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Parental punishment and peer victimization as developmental precursors to physical dating violence involvement among girls

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Abstract

The current study examined harsh punishment and peer victimization as developmental precursors to girls' involvement in physical dating violence (PDV), and the putative mediating effect of rejection sensitivity. The sample comprised 475 African American and European American participants of the longitudinal Pittsburgh Girls Study who were dating at age 17. About 10% of girls reported significant perpetration and/or victimization of physical aggression in the relationship. Results showed that initial level and escalation in harsh punishment (between 10–13 years) and escalation in peer victimization (10–15 years) predicted PDV involvement, but this relationship was not mediated by rejection sensitivity. The results highlight the need to consider the impact of early experience of different forms of aggression on girls' risk for PDV involvement.

Keywords

Teen physical dating violence; females; parenting; rejection sensitivity

Teen dating violence is a significant public health concern with wide-ranging and potentially serious mental health consequences for both victims and perpetrators (e.g. Bossarte, Simon & Swahn, 2008; Brown et al., 2009; Rothman, Johnson, Azrael, Hall & Weinberg, 2010). Most research shows that female and male adolescents experience similar rates of dating violence victimization and perpetration (Ackard & Neumark-Sztainer, 2002; Schnurr & Lohman, 2008; Sears, Byers, & Price, 2007). However, there is evidence for gender differences in severity and types of violence (e.g. Capaldi & Owen, 2001), and a greater vulnerability among females for adverse physical and emotional consequences (Berzenski & Yates, 2010; Cleveland, Herrera, & Stuewig, 2003; Sears & Byers, 2010). There are also gender differences in rates of assortative mating such that girls who perpetrate physical aggression are more likely to be intimately involved with aggressive males than vice versa (Krueger, Moffitt, Caspi, Bleske, & Silva, 1998; Quinton, Pickles, Maughan, & Rutter, 1993), a factor which is likely to increase risk for tolerating and perpetuating dating violence (Campbell, 1993; Steffensmeier & Allan, 1996). Although some studies have reported gender differences in putative mechanisms for perpetration (e.g. Banyard, Cross, & Modecki, 2006; Foshee, Linder, MacDougall, & Bangdiwala, 2001) and victimization (e.g.

O'Keefe & Treister, 1998), there remains a dearth of longitudinal studies of adolescent dating violence, particularly for girls (Williams, Ghandour, & Kub, 2010). This is of particular concern given recent data showing that prevention programs may be less effective for females than males (Wolfe et al., 2009). The current study aims to identify female-specific risk factors early in development to begin to address this gap in knowledge and to better inform appropriate targets for intervention and prevention programs.

Dating violence that is characterized by the use and experience of physical aggression, though less common than psychologically aggressive forms (Smith, Thornton, DeVellis, Earp & Coker, 2002; Teten, Ball, Valle, Noonan & Rosenbluth, 2009), is of clinical concern because it frequently escalates from other types of aggression (World Health Organization, 1998), and is more likely than psychological aggression to be bi-directional (e.g., Graham-Kevan & Archer 2003; Johnson 2006; O'Leary, Slep, Avery-Leaf & Cascardi, 2008); a characteristic which is associated with greater severity and higher rates of injury (Gray & Foshee, 1997; Swahn, Alemdar & Whitaker, 2010). Use and experience of physical aggression has also been shown to have *both* emotional and physical consequences for females (Kimmel, 2002; Taft, Hegarty & Flood, 2001). However, there remains substantial variation across studies in the nature and subtypes of physical dating violence (PDV) assessed, and in measurement methodology, making it difficult to generalize across samples (Foshee, Bauman, Linder, Rice, & Wilcher, 2007; Ismail, Berman, & Ward-Griffin, 2007; Teten et al., 2009). For example, although the prevalence of physical victimization among adolescent girls is commonly cited as being around 10% (Centers for Disease Control and Prevention, 2011), rates as high as 57% have been reported (see review by Hickman, Jaycox, & Aronoff, 2004). Female perpetration of PDV is also commonly reported in adolescent and college samples (Archer, 2000; Gomez, 2011; Straus, 2004, 2008), with rates of around 30% (Hickman et al., 2004), but national prevalence rates are not available (Mulford & Giordano, 2008). Furthermore, despite evidence that mutually-violent relationships are common among adolescents (Gray & Foshee, 1997; Malik, Sorenson, & Aneshensel, 1997; Moffitt, Caspi, Rutter & Silva, 2001), research to date has largely focused on victims *or* perpetrators of dating violence rather than any potential overlap between these two groups (Chiodo et al., 2011).

Several theoretical frameworks postulate that children's experience of aggressive or violent behavior increases the risk for later involvement in violence, either as perpetrators or victims, or both (e.g. Heyman & Slep, 2002). According to Social Learning Theory, parents and peers may foster aggressive behavior through modeling and reinforcement processes (Bandura, 1973). Children who experience harsh parenting or aggression in their peer relationships learn that violence is normal, acceptable and useful as a means of expressing feelings, releasing tension and exerting control over others. Parent and peer behaviors may also reinforce aggressive behaviors by submitting to the aggression, and/or rewarding such behavior. Empirical research consistently supports an association between exposure to violence and adolescent aggression and behavior problems generally (Akers & Jennings, 2009; Ireland & Smith, 2009; Malik et al., 1997). More specifically, studies have shown that punitive parenting practices, including verbal and emotional abuse and corporal punishment, negatively impact self-regulation and interpersonal skills, as well as acceptance by normative peers, and expectations of others in close relationships (Connolly & Goldberg, 1999; Dodge, Bates, & Pettit, 1990; Ehrensaft et al., 2003). Furthermore, experiencing harsh parenting has demonstrated links with continuity in both victim *and* perpetrator roles in relationship patterns (Wolfe, Wekerle, Reitzel-Jaffe, & Lefebvre, 1998).

Prospective studies of males have shown that adolescents' experience of hostile parenting and harsh punishment predate perpetration of PDV (Brendgen, Vitaro, Tremblay, & Wanner, 2002; Capaldi & Clark, 1998). However, one of the few prospective studies

reporting on PDV perpetration by female adolescents did not find a relationship between experiencing parental violence and subsequent dating violence perpetration (Foshee et al., 2001). Although evidence indicates that individuals often experience victimization across multiple relationship domains (Hamby, Finkelhor, & Turner, 2012; Kazdin, 2011; Malik et al., 1997), longitudinal research testing the putative link between peer victimization and later involvement in physical dating violence is lacking for both females and males. Nevertheless, data from cross-sectional studies show that dating violence victimization is associated with bullying victimization in middle and high school students (Espelage & Holt, 2007) and with polyvictimization (Hamby et al., 2012). These findings suggest that further, prospective, examination across victimization experiences is warranted.

There are several possible pathways through which parental and peer victimization may heighten the likelihood of PDV perpetration. The Rejection Sensitivity model posits that repeated rejection and victimization by parents and peers causes youth to become hypersensitive to rejection cues in social contexts (Downey, Bonica, & Rincon, 1999) triggering intense emotional and behavioral responses and maladaptive interpersonal strategies such as aggression, hostility, coercion and withdrawal. Empirical work has supported this link, showing that hostility from parents and peers is associated with high levels of rejection sensitivity, which is related to dating violence perpetration by college-aged males and females (Downey, Feldman, & Ayduk, 2000; Downey, Irwin, Ramsay, & Ayduk, 2004).

Only a few studies have reported on the relationship between rejection sensitivity and dating violence involvement in adolescent females and results have been mixed. In a cross-sectional study of 176 racially diverse youth in Grades 6 through 12, Volz & Kerig (2010) showed that rejection sensitivity was modestly associated with dating violence perpetration (but not victimization) for girls only, although this significant association did not hold in a multivariate model. In contrast, Galliher & Bentley (2010) reported no concurrent association between rejection sensitivity and adolescent girls' reports of aggression perpetration in a rural sample of 92 dating couples. Finally, in a prospective study of young adolescent females, Purdie & Downey (2000) examined the role played by sensitivity to rejection from peers and teachers on romantic relationship quality one year later. Measures of rejection sensitivity were administered to 154 minority, economically disadvantaged girls in Grades 6, 7, or 8. The results showed that rejection sensitivity prospectively predicted higher rates of girl-perpetrated physical aggression during romantic conflicts.

Although theoretically indicated, the mediating effects of rejection sensitivity on the relationship between parental punishment or peer victimization and female involvement in PDV remain unknown. One prospective study of 336 boys however, provides some support for this relationship. Brendgen et al (2002) reported that both parent-to-child aggression and peer rejection at age 12 were associated concurrently with heightened rejection sensitivity, which in turn increased the risk for physical violence towards their romantic partner (but not more general delinquency-related violence) at ages 16 and 17.

Data from adult samples have shown that intimate partner violence tends to be more prevalent in lower socioeconomic strata (SES; Breiding, Black & Ryan, 2008; Sorenson, Upchurch, & Shen, 1996), and that low SES women are more vulnerable to the negative sequelae of partner violence compared with their higher SES counterparts (e.g. Sullivan & Rumpitz, 1994). Differential risk by SES in adolescent samples is less clear, with some studies showing greater risk for dating violence victimization (Halpern, Oslak, Young, Martin & Kupper, 2001; O'Keefe, 1998), and others finding no relationship (e.g. Foshee, Benefield, Ennett, Bauman & Suchindran, 2004). There have also been inconsistent reports of race differences in PDV victimization and perpetration. Thus, Catalano (2006) reported

that African American teenage girls were at higher risk for PDV victimization compared with European American girls, whereas the opposite finding has also been reported (O'Keefe & Treister, 1998). In contrast, data from several studies have shown higher rates of PDV perpetration among African American than European American adolescents (Malik et al., 1997; O'Keefe, 1997). Other research has shown an association between PDV and a family history of divorce, separation or absence of a parental figure (Foster, Hagan & Brooks-Gunn, 2004; O'Keeffe, Brockopp, & Chew, 1986). Finally, evidence suggests that behavior problems are closely related to aggressive behavior in dating relationships (e.g. Foshee et al., 2001; Kim & Capaldi, 2004), indicating the need to control for this construct in prospective analyses.

The current study adopts a developmental framework to examine whether parental punishment and peer victimization in early adolescence increase the risk of subsequent PDV involvement in females and whether this relationship is mediated by rejection sensitivity. Our approach is guided by evidence from developmental studies showing that contextual risk factors, such as harsh parenting, change as the child ages (e.g. Sagrestano, McCormick, Paikoff, & Holmbeck, 1999; Straus & Stewart, 1999), and that girls' problem behaviors influence these changes (Hipwell et al., 2008). The study uses multiple waves of data to test the hypothesis that escalating levels of harsh punishment and peer victimization between ages 10–15 years serve as developmental precursors to girls' PDV involvement at age 17, after controlling for sociodemographic variables (i.e. single parent family, household poverty, minority race) and severity of conduct problems at age 10. We hypothesize that these associations will be mediated by rejection sensitivity at age 16. In addition, we hypothesize that, after accounting for their shared variance, growth in harsh punishment and peer victimization will each show unique prediction to adolescent PDV.

Method

Sample Description

Participants in the current sample were drawn from the Pittsburgh Girls Study (PGS); a prospective study of the development of conduct disorder, depression and substance use assessed annually from mid-childhood onwards. The PGS sample (N=2,451) comprises four cohorts; aged 5, 6, 7 and 8 in assessment wave 1. Participants were identified by a stratified sampling of households in the City of Pittsburgh. In this process, all households in the poorest third of city neighborhoods, and 50% of the households in the remaining neighborhoods were sampled (see Hipwell et al., 2002; Keenan et al., 2010 for details).

The current analyses use eight waves of prospective data collected from girls in the two oldest cohorts who reported dating at age 17. Thus, the data spanned the developmental period from age 10 to 17 (assessment waves 3–10 for cohort 8, and waves 4–11 for cohort 7). At age 17, 475 girls (38.5% of the girls interviewed) reported that they had dated in the past year, and were therefore included in the analyses.

Retention of the original sample was high: 84.6% of cohort 8 was retained in wave 10 and 85.8% of cohort 7 was retained in wave 11. Attrition analyses revealed that girls who did not complete the study interview at age 17 were more likely to be European American girls (18.8% vs 11.9% of minority race girls, $\chi^2[1]=11.19, p<.01$) and to report lower levels of harsh punishment at age 10 ($F[1,1164]=8.92, p<.01$) than girls who were interviewed at age 17. There were no differences in age 17 participation according to proportion living in household poverty (defined as receipt of public assistance such as food stamps or participation in the Women, Infants, and Children Program), living in a single-parent family, and severity of conduct problems or peer victimization. None of the study variables differed according to whether or not the girl was in a dating relationship at age 17.

By caregiver report, 40.2% girls were identified as European American, 54.2% as African American, 5% as African American together with another race and .6% as Asian American. For the current analyses, a variable was created to contrast minority racial status from European American race. At age 10, 176 girls (37.1%) were living in poverty, and approximately 50% lived in a single parent family.

Procedure

Separate in-home interviews with the girl and primary caregiver were conducted annually by trained interviewers using a laptop computer. The average length of the home visit was between 3 and 4 hours. All study procedures were approved by the University of Pittsburgh Institutional Review Board. The girl and caregiver were each compensated approximately \$15 per hour for their participation.

Measures

Sociodemographic data were collected via parent report using a format developed for the Pittsburgh Youth Study (Loeber, Farrington, Stouthamer-Loeber & Van Kammen, 1998). The data were reduced to the following binary variables: race (0=European American, 1=Minority race), household poverty (0= no public assistance, 1= receipt of public assistance), and household structure (0=dual parent, 1= single parent household).

Teenage physical dating violence was assessed by girl report using the revised Conflict Tactics Scale (CTS2, Straus, Hamby, Boney-McCoy, & Sugarman, 1996) at age 17. The measure assesses the prevalence and frequency of different tactics used during partner conflict that range from discussing issues calmly to using a weapon to inflict physical harm. The current study used 16 items reflecting aggression perpetration and victimization derived from two subscales: minor physical assault, and minor or severe injury. Items (e.g. 'My partner twisted my arm', 'I passed out from being hit on the head by my partner') were rated on 7-point scales (1=*never* to 7 = *more than 20 times*). Due to the low base rate and high positive skew of these items, each was reduced to a binary score (0 = *absent* and 1 = *present*). Girls reporting that they had had multiple partners in the past year were asked to report on the frequency of each behavior, in general. The CTS2 has been widely used and has good psychometric properties (Archer, 1999; Straus et al., 1996). In the current study, the internal consistency coefficient was $\alpha=.80$.

Harsh punishment was assessed using girls' reports on six items from the Conflict Tactics Scale: Parent-child version (CTSPC, Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). Because some girls had only one caregiver, only items relating to the primary caregiver were used. Items (e.g. 'In the past year, if you did something that you are not allowed to do or something that your parent didn't like, how often did he/she shout, yell, or scream at you?') were scored using a 3-point answer format (1= *never*, 2 = *sometimes* and 3 = *often*). Straus et al. (1998) reported adequate discriminant and construct validity for the psychological aggression subscale. The five items from this subscale were combined with a single item on physical aggression to generate a construct of harsh punishment. In the current sample, the internal consistency of this score was good (Cronbach's α ranged from .72 at age 11 to .78 at age 15).

Peer Victimization was assessed using the nine-item 'victimization of self' subscale of the Peer Experiences Scale (Vernberg, Jacobs, & Hershberger, 1999). Girls responded to the frequency of victimization during the past three months (e.g. 'A student hit, kicked or pushed me in a mean way') on 5-point rating scales (0=*never* to 4= *a few times a week*). Good reliability and concurrent validity have been reported for the scale (Vernberg et al.,

1999). In the current sample, the internal consistency of the subscale ranged from $\alpha=.77$ at age 14, to $\alpha=.90$ at age 10.

Rejection sensitivity was assessed using the Rejection Sensitivity Questionnaire (RSQ, Downey & Feldman, 1996) administered to all girls from age 16 years. The RSQ assesses anxious expectations for rejection by significant others via the presentation of nine hypothetical interpersonal interactions in which rejection by a significant other is possible (e.g. 'You call a friend when there is something on your mind that you feel you really need to talk about'). Participants rated the degree to which they felt anxiety about the outcome of each situation (1=*very unconcerned* to 6=*very concerned*), as well as the expected likelihood of rejection (1=*very unlikely* to 6=*very likely*). Scores were calculated by first multiplying the expected likelihood of rejection for each situation by the degree of anxiety, and then averaging these weighted scores across the nine situations. Previous studies (e.g., Downey & Feldman, 1996) have demonstrated good convergent and discriminant validity of the measure. In the current study, Cronbach's alpha was .92 for concern, .93 for expected rejection, and .84 for the combined construct.

Conduct problems were assessed at age 10 using parents' report on the Child Symptom Inventory (CSI-4, Gadow & Sprafkin, 1994). The CSI-4 is a DSM-IV (American Psychiatric Association, 1994) based checklist that assesses the severity of 13 clinical symptoms of Conduct Disorder (e.g., started physical fights, bullied, threatened or intimidated others). The items were scored on 4-point scales (1=never to 4=very often). The CSI-4 has demonstrated good sensitivity and specificity in distinguishing youth with clinical diagnoses from healthy controls (Gadow & Sprafkin, 1994). The internal consistency of the 13 items was .78 in the current sample.

Data Analytic Plan

Given inconsistencies in the literature about the parameters and measurement of PDV involvement, with some studies suggesting individuals should be classified as either victims or perpetrators and others suggesting individuals move more fluidly between these categories, the current study adopted an empirical approach to defining the dependent variable. Thus, two sets of Latent Class Analyses (LCA) were conducted using the robust maximum likelihood estimator in Mplus 6.0 (Muthén & Muthén, 2010). One set comprised PDV items in which the girls reported on victimization, and the other set focused on girls' reports of perpetration. The criteria used to determine the best fitting solutions for LCA were low BIC and AIC and high entropy (>.90). The extent of overlap in class membership in the two LCAs was used to determine the perpetrator and/or victim categories of the dependent variable.

The magnitude of associations among all the study variables was first examined using Spearman's *rho* coefficients. Separate latent growth curve models (LGCMs) were then used to characterize change in girls' experience of harsh punishment (HP) and peer victimization (PV) between ages 10–15 years. The models were estimated using the robust maximum likelihood estimator in Mplus 6.0 (Muthén & Muthén, 2010). Missing data on the dependent variables were handled using the expectation maximization algorithm. Model fit was evaluated using the χ^2 goodness of fit test, comparative fit index (CFI), Tucker-Lewis index (TLI), and root-mean-square error of approximation (RMSEA). For CFI and TLI, we used the conventional cutoff .90 for acceptable fit, and .95 for good fit. RMSEA values between .05 – .08 represent acceptable fit, whereas values < .05 indicated good fit (McDonald & Ho, 2002).

We first estimated an unconditional LGCM for each of HP and PV. Time points were fixed incrementally to reflect the annual assessment schedule (i.e., age 10 fixed at 0, age 11 fixed

at 1, through to age 15 fixed at 5). We compared the fit of a linear model, a quadratic model, and a piecewise linear model. For the piecewise linear model, we examined whether the best 'joint' to connect the two pieces of growth occurred at age 12 or 13 years (Bollen & Curran, 2006). These ages were the only possible joints in this model as three time points are needed to estimate a slope factor. Since these models were not nested, we compared fit by examining the match between the model estimated growth and the observed score means at each age (c.f. Hussong, Flora, Curran, Chassin, & Zucker, 2008). To determine the best solution, we also compared the mean of absolute difference between the model estimated growth and the observed means of scores at each age. We expected that the intercept and slope variance, and slope mean parameters would be significant, indicating variability around age 10 HP or PV and change over time. We then tested the fit of the models conditioned on race, household poverty, single parent family, and conduct problems assessed at age 10 (also accounting for the correlations between the covariates). Physical dating violence at age 17 was then regressed on the latent variable growth factors and the age 10 covariates.

Next, we examined whether rejection sensitivity mediated the relationship between the conditioned growth models of HP or PV and subsequent PDV. Mediation effects were tested regardless of whether there were significant direct effects between HP or PV trajectories and PDV, given that the requirement of a direct effect prior to testing for mediation has been shown to significantly reduce statistical power to detect an effect (Shrout & Bolger, 2002).

In the final step, a conditional dual latent growth model of both HP and PV on PDV was tested. In this model, physical dating violence at age 17 was regressed simultaneously on both latent variable growth factors of HP and PV and the age 10 covariates.

Results

Descriptive Statistics

Examination of one to three LCA class solutions revealed that a two-class solution provided the best model fit for both victimization (BIC = 817.8, AIC = 746.9, Entropy = .97) and perpetration (BIC = 998.0, AIC = 927.2, Entropy = .92). The two sets of clusters of girls' involvement in violence with their romantic partner reflected 'none to minimal' vs. 'significant use or experience of physical assault or injury'. The rate and type of endorsement of perpetration and victimization in the first cluster was low and mild. For example, fewer than 10% of girls in this cluster reported grabbing a partner's arm and slightly more than 10% reported having had their arms grabbed. In contrast, the rate and severity of perpetration in the 'significant' group ranged from 81.3% for grabbing a partner's arm to 2.2% for breaking a partner's bone and/or partner passed out. In the 'significant' victimization group, all girls reported having had their arms grabbed and 4.6% reported having a broken bone and/or passing out.

The association between the perpetration and victimization clusters was highly significant ($\chi^2[1] = 137.82, p < .001$) with 90.3% of girls (N=429) falling into both 'none to minimal' clusters. Of the remaining 9.7%, 17 girls (37%) fell into both victim and perpetrator clusters, 24 (52.2%) fell into the perpetrator but not victim cluster, and 5 (10.9%) fell into the victim but not perpetrator cluster. Given the similarity of cluster structure and the high degree of overlap between them, girls were designated into one of two clusters: none to minimal probability of PDV involvement (90.3%, N=429), the other with significant probability of PDV perpetration, or victimization, or both (9.7%, N=46).

Descriptive statistics for the study variables are shown in Table 1. As shown in Table 2, there were moderate associations among poverty, minority race and living in a single parent

household. Significant but modest correlations were also revealed between PDV and minority race, living in a single parent family, harsh punishment and peer victimization at age 10.

Unconditional latent growth curve models: Harsh Punishment

We fit a series of unconditional LGCMs to determine the optimal form of growth across age 10–15 years for harsh punishment (HP) scores. The piecewise growth model with age 13 as the joint time point provided the best model fit, while providing a parsimonious interpretation ($\chi^2[12] = 21.34, p < .05$; CFI = .986, TLI = .983 and RMSEA = .040). The LGCM had a significant mean slope for 10 to 13 years, $\beta = .12, z = 3.19, p < .001$, implying significant growth in level of harsh punishment across ages 10–13. In contrast, the slope between 13–15 years was non-significant, $\beta = .05, z = 0.88, p = .38$. The variances for the intercept, slope for age 10 to 13 years, and slope for age 13 to 15 years were $D_i = 2.86, z = 7.74, p < .001, \beta = 0.26, z = 4.07, p < .001$ and $\beta = 0.49, z = 3.27, p < .01$ respectively, indicating substantial variation across girls in both initial level and trajectory of HP across age 10 to 15 years. Initial level of harsh punishment was significantly negatively associated with the slope for age 10 to 13 years ($\beta = -0.28, z = -2.24, p < .05$), and the slope of age 13 to 15 years ($\beta = -0.27, z = -2.05, p < .05$). The slopes were not significantly correlated.

Effect of the conditioned models on PDV at age 17, controlling for race, conduct problems, single parent and poverty, with the mediator rejection sensitivity

In order to examine the effect of the conditional models on PDV at age 17 (controlling for race, conduct problems, race, poverty and single parent family at age 10), the dependent variable was regressed onto the latent variable and the covariates. Standard indicators showed that the model continued to fit the data well: $\chi^2[27] = 34.77, p = .14$; CFI = .992, TLI = .984 and RMSEA = .025. The severity of girls' conduct problems at age 10 was associated with higher initial level of HP ($\beta = .21, p < .001$). Minority race was also associated with higher initial level of HP ($\beta = 0.29, p < .001$), whereas single parent family and poverty at age 10 were unrelated to HP at age 10. Single parent household was significantly associated with the slope in HP between 10 to 13 years ($\beta = 0.26, p < .01$) but not between 13 to 15 years. None of the other covariates was significantly associated with either slope of HP.

More severe initial HP at age 10 significantly predicted a greater likelihood of PDV at age 17 ($\beta = 0.32, p < .001$). Furthermore, a more rapid increase in harsh punishment from ages 10–13 was associated with PDV at age 17 ($\beta = 0.27, p < .05$), while the slope for age 13–15 years was not significantly associated with PDV involvement. None of the covariates demonstrated unique prediction of PDV.

When rejection sensitivity at age 16 was added to the model as a putative mediator, standard indicators showed that the model continued to fit the data well: $\chi^2[30] = 39.62, p = .11$; CFI = .991; TLI = .980; and RMSEA = .026. Both the initial levels of HP at age 10 ($\beta = 0.19, p < .01$) and the slope of HP between ages 13 to 15 years ($\beta = 0.22, p < .01$) were significantly associated with rejection sensitivity at age 16, such that higher initial levels of HP and a more rapid increase in HP in mid-adolescence were each associated with higher levels of rejection sensitivity. In contrast, the slope in HP between ages 10–13 years was not significantly associated with age 16 rejection sensitivity. The results showed no predictive relationship between rejection sensitivity and PDV in the following year ($\beta = -.04, p > .05$). In addition, rejection sensitivity did not mediate the associations between the latent growth factors of harsh punishment and PDV. In the full model, the initial levels of HP at age 10 ($\beta = 0.33, p < .001$) and the slope of harsh punishment between ages 10 to 13 years ($\beta = 0.27, p < .05$) remained significantly associated with PDV, while the slope for age 13 to 15 years was still not related to PDV (see Figure 1).

Unconditional latent growth curve models: Peer Victimization

A series of unconditional LGCMs were also fit to determine the optimal form of growth across ages 10–15 years for peer victimization scores. In this case, the linear model fit the data well: $\chi^2[16] = 32.571$, $p = .008$; CFI = .952, TLI = .955 and RMSEA = .047 and convergence problems resulted when testing quadratic and piecewise linear growth models. The LGCM had a significant negative mean slope, $Ms = -0.39$, $z = -7.87$, $p < .001$, suggesting a steady decrease in PV level between ages 10 to 15 years. The variances for the intercept and slope were $Di = 19.83$, $z = 6.62$, $p < .001$ and $Ds = 0.77$, $z = 6.19$, $p < .01$ respectively, indicating substantial variation across girls in both initial level of PV and trajectory of PV across age 10 to 15 years. Initial levels of PV were negatively associated with the rate of decrease in peer victimization across age 10 to 15 years ($\beta = -3.27$, $z = -5.68$, $p < .001$).

Effect of the conditioned models on physical dating violence at age 17, controlling for race, conduct problems, single parenthood and poverty, with the mediator rejection sensitivity

In order to examine the unique effect of PV across age 10 to age 15 on PDV, PDV was first regressed on the latent growth factors of PV and covariates. Standard indicators showed an acceptable model fit: $\chi^2[36] = 120.10$, $p < .001$; CFI = .950, TLI = .923 and RMSEA = .070. The severity of girls' conduct problems ($\beta = 0.21$, $p < .001$), dual parent family ($\beta = -0.16$, $p < .01$) and poverty at age 10 ($\beta = 0.17$, $p < .01$) were significantly associated with initial level of PV. Race was not related to severity of age 10 PV. Conduct problems ($\beta = -0.19$, $p < .001$), European American race ($\beta = -0.17$, $p < .05$), single parent ($\beta = 0.16$, $p < .05$), and household poverty ($\beta = -0.14$, $p < .05$) were all significantly associated with the slope of PV. The results also showed that whereas higher initial levels of PV at age 10 were marginally associated with a greater likelihood of PDV ($\beta = 0.28$, $p = .05$), change in PV across ages 10 to 15 showed significant prediction to PDV ($\beta = .42$, $p < .01$). This latter finding indicated that girls with slower rates of decline in PV during this developmental period were at greater risk for PDV at age 17. Single parent family was marginally related to PDV ($\beta = .19$, $p < .05$) but there was no association with the other covariates of race, conduct problems or poverty at age 10.

We then tested whether rejection sensitivity mediated the relationship between the PV latent factors and PDV. PDV was regressed on the latent factors of PV, rejection sensitivity at age 16 and the covariates. The model fit was acceptable: $\chi^2[40] = 128.07$, $p < .001$; CFI = .949, TLI = .915 and RMSEA = .068. As previously, rejection sensitivity at age 16 was not significantly associated with PDV in the model (see Figure 2). There were also no mediating effects of rejection sensitivity at age 16 on the relationships between either the higher initial level of PV at age 10 or the trajectory of PV across ages 10 to 15 years and PDV. However, both higher initial level of PV at age 10 ($\beta = 0.30$, $p < .001$) and increase in PV scores across ages 10 to 15 years ($\beta = 0.26$, $p < .01$) were significantly associated with rejection sensitivity at age 16. In this final model, only the slope of PV increased the likelihood of significant PDV at age 17 ($\beta = 0.42$, $p < .01$).

Effect of conditioned dual latent growth model of harsh punishment and peer victimization on PDV

When the latent factors for HP and PV were considered together, the model fit was acceptable: $\chi^2[93] = 217.59$, $p < .001$; CFI = .947, TLI = .922 and RMSEA = .053. However, in this model, only initial level of HP was significantly associated with PDV ($\beta = 0.35$, $p = .001$). None of other latent factors and covariates predicted PDV.

Discussion

The current study adds to the growing body of research examining risk factors for involvement in teen physical dating violence. Particular strengths of the study include the prospectively gathered data on a population sample from age 10 through age 17, allowing the examination of antecedent contextual risk factors from a developmental perspective. The study also identified a sizeable group of female adolescents who reported significant levels of perpetration and experience of physical aggression in their dating relationship; a group at greatest need for targeted intervention and prevention efforts.

The latent class analysis identified similar derived clusters for PDV perpetration and victimization comprising none to minimal vs. significant involvement in a range of physically aggressive behaviors. The results showed that girls involved in PDV were primarily perpetrators (52%) or both perpetrators and victims (37%), but typically not victims only (11%). Although prior work has often reported higher rates of perpetration than victimization among adolescent girls (e.g. O'Keefe, 1997), the current results indicate that a substantial subset of these girls are also victimized, lending further support to the notion that mutual aggression is common in this developmental period (e.g. Gray & Foshee, 1997; Moffitt et al., 2001). It is possible that the disproportionately small group of girls reporting victimization-only may reflect some characteristic specific to the current study. For example, in this inner-city sample approximately half of the girls were of minority race (predominantly African American race), and minority race girls were more likely, than European American girls, to be dating at age 17. In some studies, African American race has been shown to be associated with lower rates of victimization (O'Keefe & Treister, 1998), and higher rates of PDV perpetration (Malik et al., 1997; O'Keefe, 1997), which may account for the pattern observed here. Further work is needed to determine whether the distribution of girls in these PDV clusters is sample-specific or developmentally specific, such that sociodemographic factors differentially influence rates of involvement at different ages.

The results of the individual latent growth curve models showed that after controlling for age 10 covariates, the experience of harsh punishment at age 10, and increasing levels of harsh punishment in early adolescence (10–13 years), were significantly associated with involvement in PDV by girls at age 17. These predictive relationships are congruent with the notion that learning and acceptance of the use of aggression as a means of managing interpersonal relationships and/or resolving conflicts may stem from similar experiences in the home (Bandura, 1973). More than this however, the finding also demonstrates that *escalation* in the severity of HP in early adolescence is an important component of this risk. Changes in harsh punishment experienced later in adolescence were not predictive of subsequent PDV. The differential risks in early and mid-adolescence may reflect normative changes in the evolution of adolescent-parent relationships whereby parental influence begins to taper off as other factors such as peer relationships become more salient in an adolescent's life. Alternatively, the lack of association between HP in mid-adolescence and PDV may reflect increasing heterogeneity in the slope of HP in at-risk families, resulting in different pathways to PDV involvement. Thus, some parents may respond to increasingly challenging adolescent behavior with a harsher style of parenting, whereas other parents may respond with withdrawal and disengagement leading to a reduction in the association between HP across adolescence and later PDV.

The analyses also showed that risk for PDV was heightened by a slower reduction in peer victimization across the adolescent period. Thus, adolescent girls who experienced a more gradual decline in peer victimization were more likely to be involved in PDV at age 17. This finding provides fairly strong support for a peer influence model rather than a peer selection

model given that the reported peer victimization preceded dating. Nevertheless, it is still possible that propensity for later PDV involvement influenced peer behaviors at an age younger than 10 years. Consistent with the notion that behavior problems and victimization frequently co-occur, the results also showed that conduct problems at age 10 were associated with initial levels and slower improvement in peer victimization. The small number of individuals in the PDV victimization-only group in the current sample did not allow us to examine whether homotypic continuity (i.e. peer victimization to PDV victimization) was stronger than heterotypic continuity (i.e. peer victimization to PDV perpetration or victimization/perpetration). Given evidence that PDV victimization is closely related to several other forms of victimization (Hamby et al., 2012), and that women who experience PDV during adolescence are at high risk for future victimization by a romantic partner in adulthood (Smith, White, & Holland, 2003), examination of these more specific developmental patterns is clearly an important avenue for future research.

When developmental change in *both* HP and PV on later PDV were considered in the dual latent growth model, the results showed that only the level of harsh punishment experienced at age 10 remained predictive. This suggests that there may be a critical period for social learning whereby the experience of negative parenting that occurs in childhood, but not in adolescence, is a robust and distal risk factor for later interpersonal violence. Prior work has demonstrated a similar association between negative parenting and PDV in male samples (Brendgen et al., 2002; Capaldi & Clark, 1998), but the current study may be the first to show that this prospective relationship holds for females over and above the effects of developmental change in parenting, or across an extended developmental period. As such, this result points to an important early target for female-specific interventions designed to prevent subsequent PDV involvement: reducing levels of harsh parenting in preadolescence. It is important to consider however, that because most of the girls in the current sample reported no PDV involvement, these otherwise null findings may have been a function of limited statistical power to detect the different developmental effects of HP and PV simultaneously. Alternatively, the separate growth models of HP and PV predicting PDV may have reflected aspects of a common pathway that had reciprocal, cascading effects over time (Dodge, Greenberg, Malone & the Conduct Problems Prevention Research Group, 2008), and that when the shared variance was accounted for, neither trajectory emerged as a unique risk factor.

Although rejection sensitivity has been shown to have a main effect on PDV involvement in prior studies (Downey et al., 2000, 2004; Purdie & Downey, 2000) and appears to mediate the association between parental and peer victimization and PDV in male samples (Brendgen et al., 2002), no such relationships were found in the current study. Thus, rejection sensitivity was predicted by harsh punishment and peer victimization in the current study, but there was no prospective relationship between rejection sensitivity and PDV, nor did rejection sensitivity explain the effects of parental punishment and peer victimization on later PDV involvement. The lack of concordance with Brendgen et al (2002)'s study may reflect gender differences in the nature and consequences of parent-child aggression and in the severity, motivations and context of PDV involvement, as well as the fact that peer victimization, rather than peer rejection, was assessed in the current study. The absence of an association between rejection sensitivity and PDV involvement in the current sample however, also stands in contrast to the results of a community sample of girls (Purdie & Downey, 2000). Possible explanations for these discrepant findings include the slightly younger age (Grades 6–7) of Purdie and Downey's sample, differences in the racial composition of the samples (69% Hispanic and 1% European American in the former study vs. none and 42% respectively in the PGS), and different modes of data collection (administration in small classroom groups vs. face-to-face interviews in the home). It is also possible that sensitivity to rejection is more closely associated with perpetration than

victimization among females (as suggested by Volz & Kerig's 2010 study) and that by combining perpetration and victimization into a single construct in the current study, differential effects may have been masked. Furthermore, features of the dating relationship, such as level of commitment and rapidity of investment in the relationship may account for heterogeneity in the relationship between rejection sensitivity on PDV involvement (Purdie & Downey, 2000; Wolfe et al., 1998). For example in research on adult males, Downey and colleagues (2000) showed that high levels of relationship investment predicted a greater likelihood of responding to perceived rejection with violence perpetration. In contrast, men with low investment were less likely to be dating. Larger samples are needed to examine moderators of rejection sensitivity that may be specific to the use and/or experience of PDV.

Some limitations of the current study should be noted. First, the study focused on the use and experience of PDV among girls only. Such an approach is necessary to redress the lag in research on risk factors for PDV involvement in girls relative to boys. Scientifically, the rationale for a gender-specific focus has also been indicated by prior studies (e.g. Krueger et al., 1998; Sears & Byers, 2010) including evidence that the effectiveness of prevention programs varies by gender (Wolfe et al., 2009). Nevertheless, comparative work on samples consisting of both females and males is essential for the development of gender-specific models of risk.

Second, the construct of PDV used in the current study consisted of a binary variable assessed at a single time point representing girls who reported minimal or significant probabilities of physical aggression in their dating relationship in the past year. Data suggest that repeated measurement provides a more valid and reliable means of assessing events during the past year (Jouriles, McDonald, Garrido, Rosenfield, & Brown, 2005) and this may be especially true in the case of adolescent dating relationships, which are typically brief. Further assessments of PDV are needed to provide valuable information on the recurrence and stability of aggressive behavior within and across different romantic relationships. It is also recognized that the use and experience of psychologically aggressive behavior and sexual coercion are prevalent, detrimental to adolescents' health, and often associated with physical aggression (e.g. Buzy et al., 2004; Sears et al., 2007). Therefore, future work should focus on whether the relationships identified in the current study show robust links with broader definitions of PDV involvement. Even so, evidence for differential treatment effects associated with different types of partner violence (Eckhardt, Holzworth-Munroe, Norlander, Sibley & Cahill, 2008) also highlight an ongoing need for research to identify risk factors for specific forms of dating aggression. Finally, by using only girls' reports of victimization and perpetration in their dating relationships, bias associated with their experience of harsh punishment and peer victimization, or other unmeasured factors such as previous relationship experiences may have been introduced. Although the convergence of self-reports with partner reports, independent observations, and ecological momentary assessment measures may provide a gold-standard, the logistics of obtaining such data are significant, and do not negate the relevance of the girls' own perceptions.

Third, our models focused on the influence of selected parent and peer variables to the exclusion of others. For example, exposure to parental intimate partner violence, experienced sexual abuse, poor parental supervision and parental psychopathology are likely to have important adverse effects on PDV risk among females. Other parenting factors such as an authoritative parenting style combined with warmth and clear limit-setting may have been protective (Vezina & Herbert, 2007), indicating that more complex models of the interplay between various aspects of parental function are needed. Other important potential predictors for future work include adolescents' use of substances (e.g. McDonnell, Ott, & Mitchell, 2010), mental health factors such as depression, anger, and impulse control (Few & Rosen, 2005), girls' perceptions of social dating norms (Sears & Byers, 2010), and their

acceptance of violence as a way to solve problems or gain status (Garbarino, 1995; Williams, Connolly, Pepler, Craig, & Laporte, 2008).

Despite these limitations, the current study findings have important implications for understanding the pathway to intimate partner violence, one of the leading causes of mortality among young women. The results revealed that females involved in PDV more often used, than experienced, physical aggression and often reported mutual violence. Preadolescent experience and escalating levels of harsh punishment in early adolescence as well as a slower reduction in early peer victimization emerged as significant developmental precursors of female involvement in PDV at age 17. Ameliorating these risk factors may therefore be an important component of programs aimed at reducing or preventing PDV among girls.

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Note: *** $p < .001$, ** $p < .01$, * $p < .05$. Standardized beta weights are shown. For clarity, the non-significant relationships between variables, the observed harsh punishment scores at ages 10–15, and correlations between the covariates are excluded.

Figure 1.

Conditioned piecewise latent growth curve model of harsh punishment (10–15 years) predicting PDV at age 17, controlling for conduct problems, minority race, poverty and single parent household at age 10.

Note: *** $p < .001$, ** $p < .01$, * $p < .05$. Standardized beta weights are shown. For clarity, the non-significant relationships between variables, the observed harsh punishment scores at ages 10–15, and correlations between the covariates are excluded.

Note: *** $p < .001$, ** $p < .01$, * $p < .05$. Standardized beta weights are shown. For clarity, the non-significant relationships between variables, the observed peer victimization scores at ages 10-15, and correlations between the covariates are excluded.

Figure 2.

Conditioned latent growth curve model of peer victimization (10–15 years) predicting PDV at age 17, controlling for conduct problems, minority race, poverty and single parent household at age 10.

Note: *** $p < .001$, ** $p < .01$, * $p < .05$. Standardized beta weights are shown. For clarity, the non-significant relationships between variables, the observed peer victimization scores at ages 10–15, and correlations between the covariates are excluded.

Table 1
Descriptive statistics of study variables by age for the sample of dating girls (N=475).

	Age (years)									
	10	11	12	13	14	15	16	17		
	N (%)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	N (%)	
Conduct problems		1.13 (2.11)								
Minority race	289 (60.8)									
Poverty	176 (37.1)									
Single parenthood	236 (49.7)									
Harsh punishment		8.67 (2.34)	8.61 (2.18)	8.71 (2.33)	8.94 (2.33)	9.12 (2.47)	8.95 (2.46)			
Peer victimization		4.61 (6.38)	3.78 (5.41)	3.35 (4.44)	2.90 (3.88)	2.55 (3.28)	2.34 (3.08)			
Rejection sensitivity							8.12 (3.16)			
PDV involvement								46 (9.7)		

Note: Conduct problems scores ranged from 0–17. Harsh punishment scores ranged between 6–18 at age 10, and 6–17 at all other ages. Peer victimization scores ranged from 0–23 at age 14 to 0–35 at age 10. Rejection sensitivity scores ranged from 1–19.

Table 2

Correlation table of predictors and covariates at age 10, rejection sensitivity at age 16, and PDV at age 17.

	PDV	Conduct problems	Minority Race	Poverty	Single parenthood	Harsh punishment	Peer victimization
Conduct problems	.08	-----					
Minority Race	.10*	.10*	-----				
Poverty	.06	.12*	.36**	-----			
Single Parenthood	.14**	.02	.41**	.28**	-----		
Harsh punishment	.15**	.18**	.22**	.14**	.10*	-----	
Peer victimization	-.09*	.18**	.07	.14**	-.04	.29**	-----
Rejection sensitivity	.03	.03	.10*	.08	.11*	.12**	.10*

Note:

** $p < .01$;

* $p < .05$.