Fall 12-15-2018

Measuring Teen Dating Violence Perpetration: A Comparison of Cumulative and Single Assessment Procedures

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MEASURING TEEN DATING VIOLENCE PERPETRATION:

A COMPARISON OF CUMULATIVE AND

SINGLE ASSESSMENTS

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MEASURING TEEN DATING VIOLENCE PERPETRATION:

A COMPARISON OF CUMULATIVE AND

SINGLE ASSESSMENTS

A Thesis Presented to the Graduate Faculty of

Dedman College

Southern Methodist University

In

Partial Fulfillment of the Requirements

For the degree of

Masters of Arts

by

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B.S., Psychology, Northern Illinois University

December 15, 2018

Krauss, Alison   B.S., Psychology, Northern Illinois University, 2015

Measuring Teen Dating Violence Perpetration:
A Comparison of Cumulative and
Single Assessments

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Masters of Arts conferred December 15, 2018

Thesis completed August 17, 2018

Teen dating violence (TDV) is a widespread and harmful public health concern. The measurement of TDV has undergone some debate, with some researchers suggesting current measurement methods are suboptimal. The current study evaluates the use of cumulative assessments, a measurement method used previously in research on mental health and TDV victimization, to measure TDV perpetration. We hypothesized prevalence of frequency estimates of TDV perpetration would be higher when measured with cumulative assessments compared to a single report. Additionally, we hypothesized TDV perpetration measured cumulatively would more strongly relate to criterion variables than TDV perpetration measured with a single report. A sample of court-referred adolescents ($n = 147$, 14-17 years old) was recruited and invited into the lab for a baseline assessment, where they completed demographic questions and measures of criterion variables, including externalizing symptoms, exposure to community violence, and attitudes about dating. Adolescents were invited back to the lab for a 3-month follow-up assessment, where they reported on their TDV perpetration across the past 3 months. Between baseline and the 3-month follow-up, participants were contacted for phone interviews every 2-weeks and reported on their TDV perpetration in the past 2-weeks. All six phone interviews were aggregated to form a cumulative measure of TDV across the 3-month period. Results indicated the cumulative assessments of TDV evidenced greater prevalence for physical and emotional

TDV compared to single reports, and greater frequency for all types of TDV compared to single reports. Furthermore, overall TDV was more strongly related to externalizing symptoms when measured cumulatively rather than with a single assessment, and sexual TDV was more strongly related to exposure to community violence when measured cumulatively rather than with a single assessment. Findings from the current study highlight the potential benefits of utilizing cumulative assessments in the measurement of TDV perpetration.

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Teen dating violence (TDV) in the United States is a prevalent and harmful public health concern. Findings from a meta-analytic review of prevalence research on TDV indicate that one in five adolescents report experiencing physical violence and one in ten report experiencing sexual violence (Wincentak, Connolly, & Card, 2017). However, prevalence rates for violence victimization vary widely across studies. Specifically, in the meta-analysis, rates of physical victimization varied from 1% to 61%, and rates of sexual victimization varied from <1% to 54% (Wincentak et al., 2017). Prevalence rates for psychological or emotional victimization are generally higher than those for physical and sexual victimization, with up to 60% of adolescents experiencing such violence (Alleyne-Green, Coleman-Cowger, & Henry, 2012; Coker et al., 2014; Orpinas, Nahapetyan, Song, McNicholas, & Reeves, 2012). Dating violence predicts a host of negative health outcomes for its victims, including mental health (Exner-Cortens, Eckenrode, & Rothman, 2013; Foshee, Reyes, Gottfredson, Chang, & Ennett, 2013) and physical health concerns (Black, 2011).

Although there is a wealth of literature on the prevalence, precursors, and consequences of TDV, many researchers argue that current measurement methods for ascertaining the prevalence and frequency of TDV are suboptimal (e.g., Hickman, Jaycox, & Aronoff, 2004; Jackson, 1999; Jouriles, McDonald, Garrido, Rosenfield, & Brown, 2005; Teten, Ball, Valle, Noonan, & Rosenbluth, 2009; Wincentak et al., 2017). Accurate measurement allows for a more precise determination of the scope of the phenomenon. For example, a TDV prevalence rate of 1% likely calls for a different approach and allocation of public health resources than a prevalence rate of 20%. Accurate measurement is also important for evaluating effects of TDV prevention and intervention programs and for understanding contributing factors and consequences of violence perpetration and victimization. Thus, efforts to improve the

measurement of TDV are not only essential for documenting the scope of TDV, but also for evaluating the effectiveness of prevention programs.

TDV perpetration is typically assessed using retrospective, self-report methods. This is true for research evaluating effects of intervention and prevention programs (Cornelius & Resseguie, 2007), as well as research documenting the prevalence, precipitants, and outcomes of TDV (Haynie et al., 2013; Niolon et al., 2015; Vagi et al., 2013; Wincentak et al., 2017). Specifically, youth typically report on the frequency of violent acts (e.g., kicked, hit, or punched partner; threatened to hurt partner; ridiculed or made fun of partner in front of others) that occurred over a designated period of time. The timeframe used often varies from study to study, with some studies asking about events over a year or longer (Wincentak et al., 2017). Such reports of violent acts, especially those in which respondents are asked to report over a long reference period, are likely to produce underestimates of prevalence rates. That is, memory error of past events has been well documented in previous literature (Rubin, 1982), and suggests that a long reference period introduces considerable error due to inaccuracy of recalling events. This recall bias may be especially pertinent to unpleasant or traumatic events, such as the perpetration of TDV, as previous research has found that individuals are more likely to forget these events than positive ones (Moradi, Taghavi, Neshat-Doost, Yule, & Dalgleish, 2000; Rubin & Berntsen, 2003).

In addition, these memory concerns may be especially important to consider when assessing events that occur frequently. Schwarz (2007) suggests that participants rely on a *recall-and-count* strategy when asked to provide a retrospective report of behavior. This strategy involves first identifying the behavior of interest, searching the reference period for this behavior, retrieving all instances that match the targeted behavior, and counting these instances.

When events are highly frequent, it becomes increasingly harder for participants to accurately recall the frequency of the event as the reference period becomes larger. To illustrate this phenomenon, Schwarz provides an extreme example of a highly frequent event assessed in the National Health Survey (Schiller, Adams, & Nelson, 2005): How many days in the last year have you had a headache? It is not difficult to image how participants may struggle to accurately respond to such questions. Certain types of TDV, such as psychological or emotional violence, occur frequently (Bonomi et al., 2012; Shepherd-McMullen, Mearns, Stoeks, & Mechanic, 2014), and may be especially vulnerable to these memory problems.

One way to mitigate error associated with reports of violence over a long reference period is to instead measure it regularly throughout the course of the reference period (Jouriles et al., 2005), and aggregate across the repeated measures. There are a few instances of this method in the violence literature (e.g., Caiozzo, Houston, & Grych, 2016; Jouriles et al., 2005). For example, Jouriles et al. (2005) asked about TDV victimization over a fairly short, specified time period (i.e., past two weeks), re-assessing participants every two weeks over a two-month reference period, and then aggregated the multiple reports of violence to produce a single estimate of violence across the two months. This cumulative measurement produced higher prevalence rates than a single measurement covering the same two-month period. In addition, the cumulative measure was more strongly correlated with correlates of TDV victimization, such as trauma and anxiety symptoms, compared to the single measurement method. Similarly, several studies of mental health diagnoses have documented higher prevalence rates using cumulative or prospective assessments compared to single measurements (Copeland, Shanahan, Costello, & Angold, 2011; Costello, Mustillo, Erkanli, Keeler, & Arnold, 2003; Jaffee, Harrington, Cohen, & Moffitt, 2005; Kim-Cohen et al., 2003; Moffitt et al., 2010).

Previous research on cumulative assessments of TDV have thus far focused on victimization. However, this assessment strategy may work differently for perpetration, and is in need of empirical examination. For instance, there are reasons to believe rates of TDV perpetration might not increase with cumulative assessments. Social desirability, or the tendency to present in a favorable way, appears to be especially relevant to self-reports of violence perpetration. For example, in a meta-analysis of the effects of social desirability on reports of intimate partner violence (Sugarman & Hotaling, 1997), social desirability effects were stronger when reporting on one's perpetration of violence, as compared to one's victimization. It seems reasonable to expect that individuals who self-report no incidents of violence perpetration, due to social desirability, will do so regardless of whether they self-report violence via cumulative or retrospective assessment methods.

Although cumulative assessments of perpetration might yield increased prevalence rates, it should not automatically be assumed that these rates are more accurate than rates from retrospective assessments—cumulative assessments may instead *overestimate* violence. For example, with frequent assessments over relatively short periods of time, participants may forget precisely when a particular violent event occurred, and may report the same incident at more than one assessment. In addition, estimates yielded by cumulative assessments might be influenced by response biases that contribute to overestimates of the frequency of specific acts (Schwarz, 2007). For example, participants may infer that a response scale provides normative information on the frequency of the item, and adjust their responses from what they extrapolate from the response scale. Although this type of error affects all self-reports of frequency (Schwarz, 2007), it is likely enhanced in cumulative assessments due to aggregating each measurement.

The current study aims to evaluate the utility of cumulative assessments of TDV perpetration, compared to a single report of TDV perpetration in a sample of court-referred adolescents. We chose this population because of to the high prevalence of dating violence among these teens (Cadely et al., 2017; Nocentini, Menesini, & Pastorelli, 2010). Assessments were conducted every two weeks over a 3-month time period. In addition, a single retrospective assessment of TDV perpetration for the past 3 months was obtained at the end of the 3-month period. We hypothesized that perpetration measured every 2 weeks and then aggregated would yield higher prevalence and frequency rates of TDV (physical, sexual, and emotional) than perpetration measured using the single, 3-month retrospective report. We focused on both prevalence and frequency as both indices of TDV are widely used (Exner-Cortens, Gill, & Eckenrode, 2016).

Additionally, we examined physical, sexual, and emotional TDV separately for a number of reasons. Namely, different types of TDV occur at different rates, with emotional TDV occurring more often that physical or sexual TDV (Niolon et al., 2015; Wolfe et al., 2001). This is especially relevant to the current study, as highly frequent events are most susceptible to recall bias across long assessment periods (Schwarz, 2007). Thus, we might expect greater differences in assessment method with emotional TDV compared to physical or sexual TDV. Relatedly, social desirability bias is likely to have a greater effect on more severe behaviors, such as physical and sexual TDV, compared to less severe behaviors such as emotional TDV. Thus, we might expect greater differences in assessment method with more severe behaviors, such as physical and sexual TDV, compared to emotional TDV. Given this, we analyzed each type of TDV separately, rather than as a total score. However, we made no directional hypotheses related to differences across TDV type in assessment method.

We also assessed the criterion validity of cumulative assessments using criterion variables theoretically and empirically correlated with TDV in past research. These include: youth externalizing problems (Olsen et al., 2010; Vagi et al., 2013), exposure to community violence (Reed, Silverman, Raj, Decker, & Miller, 2011), and attitudes about dating (Jouriles, McDonald, Mueller, & Grych, 2011; Jouriles, Rosenfield, McDonald, Kleinsasser, & Dodson, 2013; Olsen, Parra, & Bennet, 2010). We hypothesized that TDV measured cumulatively would be more strongly related to each criterion variable than would TDV measured with the single assessment.

Method

Participants and Procedure

Data for this study were collected as part of a larger study on TDV. Participants in the larger study were 147 teens (52.4% male) aged 14- to 17-years. This age group was chosen because many teens begin to have dates outside of mixed-group activities around this time, and relationships begin to include intimacy and exclusivity (Connolly, Craig, Goldberg, & Pepler, 2004; Meier & Allen, 2009). The majority of teens (88%) were recruited through county truancy courts in a large city in the Southwestern United States; the remainder were recruited through juvenile probation and victim services offices. On average, participants were 15.85 years old (*SD* = 1.05). Most identified as non-Hispanic (84.4%), and Black or African American (62.2%), followed by White (25.9%), more than one race (4.1%), American Indian/Alaska Native (1.4%), and Asian (0.7%). Five participants indicated their race as "unknown or not reported," and one participant did not provide information on their race.

The university's Institutional Review Board approved all procedures. Participants were recruited via fliers at the courts, juvenile probation offices, and victim services offices. Interested

teens and their mothers completed a screening interview by phone to assess eligibility. To participate, teens must speak English well enough to complete each assessment (as determined by research assistants), have been in a romantic or dating relationship at the time of the initial contact, and living with the mother for the past 6 months. Additional exclusion criteria included an affirmative response to any of the following questions: has (the teen) ever injured his or her head badly enough to lose consciousness? Has any professional ever told you that (the teen) has autism spectrum disorder, or might have an intellectual disability, or might be a slow learner? Assessments were conducted in a university lab; mothers provided consent and teens provided assent prior to the baseline assessment. Mothers and teens each received $50 for completing the baseline and 3-month assessment, and teens received $10 for each completed 2-week assessment.

During the 3 months after the baseline assessment, teens were contacted to complete biweekly telephone interviews during which they reported their TDV perpetration during the past 2 weeks. At the beginning of each interview, teens were asked if it was a convenient time for the assessment and given an opportunity to reschedule if needed. Each assessment took 10-15 minutes to complete. If a participant could not be reached within the 4-day window to complete an assessment, attempts to perform the assessment were ceased and a letter was mailed to the participant reminding them of their next telephone interview. At the 3-month assessment, participants returned to the lab, providing information on TDV over the past 3 months.

Measures

Teen dating violence perpetration. TDV perpetration was assessed using three subscales from the Conflict in Adolescent Dating Relationships Inventory (CADRI; Wolfe et al., 2001): physical TDV perpetration (4 items), including "pushed, shoved, or shook them" and "kicked, hit or punched them"; sexual TDV perpetration (4 items), including "touched them

when they didn't want me to" and "kissed them when they did not want me to"; and emotional TDV (10 items), including "insulted them with put downs" and "said things just to make them angry." Perpetration of each violent act was reported on a 5-point scale ranging from 0 (*Never*) to 4 (*Four or more times*). The CADRI is widely used as a measure of dating violence perpetration among adolescents (Smith et al., 2015). Retrospective reports of dating violence perpetration over a one year period are associated with observer reports of abusive behavior in an interaction task (Wolfe et al., 2001) and theorized predictors of TDV perpetration (Niolon et al., 2015).

For the single assessments in the current study, the timeframe used was the past 3 months. To examine the prevalence (occurrence/non-occurrence) of the different types of TDV perpetration, scores were dichotomized such that no TDV was coded 0 and any TDV was coded 1. To examine frequency of violence, total scores for each subscale were calculated by summing the items on the subscale. Due to the skewed distribution of TDV, we utilized the greatest lower bond (GLB) coefficient as an index of internal consistency (Trizano-Hermosilla & Alvarado, 2016). GLB in the current sample was .95 for physical TDV, .91 for sexual TDV, and .94 for emotional TDV.

For the cumulative assessments, the timeframe used was the past 2 weeks. Prevalence and frequency scores for each 2-week period were computed using the same procedure as for the 3-month retrospective reports. Total scores at each cumulative assessment were then summed to form a total frequency score across the 3-month time period. Cranford and colleagues (2006) reliability model was used to compute internal consistency as it allows for measurement variability at the between- and within- subjects level. Reliability in the current sample was $R = .96$ for physical TDV, $R = .89$ for sexual TDV, and $R = .98$ for emotional TDV.

Externalizing. Participants completed the Delinquent Behavior and Aggressive Behavior subscales of the Youth Self Report – Revised (YSR-R; Achenbach, 1991) at the baseline assessment. The Delinquent Behavior subscale is comprised of 11 items including "I lie or cheat" and "I steal from places other than home." The Aggressive Behavior subscale includes 19 items such as "I get in many fights" and "I scream a lot." Participants were asked to indicate how true each item was to them in the past 3 months on a 3-point scale: 0 (not true), 1 (somewhat or sometimes true), and 2 (very true or often true). The Delinquent Behavior and Aggressive Behavior subscales are combined to form an index of Externalizing Problems. GLB for Externalizing Problems in the current sample was .93. Externalizing symptoms measured with the YSR-R are positively related to dating violence among adolescents (Narayan, Englund, Carlson, & Egland, 2013; Ohlert, Seidler, Rau, Fegert, & Allroggen, 2017)

Exposure to community violence. A modified version of the Survey of Exposure to Community Violence was administered at the baseline assessment to examine exposure to community violence in the past 3 months (SECV; Richters & Saltzman, 1990). Participants rated how often they had experienced 11 events involving community violence on a 3-point scale ranging from 1 (*Never*) to 3 (*Four or more times*). Items included "I have heard guns being shot in my neighborhood," "I have seen drug deals in my neighborhood," and "I have seen someone get stabbed in my neighborhood." Items were summed such that higher scores indicate greater exposure to violent events in the community. GLB in the current sample was .82. The SECV is associated with theorized outcomes of exposure to community violence, such as PTSD (Scarpa, Haden, & Hurley, 2006), mental health concerns (McDonald & Richmond, 2008), and violent behavior (McMahon, Felix, Halpert, & Petropoulos, 2009).

Attitudes about dating. Beliefs about dating relationships were assessed with a modified

version of the Attitudes About Dating and Sexual Relationships Measure (AADSR; Ward, 2002)

at the baseline assessment. The AADSR assesses a variety of beliefs related to stereotypical or

traditional gender roles within dating relationships. Two subscales were used in the current data

collection: a 7-item subscale involving themes of men as sex-driven, and a 7-item subscale

involving themes of women as sexual objects. Sample items include: "Men are always ready and

willing for sex; they think about it all the time" and "Using her body and looks is the best way

for a woman to attract a man." A total score was commuted by summing items, such that higher

scores indicate greater endorsement of traditional gender roles in dating relationships. GLB in

the current sample was .91. The AADSR is associated with media exposure to traditional gender

roles (Ward, 2002).

Data Analysis

We used Wilcoxon signed rank test and McNemar's test to determine differential

frequency and prevalence of TDV perpetration across measurement methods. To examine

differences across TDV type in assessment method, and differential associations with criterion

variables, we used multivariate generalized linear multilevel modeling (GLMM). Repeated

assessments of TDV perpetration (with each measurement method) were nested within

individuals. GLMM allows repeated measures to be correlated through modeling the covariance

structure of the errors of repeated measures. Additionally, multivariate GLMM allows for

multiple dependent variables in a single model, which subsequently reduces bias associated with

multiple comparisons. Furthermore, multivariate analyses allow for examination of differences in

models across dependent variables. Specifically, using a multivariate model we are not only able

to test whether differential associations between criterion variables and TDV arise across

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assessment method, but whether these differential associations differ across type of TDV (physical, sexual, and emotional).

As is common when assessing violence, our measure of TDV evidenced a zero-inflated distribution; we therefore utilized a negative binomial distribution in all models, with robust estimations (Atkins & Gallop, 2007). Although it is often advised that dependent variables are z-scored in multivariate GLMM to account for differences in units of variables (Heck, Thomas, & Tabata, 2014), doing so would prevent the use of a negative binomial model. We therefore retained the raw scores of TDV and included dummy codes for each subtype of TDV in the models to account for differences in scale. For instance, when examining sexual TDV, dummy codes for physical TDV and emotional TDV were included.

We examined differential associations between criterion variables and TDV perpetration across measurement methods using the following level 1 GLMM model:

$$\text{TDV Perpetration}_{ijk} = b0_{ik} + b1_{ik}*\text{Method}_{ijk} + \varepsilon_{ijk}$$

Where ijk subscripts refer to individual i for measurement method j among TDV type k. The level 2 models for all analyses were:

$$b0_{ik} = \Upsilon00_k + \Upsilon01_k*\text{Criterion}_i + \mu0_{ik}$$

$$b1_{ik} = \Upsilon10_k + \Upsilon11_k*\text{Criterion}_i + \mu1_{ik}$$

The composite GLMM model (a combination of level 1 and 2 models) tests the main effects of the criterion variable and measurement method on predicting TDV perpetration, as well as the interaction of the criterion variable and measurement method. Specifically, the interaction term defines whether the association between the criterion variable and TDV perpetration differs by measurement method of TDV.

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We used three separate models to examine differential relations with our three criterion variables. For each model, we first examined whether the effect of assessment method on the relation between TDV and the criterion variable differed by TDV type. We therefore included three-way interactions between assessment method, the criterion variable, and the dummy code for each violence type except the reference group. Specifically, if sexual TDV is the reference group, one would include three way interactions between assessment method, the criterion variable, and the dummy code for physical TDV, and between assessment method, the criterion variable, and the dummy code for emotional TDV. Significant three-way interactions indicate models differ by type of TDV. If all three-way interactions are non-significant, results are equivalent across type of TDV and a single overall model can be used.

Sample Size Justification

We evaluated our statistical power for detecting difference in prevalence and frequency of TDV with a sample size of 147 and alpha set at .05 using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). We found that power exceeded .85 to detect a small difference in prevalence of TDV using McNemar's test ($OR = .20$), and exceeded .93 to detect a small difference in frequency of TDV using Wilcoxon signed rank test ($d = .25$).

Although several software programs for calculating power of multilevel models exist, they are often limited in the extent to which complex analytic models can be accurately represented (Lane & Hennes, 2018). We therefore followed recommendations of Lane and Hennes (2018) to perform power analysis via simulations of the hypothesized model using SAS software version 9.4. Due to lack of comparable models in the existing literature, we assumed a small-to-moderate effect of all fixed effect predictors ($\beta = .10$-.20), with a small random slope variance (15%) and moderate residual variance (40%). Results from 1000 randomly generated

simulations of 147 total participants indicate adequate power to detect differential associations of TDV to criterion variables across assessment method (power = .93).

Attrition and missing data

Of the 147 participants at the baseline assessment, 127 (84%) completed the 3-month assessment. Of these 127, 25 completed all six biweekly assessments, 31 completed five, 26 completed four, 24 completed three, 10 completed two, and 8 completed one. Although missing data is common in studies involving frequent assessments, any missing data may still introduce bias in results. Thus, data were imputed at the item-level using R missForest (Stekhoven & Bühlmann, 2011), an imputation technique appropriate for nonparametric data. The missForest package uses random forests on each observed part of the data to predict missing values, a process that is run iteratively until a stopping criterion is met. All demographic and criterion variables were included as predictors in the imputation model. The imputed data was used for all analyses.

<div align="center">

Results

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Descriptive data

Means, standard deviations, and prevalence rates of TDV perpetration are presented in Table 1. The majority of participants reported emotional abuse on both the single assessment (80%) and the cumulative assessments (91%), while less than one third of participants reported physical and sexual abuse on the single assessment (14% and 15%, respectively) and the cumulative assessments (26% and 22%, respectively). For the single assessment of TDV, 28 participants endorsed "four or more times" to at least one of the 18 TDV items. However, most participants did not reach the maximum score at the scale level on the single assessments, with the expectation of one participant who indicated "four or more times" on all four physical TDV

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items. Thus, the single assessment of TDV did not demonstrate a ceiling effect due to the limited range of the response scale. Correlations between all study variables are presented in Table 2.

Prevalence and frequency rates of TDV

McNemar's tests indicated the prevalence of TDV perpetration was higher when measured cumulatively rather than with a single assessment, for physical ($p = .002$, $OR = 5.77$) and emotional ($p = .001$, $OR = 20.17$), but not sexual TDV ($p = .052$, $OR = 2.84$). Wilcoxon signed rank tests indicated frequency of TDV perpetration was greater when measured cumulatively rather than with a single assessment for all three types of TDV: physical TDV, $Z = -5.02$, $p < .001$, $\eta^2 = .34$; sexual TDV, $Z = -3.21$, $p = .001$, $\eta^2 = .16$; emotional/verbal TDV, $Z = -9.92$, $p < .001$, $\eta^2 = .74$.

To examine whether differences in assessment method were comparable across TDV type, we used GLMM with measurement method, dummy codes, and 2-way interactions between measurement method and dummy codes as predictors. Measurement method had a greater effect on emotional TDV, $b = 0.66$, $SE = 0.23$, $p = .004$, $OR = 1.93$, and physical TDV, $b = 0.64$, $SE = 0.29$, $p = .03$, $OR = 1.90$, compared to sexual TDV. There was no difference in the effect of measurement method between emotional TDV and physical TDV, $b = .02$, $SE = .23$, $p = .94$, $OR = 1.02$.

Associations with correlates of TDV perpetration

We first examined the association between TDV and externalizing symptoms across assessment methods. Three-way interactions between externalizing symptoms, assessment method, and type of violence were included to determine if the effect of assessment method on the relation between exposure to community violence and TDV differed by type of TDV. None of the three-way interactions were significant, suggesting that results did not differ by TDV type:

sexual TDV vs. emotional TDV, $b = -0.01$, $SE = 0.03$, $p = .86$; sexual TDV vs. physical TDV, $b = 0.02$, $SE = 0.03$, $p = .58$; and emotional TDV vs. physical TDV, $b = 0.02$, $SE = 0.02$, $p = .21$. Results were subsequently examined across all three types of TDV. There was an interaction between assessment method and externalizing symptoms, $b = -0.014$, $SE = .001$, $p = .01$, $OR = .99$, such that the relation between externalizing symptoms and TDV perpetration was stronger when TDV was measured cumulatively rather than with a single assessment.

Next, we examined the association between TDV and exposure to community violence across assessment methods. Three-way interactions indicated that differential associations between exposure to community violence and measurement method differed between sexual TDV and emotional TDV, $b = -.13$, $SE = 0.05$, $p = .01$; and between sexual TDV and physical TDV, $b = -0.15$, $SE = 0.07$, $p = .03$. Differential associations did not differ between emotional TDV and physical TDV, $b = .02$, $SE = .05$, $p = .71$. The results were subsequently examined separately by TDV type.

The interaction between exposure to community violence and assessment method was significant for sexual TDV, $b = 0.12$, $SE = 0.05$, $p = .03$, $OR = 1.13$, suggesting the relation between exposure to community violence and sexual TDV was stronger when TDV was measured cumulatively rather than with a single assessment. Conversely, this interaction was not significant for physical, $b = -0.02$, $SE = 0.05$, $p = .66$, $OR = .98$, or emotional TDV, $b = -0.004$, $SE = 0.02$, $p = .82$, $OR = 1.00$.

Finally, we examined whether the association between attitudes about dating and TDV differed across assessment methods. None of the three-way interactions were significant, suggesting that results did not differ by TDV type: sexual TDV vs. emotional TDV, $b = -0.004$, $SE = 0.02$, $p = .78$; sexual TDV vs. physical TDV, $b = 0.02$, $SE = 0.02$, $p = .39$; and emotional

TDV vs. physical TDV, $b = -0.02$, $SE = 0.02$, $p = .22$. Thus, results were examined across all three types of TDV. The interaction between assessment method and attitudes about dating was not significant, $b = -0.01$, $SE = 0.01$, $p = .44$, $OR = 1.00$, suggesting the relation between attitudes about dating and TDV did not differ by assessment method.

Discussion

We examined the utility of a cumulative measure of TDV perpetration across six assessments spaced 2-weeks apart, compared to a single, retrospective measure for a 3-month period. Results suggest that the cumulative assessment yielded higher prevalence rates for physical and emotional TDV, compared to the single assessment. In addition, the frequency of physical, sexual, and emotional TDV was greater for the cumulative measure compared to the single assessment. Indeed, the frequency of TDV perpetration was almost five times greater for physical TDV, three times greater for sexual TDV, and six times greater for emotional TDV when measured cumulatively compared to with a single assessment. Measurement method demonstrated a greater effect when measuring emotional TDV and physical TDV compared to sexual TDV. Although cumulative assessments increased rates of TDV across all types, these results suggest that this increase is not identical across type of TDV. Furthermore, less than 20% of participants endorsed "four or more times" on at least one TDV item, and almost no participants indicated experiencing the maximum amount of TDV perpetration possible on the single assessment. This suggests differences in frequency are not simply due to limitations of the response scale but are likely due to memory bias in the single assessment.

Additionally, we examined the criterion validity of the cumulative measure by examining differential associations of TDV perpetration to predictors of perpetration. Externalizing symptoms evidenced a stronger relation across all types of TDV when TDV was measured

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cumulatively rather than with a single report, and sexual TDV was more strongly related with exposure to community violence when measured cumulatively compared to a single report. Associations between attitudes about dating and any type of TDV did not differ by assessment method. Finally, externalizing symptoms evidenced a stronger relation across all types of TDV when TDV was measured cumulatively rather than with a single report. These results suggest that single, retrospective measurements may dramatically underestimate both prevalence and frequency rates of TDV perpetration. Additionally, these results provide some support that estimates of TDV perpetration obtained from cumulative assessments demonstrate greater criterion validity compared to estimates obtained from single reports. Our results replicate previous findings demonstrating greater prevalence using cumulative assessments compared to single reports in both the field of mental health (Copeland et al., 2011; Costell et al., 2003; Jaffee et al., 2005; Kim-Cohen et al., 2003; Moffitt et al., 2010) and TDV victimization (Jouriles et al., 2005).

It may be argued that the current findings are not due to differential assessment methods but the administration of these assessments. That is, the cumulative assessments were conducted via phone interview, while the single assessments were gathered in an in-person interview. It could be reasoned that adolescents are more likely to divulge socially undesirable information during a phone interview rather than when a researcher is physically present. In this case, differential prevalence, frequency, and associations would be due to the format with which the interviews are conducted rather than the frequency of assessments. However, previous research demonstrates participants respond to phone interviews similarly to in-person interviews (Bidarra, Lessard, & Dumont, 2016; Dansky, Saladin, Brady, Kilpatrik, & Resnick, 1995). Given this, it is

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unlikely the results of the current study are due to the difference in administration rather than measurement method.

One implication of the current findings relates to our knowledge of predictors of TDV perpetration given the field's reliance on single reports. Specifically, we found some relations between TDV and criterion variables were only present when TDV was measured using cumulative assessments. When TDV is measured with a single retrospective report, researchers are likely to miss potentially important precipitants of TDV perpetration, or underestimate the importance of these precipitants. Relatedly, the use of single assessments may limit our ability to evaluate interventions for TDV. Cumulative assessments provide a more sensitive measure of TDV compared to single assessments, which allows researchers to more accurately measure small but meaningful changes in intervention studies. This may be especially relevant to interventions that have thus far demonstrated little evidence of effectiveness, such as batterer intervention programs. Although some argue these programs are ineffective, it may be that our current measures of dating violence perpetration are not sensitive enough to detect meaningful changes in these programs, leading to incorrect conclusions about their effectiveness. Insensitive measurement strategies not only inhibit our understanding of TDV perpetration, but also limit our ability to determine the effectiveness of intervention and prevention strategies.

Researchers may be reluctant to employ cumulative assessments due to the perception that repeated assessments require significant time and effort on the part of the researcher. Although some forms of administration can be laborious (e.g., in person interviews), advancements in technology significantly reduce burden of researchers attempting to collect cumulative data. For instance, several online survey programs include automatic survey distribution and tracking, such that researchers do not have to manually send surveys and track

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participant recruitment. Additionally, several studies document the feasibility of using remote technology, such as cell phones, to collect intensive longitudinal data (Heinonen, Luoto, Lindfors, & Nygård, 2012; Hensel, Fortenberry, Harezlak, & Craig, 2012; Nelson Flick, Winer, & Golden, 2013). With these advancements in technology, there are now several feasible options for administration of cumulative assessments with little burden to the researcher.

Limitations

Several limitations of the current study should be noted. First, there was some missing data across the 2-week cumulative assessments (~30% missing data). Missing data is not uncommon in repeated measures designs, especially when implementing intensive longitudinal studies such as diary studies (Silvia, Kwapil, & Walsh, 2014). In fact, our rate of missing data is not much greater than that seen in similar studies where data are collected in longitudinal designs (Karahalios, Baglietto, Carlin, English, & Simpson, 2012; Ohly, Sonnentag, Niessen, & Zapf, 2010). Although we employed a well-established data imputation method appropriate for our data, best practice for handling missing data are to limit missingness as much as possible during data collection (Newman, 2014). Additionally, the amount of missing data may suggest some participant burden when completing cumulative assessments. Previous research does note participant burden as one consideration when utilizing measurement methods involving multiple assessments (Mehl & Conner, 2012). However, researchers have been able to successfully implement cumulative techniques (e.g., Jouriles et al., 2005; Moffitt et al., 2007), suggesting participant burden may be reduced to a reasonable rate. Future research should examine the extent of participant burden in conducting cumulative assessments and techniques for reducing such burden.

It might also be argued that administration of repeated cumulative assessments may influence participant responses on a single assessment. That is, the administration of six cumulative assessments may have primed participants to notice instances of relationship violence during the 3-month period that they might otherwise not recognize. Reports of TDV on the single assessment may thus be inflated due to a priming effect of cumulative assessments. However, if participants did experience a priming effect influencing the single assessment of TDV, the current findings provide a conservative test of our hypotheses. That is, a priming effect would decrease the likelihood of differences between the single and cumulative assessment method. Thus, differences between single and cumulative assessments in the current study may be greater than those demonstrated in the current study.

Relatedly, many influential factors related to the cumulative assessments remain unknown. Specifically, the number of cumulative assessments used in the current study and the time between them was determined based on prior studies of cumulative assessments (Caiozzo et al., 2016; Jouriles et al., 2005). However, the optimum number of assessments and time between them has yet to be scientifically explored. One could reason that shorter assessment periods, such as those used in daily diary studies, may yield more accurate estimates of TDV, especially for types of violence that occur on a daily or weekly basis (Schwarz, 2007). On the other hand, reducing the number of assessments by extending assessment periods may be one valuable way to reduce participant burden. Specific factors related to conducting cumulative assessments of TDV perpetration should be further explored to optimize this measurement technique.

We utilized a single, well-validated scale of TDV perpetration for both the cumulative assessments and the single assessments. Although we found evidence for the utility of cumulative assessments, it is unclear if our results would generalize to other measures of TDV

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perpetration that employ different items and response scales. Relatedly, we only examined three known predictors of TDV perpetration. Although we found promising results with our three criterion variables, future research should extend these findings to other predictors of TDV, such as substance use, affiliation with negative peers, and exposure to family violence.

Conclusion

Results of the current study suggest cumulative assessments provide greater prevalence and frequency rates of TDV perpetration compared to single reports. Additionally, differential associations between TDV perpetration and predictors of violence across measurement methods provide some evidence that estimates obtained via cumulative assessments are more accurate than those obtained via single reports. Although further research is needed on the use of cumulative assessments, especially within the field of TDV, the current study points to the importance of accurate assessment and the utility of cumulative assessment methods. Future research should begin to incorporate cumulative assessments in studies of TDV, as continued reliance on single measures are likely to limit advancement of the field.

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Table 1

Means, standard deviations, and prevalence rates of study variables

	Single Assessment		Cumulative Assessment	
	M (SD)	*% (n)*	*M (SD)*	*% (n)*
Physical Abuse	0.63 (2.28)	14.3 (21)	3.10 (8.86)	25.9 (38)
Sexual Abuse	0.42 (1.34)	15.0 (22)	1.37 (3.96)	21.8 (32)
Emotional Abuse	5.80 (6.74)	79.6 (117)	35.83 (37.58)	91.2 (134)

Note. Prevalence rates reflect the percent of participants who endorsed any violence perpetration.

For frequencies, on the single assessment, physical abuse and sexual abuse scores had a possible range of 0-16, while emotional/verbal abuse scores had a possible range of 0-40. On the cumulative assessment, physical abuse and sexual abuse scores had a possible range of 0-96, while emotional abuse scores had a possible range of 0-240.

Table 2

Correlations between study variables

	Single Assessment			Cumulative Assessment		
	Physical TDV	*Sexual TDV*	*Emotional TDV*	*Physical TDV*	*Sexual TDV*	*Emotional TDV*
Exposure to Community Violence	.25**	.12	.21**	.30**	.32**	.27**
Attitudes about Dating	.11	.17*	.19*	.12	.16	.19*
Externalizing Symptoms	.27**	.22**	.46**	.39**	.36**	.46**

Note. All values presented are Spearman correlations.

*p < .05

**p < .01