [95% CI]	FLIE a × b ₂ [95% CI]	
Model 1						
Witness IPV	.02 (.11)	.15 (.05)*	.21 (.07)**	.003 [−.030, .040]	.005 [−.041, .054]	
Hit by an adult	.26 (.10)**			.036 [.01, .097]**	.043 [.012, .130]**	
Model 2						
Witness IPV	−.02 (.08)	.14 (.04)***	.11 (.05)*	−.003 [−.028, .020]	−.002 [−.025, .017]	
Hit by an adult	.34 (.08)***			.047 [.021, .090]**	.039 [.009, .084]*	
Model 3						
Witness IPV	.22 (.14)	.05 (.03)	.02 (.04)	.011 [−.003, .045]	.003 [−.013, .034]	
Hit by an adult	.30 (.13)*			.015 [−.002, .050]	.009 [−.018, .036]	
Model 4						
Witness IPV	.05 (.11)	.12 (.05)*	.19 (.07)**	.006 [−.016, .043]	.010 [−.027, .059]	
Hit by an adult	.26 (.10)**			.031 [.005, .084]*	.049 [.010, .121]**	
Witness IPV	−.01 (.08)	.08 (.04)*	.08 (.05) [†]	−.001 [−.018, .012]	−.001 [−.019, .013]	
Hit by an adult	.36 (.08)***			.027 [.004, .062] [†]	.028 [−.002, .071] [†]	
Witness IPV	.23 (.14) [†]	.06 (.03) [†]	.001 (.04)	.014 [−.001, .050]	.000 [−.022, .024]	
Hit by an adult	.31 (.13)*			.001 [.019, .054]*	.000 [−.028, .029]	

Note: Models 1, 2, and 3 include a single mediator (denoted in the second column of the table) variable. Model 4 includes all three mediators. Path a is from family violence indicator X at Time 1 (XT1) to mediator M at Time 2 (MT2). Path b₁ is from time one mediator (MT1) to dating aggression at time 2 (YT2). Path b₂ is from MT2 to YT3. HLIE = half-longitudinal indirect effect; FLIE = fully longitudinal indirect effect; IPV = interparental violence.

[†] $p < .10$.
 * $p < .05$.
 ** $p < .01$.
 *** $p < .001$.