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Understanding the Integrated Prevention Effects of Dating Matters on Bullying and Teen Dating Violence: Does Promotion of Healthy Relationship and Conflict Resolution Skills Prevent Both Forms of Aggression?

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by

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Under the Direction of Gabriel Kuperminc, PhD

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ABSTRACT

Although bullying and teen dating violence (TDV) have similar behavioral manifestations and are likely to affect the same individuals throughout development in similar ways, interventions typically address bullying and TDV separately. This study used longitudinal data from middle school participants (N = 1,504) to test aspects of the Dating Matters (DM) program's theory of change, which aims to prevent bullying and TDV by teaching youth healthy relationship skills (HRS) and conflict resolution strategies. First, latent class analysis was used to identify classes of co-occurring bullying, dating, and TDV perpetration at baseline and assess the association of those classes with HRS and negative conflict resolution strategies (NCRS). A three-class model best fit the data: TDV & Bullying, TDV only, and Low Perpetration. No significant association was found between latent class of baseline perpetration and HRS; however, those in the TDV & Bullying class reported using NCRS significantly more than the other classes. Next, a latent growth curve model was used to assess HRS and NCRS development throughout the intervention, comparing the latent classes described above. Due to poor fit of the model for HRS, no conclusions can be drawn about the trajectory of HRS. The model for NCRS showed no significant linear or quadratic change in frequency of use throughout DM for the overall sample. However, there were significant differences in the NCRS trajectories among the latent classes of baseline perpetration, such that those in the TDV & Bullying class had consistently more frequent use of NCRS over time. Ultimately, two cross-lagged panel models found that NCRS and HRS were correlated with bullying and TDV cross-sectionally and longitudinally, suggesting that HRS can be a protective factor and NCRS a risk factor for future perpetration. Given the lack of significant effects on HRS, this study provided no evidence that HRS development drives DM's treatment effects on bullying and TDV. This

study's findings suggest that NCRS is a determinant of later bullying and TDV. NCRS is an important target of youth violence prevention; however a higher intensity of intervention may be necessary for youth who perpetrate multiple forms of violence.

INDEX WORDS: Violence prevention, Teen dating violence, Bullying, Adolescent development

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DEDICATION

I acknowledge that my privilege as a White person has propelled me towards this stage of advanced education that will continue to benefit me after I obtain my degree. My words of gratitude for this immense privilege will do nothing to erase the injustices of racism and academic inequity. I commit to leveraging this degree to combat inequity and all the ‘isms’ that make career advancement unattainable for so many.

ACKNOWLEDGEMENTS

The phrase “it takes a village” does not only pertain to raising children. It also aptly characterizes my graduate school experiences. I could not have reached this phase of my doctoral training without the careful mentoring and advising of my professors, the inspiring collaboration of my peers, and the patience, support, and encouragement of my friends and family. I would like to thank my village that has put up with and stoked the fires of my ambling rants about adolescent development, mental healthcare, health equity, and violence prevention. Thank you for encouraging me to fend off burnout with passion, self-care, and community.

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LIST OF ABBREVIATIONS

- DM = Dating Matters, a comprehensive, multicomponent violence prevention intervention intentionally designed to promote healthy relationships and prevent TDV and other associated youth violent outcomes throughout adolescent development
- TDV = teen dating violence
- HRS = healthy relationship skills
- NCRS = negative conflict resolution strategies

1 INTRODUCTION

Bullying and teen dating violence (TDV) are strategic, persistent, and control-oriented acts of aggression (Corvo & deLara, 2010) that occur among young people and can lead to severe physical and mental health consequences for victims (Ackard, Eisenberg, & Neumark-Sztainer, 2007; Exner-Cortens, Eckenrode, & Rothman, 2013; Hawker & Boulton, 2000; Lereya, Copeland, Costello, & Wolke, 2015). Bullying and TDV behaviors are similar in form (physical violence and psychological aggression), and share risk factors, including exposure to family conflict and peer engagement in violence (Foshee, Reyes, et al., 2016). Additionally, victimization and perpetration of one are associated with increased likelihood of victimization and perpetration of the other (Espelage & Holt, 2007; Niolon et al., 2015; Vivolo-Kantor, Olsen, & Bacon, 2016; Yahner, Dank, Zweig, & Lachman, 2015). Although both forms of aggression have similar behavioral manifestations and are likely to affect the same individuals throughout development in similar ways, interventions typically address them separately. For these reasons, the Centers for Disease Control and Prevention recently published a strategic vision for violence prevention, calling for more integrated approaches by practitioners and researchers (2016). Taking steps towards that vision, this study will test the theory of change of Dating Matters, an integrated intervention program aiming to simultaneously prevent bullying and TDV by teaching youth healthy relationship skills and conflict resolution strategies.

1.1 Why is an Integrated Intervention Approach Necessary for TDV and Bullying Prevention?

1.1.1 Identifying Definitional Differences between Bullying and TDV

An integrated approach to TDV and bullying prevention makes sense because, while the two fields are often siloed, there are only minor differences in what behaviors are considered

bullying versus TDV. The little distinction between terms is illustrated by looking at the definitions of each. One difference is the social context: bullying takes place between youth who are not siblings or current dating partners where there is a real or perceived power imbalance, whereas TDV occurs between adolescents in a dating relationship (Centers for Disease Control and Prevention, 2014; Gladden, Vivolo-Kantor, Hamburger, & Lumpkin, 2014). Though both bullying and psychological TDV can involve inappropriate and unwanted sexual comments, an important difference is that bullying does not include non-consensual sexual activity, whereas sexual TDV does (Centers for Disease Control and Prevention, 2014). Additionally, TDV can occur once or multiple times, whereas bullying is, by definition, repeated or has a high likelihood of being repeated (Gladden et al., 2014).

1.1.2 Bullying and TDV are Similar in Form

Both bullying and TDV can be physical (e.g., pinching, hitting) or psychological (e.g., threats, name-calling; CDC, 2014; Gladden et al., 2014). Behaviors intended to isolate and exclude the victim from social support (e.g., spreading rumors, exclusion from group activities) are called relational bullying among peers or psychological TDV within a romantic relationship. Though not consistently included in measures, intent to harm is required in one of the most commonly used definitions of bullying (Olweus & Limber, 2010) and some definitions of psychological (Wincentak, Connolly, & Card, 2017) and physical TDV (Vagi, O'Malley Olsen, Basile, & Vivolo-Kantor, 2015).

1.1.3 Bullying and TDV Tend to Co-occur

Prevalence estimates vary due to measurement inconsistency (Modecki, Minchin, Harbaugh, Guerra, & Runions, 2014; Wincentak et al., 2017); however, bullying and TDV are everyday experiences for youth. A recent national estimate suggested that 6% of youth ages 6-17

perpetrate bullying behavior, and 21% of youth are bullied annually (Child and Adolescent Health Measurement Initiative, 2017). A recent meta-analysis estimated the international prevalence of TDV: 20% experienced physical TDV victimization or perpetration, and 9% experienced sexual TDV victimization or perpetration (Wincentak et al., 2017). A nationally representative survey estimated that 66% of adolescents are victims of psychological TDV, and 62% perpetrate psychological TDV (Taylor & Mumford, 2016). Being the victim or perpetrator of bullying is associated with an increased likelihood of being a victim or perpetrator of TDV. Cross-sectionally, compared to those who neither bully nor experience bully victimization, bullies and victims of bullying (and so-called bully-victims) are more likely to be both perpetrators and victims of TDV (Vivolo-Kantor et al., 2016; Yahner et al., 2015; Zych, Viejo, Vila, & Farrington, 2019).

1.1.4 Stability in the Perpetration of Bullying and TDV over Time

Bullying occurs at all ages and overlaps with TDV throughout adolescence. Bullying typically precedes TDV developmentally: Bullying peaks in middle school and declines throughout high school (Zhang, Musu-Gillette, & Oudekerk, 2016), whereas rates of psychological and sexual TDV tend to increase during the high school years as more adolescents begin dating (Taylor & Mumford, 2016; Wincentak et al., 2017). Though not all bullies or bully-victims go on to perpetrate or become victims of TDV, some studies have begun to demonstrate that bullying predicts TDV perpetration longitudinally (Espelage, Low, Anderson, & De La Rue, 2014; Foshee, Benefield, et al., 2016). These longitudinal studies did not use nationally representative datasets; thus further assessment of the developmental trajectory of perpetration is warranted. Person-centered longitudinal analyses of bullying from middle to high school identified five classes of perpetration, suggesting heterogeneity in trajectories of perpetration: 1)

no/low perpetration (37.8% of sample), 2) moderate perpetration that is stable over time (51.3% of sample), 3) high perpetration at baseline declining over time (3.4% of sample), 4) middle school peak in perpetration declining in high school (4.2% of sample), 5) moderate escalating perpetration over time (3.4% of sample) (Espelage, Van Ryzin, & Holt, 2018). Longitudinal latent growth models of TDV suggest three classes over three years of adolescence. The first class, comprised of 37.3% of the sample, was labeled "Non-daters." This class included individuals who were unlikely to date or perpetrate TDV. The second class, comprised of 44.6% of the sample, was labeled "Increasing Dating/ADA" (ADA refers to adolescent dating abuse). This class included individuals whose likelihood of engaging in any non-abusive dating or TDV perpetration increased over time. The third class, comprised of 18.1% of the sample, was labeled "High Stable ADA." This class included individuals whose likelihood of dating and perpetrating TDV was high and stable over time (Mumford, Liu, & Taylor, 2019).

Longitudinal person-centered studies that examined patterns of bullying and TDV simultaneously have found overlapping perpetration through adolescence (Miller et al., 2013; Williams et al., 2015). In a longitudinal latent transition analysis study assessing patterns in perpetration and victimization of bullying, sexual harassment, and TDV among middle schoolers, Miller and colleagues (2013) found a relatively stable five class structure: 1) multi-problem (e.g., victimization and perpetration (V/P) of all behaviors; 12.2% of the sample), 2) bullying and sexual harassment V/P (15.0% of the sample), 3) bullying V/P and sexual harassment V (27.7% of students), 4) bullying only (V/P) (23.5% of the sample), 5) low levels of all three behaviors (21.6% of the sample). Most classes were characterized by victimization and perpetration of multiple forms of aggression. The low-level problem behavior class grew over time, suggesting decreases in all three forms of aggression. When transitions between classes

occurred, it generally was from a class with more problem behavior to one with less problem behavior. Examining bullying and TDV concurrently over time demonstrates the stable shared risk of perpetration for a subset of perpetrators and the potential for integrated intervention efforts.

1.1.5 Developmental Theory Suggests Common Risk Factors for Bullying and TDV

This section describes two broad theoretical perspectives from developmental theory that suggest common risk factors: attachment theory (Bowlby, 1969) and social learning theory (Bandura, 1973; Bandura & Walters, 1977).

1.1.5.1 Early Life Exposure to Violence. Socio-cultural theories of the etiology of both forms of aggression highlight similar contextual risk factors that occur throughout development, starting with early life experiences with family. Developmental theory suggests that experiences, such as a history of exposure to child maltreatment and hostile parenting, are associated with problems in adjustment that are linked to an increased likelihood of later interpersonal difficulties and aggression (Ehrensaft et al., 2003).

Attachment theory, in particular, underscores the effects of early caregiver-child relationships on later behavior, emotion regulation skills, and expectations of close relationships (Bowlby, 1969). Infants with mothers who reported partner violence victimization were more likely to demonstrate disorganized attachment styles in the Strange Situation Procedure compared to infants whose mothers had no victimization experiences (Zeanah et al., 1999). Similarly, infants who experienced maltreatment were more likely to have disorganized attachment styles than infants who were not maltreated (Carlson, Cicchetti, Barnett, & Braunwald, 1989). Disorganized attachment patterns in infancy have been found to predict problematic stress management and increased risk of externalizing problems in school-aged

children (Van Ijzendoorn, Schuengel, & Bakermans-Kranenburg, 1999), as well as aggression towards peers (Lyons-Ruth, 1996). Some cross-sectional studies suggest that youth ages 10-12 years old with insecure attachment styles are more likely to bully or be victims of bullying (Eliot & Cornell, 2009; Kokkinos, 2013) and more likely to perpetrate later intimate partner violence (Woodin & O'Leary, 2009). Though attachment style does not appear to be static over time and across relationships (Allen, 2008), Furman and colleagues (2002) found that adolescents tend to demonstrate similar attachment style with their parents, friends, and romantic partners.

According to social learning theory, children exposed to conflictual family dynamics learn that violence is an acceptable and effective method of conflict resolution and become more likely to perpetrate future violence. By witnessing violence at home and perceiving positive consequences for aggressors, youth are theorized to learn maladaptive, aggressive social interactions with peers via vicarious reinforcement (Bandura, 1973; Bandura & Walters, 1977). Other theorists have expanded on this theory by suggesting that coercive parenting practices (e.g., aversive experiences inflicted to control another's behavior) can catalyze an ongoing pattern of family conflict and subsequent antisocial youth behavior (Patterson, 2016), including violence perpetration (Patterson, Dishion, & Bank, 1984; Schwartz, Dodge, Pettit, & Bates, 1997). In sum, these theories suggest that youth who are exposed to childhood maltreatment and family conflict may develop an insecure attachment style and begin to generalize the negative conflict resolution strategies and other social skills learned in the family context to relationships outside of the family (Ehrensaft, 2008), making them more likely to express aggression in the form of bullying or TDV.

1.1.5.2 Peer Influence. Negative peer influence is a salient risk factor for bullying (Espelage, Bosworth, & Simon, 2000) and TDV (Foshee et al., 2013). Social network analysis

and hierarchical linear modeling have demonstrated that bullies are more likely to become friends with other bullies (those who are more likely to reinforce maladaptive aggressive problem-solving approaches) than non-aggressive peers (Espelage, Green Jr, & Wasserman, 2007; Espelage, Holt, & Henkel, 2003). Longitudinal studies have documented that adolescents are more likely to perpetrate physical TDV if their friend perpetrated TDV (Foshee et al., 2013) and are more likely to be victims of TDV if their friends are in violent relationships (Arriaga & Foshee, 2004). A multinomial logistic regression distinguished profiles of adolescent peer violence (violence directed at a peer who is not a dating partner, this term is not limited to bullying) and dating violence perpetration. The study found that adolescents with friends who perpetrate peer violence were more likely to perpetrate both peer violence and dating violence. In contrast, having friends who perpetrate dating violence was uniquely associated with high risk of perpetrating TDV and not peer violence (Foshee et al., 2011).

Moffitt (2017) posited that individual expressions of aggression change across development as peer relationships change and new social opportunities arise (e.g., the emergence of more mixed-gender peer groups during early adolescence, sexuality and romantic interests (Connolly & Goldberg, 1999)), possibly explaining the observed developmental progression from bullying to TDV. This may explain the comorbid perpetration of bullying and TDV but does not explain why some youth who bully do not go on to perpetrate TDV and why some adolescents who perpetrate TDV do not have a history of bullying. A cross-sectional descriptive study of middle school students suggests that bullies were more likely to initiate dating earlier and spend more time out of school with their romantic partners than comparison adolescents. ullies' views of their friends and romantic partners were less positive and less equitable, and

bullies were more likely to report physical and social aggression within their romantic relationships (Connolly, Pepler, Craig, & Taradash, 2000).

1.1.6 Limited Effectiveness of Existing Interventions to Prevent Bullying and TDV Separately

Research documenting similar risk factors for bullying and TDV perpetration and victimization (Cook, Williams, Guerra, Kim, & Sadek, 2010; Espelage et al., 2014; Foshee, Reyes, et al., 2016; Niolon et al., 2015; Smith-Darden, Kernsmith, Reidy, & Cortina, 2017), suggests a common developmental process. However, most community-based interventions intended to prevent bullying and TDV were designed and evaluated to address them separately (Hamby & Grych, 2012), and evidence for their effectiveness is mixed (De Koker, Mathews, Zuch, Bastien, & Mason-Jones, 2014; Evans, Fraser, & Cotter, 2014; Zych, Ortega-Ruiz, & Del Rey, 2015). At least some of the inconsistency can be attributed to a lack of theoretical grounding in the design of many interventions (Farrington & Ttofi, 2009; Offenhauer & Buchalter, 2011). Nevertheless, findings from two Campbell Collaboration systematic review meta-analysis studies concluded that, on average, interventions are associated with a 19-23% decrease in the rate of bullying and a 15-20% decrease in the rate of victimization (Farrington & Ttofi, 2009; Gaffney, Ttofi, & Farrington, 2018). Though interventions are shown to be effective at improving knowledge of dating violence and have demonstrated some ability to alter attitudes toward TDV, a recent systematic review and meta-analysis of TDV and sexual violence prevention interventions found that, overall, programs produce no statistically significant change in perpetration or victimization (De La Rue, Polanin, Espelage, & Piggot, 2014).

In sum, theory suggests that the same early life experiences (e.g., child abuse) and family and peer modeling of aggression may increase the likelihood of conflictual peer interactions that

can be carried into dating relationships. Also, experiencing bullying or TDV (as victim or perpetrator) may increase the odds of experiencing the other form of aggression (Foshee, Benefield, et al., 2016; Vivolo-Kantor et al., 2016; Yahner et al., 2015). This suggests that interventions designed to target shared etiological processes may prevent both TDV and bullying more effectively than interventions designed to address either separately.

1.2 A Theoretically Integrated Intervention Model to Prevent Bullying and TDV Concurrently

One method suggested by researchers to identify crosscutting intervention strategies that impact multiple violent outcomes is to find existing evidence-based programs that target risk behaviors relevant to multiple outcomes (DeGue et al., 2013). Public health prevention initiatives geared towards behavioral health outcomes target modifiable risk factors rather than historical risk factors (e.g., history of childhood maltreatment; Niolon et al., 2015).

Joseph & Kuperminc (2020) proposed a model of coordinated intervention strategies targeting shared modifiable risk factors (posited proximal effects) to ultimately prevent both bullying and TDV (hypothesized distal effects). As the building blocks for this theoretical model, those authors reviewed existing bullying and TDV interventions that met the following inclusion criteria: 1) interventions based in schools or other community settings, 2) interventions intended to prevent bullying or TDV, 3) interventions having at least one evaluation study published in a peer-reviewed journal using a randomized control trial or quasi-experimental design, 4) interventions with statistically significant prevention effects on quantitative outcomes measuring the frequency of bullying or TDV victimization or perpetration, and 5) interventions using primary or secondary prevention approaches. They then systematically assessed what strategies were used across these evidence-based interventions. The proposed integrated intervention

model used a combination of school, parent, and individual-focused interventions with program strategies to target shared risk factors for bullying and TDV (see Figure 1 and Table 1 for a depiction of the theoretical model and see description of the model below).

Table 1. Integrated Intervention Model

Level of Influence	**Risk Factor**	**Intervention Strategy**
School/Peers	Norms Promoting Violence Peer Engagement in Violence	Bystander approaches Violence awareness Consequences of violence Norm busting Increased Supervision Classroom Rules Prosocial Peer Model/Mentor Direct Intervention with Victims and Perpetrators
Parents	Family Conflict	Help-seeking Connection to community resources Healthy relationship skills
	Low Maternal Monitoring Low Parent-Child Closeness Low Family Cohesion	Information for parents Parent training
Individual	Feelings of Anger/ Anger Reactivity	Emotion Regulation Cognitive Behavior Techniques Self-awareness Nonviolent Conflict Resolution
	Prior Victimization or Perpetration Experience	Healthy Relationship Skills Setting Boundaries and Assertiveness Skills Nonviolent Conflict Resolution Communication Skills Help-seeking Self-awareness Social problem solving
	Depressed affect	Cognitive Behavior Technique Emotion Regulation Help-seeking

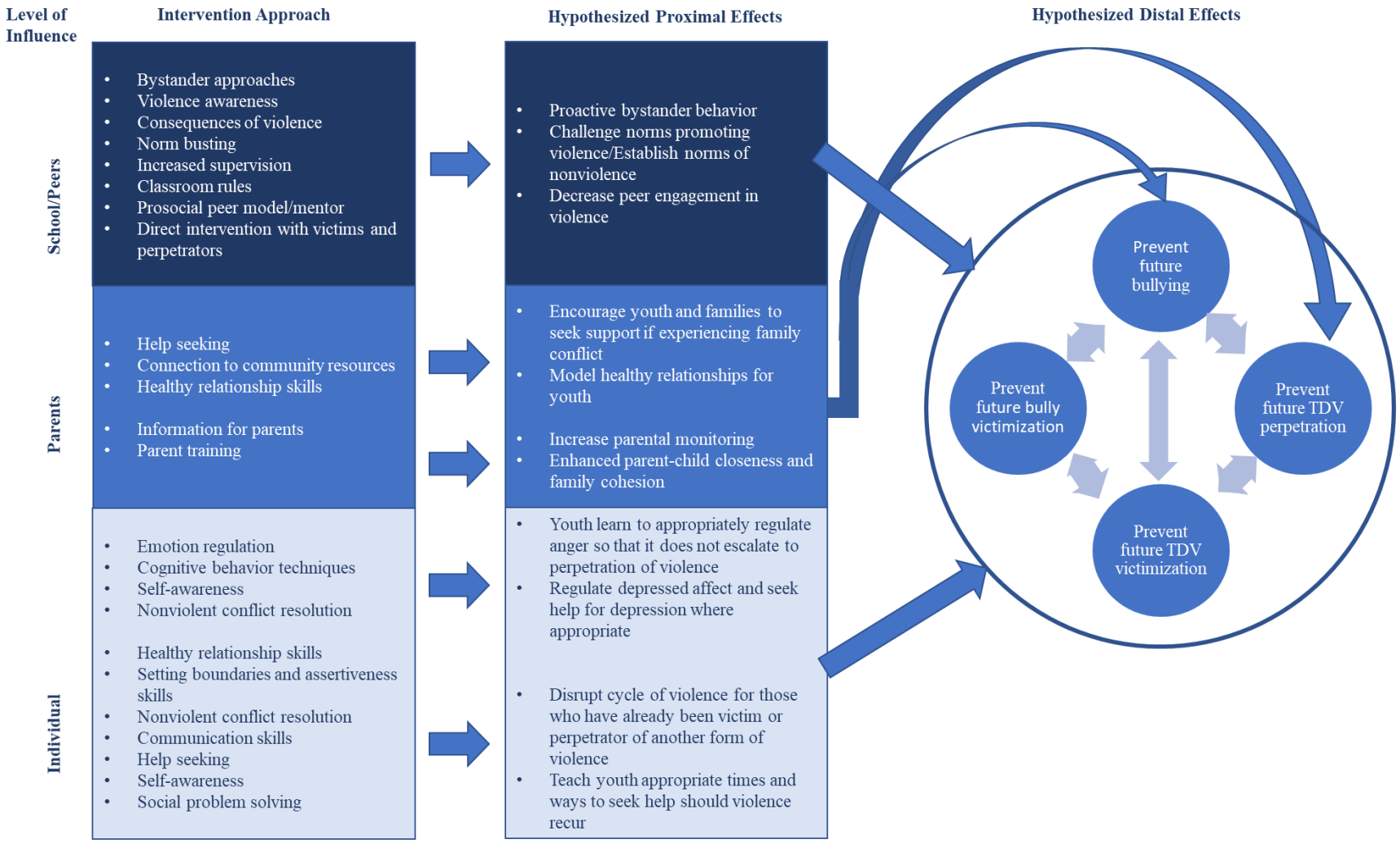

Figure 1. Integrated Intervention Model for the Prevention of Bullying and TDV Perpetration and Victimization

1.2.1 School and Parent Interventions

Joseph & Kuperminc (2020) proposed a multi-level intervention model to address bullying and TDV including school-level and parent programming. To target shared risk factors pertaining to the social context at school (e.g. norms promoting acceptance of violence) (Cook, Williams, Guerra, Kim, & Sadek, 2010; Foshee et al., 2013; Smith-Darden, Kernsmith, Reidy, & Cortina, 2017), the theoretical intervention model includes a combination of school- and classroom-level interventions (e.g. bystander intervention, prosocial peer models) to establish a norm of nonviolence and socially disincentivize future bullying and TDV (Joseph & Kuperminc, 2020). The model includes program strategies for parents (e.g. parent information and training) that aim to minimize the risk associated with family conflict (Foshee, Reyes, et al., 2016), maximize the protective effects of parental monitoring of youth and family cohesion, and in doing so, prevent bullying and TDV perpetration.

1.2.2 Individual-level Adolescent Interventions

Joseph & Kuperminc (2020) proposed individual-level curricular/skills-based strategies to teach youth skills to manage anger, disrupt cycles of violence, and thus decrease the likelihood of future bullying or TDV perpetration or victimization. Anger and anger reactivity have been found to mediate the association between bullying and TDV perpetration, regardless of the level of victimization (Foshee, Benefield, et al., 2016). Thus, strategies that help with anger management (emotion regulation, cognitive behavior techniques, self-awareness, and nonviolent conflict resolution techniques) might be vital to preventing risk for co-occurrence (Joseph & Kuperminc, 2020). These same program components may also influence depressive symptoms, another common risk factor for bullying and physical TDV perpetration (Foshee, Reyes, et al., 2016). Intervention components are intended to interrupt the cycle of repeated victimization and

perpetration and model positive relationships, including teaching healthy relationship skills, and nonviolent conflict resolution strategies (Vivolo-Kantor et al., 2016; Yahner et al., 2015). This project will focus on evaluating joint prevention effects of individual skill-building program components.

1.3 Dating Matters: An Evidence-based Integrated Violence Prevention Intervention

Dating Matters (DM) is one example of a violence prevention intervention intentionally designed to promote healthy relationships and prevent TDV and other associated youth violent outcomes (including bullying) throughout adolescent development (Tharp et al., 2011). Developed by the CDC, the program targets a constellation of shared risk factors for TDV and other youth violence outcomes at each level of social ecology, emphasizing youth communication and healthy relationship skills (Vivolo-Kantor et al., 2020). DM is a comprehensive intervention and therefore participants experienced multiple program components, however this study will focus on the effects of just the DM classroom-delivered student curricula for middle school students to address processes that underlie youth violence (e.g., emotion regulation and poor communication) (Tharp et al., 2011). Other DM program components included a parent intervention, a free online training for educators, communication strategies promoted by influential older peers to reinforce messaging from curricula, and local health department capacity building to track TDV related policy and data (Tharp et al., 2011). Due to limitations in the program component engagement data, it was not possible to control for exposure to other DM program components. One reason for focusing on curricular skill-building programming is because it is the most common prevention strategy among evidence-based TDV and bullying prevention interventions (Joseph & Kuperminc, 2020). Another reason for focusing on this facet of the intervention is that violence prevention researchers have called for an

integrated approach to preventing violence throughout development, focusing on healthy relationship skill promotion (Banyard, 2013).

A longitudinal cluster randomized cross-site evaluation was conducted to assess the effects of DM compared against the Safe Dates (SD) program, an evidence-based TDV prevention curriculum that was used as the standard of care. SD is a classroom-based student curriculum (with no additional program components) implemented in the eighth grade only (Foshee et al., 2004). The evaluation sought to assess whether student participants in DM experienced a significant decline in their likelihood of TDV victimization or perpetration above and beyond the prevention effects experienced by participants in the SD program. Evaluation findings documented significant DM program effects on the decreased likelihood of TDV perpetration, TDV victimization, negative conflict resolution strategies with romantic partners (Niolon et al., 2019), cyberbullying, physical violence, and bullying (Vivolo-Kantor et al., 2020). However, overall there were no significant changes in healthy relationship skills over time, and there were no significant differences in healthy relationship skills between interventions (DM vs. SD) (Niolon et al., 2019). Research has not yet assessed whether participants' use of negative conflict resolution strategies with peers and healthy relationship skills with romantic partners might explain the joint prevention effects of DM on bullying and TDV perpetration, focusing on DM participants only.

1.4 Current Study

The purpose of this study is to test the underlying assumption of DM, as a healthy relationship promotion program, that teaching healthy relationship skills and nonviolent conflict resolution skills prevents multiple forms of aggression, in this case, bullying and TDV. Due to multicollinearity among victimization and perpetration measures in this dataset, this study

focused on assessing bullying and TDV perpetration exclusively. Utilizing six waves of longitudinal quantitative questionnaire data from middle school DM participants, this study explores whether this skill-building approach explains joint prevention effects. The first aim of this study is to identify latent classes of bullying and/or TDV perpetration in the fall of the sixth grade (before DM participation) and to assess whether healthy relationship skills (HRS) and negative conflict resolution strategies (NCRS) are associated with class membership at the study's baseline assessment. Consistent with the assumption that skill-building prevents perpetration, it is hypothesized that class membership is significantly correlated with HRS and NCRS. Specifically, before participating in the DM program, it is hypothesized that classes of perpetrators of bullying and/or TDV will have significantly worse HRS and more NCRS than classes of no or low reported perpetration history. Since skill-building is the posited mechanism of joint prevention effects, it is also expected that youth grouped into classes high in the perpetration of bullying and/or TDV will have similar skills deficits in HRS and conflict resolution strategies.

The second aim is to test whether there are gains in participants' HRS and declines in participants' use of NCRS over time, comparing skill development across classes of bullying and TDV perpetration (identified in Aim 1). Do the patterns of change in HRS and NCRS differ across classes of bullying and TDV perpetration (e.g., comparing classes with no/low perpetration to classes of bullying and/or TDV perpetration)? This aim is exploratory since there is a shortage of other research assessing the relative rate of change in these skills among adolescents with different bullying and TDV perpetration histories.

Finally, the third aim is to evaluate whether learning HRS and nonviolent conflict resolution skills is associated with reducing the likelihood of bullying and TDV perpetration over

time. Cross-lagged panel models will be used to assess the temporal relationship between skill development (of HRS and NCRS) and perpetration (of bullying and TDV) over time. It is hypothesized that more HRS are associated with less perpetration cross-sectionally and longitudinally. Similarly, it is also hypothesized that lower levels of NCRS will be associated with less perpetration cross-sectionally and longitudinally.

2 METHOD

2.1 Procedures

Public health departments in Alameda County, CA, Baltimore, MD, Broward County, FL, and Chicago, IL implemented DM. All four public health departments selected ten to 12 neighborhood middle schools in neighborhoods that they determined to be "high-risk," based upon whether they had above-average crime and above-average economic disadvantage compared to the rest of the city or state. From those neighborhoods, 46 schools were randomly assigned to either implement DM or SD during the randomized control trial for four consecutive academic years (2012 – 2016).

Active parental consent was obtained for all youth participants before survey completion, except for those in one of the school districts where passive consent procedures were permitted starting in year two of the project due to difficulty attaining the minimum consent form return rate (60%). The overall consent form return rate across the four sites was 74%, and 78% of the returned forms indicated parental permission to participate. Thus, 58% of all those contacted for recruitment consented to participate (Niolon et al., 2019). Of all the eligible DM students with parental consent to participate in the surveys, 79.7% completed surveys.

Additional information about the recruitment, implementation, and data collection procedures have been reported in published studies (see Niolon et al. 2016, 2019). All

procedures and materials for this study were approved by multiple Institutional Review Boards (IRBs). This secondary data analysis study was approved by the GSU IRB for approval.

2.2 Sample

This study included only DM participants (no SD participants) in schools (n = 25) where the program was implemented. Additionally, this sample includes only students who reported having dated before or during middle school (N = 1,504) and therefore had the opportunity to answer questions about dating outcomes included in these analyses. Since there is some evidence to suggest that students who bully start dating earlier than those who do not bully (Connolly et al., 2000), it is possible that limiting this sample to students who dated in middle school may skew the sample to overrepresent bullies.

Of the sample of 1,504 DM participants from the selected schools, one cohort started sixth grade in 2012 (n = 804) or and one started sixth grade in 2013 (n = 700). This sample was roughly half female (49%). Slightly more than half of the sample identified as Black, non-Hispanic (54%), and around one quarter identified as Hispanic (any race) (27%). The mean age of the sample was 11.99 years old at the baseline survey in the fall of sixth grade (Niolon et al., 2019). Most participants reported being exposed to violence at home or in the community by the 6th-grade fall (83%). At the baseline survey, about half reported living with guardians other than their biological, step, or foster parents (e.g., living with other relatives) (55%), less than a quarter of the sample reported living with two biological parents (23%), and another 14% reported living with a single parent. By the 6th grade fall, nearly all the sample reported having dated (81%). See Table 2 for more information about the sample demographics.

Table 2. Sample Demographics

	N	%
Cohort, Class of 2019	804	53.5
Class of 2020	700	46.5
Sex, Female	740	49.2
Male	764	50.8
Race/ethnicity		
Black, non-Hispanic	817	54.3
Hispanic (any race)	399	26.5
Multiracial	117	7.8
Asian	92	6.1
White	61	4.1
American Indian or Alaskan Native	12	0.8
Native Hawaiian or Pacific Islander	6	0.4
Site, Alameda County	436	29.0
Baltimore	517	34.4
Broward County	283	18.8
Chicago	268	17.8
Exp. to violence, home or comm.	1,255	83.4
Exposure to other DM programing		
Brand Ambassador	1504	100
Parent programming	113	7.5
Age, years, M (SD)[a]	11.99	0.63

	6th grade fall		6th grade spring		7th grade fall		7th grade spring		8th grade fall		8th grade spring	
Guardianship	N	%	N	%	N	%	N	%	N	%	N	%
Single parent	203	13.5	249	16.6	245	16.3	227	15.1	261	17.4	300	19.9
Two biological parents	344	22.9	325	21.6	339	22.5	335	22.3	329	21.9	336	22.3
Stepparent only	125	8.3	163	10.8	133	8.8	132	8.8	107	7.1	143	9.5
Foster parent	4	0.3	5	0.3	3	0.2	2	0.1	1	0.1	---	---
Other guardian	828	55.1	762	50.7	784	52.1	808	53.7	806	53.6	725	48.2
Dating history[b]	1212	80.6	1090	72.5	1150	76.5	1069	71.1	1155	76.8	1191	79.2

[a] Age in November of 6th grade; [b] participants reported whether they had ever dated in 6th grade fall and then whether they had dated in the last 4 months at subsequent survey waves

2.3 Measures

Surveys were administered to DM participants in the fall and spring of their 6th, 7th, and 8th grade years. In the 6th grade fall the baseline surveys were administered, and in the 6th grade spring through 8th grade spring follow-up surveys were administered. The following measures were collected during each of those survey waves. See Appendix A for a full list of the survey items included in this study.

Psychological Bullying Perpetration. The Illinois Bully Scale was used to measure bullying in the last 30 days prior to the participant completing the survey (Espelage & Holt, 2001). Six items were used to measure psychological and relational in-person (not cyberbullying) bullying behavior that occurred at school (e.g. "I upset other students for the fun of it, I helped harass other students, I teased other students"). Students were asked to rate the frequency of engaging in this behavior on a scale from never (1) to 5 or more times (4). Though this measure does not account for intentional nature of bullying, the power differential, or repeated perpetration inherent in the definition of bullying (Gladden et al., 2014; Olweus & Limber, 2010), the Illinois Bully Scale is a commonly used measure of bully perpetration (Espelage et al., 2007; Espelage et al., 2014; Espelage et al., 2018; Foshee, Reyes, et al., 2016; Niolon et al., 2015). Cronbach's alpha for psychological bullying ranged from .84 to .92 across surveys.

Physical Bullying Perpetration. By definition, physical bullying is a subtype of physical peer violence that includes only behaviors that are intended to cause harm, are repeated or have a high likelihood of being repeated (Gladden et al., 2014), and where there is a power imbalance between the person bullied and the perpetration (Olweus, 1996). In practice, however, many studies use measures of the frequency of committing physically violent acts as a proxy for

bullying without controlling for repetition, power imbalance, aggression, and intent to harm (Jia & Mikami, 2018; Vivolo-Kantor, Martell, Holland, & Westby, 2014). In the current study, physical bullying perpetration was measured using two items: 1) In the last six months (baseline)/four months (follow-up), how often did you attack someone with the idea of seriously hurting them?; 2) How often did you get into a serious physical fight? Participants responded on a scale from never (1) to 5 or more times (4). Cronbach's alpha for physical bullying ranged from .42 to .74 across surveys.

Relationship status. Participants were asked whether they had ever dated ("Have you ever DATED someone you are/were seeing or going out with?"). They were also asked how many dating partners they had had since they began dating (baseline survey) or in the last 4 months (follow-up surveys) ("How many different people have you dated since you began dating?"). At each wave of data collection, only those who responded that they had dated at least one partner within that time period were asked subsequent questions about TDV.

TDV perpetration. Participants were asked whether they had engaged in specific aggressive behaviors with a past or current boyfriend or girlfriend within the response period on a scale from never (1; this has never happened in your relationship) to often (4; this has happened 6 or more times in your relationship). During the baseline survey, participants were asked if they ever engaged in these behaviors, and during the follow-up surveys participants were asked if they had engaged in these behaviors in the last 4 months. See below for a description of the specific items used to measure physical and psychological TDV.

Psychological TDV perpetration. Eighteen items from the Conflict in Adolescent Dating Relationships Inventory (Wolfe et al., 2001) were used to assess threatening behaviors (5 items; e.g. "I deliberately tried to frighten him/her"), relational abuse (3 items; e.g. "I tried to turn

his/her friends against him/her") and emotional/verbal abuse (10 items; "I insulted him/her with put-downs") perpetration. Cronbach's alpha for psychological TDV perpetration ranged from .87 to .91 across surveys.

Physical TDV perpetration. Four items from the Conflict in Adolescent Dating Relationships Inventory (Wolfe et al., 2001) were used to assess physical abuse (e.g. "I threw something at him/her"). Another five items from the Safe Dates scales were used to assess more severe physical abuse and threatening violence with a weapon (e.g. "I choked him/her") (Foshee et al., 1998). Cronbach's alpha for physical TDV perpetration ranged from .84 to .92 across surveys.

Negative conflict resolution skills. Twelve items from the Conflict Resolution Style Inventory were used to measure how often participants engaged in negative behaviors in a conflict situation with a romantic partner in the last four months on scale from never (1) to always (5) (Kurdek, 1994). Data were imputed for participants who had not dated in the last four months as if they had reported dating. This measure included three subscales of four items each: compliance (e.g. "not being willing to stick up for myself"), conflict engagement (e.g. "exploding and getting out of control"), and withdrawal (e.g. "remaining silent for long periods of time"). Cronbach's alpha ranged from .88 to .92.

Healthy Relationship Skills. Four items adapted from the Supporting Healthy Marriage Study were used to measure positive relationship skills (Miller Gaubert, Gubits, Principe Alderson, & Knox, 2012). Participants were asked to report on the frequency of use of these healthy relationship skills (e.g. "My boyfriend/girlfriend is/was honest and truthful with me" and "My boyfriend/girlfriend and I work(ed) as a team") in their most recent dating relationship on a scale from never (1) to always (4). Cronbach's alpha ranged from .90 to .94.

2.4 Data Analysis

2.4.1 Preliminary Analyses

Preliminary analyses were conducted using SPSS (Version 25) to check for the presence of outliers. Measures of HRS and NCRS were standardized using the percentage of maximum scaling (POMS), which range from 0 (lowest possible score) to 100 (highest possible score). The advantage of using POMS is that it expresses all indicators on the same metric, which can facilitate ease of comparison across related scales (Cohen, Cohen, Aiken, & West, 1999). Correlations were used to examine the bivariate associations among key study variables and to identify what potential covariates would be included in study analyses.

Indicators of which school the student attended were used to cluster analyses, since DM participants in the sample attended 25 schools in four urban neighborhoods. After testing which sample characteristics were associated with the key study variables, the following covariates were selected: exposure to violence in the community and at home (0=has not witnessed violence, 1=has witnessed violence), cohort. All models clustered data by middle school and controlled for the selected covariates. The remainder of the analyses were conducted using MPlus Version 8.4 (Muthén & Muthén, 2010).

Multiple imputation of missing data was previously conducted using PcAux. The imputation was based on all available student responses and school-level information (Niolon et al., 2019). See Niolon et al. (2019) for details on the imputation process. This study utilized the grand mean data set generated as a summation of the 100 imputed data sets.

2.4.2 Primary Analyses

To test Aim 1, latent class analysis (LCA) was used to identify empirically derived classes of co-occurring dating, bullying perpetration, and TDV perpetration at baseline before

DM participation. Given the low base rate of perpetration, bullying and TDV perpetration frequency measures were collapsed into five separate dichotomous indicators of physical TDV, psychological TDV, psychological bullying, physical bullying (1= any perpetration, 0= no perpetration), and dating (1= any history of dating, 0=no history of dating). The Bayesian Information Criterion (BIC) and the Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR-LRT) fit indices were used to determine the number of classes. Significant p-value for the VLMR-LRT test indicates that the model with *k* number of classes is favored over the model with k-1 number of classes (Lo, Mendell, & Rubin, 2001). BIC values are used to compare across plausible models, and the model with the lowest BIC value indicates the best fitting model (Nylund, Asparouhov, & Muthén, 2007). Next, distal outcomes were added to HRS and NCRS across the latent classes of bullying and/or TDV perpetration. The HRS and NCRS models were run separately. The manual BCH two-step method was used to conduct a multiple group comparison of the HRS and NCRS means across the latent classes. The BCH approach is used to generate weights to reflect the measurement error of the latent class. Those weights are used in the estimation of an auxiliary model; in this case to estimate the mean differences in HRS and NCRS across the latent classes of baseline perpetration (Asparouhov & Muthen, 2014).

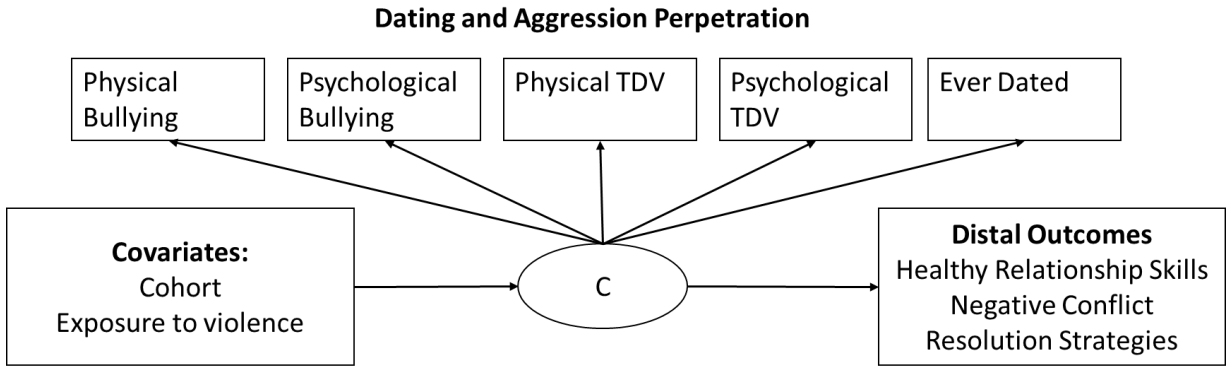

Figure 2. Analytic Model Using Latent Class Analysis to Empirically Derive Classes of Co-occurring Dating, Bullying Perpetration, and TDV Perpetration at Baseline

For Aim 2, latent growth curve models were used to assess HRS and NCRS development over six assessments spanning three years. First, an unconditional latent growth curve model was tested. Next, conditional latent growth curve models with linear and quadratic growth factors were tested against one another. Fit indices were used to assess the patterns of change (linear and quadratic) in HRS and NCRS skills over time. Using the BCH method to retain latent class weights of bullying, dating, and TDV perpetration assessed in Aim 1 (Asparouhov & Muthen, 2014), multiple group comparisons were then made to assess differences in the rate of change of HRS and NCRS over time across latent classes of baseline perpetration. Comparing the slope of the rate of change of these skills between perpetration groups allowed for consideration of whether participants with a history of bullying and/or TDV perpetration at baseline were able to learn HRS and NCRS at a rate commensurate with non-perpetrating peers. Wald difference tests were used to test whether the differences among intercepts, linear and quadratic slopes differed significantly by class (Muthen, 2010).

To test Aim 3, a cross-lagged panel model was used to assess whether development of HRS was related to changes in bullying and TDV perpetration over time. A separate model evaluated whether NCRS was related to changes in bullying and TDV perpetration over time. Cross-lagged panel models allow for estimation of autoregressive effects that link past and future behavior, also referred to as stability, (e.g. likelihood of bullying in 6th grade spring given perpetration in 6th grade fall) cross-sectional correlations among different variables at a given wave of data (e.g. association between HRS and TDV perpetration in 6th grade spring), and cross-lagged effects testing the association of one variable with subsequent levels of another (e.g. HRS reported in 7th grade spring predicting TDV perpetration in 8th grade fall) (Zyphur et al., 2020). Given the number of indicators in one model, psychological and physical bullying were

collapsed into one indicator assessing overall bullying and psychological and physical TDV perpetration were collapsed one indicator assessing perpetration of TDV (1= any perpetration, 0= no perpetration). Because youth who were not dating were by definition not engaging in TDV, to control for variable dating across waves an indicator of whether the participant reported dating in that wave was included in the models (1=dating, 0=no dating).

3 RESULTS

3.1 Descriptive Statistics

Table 3 displays prevalence rates of TDV and bullying perpetration as well as exposure to violence. Table 4 shows mean HRS, and NCRS across all six waves of data. The prevalence of perpetration differed by aggression subtype; psychological TDV perpetration was the most common form of aggression (prevalence rates for perpetration ranged from 56.9% to 66.8% across waves) and psychological bullying perpetration was the next most common (prevalence rates ranged from 27.6% to 42.2% across survey waves). The mean value of HRS was above 70 POMs across all waves of data, meaning most participants reported being honest, working through differences, discussing disagreements respectfully and working well as a team. The mean value of NCRS was less than 29 POMs across all waves of data, meaning most participants reported infrequent use of withdrawal, conflict engagement, and compliance.

Table 3. Descriptive Statistics for TDV Perpetration, Bullying Perpetration, and Exposure to Violence (N=1504)

Measure	6th grade				7th grade				8th grade			
	Fall		Spring		Fall		Spring		Fall		Spring	
	N	%	N	%	N	%	N	%	N	%	N	%
Physical TDV Perpetration	430	28.6	542	36.0	338	22.5	313	20.8	451	30.0	360	23.9
Psychological TDV Perpetration	917	61.0	1005	66.8	856	56.9	901	59.9	937	62.3	874	58.1
Physical Bullying Perpetration	500	33.2	391	26.0	325	21.6	402	26.7	364	24.2	227	15.1
Psychological Bullying Perpetration	415	27.6	605	40.2	496	33.0	634	42.2	557	37.0	509	33.8
Exposure to violence (at home or in community)	991	65.9	558	37.1	583	38.8	549	36.5	527	35.0	444	29.5

Table 4. Descriptive Statistics for Healthy Relationship Skills and Negative Conflict Resolution Strategies (N=1504)

Measure	6th grade				7th grade				8th grade			
	Fall		Spring		Fall		Fall		Spring		Fall	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Healthy Relationship Skills	70.94	19.81	74.44	17.85	72.56	16.18	76.77	15.78	74.92	15.47	75.26	16.41
Negative Conflict Resolution Strategies	27.59	7.94	27.15	7.96	27.68	7.63	28.58	7.28	28.54	7.35	28.97	7.48

3.2 Correlations among Study Variables

See Table 5 for correlations among all study variables at baseline (6th grade fall). Correlations among study variables for each of the five subsequent waves of survey data were similar (see Appendix B). All the aggression perpetration variables were significantly and positively correlated with one another. NCRS and exposure to violence in the home or community were both positively associated with all forms of aggression perpetration. HRS were significantly and negatively associated with physical TDV perpetration. There was no significant correlation between HRS and psychological TDV, psychological bullying or physical bullying perpetration.

Among key study variables, the retest correlations from one wave to the next for physical TDV perpetration ranged from .37 to .50. For psychological TDV perpetration, the retest correlations ranged from .31 to .38. For physical bullying perpetration, the retest correlations ranged from .36 to .41 and for psychological bullying perpetration, the retest correlations ranged from .35 to .47. The retest correlations for HRS ranged from .40 to .58, and for NCRS the retest correlations ranged from .46 to .72.

Table 5. Correlations among All Study Variables, 6th Grade Fall

	1	2	3	4	5	6	7
1. Physical TDV	1						
2. Psychological TDV	.46*	1					
3. Physical Bullying	.23*	.28*	1				
4. Psychological Bullying	.17*	.20*	.35*	1			
5. Healthy Relationship Skills	-.11*	-.02	.02	-.05	1		
6. Negative Conflict Resolution Strategies	.26*	.24*	.28*	.27*	-.00	1	
7. Cohort	-.04	.01	.07*	-.00	.05*	.07*	1
8. Exposure to violence	.13*	.21*	.29*	.21*	.06*	.24*	.01

Note: TDV= teen dating violence

3.3 Description of Exposure to Other DM Program Components

Though the DM program involved multiple components, this project focused on the classroom programming only. Across four waves of follow-up data when students were asked about parent programming (seventh grade fall through eighth grade spring), only 113 students reported that their parents had participated in programming focusing on communication, dating or healthy relationships. Due to the high rate of missing data (88.23%), parent participation in DM programming was not included as a covariate. Every participant reported being exposed to the DM youth-focused communication programming in middle school. Due to the limited variability, this was not included as a covariate in the models. It is possible that participants may have had variable exposure to other programmatic components and this limitation will be addressed further in the discussion section (see page 72).

3.4 Latent Class Analysis of Baseline Dating, & Bullying and TDV Perpetration

To assess whether those with a history of perpetrating bullying and TDV tended to have worse HRS and more NCRS relative to non-perpetrating peers, first a latent class model was fit to psychological bullying, physical bullying, psychological TDV, physical TDV, and dating in the 6th grade fall. Fit indices were compared for models with different numbers of classes to determine the optimal model (see Table 6). Both the BIC and VLMR-LRT tests suggested that a 3-class model best fit best, with an entropy of .752. Additionally, the 3-class model was most interpretable. See Figure 3 for the class structure. There was little variability in the probability of dating across classes, varying from 71.4% to 87.3%. A *Low Perpetration* class was identified that included 37.9% of the sample. For adolescents in this class, the probability of perpetrating any form of aggression was less than or equal to 15%. On the other end of the spectrum, a *TDV & Bullying* class was identified which consisted of 34.1% of the sample. Participants in this class

had a 50% probability of perpetrating physical TDV and psychological bullying, a near 100% probability of perpetrating psychological TDV, and a 73% probability of perpetrating physical bullying. Last, a *TDV Only* class was identified for 28.0% of the sample. Individuals in this class had a less than 10% probability of perpetrating psychological or physical bullying, a 34% probability of perpetrating physical TDV, and over a 90% probability of perpetrating psychological TDV.

Table 6. Fit Statistics and Classification Coefficients: Dating & Baseline Perpetration of Psychological TDV, Physical TDV, Psychological Bullying, and Physical Bullying—Latent Class Analysis Models

Model	Log likelihood	AIC	BIC	SABIC	VLMR-LRT *p*	Entropy
1-class	Model would not run with auxiliary variables on a single class					
2-classes	-4158.756	8339.511	8397.986	8363.042	0.0000	.671
3-classes	-4114.081	8262.162	8352.532	8298.527	0.0077	.752
4-classes	-4100.530	8247.061	8369.326	8296.261	0.2488	.807

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; SABIC = sample size-adjusted Bayesian information criterion; VLMR-LRT = Vuong-Lo-Mendell-Rubin-likelihood ratio test; Covariates included: exposure to violence, cohort; data clustered using middle school.

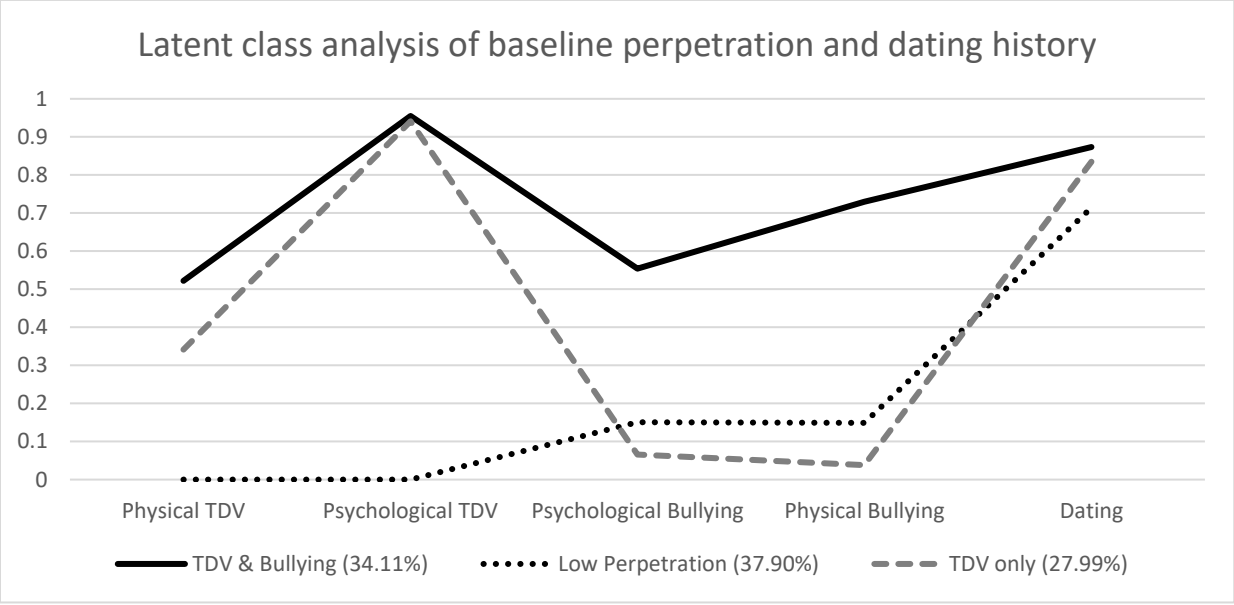

Figure 3. Conditional Item Probability Plot: Baseline Perpetration, 3-class Model with Covariates. Class prevalence in parentheses.

Results of the multinomial logistic regression of covariates on class membership demonstrated that there was no significant effect of cohort on latent class of baseline perpetration (TDV & Bullying: B = 0.09, SE = 0.17, p = .592; TDV only: B = -0.15, SE = 0.18, p = .388, with the Low Perpetration class as the reference group). Having been exposed to violence in the home or community significantly and positively predicted class membership in the TDV & Bullying class compared to the Low Perpetration class (B = 1.92, SE = 0.21, p < .001) but did not significantly predict membership in the TDV only class (B = 0.10, SE = 0.11, p = .370). This result suggests that a history of exposure to violence may be a particularly important risk factor for perpetrating both bullying and TDV.

3.5 Relationship Between Exogenous Variables and TDV/Bullying Class Membership

Next, Wald difference tests were used to test differences in HRS and NCRS across latent classes of baseline bullying and TDV perpetration (discussed above). There was no significant difference in HRS across the three latent classes of baseline perpetration (W = 1.32, p = 0.516). However, there was a significant difference in NCRS among the three classes (W = 17.40, p < .001). Those in the TDV & Bullying class tended to report using more NCRS (*M = 3.66, SE =0.22,* p < .001) than those in the Low Perpetration class (M = 3.26, SE = 0.13, p <.001, W = 23.99, p < .001) and those in the TDV perpetration only class (*M = 3.52, SE = 0.14,* p <.001, W = 16.25, p <.001). This finding indicates use of NCRS could be related to perpetration of multiple forms of aggression.

3.6 Latent Growth Analysis of Healthy Relationship Skills

Latent growth curve modeling specifying linear and quadratic change in HRS was used to address research questions about skill acquisition over the course of the DM program. The quadratic model of growth in HRS produced the better fitting and more parsimonious model (χ^2

= 197.979, p <.01; RMSEA = .082, CFI = .870; AIC = 74926.922, BIC = 75038.555; comparing the quadratic to linear models $\Delta\chi^2$ = 168.048, Δdf = 6, p <.001)) model. Overall, though, neither the linear nor quadratic growth models fit the data well. See Appendix D for the standardized latent growth model results and see Table 7 for the unstandardized results. The unstandardized mean level of HRS at Wave 1 was 68.35 (SE = 1.13 p <.001), indicating that before starting the DM program, on average, participants already reported a high level of HRS. The intercept (Var_{res} = 322.40, *SE* = 17.49, p <.001), linear slope (Var_{res} = 126.43, *SE* = 9.23, p <.001), and quadratic slope (Var_{res} = 3.39, *SE* = 0.29, p <.001) varied significantly between-subjects, suggesting that there were significant individual differences in the initial level and change in HRS. On average, there was a significant, positive linear slope (M_{slope} = 3.41, *SE* = 0.86, p <.001*)*, but the quadratic slope (M_{slope} = -0.32, *SE* = 0.17, p =.056*)* for relationship skills over time did not reach significance. See Appendix D for standardized results. The R square statistics for the growth curve factors are all less than 0.01, indicating that the proportion of the variance in the observed measures that is explained by the growth curve factors is less than 1%. This suggests that most of the observed change is not related to time. Additionally, the linear (r = -0.74 , p<.01) and quadratic (r = .54, p<.01) slopes were correlated with the intercept, such that the lower the participant's intercept was, the steeper his or her HRS growth was over time.

The growth models controlled for effects of cohort and exposure to violence at home and in the community (at Wave 1) on the intercept and slopes. Exposure to violence and cohort were significantly associated with the intercept of HRS, but not to the linear or quadratic slope (see Table 7). Those who reported being exposed to violence were also more likely to report more HRS at wave 1. Those in the later cohort were more likely to report a higher level of HRS a wave 1.

Table 7. Final Latent Growth Model for Healthy Relationship Skills over Time, includes Full Sample Results and Results by Latent Class of Bullying and TDV Perpetration, Unstandardized

	Intercept			Linear slope			Quadratic slope		
	B	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Full sample	68.35	1.13	0.000	3.41	0.86	0.000	-0.32	0.17	0.056
Exposure to violence	2.17	0.86	0.012	-1.00	0.77	0.198	0.00	0.15	0.978
Cohort	2.48	1.12	0.027	-0.72	0.77	0.355	0.00	0.14	0.991
Low Perp. Class	71.49	1.25	0.000	2.71	0.73	0.000	-0.32	0.13	0.010
TDV Only Class	71.18	0.93	0.000	2.83	1.00	0.004	-0.31	0.21	0.141
TDV & Bully. Class	70.66	0.87	0.000	1.73	0.63	0.006	-0.31	0.13	0.016

Note: Low Perp. Class= Low Perpetration Class; TDV & Bully. Class= TDV & Bullying Class

3.7 Relationship Between Trajectory of Healthy Relationship Skills and TDV/Bullying Latent Class Membership

Next, Wald difference tests were used to compare the intercept, linear slope, and quadratic slope of the latent growth curve of HRS across the latent classes of bullying and TDV perpetration reported above. There were no significant differences in the intercept ($W = 0.26$, $p = .88$), linear slope ($W = .95$, $p = .62$) or quadratic slope ($W = .01$, $p = .99$) across classes. This suggests that those with a history of perpetrating bullying and/or TDV did not differ in reports of HRS over time compared to their peers with no history of perpetrating bullying or TDV.

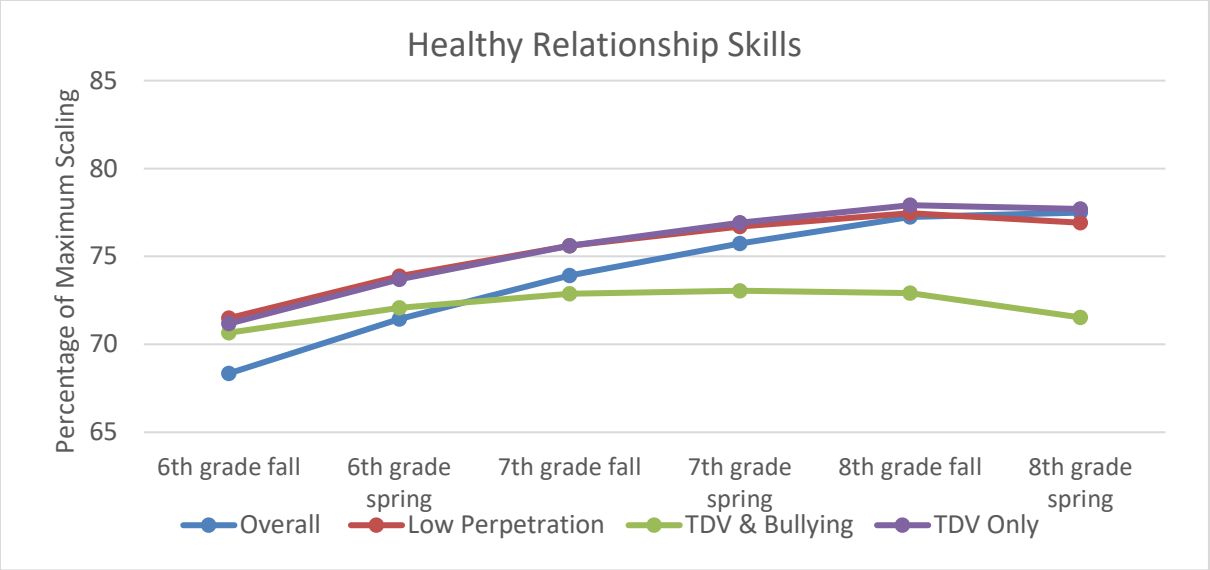

Figure 4. Latent Growth Curves of Healthy Relationship Skills by Latent Class of TDV and Bullying Perpetration, Unstandardized Using POMS Scale

3.8 Latent Growth Analysis of Negative Conflict Resolution Strategies

Latent growth curve modeling specifying linear and quadratic change in NCRS was used to address research questions about skill acquisition over the course of the DM program. The quadratic model of growth in NCRS produced the best fitting and most parsimonious model (χ^2 = 130.771, p <.01; RMSEA = .054, CFI = .955; AIC = 57057.978, BIC = 57169.612; comparing the quadratic to linear models $\Delta\chi^2$ = 56.083, Δdf = 6, p <.001). See Table 8 for the unstandardized latent growth curve model results for NCRS. In the quadratic model, the unstandardized mean level of NCRS at Wave 1 was 24.18 (SE = 0.35, p <.001), indicating that before starting the DM program, on average, participants reported using NCRS infrequently. The intercept (Var_{res} = 25.11, *SE* = 1.99, p < .001), linear slope (Var_{res}= 2.14, *SE* = 0.92, p = .020), and quadratic slope (Var_{res} = 0.13, *SE* = 0.03, p < .001) varied significantly between-subjects, suggesting that there were significant individual differences in the initial level in NCRS and change in those strategies over time. On average, there was no overall significant linear (M_{slope} = 0.27, *SE* = 0.16, p = .088*)* or quadratic (M_{slope} = 0.04, *SE* = 0.03, p = .200*)* change in NCRS over

time. The R square statistics for the growth curve factors are small ($R^2_{intercept}$ = .129, p <.001; $R^2_{lin\ slope}$ = .001, p = .769; $R^2_{quad\ slope}$ = .004, p = .514). This suggests that most of the observed change is not related to time. The correlations between the intercept and the linear slope (r = .28, p = .146) and between the intercept and the quadratic slope (r = -0.17, p = .132) were not significant, indicating that the rate of change in NCRS did not differ based on the starting level of NCRS.

The growth models controlled for cohort and exposure to violence (at Wave 1) on the intercept and slopes. Exposure to violence and cohort were significantly associated with the NCRS intercept at Wave 1, but not to the linear or quadratic slope. Those who reported being exposed to violence were also more likely to report more frequent use of NCRS at wave 1. Those in the later cohort were more likely to report a higher level of NCRS a wave 1.

Table 8. Final Linear Growth Model for Negative Conflict Resolution Strategies over Time, includes Full Sample Results and Results by Latent Class of Bullying and TDV Perpetration, Unstandardized

	Intercept			Linear slope			Quadratic slope		
	B	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Intercept	24.18	0.35	0.000	0.27	0.16	0.088	0.04	0.03	0.200
Exp. to violence	3.98	0.48	0.000	-0.05	0.25	0.847	0.00	0.05	0.945
Cohort	0.77	0.37	0.036	0.10	0.18	0.553	-0.05	0.03	0.176
Low Perp. Class	23.61	0.40	0.000	0.09	0.22	0.676	0.07	0.04	0.051
TDV Only Class	24.02	0.49	0.000	0.54	0.30	0.068	-0.04	0.05	0.404
TDV & Bully. Class	29.65	0.68	0.000	-1.07	0.44	0.015	0.26	0.08	0.001

Note: Low Perp. Class= Low Perpetration Class; TDV & Bully. Class= TDV & Bullying Class

3.9 Relationship Between Trajectory of Negative Conflict Resolution Strategies and TDV/Bullying Latent Class Membership

Next, Wald difference tests were used to compare the intercept, linear slope, and quadratic slope of the latent growth curve of NCRS across the latent classes of bullying and TDV perpetration reported above. There were significant differences in the intercept (W = 69.68, p <

.001), linear slope (W = 9.73, p = .007), and quadratic slope (W =12.18, p = .002) across classes. Those in the TDV & Bullying class had a significantly more negative linear slope than those in the Low Perpetration class (W = 7.48, p <.001) and those in the TDV only class (W = 9.12, p<.001). The quadratic slope of the TDV & Bullying class was significantly larger than the Low Perpetration class (W = 7.35, p < .001), and the quadratic slope of the Low Perpetration class was significantly larger than the TDV only class (W = 3.99, p = 0.046). Those in the TDV & Bullying class tended to decrease the frequency of their use of NCRS in the 6th grade, and then increase their frequency of use from the 7th grade spring through the 8th grade spring. Those in the Low Perpetration and TDV only class showed an overall slight increase in their frequency of NCRS use, however the shape of that rate of change varied slightly between classes. The Low Perpetration class had a slightly more curved slope whereas the TDV Only class had a more linear slope.

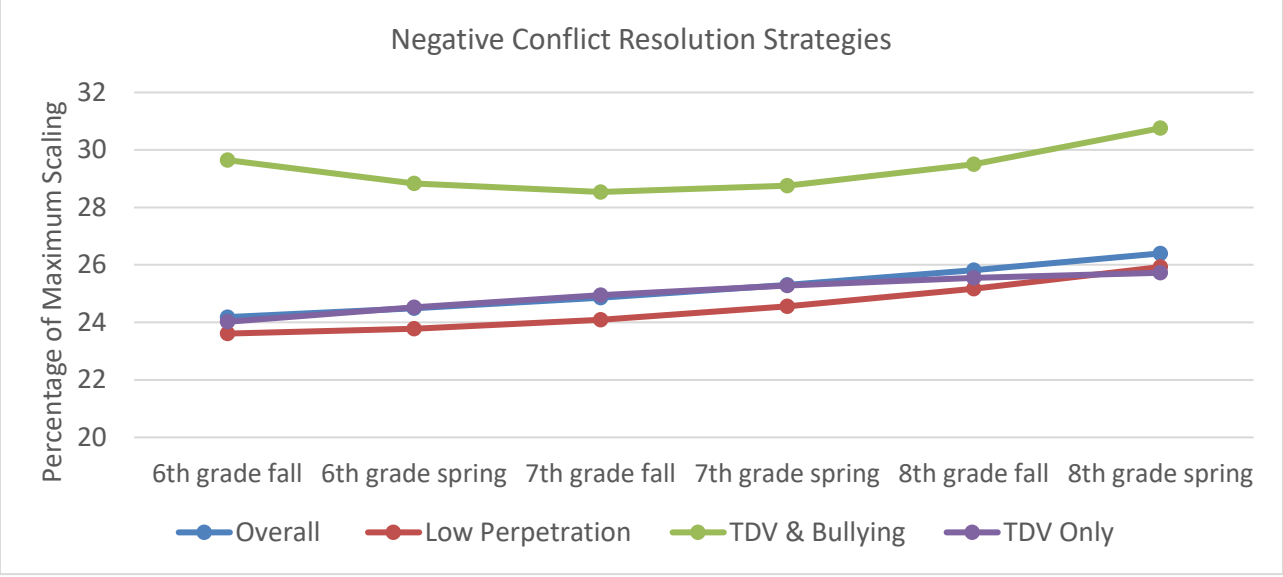

Figure 5. Latent Growth Curves of Negative Conflict Resolution Strategies by Latent Class of TDV and Bullying Perpetration, Unstandardized Using POMS Scale

3.10 Cross-lagged Panel Model with Healthy Relationship Skills

To evaluate whether learning HRS was associated with a reduction in the likelihood of perpetrating bullying and TDV overtime, a cross-lagged panel model was used to examine the cross-sectional and longitudinal relationships among bullying perpetration, TDV perpetration, dating, and HRS in DM participants throughout middle school (See Figure 6). The model demonstrated adequate fit, $\chi^2(152) = 232.185$, $p < .01$, RMSEA = .019, CFI = .981. Significant autoregressive effects were identified for HRS, bullying, TDV, and dating. See Appendix C for a table with all model parameters.

Healthy Relationship Skills Predicting Bullying and TDV. HRS was consistently cross-sectionally negatively correlated with both bullying and TDV. The cross-sectional correlations of HRS with bullying were significant in 6th grade spring, 7th grade fall, and 7th grade spring, with correlations ranging from -.108 to -.091. Similarly, the cross-sectional correlations of HRS with TDV were significant across all survey waves except 6th grade fall, with correlations ranging from -.089 to -.057.

After accounting for the significant cross-sectional associations, the cross-lagged effects showed that HRS was also significantly and negatively associated with later bullying and TDV perpetration, however not across all waves. HRS in the 8th grade fall was significantly and negatively associated with bullying in the 8th grade spring, ß = -.071. HRS in the 6th grade fall was significantly and negatively associated with TDV in the 6th grade spring, ß = -.157. Unexpectedly, HRS in the 6th grade spring was significantly and positively associated with TDV in the 7th grade fall, ß = .050.

Reverse cross-lagged effects showed that aggression was negatively associated with later HRS, however not across all waves. Bullying was significantly and negatively associated with

HRS from 6th grade fall to spring and from 8th grade fall to spring, with beta weights of -.056 and -.125 respectively. TDV was also significantly and negatively associated with later HRS from 7th grade fall to spring and from 7th grade spring to 8th grade fall, with beta weights of -.104 and -.116 respectively.

Bullying and TDV. After accounting for the significant and positive cross-sectional associations of bullying with TDV, both forms of aggression were positively associated longitudinally with bullying more often preceding TDV. For the cross-lagged effects, bullying was significantly associated with later TDV across all waves of survey data with beta weights ranging from .239 to .290. However, the only significant cross-lagged effect between TDV and later bullying was from 6th grade fall to spring with a beta weight of .179. In all these significant paths, the associations were positive, such that perpetrating one form of aggression was associated with perpetration of another. Similar with other longitudinal research about trajectories of perpetration (Espelage et al., 2014; Foshee, Benefield, et al., 2016), bullying was more likely to predict TDV perpetration than TDV was to predict bullying.

Dating. After accounting for the significant positive cross-sectional associations of HRS with dating, cross-lagged effects demonstrated a reciprocal positive relationship between HRS and dating. HRS was significantly associated with later dating from 6th grade fall to spring, from 7th grade fall to spring, and from 8th grade fall to spring, with beta weights ranging from .076 to .090. Dating was significantly associated with HRS from 6th grade spring to 7th grade fall and from 7th grade fall to spring, with beta weights of .141 and .096 respectively.

Though dating was associated with more interpersonal skillfulness, it was also intermittently related to increased risk of bullying and TDV perpetration over time. After accounting for the significant associations of dating with bullying and TDV cross-sectionally,

several cross-lagged effects emerged in which aggression and dating were reciprocally related over time. Bullying was significantly associated with later dating from 7th grade fall to spring and from 7th grade spring to 8th grade fall, with beta weights of .123 and .095 respectively. TDV was associated with later dating from 6th grade fall to spring, with a beta weight of .095. On the other hand, dating in 6th grade fall was significantly associated with bullying in 6th grade spring (ß = .088) and dating was associated with later TDV from 6th grade spring to 7th grade fall, from 7th grade fall to spring, and from 8th grade fall to spring (beta weights ranged from .088 to .111). These significant cross-lagged associations were all positive except that dating in the 7th grade spring was negatively associated to TDV perpetration in 8th grade fall.

3.11 Cross-lagged Panel Model with Negative Conflict Resolution Strategies

To evaluate whether learning to use fewer negative conflict resolution strategies (NCRS) was associated with a reduction in the likelihood of perpetrating bullying and TDV overtime, a cross-lagged panel model was used to examine the cross-sectional and longitudinal relationships among bullying perpetration, TDV perpetration, dating, and NCRS in DM participants throughout middle school (See Figure 7). The model fit the data, $\chi 2(152) = 236.666$, $p < .01$, RMSEA = .019, CFI = .988. Significant autoregressive effects were identified for NCRS, bullying TDV, and dating. See Appendix D for a table with all model estimates.

Negative Conflict Resolution Strategies Predicting Bullying and TDV. NCRS was consistently cross-sectionally correlated with both bullying and TDV. The cross-sectional correlations of NCRS with bullying were significant and positive in 6th grade fall, 6th grade spring, 7th grade spring, and 8th grade spring, with correlations ranging from .113 to .310. Similarly, the cross-sectional correlations of NCRS with TDV were significant and positive in 6th

grade fall, 6th grade spring, 7th grade spring, and 8th grade spring, with correlations ranging from .112 to .241.

After accounting for the significant cross-sectional associations, the cross-lagged effects showed that NCRS were also significantly and positively associated with later bullying across one survey wave, and positively associated with later TDV consistently across time. NCRS in 6th grade fall was significantly associated with bullying in 6th grade spring, ß = .250. NCRS was significantly associated with later TDV across all survey waves, with beta weights ranging from .098 to .192.

Reverse cross-lagged effects showed that aggression was also positively associated with later NCRS. Bullying was positively and significantly associated with later NCRS in all but one survey wave, with beta weights ranging from .062 to .142. TDV was also positively and significantly associated with later NCRS from 6th grade fall to spring, 7th grade fall to spring, and 8th grade fall to spring, with beta weights ranging from .053 to .087.

Bullying and TDV. These results resembled those in the cross-lagged model with HRS in terms of which paths were significant as well as the direction of associations.

Dating. After accounting for the significant negative cross-sectional associations of NCRS with dating, cross-lagged effects demonstrated a reciprocal and mostly negative relationship between NCRS and dating across time. NCRS was significantly associated with later dating from 6th grade fall to spring, from 6th grade spring to 7th grade fall, and from 7th grade spring to 8th grade fall. The path between NCRS in 7th grade spring and dating in the 8th grade fall was positive, however the other paths were negative, with beta weights ranging from -.146 to .109. Dating was significantly and negatively associated with later NCRS from 6th grade fall to spring, from 7th grade spring to 8th grade fall, and from 8th grade fall to spring, with beta weights

ranging from -.106 to -.058. Thus, dating tended to be related to less negative skill use and less negative skill use tended to be related to an increased rate of dating (except between 7th grade spring and 8th grade fall).

As in the cross-lagged panel model with HRS, dating, bullying and TDV were reciprocally related over time. Bullying was significantly and positively associated with later dating from 6th grade fall to spring, 6th grade spring to 7th grade fall, and 7th grade fall to spring, with beta weights ranging from .106 to .148. TDV was significantly and positively associated with later dating from 6th grade fall to spring and negatively associated from 7th grade spring to 8th grade fall, with beta weights of .128 and -.101 respectively. For the reverse paths, dating was significantly and positively associated with later bullying from 6th grade fall to spring with a beta weight of .122. Dating was also significantly and positively associated with later TDV from 6th grade spring to 7th grade fall and from 8th grade fall to spring with beta weights of .126 and .150 respectively. Though some of the specific paths differed slightly between the cross-lagged model with HRS and with NCRS, there was an overall trend in which dating, bullying, and TDV were often significantly and positively associated cross-sectionally and longitudinally.

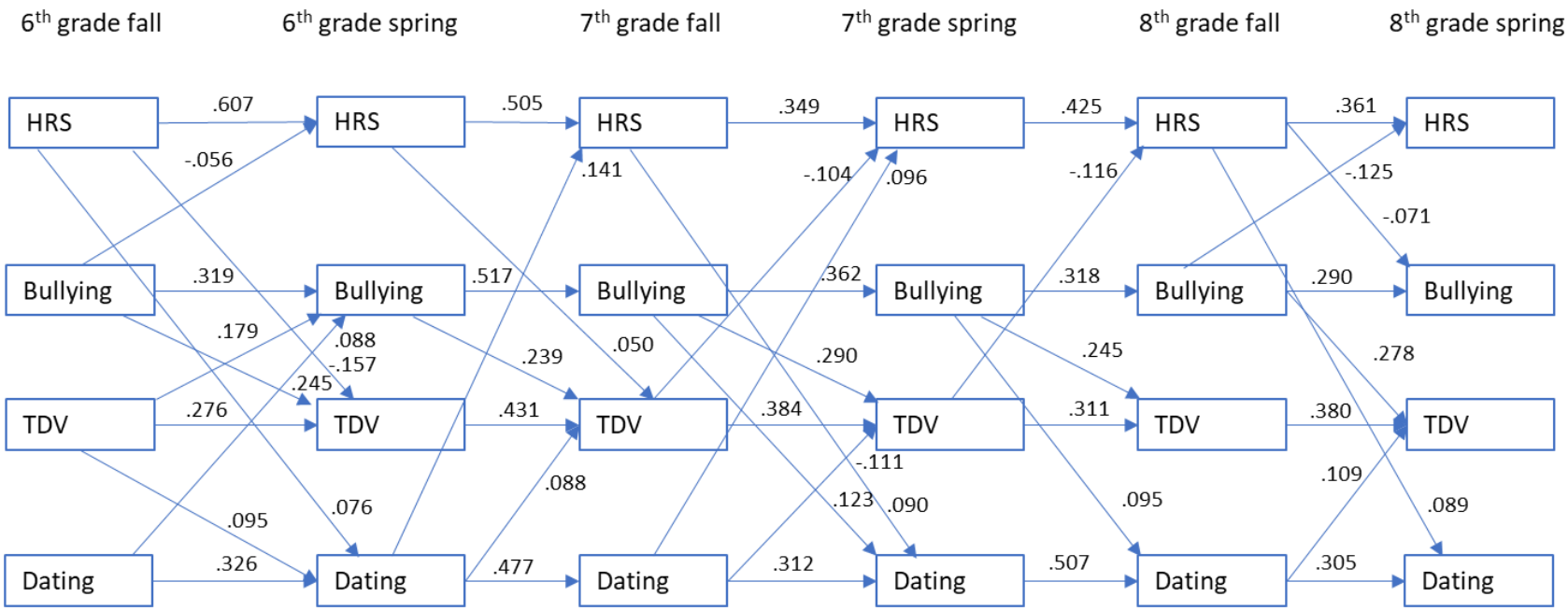

Figure 6. Cross-lagged Panel Model Depicting the Cross-sectional and Longitudinal Relationships among Healthy Relationship Skills, Bullying, TDV, and Dating

Note: Standardized Betas (ß) are shown. $\chi^2(152) = 232.185$, $p<.01$, RMSEA = .019, CFI = .981. Additional autoregressive paths, covariates, and cross-sectional correlations at each survey wave were included in the model but were not shown in the figure to reduce complexity. Only statistically significant pathways are depicted; HRS = healthy relationship skills; TDV = teen dating violence

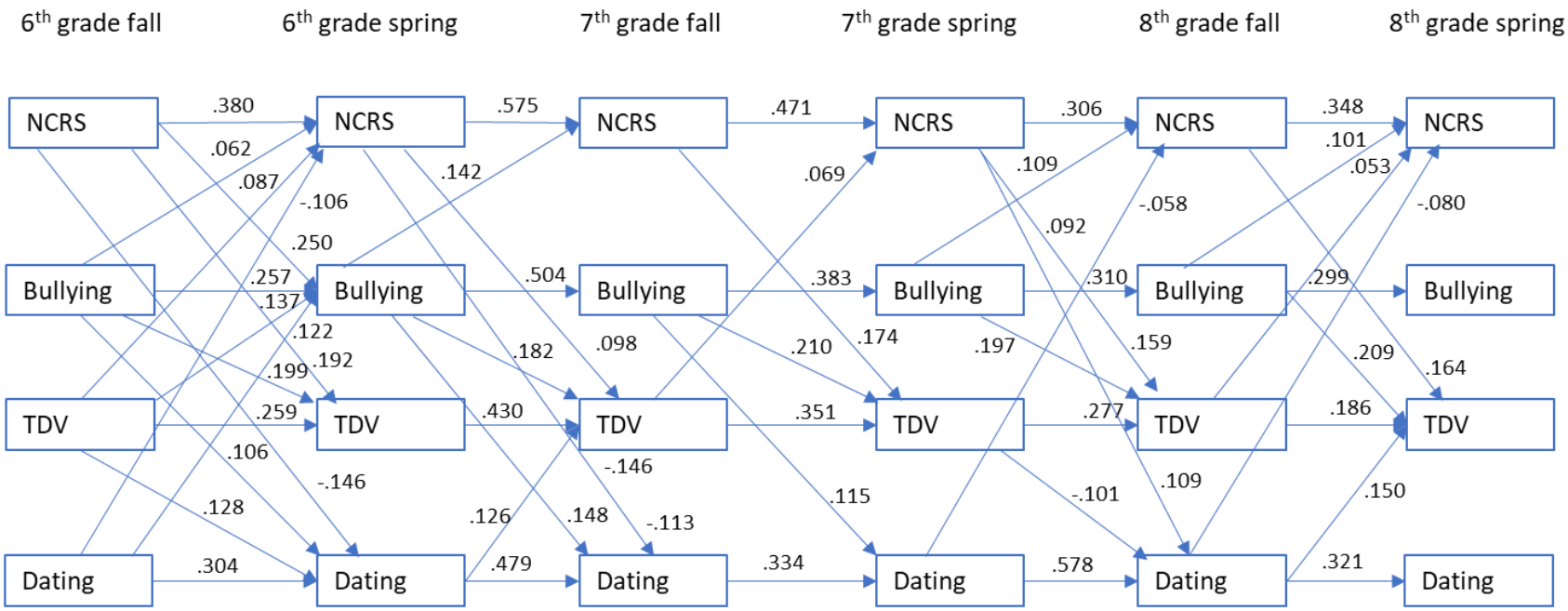

Figure 7. Cross-lagged Panel Model Depicting the Cross-sectional and Longitudinal Relationships among Negative Conflict Resolution Strategies, Bullying, TDV, and Dating

Note: Standardized Betas (ß) are shown. $\chi^2(152) = 236.666$, $p<.01$, RMSEA = .019, CFI = .988. Additional autoregressive paths, covariates, and cross-sectional correlations at each survey wave were included in the model but were not shown in the figure to reduce complexity. Only statistically significant pathways are depicted; NCRS = negative conflict resolution skills; TDV = teen dating violence

4 DISCUSSION

Taking a step towards the Centers for Disease Control and Prevention strategic vision for an integrated approach to violence prevention (2016), the DM program was intentionally designed to promote healthy relationships and prevent TDV and other associated youth violent outcomes throughout adolescent development (Tharp et al., 2011). A longitudinal cluster randomized cross-site evaluation has demonstrated that DM is associated with a significant decline in the likelihood of perpetrating TDV (Niolon et al., 2019) and bullying (Vivolo-Kantor et al., 2020). However, less is currently known about the mechanism of the multicomponent comprehensive intervention's effects. Using longitudinal survey data from middle school students in schools that implemented the DM classroom-based curriculum, this study tested aspects of the DM program's theory of change aiming to simultaneously prevent bullying and TDV by teaching youth HRS and nonviolent conflict resolution strategies.

The first aim of this study was to identify latent classes of bullying and TDV perpetration before students participated in the DM program. A three-class model of baseline perpetration was identified as the best fitting model with the following classes: TDV & Bullying, TDV only, and Low Perpetration. The sample was roughly evenly split among the three classes, demonstrating the high level of overlap in perpetration outcomes. The fact that approximately a third of the sample had perpetrated bullying and TDV in the 6th-grade fall (in a grade that typically predates the middle school peak in bullying (Zhang et al., 2016) and high school peak in TDV (Taylor & Mumford, 2016; Wincentak et al., 2017)), further illustrates that it is common for youth who perpetrate aggression to perpetrate multiple forms (Yahner et al., 2015; Zych et al., 2019). For this reason, prevention initiatives that target multiple forms of aggression are

important (Joseph & Kuperminc, 2020). This sign of early perpetration also highlights that prevention efforts may be needed before the start of middle school.

Notably, no non-dating or bullying-only classes emerged, which may be due to this study's sample selection criteria. Using a sample of middle school daters meant that a minority of the sample had not dated by the 6th-grade fall (19.4%). It is possible that limiting the study sample to middle school daters may have excluded DM participants who would have otherwise fallen into a non-dating or bullying-only latent class. Analyses of variance among all DM participants (not just daters) found that, across all survey waves, those who perpetrated physical and psychological bullying were more likely to date in middle school than not (Chi-square analyses across all waves of survey data range from $5.44 < \chi < 84.05$; $p < .05$). Since youth who bully are more likely to be precocious daters (Connolly et al., 2000) and are more likely also to perpetrate TDV (Zych et al., 2019), bullies who date may also be more likely to perpetrate TDV. There is limited literature assessing the overlap between bullying and TDV, and much of that research has been cross-sectional. Thus, evaluation of overlapping perpetration trajectories over time is an essential area for further study (Zych et al., 2019).

Next, this study assessed the relationship between those latent classes of bullying and TDV perpetration and two distal outcomes: 1) healthy relationship skills (HRS) and 2) negative conflict resolution strategies (NCRS). No significant relationship was found between the latent class of perpetration and baseline HRS. This finding does not support the hypothesis that latent classes with a high likelihood of bullying and TDV perpetration would be associated with significantly worse HRS than classes with a low likelihood of perpetration. As a comprehensive TDV prevention program intended to teach strategies to promote healthy teen relationships, DM is based on the assumption that those who perpetrate TDV tend to have significantly worse

relationship skills. This baseline study result contradicts that assumption since latent classes of TDV & Bullying and TDV Only did not have a significantly different HRS level than those in the Low Perpetration class.

However, a significant relationship was found between NCRS and the latent classes of perpetration. In support of the study hypothesis that those in a high perpetration class would report a significantly higher frequency of use of NCRS than those in a low perpetration class, those in the TDV & Bullying class reported using NCRS significantly more frequently than those in the Low Perpetration class. Additionally, it was found that those in the TDV & Bullying class were more likely to report using more frequent NCRS than those in the TDV Only class. This finding is counter to the hypothesis that youth in different classes characterized by the perpetration of bullying and/or TDV would have similar skills deficits in NCRS. Instead, this result suggests that those who perpetrate both forms of aggression are more likely to use NCRS than those who do not perpetrate or perpetrate only one form of aggression.

The second aim of this study was to assess the latent trajectory of HRS and NCRS throughout the DM intervention, comparing the different trajectories in skill use across the latent classes of baseline perpetration (estimated in Aim 1). Due to the dearth of research assessing the relative change in these skills among adolescents with different histories of bullying and TDV perpetration, this aim was exploratory, and no specific hypotheses were made. As a result of the poor fit of the latent growth model, no conclusions about the trajectory of HRS over time can be drawn from these analyses. It should be noted that the randomized control trial (RCT) assessing mean change across time points found no significant group difference (comparing DM participants to the controls) and found no significant change in HRS over time (Niolon et al.,

2019). In sum, research to date has provided no evidence that learning HRS is the mechanism of DM prevention effects.

However, it is possible that the lack of group level findings could have to do with limitations of the HRS measure, which was not originally developed to be used with adolescents. The overall sample scored in the top 25% of the measure on the POMS scale (with the mean ranging from 70.9 to 76.8 across survey waves), indicating a potential ceiling effect. Additionally, the HRS measure was adapted for the DM evaluation from the Supporting Healthy Marriage Study, which was designed for adults (Miller Gaubert et al., 2012). This measure had not been piloted with adolescents before it was used for this study. Without knowing whether the HRS measure was valid for this younger population, it is difficult to know whether the lack of significant findings indicates no significant program effects on HRS or whether there is merely a measurement problem. Cognitive interviewing could test this question by assessing the validity of this measure for an adolescent population. It would also be helpful to test for convergent validity with existing validated measures (e.g. the University of Rhode Island Change Assessment-Healthy Relationship Skills measure (Levesque et al., 2011)).

Results suggested there was no significant linear or quadratic change in the frequency of NCRS use throughout the intervention for the overall sample of DM participants, as well as the TDV Only and Low Perpetration classes. However, those in the TDV & Bullying class tended to start the intervention with a significantly higher frequency of use of NCRS than the TDV Only and Low Perpetration classes. Additionally, this class had a significant negative linear slope and positive quadratic slope that resulted in a U-shaped curve, meaning NCRS decreased slightly from 6th-grade spring through 7th-grade spring and increased again in the 8th grade.

These results suggests that youth who have perpetrated bullying and TDV by the beginning of middle school may require a higher level of intervention to benefit from skill development. This study found that those in the TDV & Bullying class were more likely to have been exposed to violence at home or in their community before 6th-grade fall. Additionally, the TDV & Bullying class was associated with more NCRS at baseline and with initial progress (e.g., decreases in the frequency of NCRS use) in 7th grade that deteriorated in 8th grade. These findings are consistent with social learning theory, which suggests that children who see violence modeled learn that it is permissible and an effective method of conflict resolution, thus becoming more likely to perpetrate in the future (Bandura, 1973; Bandura & Walters, 1977). Those in the Bullying & TDV class used NCRS more frequently than those in the other classes throughout middle school, suggesting that a more targeted and intensive intervention approach may be warranted starting earlier in development to teach nonviolent conflict resolution skills to youth who perpetrate both bullying and TDV. Since youth in this class were also more likely to have been exposed to violence, more community and family supports could help model healthy skill development. For example, Joseph & Kuperminc (2020) proposed a joint prevention model for bullying and TDV that includes parent trainings focused on connecting families exposed to violence to community resources and teaching streategies to promote parental monitoring of youth and family cohesion.

Since the latent growth curve of NCRS does not distinguish program effects from maturation effects, the fact that there was no significant downward trend in NCRS found in the latent growth curve does not indicate a lack of positive program effects. The RCT comparing DM participants to controls found that that DM participants tended to use NCRS significantly less often than controls did by the end of the intervention (Niolon et al., 2019). Though the

overall DM sample did not significantly change their use of NCRS over time, the control group increased their frequency over time (Niolon et al., 2019). By comparing the latent growth curve in NCRS among the different latent classes of bullying and TDV perpetrators, this study contributed new findings to existing RCT findings by identifying how this program affected the heterogeneous sample differently. The uniquely high baseline rate of NCRS use among those in the Bullying & TDV class and the U-shaped rate of change in use over time suggest that this subpopulation may require additional intervention to catch up to their peers' use of nonviolent conflict resolution strategies.

Since the lack of deteriorating conflict resolution strategies represents a positive program effect, this begs the question of what is a normative progression in NCRS for adolescents. Given the many changes in peer relationships (e.g., increased frequency of time spent with peers, decreased overall adult supervision, the introduction of romantic relationships (Kuperminc & DiMeo-Ediger, 2012)), increased rate of peer conflicts (Noakes & Rinaldi, 2006), and ongoing development of social perspective-taking skills throughout adolescence (Selman, 1975), it may be a normative trend to see some increased frequency in NCRS during adolescence. A meta-analysis assessing the development of conflict resolution strategies found age-related differences in conflict resolution strategy use (Laursen, Finkelstein, & Betts, 2001) such that adolescents tended to resolve conflicts more often with disengagement or coercion (examples of NCRS) than negotiation. An analysis of interpersonal negotiation strategies using a structured dilemma-discussion interview procedure demonstrated that the capacity for expressing reciprocal or collaborative strategies in interpersonal negotiations tends to develop in later adolescence (e.g., after age 16) (Selman, Beardslee, Schultz, Krupa, & Podorefsky, 1986). This finding further reinforces the idea that positive conflict resolution strategies are often not well developed in

middle school. Keeping in mind that nonviolent conflict resolution strategies are emerging skills during adolescence, it is easier to understand how the results of this study suggest that continuous low-level use of NCRS represent positive program effects.

Ultimately, a cross-lagged panel model was used to evaluate whether learning HRS was associated with reducing the likelihood of bullying and TDV perpetration over time. Consistent with the hypothesis that HRS would be cross-sectionally correlated with bullying and TDV cross-sectionally, HRS was significantly and negatively correlated with bullying in three of the six survey waves, and HRS was significantly and negatively correlated with TDV in all survey waves except 6th-grade fall. Longitudinally, HRS was negatively significantly associated with later bullying in only one cross-lagged path. Additionally, two cross-lagged paths between HRS and later TDV were significant, one was negative and one was positive. It is possible that the positive cross-lagged effect had to do with the timing of the survey waves which spanned the summer between sixth and seventh grades when children are out of school and often have more time without adult supervision. It is also important to note that the DM programming occurred between the fall and spring survey waves and no programming was delivered over the summer. Most of the significant cross-lagged paths were from fall to spring of a given academic year. It is possible that increased time since participating in DM programming along with time spent unsupervised while out of school contributed to limited program effects observed from spring to fall. Including only one survey wave annually might diminish the likelihood of such seasonal effects.

Though most of these longitudinal effects support the hypothesis that HRS would be negatively associated with later bullying and TDV perpetration, these results suggest that there is more consistently a relationship between HRS and TDV than between HRS and bullying. Given

that the HRS measure items refer to the context of a romantic relationship (e.g., “My boyfriend/girlfriend is/was honest and truthful with me”), it makes sense that the measure would be more consistently related to dating violence. Though the cross-sectional results from Aim 1 found no association between perpetration history of HRS in the 6th-grade fall, these longitudinal results provide a more nuanced picture that suggests that HRS could sometimes be a protective factor for both bullying and TDV.

A cross-lagged panel model also assessed whether NCRS was associated with the reduced likelihood of perpetrating bullying and TDV over time. As hypothesized, NCRS was significantly associated with bullying in three of the six survey waves and with TDV in four survey waves. Further, NCRS positively predicted later bullying in one cross-lagged path and positively predicted TDV in all five cross-lagged paths. Interestingly, bullying was more consistently related to later NCRS (significant and positive in four of the five cross-lagged paths) than the reverse paths (significant in one cross-lagged path). This finding highlights the reciprocal nature of skill development and perpetration over time. While NCRS use seems to often precede bullying, it is also likely that perpetration of bullying reinforces NCRS use which in turn increases likelihood of TDV perpetration. Overall, using NCRS was associated with a higher likelihood of bullying and TDV perpetration cross-sectionally and longitudinally.

Dating status was included in analyses as a covariate, and no hypotheses involving dating status were advanced; however, it is worth noting that dating was cross-sectionally and longitudinally associated with HRS and NCRS in reciprocal directions. These findings suggest that, among this sample of early daters, adolescents who were more skillful in healthy relationship skills and nonviolent conflict resolution strategies were also more likely to be dating partners. Additionally, those who gained relationship experience by dating also learned to

increase their HRS and decrease their NCRS through practice; and those who demonstrated poor HRS and high levels of NCRS were more likely to go from dating to being single from one survey wave to another. Given that the HRS measure items refer to the context of a romantic relationship (e.g., "My boyfriend/girlfriend is/was honest and truthful with me"), it makes sense that the measure would be related to dating.

Dating and the emergence of romantic relationships reflect a new type of setting and source of social influence in the lives of many young adolescents (Kuperminc & DiMeo-Ediger, 2012). Romantic relationships introduce a role change in adolescence that adds a new dimension of complexity in peer relationships. Sexuality is a normative component of identity formation during this developmental phase (Erikson, 1968). Dating can be a positive indicator of social competence (e.g., associated with relationship satisfaction and commitment) as well a risk factor for adverse health outcomes and risky behavior (e.g., associated with risk for STI, TDV) (Tolman & McClelland, 2011). This study's sample was comprised of middle school daters, which is important to note, because early dating is a risk factor for TDV (Halpern, Spriggs, Martin, & Kupper, 2009; Rickert & Wiemann, 1998). Further understanding of trajectories of adolescent dating experiences with attention to romantic relationship characteristics, relationship skills, and sexual behavior is needed to help understand what experiences are "normative" and what experiences are associated with dating violence.

4.1 Conclusions

The DM program is an example of an intervention designed to prevent multiple forms of violence by targeting shared modifiable risk factors. Though research has already documented the successful prevention effects of the DM program on TDV and bullying (Vivolo-Kantor et al., 2020), given the lack of significant effects on HRS (Niolon et al., 2019), there is no evidence to

support the assumption that HRS development is what is driving these treatment effects. However, it is still possible that the healthy relationship promotion model is promoting skill development not captured by the HRS measure due to potential measurement limitations. Though the HRS level at baseline did not differ by latent class of bullying and TDV perpetration, results of the cross-lagged panel model demonstrated a more complex picture over time. The cross-lagged panel model results revealed that HRS are associated cross-sectionally and sometimes longitudinally with the perpetration of TDV and bullying. These results suggest that HRS can be a protective factor since more skillfulness is related to decreased risk of perpetrating bullying and TDV cross-sectionally and in one cross-lagged path. Reciprocal effects also demonstrated how perpetrating bullying and TDV is associated with significantly worse HRS later. Though the RCT results showed that DM did not change HRS relative to the control intervention (Niolon et al., 2019), further measurement testing is needed to determine whether lack of findings is related to lack of measurement sensitivity or appropriateness for this age group.

Previous evaluations of the DM program showed an impact on reducing NCRS. Specifically, youth in the control intervention (not DM) tended to use more NCRS than the DM participants by the end of the program (Niolon et al., 2019). Thus, the demonstrated lack of change in the rate of NCRS among the overall DM sample may represent an important treatment effect that can help explain some prevention effects. The latent class analysis results provided evidence that perpetration of both bullying and TDV is associated with a skills deficit in NCRS. Additionally, the cross-lagged panel model shows that using NCRS is associated with an increased likelihood of perpetrating bullying across the first year of the program and increased likelihood of perpetrating TDV consistently throughout middle school.

The DM sample included youth in neighborhoods with above-average cime and economic disadvantage compared to the rest of the city or state. Over 80% of the sample reported being exposed to violence in their home or in their community by the fall of 6th grade. In this sample of middle school daters who had been exposed to violence at a high rate in comnunities of economic disadvantage, the DM program has shown promising results that highlight the power of comprehensive intervention to address multiple outcomes. A rigorous RCT design has found program pariticpation leads to reduced risk in a wide range of outcomes including substance use, delinquency (Estefan et al., 2021), sexual violence victimization and perpetration, and sexual harrassment victimization and perpetration (DeGue et al., 2021). Understanding the mechanism of program effects is critical to future dissemination efforts, especially given the cost associated with such a comprehensive intervention. This study added to those existing findings by suggesting that positive impact on NCRS likely contributes to the joint prevention effects on bullying and TDV.

4.2 Limitations & Future Directions

Though it is commonplace to use self-report measures of TDV and bullying (Exner-Cortens, Gill, & Eckenrode, 2016; Vivolo-Kantor et al., 2014), there is some evidence to suggest that social desirability bias may decrease adolescent reporting of TDV (Fernández-González, O'Leary, & Muñoz-Rivas, 2013). There is also evidence to suggest that students may underreport their bullying behavior on self-report measures compared to other sources (e.g., teachers) (Totura, Green, Karver, & Gesten, 2009). As such, it is possible that the measures used in this study underreport bullying and TDV. Future studies may supplement self-report measures with data from other sources including peer and teacher observational measures of bullying and behavior rating scales administered to both dating partners about each other's TDV perpetration.

Additionally, the measure of physical violence perpetration was used as a proxy for physical bullying, however, the measure captured a broader range of violence perpetration than just bullying. Specifically, the measure did not assess whether the victim of the physical violence perpetration was a peer, whether there was a power imbalance between perpetrator and victim, or whether the attack was repeated. It is recommended that future research test generalizability of this study's findings using a validated measure of physical bullying perpetration that more closely meets the definition of bullying.

Another limitation of this study is the non-concordant reporting periods for measures of bullying and TDV. At baseline, students were asked to report on whether they had perpetrated TDV ever within their lifetime; however, they were asked to report on their physical bullying perpetration in the last six months and their psychological bullying perpetration in the last 30 days. In follow-up surveys, students were asked to report on their TDV and physical bullying perpetration in the last four months, but their psychological bullying perpetration in the last 30 days. Given the consistently shorter reporting periods for psychological bullying than TDV or physical bullying, it is likely that this study underestimates the rate of psychological bullying relative to physical bullying and TDV. This limitation would be addressed by coordinating the reporting periods in surveys of bullying and TDV. Using daily diaries to report on use of interpersonal skills, bullying and TDV perpetration would allow for longitudinal analyses that are likely less biased by memory (Fortin, Paradis, Hébert, & Lapierre, 2021).

The measure of negative conflict resolution strategies used in this study represents an inverse proxy for positive conflict resolution strategies. The DM program encouraged increased use of nonviolent conflict resolution strategies. It is assumed that the frequency of use of negative conflict resolution strategies would decline as nonviolent conflict resolution strategy

use increases. Further research can test whether the absence of NCRS is associated with nonviolent conflict resolution strategy use by including measures of both. Other methods of measurement including analysis of interpersonal negotiation strategies using a structured dilemma-discussion interview procedure (Selman et al., 1986) would also bolster measurement of this construct. Additionally, there is content overlap among the survey items used to measure NCRS (e.g. throwing insults and digs) and those used to measure psychological TDV (e.g. I insulted him/her with put-downs). This might have influenced results by leading to stronger associations between NCRS and psychological TDV.

Though the DM program included multiple components, there was not enough program engagement data to differentiate the effects of the classroom intervention from the effects of other intervention components. The limited engagement data available suggested little variability in exposure to other program components (7.5% of the sample reported that their parent participated in the parenting intervention, and 100% of the sample reported being exposed to the DM youth-focused communication programming in middle school). While evaluation efforts until this point have not been able to disentangle effects of different program components (Debnam & Temple, 2021), it is posited that the comprehensive nature of the multi-component model contributes to its success (Niolon, 2021). However, further evaluation is needed to understand the potentially overlapping effects of different programming efforts (e.g., policymaking, capacity building), which may help to elucidate the key to replicating the prevention effects of DM in the future.

There are some limitations to the generalizability of study findings. For example, because DM participants were not asked about TDV experiences if they reported that they were not dating, this study sample was limited to students who reported dating in middle school. Limiting

the sample to daters meant that bullying perpetration, and NCRS and HRS skill development was not captured for DM participants who did not date, which may have limited generalizability of study findings. Since the study sample included DM participants with no control group, analyses did not distinguish program effects from maturation effects. Future analyses could attempt to replicate study findings in a non-intervention sample. Additionally, the schools where DM was implemented had above-average rates of crime and economic disadvantage compared to the rest of the city or state. For this reason, it is not known how DM effects would generalize to communities less impacted by neighborhood crime and with more socioeconomic advantages.

Though the cross-lagged panel model in this study offers some indication of the direction of longitudinal effects, replication of these analyses in different samples would test for generalizability of findings, and the use of alternative study designs would help confirm causality of program effects. The use of cohort-sequential evaluation design would allow researchers to differentiate developmental effects from program effects (Prinzie & Onghena, 2014). Given the salience of peer influence in adolescents, it would also be beneficial to assess DM program effects using a social network approach. For example, the use of stochastic actor-based models would allow for the analysis of network structure, peer selection, and peer influence processes (Ivaniushina & Titkova, 2021). There may be patterns in the use of HRS and NCRS across close friendships that are not captured in the latent class or latent growth analyses in this study. The use of social network analysis would not only allow for consideration of skill development among social networks but would also allow for practitioners to identify key influential peers who may be able to effectively promote HRS and nonviolent conflict resolution skill development.

Future research can explore other potential mechanisms of the prevention effects of the DM program. DM is a comprehensive intervention with many components, including a parent intervention, free online training for educators, and local health department capacity building to track TDV related policy and data (Tharp et al., 2011)). These components address important shared risk factors for multiple youth violence outcomes (e.g., norms promoting violence, peer engagement in violence) and thus could be driving program effects. In addition to reduced use of NCRS and increased use of HRS being the posited mechanism of DM, Niolon posited that other social-emotional learning components of the intervention (e.g. emotion regulation, communication skills) may drive prevention effects (Niolon, 2021)

Further research is needed to see how teaching emotion regulation strategies may help prevent bullying and TDV perpetration. A recent study of different trajectories of bullying found that those who perpetrated bullying consistently at a high rate throughout middle school tended to have higher rates of impulsivity, positive attitudes toward bullying, peer delinquency, anger, and perpetration of sexual violence and TDV during high school (Cho, 2021). The same study also found that anger was associated with starting to bully earlier in middle school and with more consistency in bullying throughout middle school, underscoring the importance of social emotional skills for antibullying efforts (Cho, 2021). Other research has found that anger reactivity mediates the association between bullying and TDV perpetration, regardless of level of victimization (Foshee, Benefield, et al., 2016). Thus, strategies that help with anger management (emotion regulation, cognitive behavior techniques, self-awareness, and nonviolent conflict resolution techniques) might enhance programming intended to preventing risk for co-occurrence of bullying and TDV (Joseph & Kuperminc, 2020).

Violence victimization experiences were not included in analyses in this study due to challenges associated with multicollinearity. However, longitudinal studies have demonstrated often overlapping patterns of bullying and TDV perpetration and victimization (Miller et al., 2013; Orpinas, Nahapetyan, Song, McNicholas, & Reeves, 2012). The developmental victimology framework explains that victims of one form of violence (e.g., bullying) may become more vulnerable to other forms of aggression (e.g., TDV (Finkelhor, Ormrod, & Turner, 2007). For example, a longitudinal study of adolescent victims of school bullying found that victims of bullying were initially more likely to display higher levels of aggression compared to students who did not experience bullying victimization. There was a decline in aggression among the overall sample, however those who had been victims of bullying declined in their aggression more rapidly (Duggins, Kuperminc, Henrich, Smalls-Glover, & Perilla, 2016). Future research can build on this study by considering how past victimization experiences influence HRS and NCRS development.

Another important avenue for future research is to explore the developmental interplay between dating experiences, social and emotional skills, and violence perpetration. One unexpected finding of this study was the positive longitudinal relationship between dating and HRS and the negative relationship between dating and NCRS. Additionally, the reverse cross-lagged paths between perpetration of bullying and TDV and later skill use (HRS and NCRS) suggest that previous experiences perpetrating violence may predict later use of NCRS and less skillful HRS. Contrary to the positive role that dating seemed to play on HRS and nonviolent conflict resolution skill development, the direct cross-lagged path between dating and later bullying and the paths between bullying and later dating were positive. This finding is consistent with past research documenting that bullies were more likely to begin dating earlier (Connolly et

al., 2000). Taken together, these findings suggest that dating can represent positive interpersonal skill development while also introducing risk for aggression (as discussed earlier).

Further evaluation is needed of what characteristics predict which youth who have bullied continue to perpetrate bullying and/or TDV over time. Might dating experiences (e.g., relationship characteristics (Taylor, Joseph, & Mumford, 2017), sexual activity (Silverman, Raj, Mucci, & Hathaway, 2001)) predict that trajectory? Years of research have supported the developmental taxonomy of antisocial behavior that posits two trajectories of antisocial behavior: life-course-persistent offenders and adolescent-limited offenders. Research suggests that neurodevelopmental processes (e.g., impulsivity) and early environmental risk (e.g., disrupted family bonds, poor peer relationships) beginning in childhood tend to predict the life-course-persistent offending while social processes beginning in adolescence predict adolescent-limited offending (Moffitt, 2006). The next steps in this research might assess whether skill development of HRS and nonviolent conflict resolution strategies may predict which adolescent perpetrators of bullying and TDV do not perpetuate violence throughout their lives.

Violence prevention researchers have called for an integrated approach to preventing violence throughout development, focusing on healthy relationship skill promotion (Banyard, 2013). This study assessed how the DM program did just that. Despite the encouraging program effects on bullying and TDV prevention, it is unclear whether that healthy relationship skill development model drove those effects. As the field continues to advance integrated violence prevention initiatives, attention to the mechanism of program effects will be critical to promote effective approaches that prevent multiple youth outcomes.

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APPENDICES

Appendix A Study Measures

Negative Conflict Resolution Strategies

The following questions refer to times when you and the person you are dating have disagreements. We want you to answer these questions about a dating partner if you have one now or have had one in the last 4 months. But if you do not have a current or recent (in the last 4 months) boyfriend or girlfriend, please think about a close friend, either a boy or a girl. How often do YOU use these styles…

1=never
2=almost never
3=sometimes
4=often
5=always

Subscale	Survey item
Compliance	Not being willing to stick up for myself
	Reaching a limit, shutting down, and refusing to talk any further
	Not defending my position
	Giving in with little attempt to present my side of the issue
Conflict engagement	Launching personal attacks
	Exploding and getting out of control
	Getting carried away and saying things that aren't meant
	Throwing insults and digs
Withdrawal	Remaining silent for long periods of time
	Being too compliant
	Tuning the other person out
	Withdrawing, acting distant, and not interested

Healthy Relationship Skills

Please indicate how often each of the following statements is true currently or was true in your most recent dating relationship [follow-up survey version added "**in the last 4 months**"].

1=never
2=sometimes
3=usually
4=always

My boyfriend/girlfriend is/was honest and truthful with me.
My boyfriend/girlfriend and I are/were good at working out our differences.
When I have a serious disagreement with my boyfriend/girlfriend, we discuss(ed) it respectfully.
My boyfriend/girlfriend and I work(ed) as a team.

Teen Dating Violence Perpetration

The following questions ask you about things that may have happened with a boyfriend/girlfriend (past or present) [Follow-up survey version added: *in the last **4 months***]. Fill in the bubbles below that are your best estimates of how often these things have **ever** happened with someone you were dating. As a guide, use the following scale:

1=never (this has never happened in your relationship)
2=seldom (this has happened only 1–2 times in your relationship)
3=sometimes (this has happened about 3–5 times in your relationship)
4=often (this has happened 6 or more times in your relationship)

Subscale	Survey item
Verbal/Emotional abuse	I did something to make him/her feel jealous.
	I brought up something bad he/she had done in the past.
	I said things just to make him/her angry.
	I spoke to him/her in a hostile or mean tone of voice.
	I insulted him/her with put-downs.
	I ridiculed or made fun of him/her in front of others.
	I kept track of who he/she was with and where he/she was.
	I blamed him/her for the problem.
	I accused him/her of flirting with another girl/guy.
	I threatened to end the relationship.
Relational abuse	I tried to turn his/her friends against him/her.
	I said things to his/her friends about him/her to turn them against him/her.
	I spread rumors about him/her.
Threatening behaviors	I destroyed or threatened to destroy something he/she valued.
	I deliberately tried to frighten him/her.
	I threatened to hurt him/her.
	I threatened to hit him/her or throw something at him/her.
	I threatened him/her with a knife or gun (including waving or pointing a knife).
Physical abuse	I threw something at him/her.
	I kicked, hit, or punched him/her.
	I slapped him/her or pulled his/her hair.
	I pushed, shoved, or shook him/her.

Bullying

In the last **30 days,** how often did this happen?

Rated on a scale: Never (0), 1 or 2 times (1), 3 or 4 times (2), 5 or more times (3)	
Perpetration	I upset other students for the fun of it.
	In a group, I teased other students
	I helped harass other students.
	I spread rumors about other students.
	I started (instigated) arguments or conflicts.
	I excluded other students from my clique of friends.

Physical Bullying

Rated on a scale: Never (1), 1 or 2 times (2), 3 or 4 times (3), 5 or more times (4).

In the last six months (baseline)/four months (follow-up), how often did you attack someone with the idea of seriously hurting them?

How often did you get into a serious physical fight?

Relationship Status

Have you ever DATED someone you are/were seeing or going out with?

How many different people have you dated since you [began dating (baseline)] or [in the last 4 months (follow-up)]?

Appendix B Longitudinal Correlation Tables

Table 9. Correlations among All Study Variables, 6th Grade Spring

	1	2	3	4	5	6	7
1. Physical TDV	1						
2. Psychological TDV	.48*	1					
3. Physical Bullying	.26*	.21*	1				
4. Psychological Bullying	.34*	.28*	.35*	1			
5. Healthy Rel. Skills	-.15*	-.13*	-.04	-.09*	1		
6. Neg. Con. Res. Strategies	.25*	.19*	.26*	.28*	-.03	1	
7. Cohort	.11*	.08*	.07*	.01	.08*	.05	1
8. Exposure to violence	.22*	.14*	.26*	.27*	-.03	.24*	.01

Table 10. Correlations among All Study Variables, 7th Grade Fall

	1	2	3	4	5	6	7
1. Physical TDV	1						
2. Psychological TDV	.40*	1					
3. Physical Bullying	.34*	.28*	1				
4. Psychological Bullying	.28*	.23*	.43*	1			
5. Healthy Rel. Skills	-.13*	-.02	-.05*	-.14*	1		
6. Neg. Con. Res. Strategies	.17*	.16*	.20*	.23*	.01	1	
7. Cohort	.02	.15*	.08*	.03	.06*	.04	1
8. Exposure to violence	.16*	.19*	.26*	.24*	-.04	.22*	.13*

Table 11. Correlations among All Study Variables, 7th Grade Spring

	1	2	3	4	5	6	7
1. Physical TDV	1						
2. Psychological TDV	.40*	1					
3. Physical Bullying	.28*	.25*	1				
4. Psychological Bullying	.23*	.24*	.30*	1			
5. Healthy Rel. Skills	-.17*	-.16*	-.07*	-.16*	1		
6. Neg. Con. Res. Strategies	.27*	.29*	.15*	.26*	-.03	1	
7. Cohort	.03	.05*	.02	.00	.01	.04	1
8. Exposure to violence	.21*	.19*	.28*	.26*	-.08*	.26*	.06*

Table 12. Correlations among All Study Variables, 8th Grade Fall

	1	2	3	4	5	6	7
1. Physical TDV	1						
2. Psychological TDV	.43*	1					
3. Physical Bullying	.30*	.27*	1				
4. Psychological Bullying	.34*	.23*	.25*	1			
5. Healthy Rel. Skills	-.19*	-.13*	-.05*	-.07*	1		
6. Neg. Con. Res. Strategies	.26*	.30*	.14*	.28*	.06*	1	
7. Cohort	.05	.06*	.07*	-.09*	-.08*	.07*	1
8. Exposure to violence	.28*	.27*	.32*	.32*	-.04	.28*	.05*

Table 13. Correlations among All Study Variables, 8th Grade Spring

	1	2	3	4	5	6	7
1. Physical TDV	1						
2. Psychological TDV	.45*	1					
3. Physical Bullying	.29*	.19*	1				
4. Psychological Bullying	.26*	.25*	.34*	1			
5. Healthy Rel. Skills	-.17*	-.18*	-.06*	-.15*	1		
6. Neg. Con. Res. Strategies	.29*	.31*	.15*	.28*	-.13*	1	
7. Cohort	.02	.04	-.01	-.07*	-.00	.00	1
8. Exposure to violence	.22*	.16*	.28*	.24*	-.11*	.25*	.06*

Appendix C Standardized Latent Growth Models

Table 14. Final Latent Growth Model for Healthy Relationship Skills over Time, includes Full Sample Results and Results by Latent Class of Bullying and TDV Perpetration, Standardized

	Intercept			Linear slope			Quadratic slope		
	B	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Full sample	3.79	0.10	0.000	0.30	0.08	0.000	-0.17	0.09	0.056
Exposure to violence	0.06	0.02	0.013	-0.04	0.03	0.199	0.00	0.04	0.978
Cohort	0.07	0.03	0.029	-0.03	0.03	0.354	0.00	0.04	0.991
Low Perp. Class	3.97	0.11	0.000	0.24	0.06	0.000	-0.18	0.07	0.010
TDV Only Class	3.92	0.11	0.000	0.15	0.06	0.006	-0.17	0.07	0.019
TDV & Bully. Class	3.95	0.11	0.000	0.25	0.09	0.003	-0.17	0.11	0.132

Note: Low Perp. Class= Low Perpetration Class; TDV & Bully. Class= TDV & Bullying Class

Table 15. Final Linear Growth Model for Negative Conflict Resolution Strategies over Time, includes Full Sample Results and Results by Latent Class of Bullying and TDV Perpetration, Standardized

	Intercept			Linear slope			Quadratic slope		
	B	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Intercept	4.50	0.22	0.000	0.18	0.13	0.149	0.10	0.07	0.179
Exp. to violence	0.35	0.03	0.000	-0.02	0.08	0.849	0.00	0.06	0.945
Cohort	0.07	0.03	0.038	0.04	0.06	0.557	-0.06	0.05	0.188
Low Perp. Class	3.48	0.16	0.000	0.01	0.06	0.031	0.13	0.06	0.031
TDV Only Class	3.52	0.17	0.000	0.11	0.07	0.091	-0.04	0.08	0.575
TDV & Bully. Class	3.81	0.15	0.000	-0.26	0.10	0.010	0.40	0.11	0.000

Note: Low Perp. Class= Low Perpetration Class; TDV & Bully. Class= TDV & Bullying Class

Appendix D Cross-lagged Panel Model Results for Healthy Relationship Skills

Table 16. Cross-lagged Panel Model Results including Autoregressive and Cross-lagged paths for Healthy Relationship Skills

	W 1-2	W 2-3	W 3-4	W 4-5	W 5-6	W 1-3	W 1-4	W 1-5	W 1-6	W 2-4	W 2-5	W 2-6	W 3-5	W 3-6	W 4-6
Autoregressive Paths															
Bullying	.32*	.52*	.36*	.32*	.29*	.20*	.07*	.17*	.04	.35*	.04*	.03	.21*	.15*	.29*
TDV	.28*	.43*	.38*	.31*	.20*	-.13*	.38*	.09*	.06	.04	.23*	.10	.10	.12*	.17*
HRS	.61*	.51*	.35*	.43*	.36*	-.07	.11*	.12*	-.05	.18*	-.13*	.06	.03	.05	.02
Dating	.33*	.48*	.31*	.51*	.31*	.14*	.07*	.06	-.07*	.40*	.10	.15*	.10*	.08	.26*
Cross-lagged effects															
HRS→ Bull.	-.02	-.04	-.01	.03	-.07*										
HRS→TDV	-.16*	.05*	-.03	-.01	-.02										
Bull.→ TDV	.25*	.24*	.29*	.25*	.28*										
TDV→ Bull.	.18*	.05	-.03	.08	-.02										
TDV→HRS	-.05	-.01	-.10*	-.12*	-.08										
Bull.→HRS	-.06*	-.05	-.05	-.01	-.13*										
Dating→TDV	.02	.09*	-.11*	-.04	.11*										
Dating→Bull.	.09*	.05	.05	.05	-.08										
Dating→HRS	-.01	.14*	.10*	.04	.03										
TDV→Dating	.10*	-.00	.05	-.05	.04										
Bull.→Dating	.05	.08	.12*	.10*	.02										
HRS→Dating	.08*	-.01	.09*	.08	.09*										
Covariates															
Cohort→Bull.	-.02														
Cohort→TDV	.18*														
Cohort→HRS	.06*														
Cohort→Dating	-.02														
Exp.vio.→Bull.	.17*														
Exp.vio.→TDV	.08*														
Exp.vio.→HRS	-.01														
Exp.vio.→Datin g	.11*														

Table 17. Cross-sectional Correlations among Study Variables in Cross-lagged Panel Model with Healthy Relationship Skills

	6th fall			6th spring			7th fall			7th spring			8th fall			8th spring		
	B	SE	*P*	*B*	SE	*P*	*B*	SE	*P*	*B*	SE	*P*	*B*	SE	*P*	*B*	SE	*P*
HRS & TDV	.01	.03	.826	-.09	.04	.016	-.09	.04	.016	-.07	.03	.034	-.06	.03	.049	-.15	.05	.001
HRS & Bull.	.01	.03	.842	-.11	.04	.005	-.11	.04	.007	-.09	.04	.032	.04	.04	.296	-.02	.04	.641
Bull. & TDV	.28	.02	.000	.33	.03	.000	.13	.05	.008	.12	.04	.008	.13	.05	.006	.08	.07	.213
Bull. & Dating	.09	.04	.018	-.01	.04	.767	-.02	.07	.819	.14	.06	.023	-.14	.05	.010	.05	.07	.516
TDV & Dating	.16	.02	.826	.11	.05	.014	.10	.06	.107	.16	.06	.007	.15	.08	.068	.11	.06	.039
HRS & Dating	.16	.02	.000	-.03	.03	.436	.15	.04	.000	.12	.05	.019	.13	.03	.000	-.06	.04	.099
Bull. & cohort	.04	.03	.197															
Bully. & exp.vio.	.32	.02	.000															
TDV & Dating	.16	.02	.000															
TDV & cohort	.01	.03	.774															
TDV & exp.vio.	.22	.02	.000															
HRS & cohort	.05	.03	.072															
HRS & exp. Vio.	.06	.02	.003															
Dating & cohort	.10	.03	.001															
Dating & exp. Vio.	.05	.02	.037															

Appendix E Cross-lagged Panel Model Results for Negative Conflict Resolution Strategies

Table 18. Cross-lagged Panel Model Results Including Autoregressive and Cross-lagged paths for Negative Conflict Resolution Strategies

	W 1-2	W 2-3	W 3-4	W 4-5	W 5-6	W 1-3	W 1-4	W 1-5	W 1-6	W 2-4	W 2-5	W 2-6	W 3-5	W 3-6	W 4-6
Autoregressive Paths															
Bullying	.26*	.50*	.38*	.31*	.30*	.19*	.07*	.04	.04	.32*	.15*	.02	.22*	.14*	.29*
TDV	.26*	.43*	.35*	.28*	.19*	.05	.08*	.08*	.05	.06	.20*	.12*	.09	.11	.15*
NCRS	.38*	.58*	.47*	.30*	.35*	.17*	.09*	.21*	.06*	.24*	.04	.09*	.26*	.11*	.25*
Dating	.30*	.48*	.33*	.58*	.32*	.13*	.07*	.07	-.07*	.40*	.06	.16*	.10	.07	.25*
Cross-lagged effects															
NCRS → Bull.	.25*	.04	.01	.01	.05										
NCRS →TDV	.19*	.10*	.17*	.16*	.16*										
Bull.→ TDV	.20*	.18*	.21*	.20*	.21*										
TDV→ Bull.	.14*	.08	-.03	.09	-.03										
TDV→ NCRS	.09*	-.03	.07*	.05	.05*										
Bull.→ NCRS	.06*	.14*	.05	.11*	.10*										
Dating→TDV	.03	.13*	-.05	.02	.15*										
Dating→Bull.	.12*	.04	.06	.06	-.07										
Dating→ NCRS	-.11*	-.04	.02	-.06*	-.08*										
TDV→Dating	.13*	-.06	.04	-.10*	.03										
Bull.→Dating	.10	.15*	.12*	.04	.04										
NCRS →Dating	-.15*	-.11*	-.01	.11*	-.04										
Covariates															
Cohort→Bull.	-.04*														
Cohort→TDV	.26*														
Cohort→ NCRS	.04														
Cohort→Dating	.00														
Exp.vio.→Bull.	.12*														
Exp.vio.→TDV	.02														
Exp.vio.→ NCRS	.15*														
Exp.vio.→Dating	.13*														

Table 19. Cross-sectional Correlations among Study Variables in Cross-lagged Panel Model with Negative Conflict Resolution Strategies

	6th fall			6th spring			7th fall			7th spring			8th fall			8th spring		
	B	SE	*P*	*B*	SE	*P*	*B*	SE	*P*	*B*	SE	*P*	*B*	SE	*P*	*B*	SE	*P*
NCRS & TDV	.24	.03	.000	.12	.05	.026	-.06	.04	.152	.12	.04	.001	.02	.05	.696	.11	.05	.020
NCRS & Bull.	.31	.03	.000	.19	.04	.000	.01	.03	.876	.11	.05	.030	.07	.05	.208	.12	.04	.001
Bull. & TDV	.28	.02	.000	.31	.06	.000	.15	.05	.005	.14	.04	.001	.14	.05	.004	.09	.06	.166
Bull. & Dating	.09	.04	.015	.02	.04	.694	-.04	.07	.528	.13	.07	.049	-.12	.06	.036	-.06	.07	.373
TDV & Dating	.16	.02	.000	.12	.05	.026	.13	.06	0.23	.16	.06	.006	.11	.08	.164	.13	.05	.020
NCRS & Dating	-.06	.03	.039	-.19	.05	.000	-.10	.06	.085	-.12	.05	.006	-.18	.05	.001	-.18	.05	.001
Bull. & cohort	.03	.03	.237															
Bully. & exp.vio.	.32	.02	.000															
TDV & Dating	.16	.02	.000															
TDV & cohort	.00	.03	.895															
TDV & exp.vio.	.22	.02	.000															
NCRS & cohort	.06	.03	.013															
NCRS & exp. Vio.	.26	.03	.000															
Dating & cohort	.10	.03	.000															
Dating & exp. Vio.	.05	.02	.030															