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Witnessing Domestic Violence: Measuring The Effects In Adolescence, Adulthood, And In The Next Generation Of Children

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Witnessing Domestic Violence: Measuring The Effects In Adolescence, Adulthood, And In The Next Generation Of Children

Abstract
Witnessing domestic violence during childhood has been associated with various negative health outcomes. In this work, we conducted a series of analyses to further explore the effects of witnessing that persist into adolescence, adulthood, and, taking a novel approach, to the next generation of children.

First, we compared witnessing status and subsequent experiences with different types (physical, sexual, emotional, or multiple types) of adolescent relationship violence by comparing standardized marginal effects from multiply-imputed data. Witnessing was associated with all forms of violence, and additive effect modification indicated that female witnesses were more likely than male witnesses to experience victimization-related outcomes. In contrast, male witnesses were more likely than female witnesses to experience perpetration-related outcomes, except for physical perpetration.

Second, using standardized multinomial regression, we compared whether witnessing same-gender, opposite-gender, or bidirectional domestic violence perpetration was associated with different adolescent relationship violence outcomes for boys and girls. Compared to non-witnesses, boys who witnessed adult males perpetrate had increased adolescent perpetration. In contrast, girls had increased adolescent victimization if they witnessed males and females perpetrating together and had a tendency toward higher victimization when witnessing males perpetrate alone. Notably, boys and girls who witnessed females perpetrate, alone or together with a male, had increased risk for combined victimization/perpetration compared to non-witnesses.

Finally, perhaps the greatest challenge in this field is having to rely on observational studies, particularly because witnessing co-occurs with many confounding experiences. To overcome this limitation, we used propensity score weighting and applied a new approach to understand the impact that intergenerational violence has on health. Comparing the effects of witnessing domestic violence on first- and second-generation health outcomes using parent-child pairs from a population-based study, we found no effect of witnessing on general health of adults who witnessed violence during childhood. However, children whose parents witnessed domestic violence had worse health compared to children with non-witnessing parents.

This work further supports the theory of intergenerational violence transmission and provides a springboard for future studies by offering a novel approach to studying multi-generational effects of witnessing and promoting more rigorous methods to remove the effects of commonly confounding exposures.

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WITNESSING DOMESTIC VIOLENCE: MEASURING THE EFFECTS IN ADOLESCENCE, ADULTHOOD, AND IN THE NEXT GENERATION OF CHILDREN

Christine Forke Young

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WITNESSING DOMESTIC VIOLENCE: MEASURING THE EFFECTS IN ADOLESCENCE, ADULTHOOD, AND IN THE NEXT GENERATION OF CHILDREN

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Christine Forke Young
Dedication

To Wyatt, my driving force in the quest to achieve a peaceful and hopeful world for all children.
ACKNOWLEDGMENT

I would like to thank my committee for their guidance and encouragement during this process. I have been blessed with an advisor, JA (Jeane Ann) Grisso, who is a true gem - smart, compassionate, realistic, and one of the best cheerleaders anyone could ever dream of having. No matter how challenging the situation, I always left our discussions feeling motivated and prepared to overcome whatever challenge I faced. Doug Wiebe, your calm, thoughtful presence, practical approach and brilliant mind, have helped me see the forest through the trees, successfully navigate the process, and stay focused on the ultimate goal. Marina Catallozzi, you are such a bright light and a tireless advocate for teens. Thank you for encouraging Sandy and Martha to add me to the team at the start of this project and for having enough faith in me to pass the baton. I am extremely grateful for your collaborative spirit and friendship. Joel Fein, you are the epitome of a true mentor. Your passion for improving the lives of children and families is infectious. You have taught me more than I can describe over the years I have known you, including the importance of humor, balance, and self-reflection. You have championed for me, supported me, encouraged me, and believed in me – even when I questioned myself. Russell Localio, you are a dedicated teacher at heart. Thank you for challenging me and encouraging the pursuit of scholarly perfection; my work is stronger because of your guidance, persistence, and patience, and I certainly am more enlightened. Tom TenHave, one of my previous dissertation mentors, was kind, wise, and loved by all. Sadly, he passed from this life much too soon, and I feel incredibly fortunate to have had the chance to work with him.

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ABSTRACT

WITNESSING DOMESTIC VIOLENCE: MEASURING THE EFFECTS IN ADOLESCENCE, ADULTHOOD, AND IN THE NEXT GENERATION OF CHILDREN

Christine Forke Young
Jeane Ann Grisso

Witnessing domestic violence during childhood has been associated with various negative health outcomes. In this work, a series of analyses further explores the effects of witnessing that persist into adolescence, adulthood, and, taking a novel approach, to the next generation of children.

First, witnessing status was compared to subsequent experiences with different types (physical, sexual, emotional, or multiple types) of adolescent relationship violence by assessing standardized marginal effects from multiply-imputed data. Witnessing was associated with all forms of violence, and additive effect modification indicated that female witnesses were more likely than male witnesses to experience victimization-related outcomes. In contrast, male witnesses were more likely than female witnesses to experience perpetration-related outcomes, except for physical perpetration.

Second, standardized multinomial regression was used to determine whether witnessing same-gender, opposite-gender, or bidirectional domestic violence perpetration was associated with different adolescent relationship violence outcomes for boys and girls. Compared to non-witnesses, boys who witnessed adult males perpetrate had increased adolescent perpetration. In contrast, girls had increased adolescent victimization if they witnessed males and females perpetrating together and had a tendency toward higher victimization when witnessing males perpetrate alone. Notably, boys and girls who witnessed females perpetrate, alone or together
with a male, had increased risk for combined victimization/perpetration compared to non-witnesses.

Finally, perhaps the greatest challenge in this field is having to rely on observational studies, particularly because witnessing co-occurs with many confounding experiences. To overcome this limitation, propensity score weighting was used and a new approach was applied to understand the impact that intergenerational violence has on health. Comparing the effects of witnessing domestic violence on first- and second-generation health outcomes using parent-child pairs from a population-based study, there were no effects of witnessing on general health of adults who witnessed violence during childhood. However, children whose parents witnessed domestic violence had worse health compared to children with non-witnessing parents.

This work further supports the theory of intergenerational violence transmission and provides a springboard for future studies by offering a novel approach to studying multi-generational effects of witnessing and promoting more rigorous methods to remove the effects of common confounding exposures.
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CHAPTER 1
Introduction

Domestic violence is a significant public health issue impacting all races, ages, and socioeconomic strata, with roughly one in four women and one in six men experiencing domestic violence over the course of their lifetime.\(^1\) Domestic violence has been associated with substantial costs to individuals and society\(^2\)\(^-\)\(^6\) that result from numerous sequelae. While domestic violence has a significant impact on the adult victims, the impacts also are felt on children who are exposed to domestic violence in the home.

Domestic violence occurs in approximately 13 million homes in the United States, resulting in approximately 15 million children being exposed annually.\(^7\) Children's witnessing of domestic violence is one of the well-studied adverse childhood experiences (ACEs), which in combination have been shown to impact adult health outcomes such as obesity, heart disease, depression, anxiety, and suicidality.\(^8\)\(^-\)\(^11\) When studied on its own, childhood witnessing of domestic violence has been found to be a risk factor for several negative health outcomes throughout childhood including poor school performance, cognitive delay, emotional and behavioral issues and mental health diagnoses in children.\(^8\)\(^-\)\(^10,12\)

In addition, prior research has found that childhood witnessing of domestic violence is associated with future violent behavior in one's own romantic relationships in adolescence and adulthood,\(^4\)\(^,\)\(^13\)\(^-\)\(^25\) which lends strong support to the theory of intergenerational violence transmission.\(^26\) It is well established that those at highest risk for partner violence are women between the ages of 16-24,\(^4\) and recent work has shown that relationship violence frequently begins during early and mid-adolescence.\(^27\)\(^-\)\(^31\) Prevalence rates for adolescent relationship violence, range from 10-80%, depending on the sample and measurement technique used.\(^21,23,27,29,32-36\)

Although there is now a well-established literature supporting the repetitive nature of violence that occurs across generations, we know much less about the effects of
intergenerational violence on overall health. For example, do the negative childhood health effects associated with witnessing subside once the child ages and moves out of the abusive home, or are they more salient, persisting into adulthood, and possibly even beyond, into the next generation of offspring?

**Knowledge gaps**

This field has made considerable strides in the last 20 years, however, knowledge gaps still exist. For example, many studies that examine whether adolescent relationship outcomes are associated with witnessing have utilized convenience sampling of social science students limiting generalizability. In addition, studies frequently explore physical, emotional, or sexual violence separately, and infrequently examine the co-occurrence of victimization and perpetration. Moreover, until relatively recently, studies tend to be based on stereotypical perceptions, which assume that men perpetrate and women are victims. Without including males and females together in studies exploring various forms or violence, it is impossible to understand the effects of gender. Furthermore, many adolescent studies measure violence experiences over the past 12-18 months, potentially underestimating actual lifetime experience and limiting the assessment of multiple types of exposures (i.e., polyvictimization and polyperpetration).

Measuring exposure to multiple types of violence is particularly important because having experiences with multiple types violence has been shown to be even more detrimental to health than having repeated episodes of the same time of violence. Much of the work in this field has been based on the premise of Social Learning Theory, which suggests that children normally would model the behaviors of their parents, particularly those of the same gender. Thus, girls would be more likely to model mothers’ behaviors, and boys would be more likely to model their fathers’ behaviors. Applying this concept to adolescent relationship violence outcomes that are associated with witnessing domestic violence has not been explored fully in literature. Though prior studies have been inconsistent in identifying associations between perpetrator and witness gender and subsequent violence outcomes, a
number of studies have shown different effects for girls and boys.\textsuperscript{18,20,21,24-26,37,38,41,43,48} The majority of prior studies have compared associations between witnessing male to female violence and female to male violence.\textsuperscript{18,21,26,41,43} Studies rarely examine outcomes that are associated with witnessing both parents being mutually violent, and even fewer also explore the association between witnessing domestic violence and experiencing both victimization and perpetration during adolescence. This leaves a gap in knowledge, particularly as it relates to bidirectional witnessing and combined victimization/perpetration during adolescence.

Finally, one of the most challenging issues in this field is the need to rely heavily on observational studies, which limits our ability to establish causal inferences. This is particularly challenging when trying to separate the effects of witnessing from the effects of a host of other co-existing adversities. While there is not much we can do about relying on observational data for ethical reasons, there are more rigorous analytic techniques that can be used with observation data that will allow us to decrease bias and have more confidence in our findings.

**Summary of Work**

This work builds upon the available literature in order to overcome some of limitations that were just discussed. In doing so, a series of analyses is conducted that further explores the effects of witnessing that persist into adolescence, adulthood, and, taking a novel approach, to the next generation of children. There are three key objectives to this work.

First, in Chapters 2 and 3, two separate analyses use data from a study of three universities in the Northeastern U.S. that were chosen to represent a demographically diverse sample of students. Unlike past studies that frequently use convenience samples consisting of a few large introductory social science classes, this sample included students in 67 classes from a wide variety of disciplines across the three schools, to increase the generalizability of the findings. In addition, male and female students reported on lifetime experiences with victimization and perpetration of physical, sexual, and emotional violence separately. These methods allow direct cross-comparisons, not only between men and women, but also between victimization and
perpetration status for all three type of violence exposure. Furthermore, querying about all forms of violence allowed us to examine associations between witnessing domestic violence and having exposures to multiple types of violence.

In Chapter 2, associations are examined between witnessing domestic violence at home as a child and subsequent experiences with various types of adolescent relationship violence. This allows for a better understanding of whether witnessing is associated with some types of violence more than others, or if all types are affected equally. Additionally, the role of gender is measured by testing for effect modification.

Chapter 3 builds on these findings and prior work related to Social Learning Theory by comparing the gender of the adult perpetrator and child witness to determine if they are associated with subsequent victimization and perpetration during adolescence. For example, this work assess whether boys who witness adult females being violent have different adolescent relationship violence outcomes compared to boys who either witness adult males being violent or both male and female adults being mutually violent toward each other. Specific associations are examined between witnessing bidirectional adult perpetration (witnessing both male and female adults being violent towards each other) and experiencing combined victimization/perpetration during adolescence.

Chapter 4 looks beyond adolescence into adulthood and to the next generation of offspring to examine the effects of childhood witnessing on the health of the adults who witnessed and the health of their children. This analysis uses data from the 2012 Southeastern Pennsylvania Household Health Survey (SE PA HHS) that is conducted in the 5-country region local to Philadelphia. This survey is conducted every two years using random-digit dialing of landlines and cell phones, and captures health data for between 10-15 thousand residents. In 2012, the Philadelphia Adverse Childhood Experiences (ACEs) Leadership Task Force developed the Philadelphia ACE Survey to build upon the landmark ACE Study conducted by Felitti and Anda in the late 1990s. The ACE add-on module was coupled with the HHS to
collect data on childhood adversities in an urban community. Approximately 2,000 Philadelphia County residents were re-contacted and asked to complete the module.

Adult and child pairs from this subsample are used to examine effects of witnessing into adulthood using more sophisticated analytic techniques compared to what is currently in the literature. Propensity score weighting is used to control for the various co-existing adversities that occur with witnessing to allow for causal inferences, and sensitivity analysis is added to assist with interpreting the strength of the overall findings.

Finally, Chapter 5 summarizes findings of the three key objectives and discusses implications for screening in both the pediatric, adolescent, and adult settings. Suggestions are also provided for advancing the field both in terms of capitalizing on the novel approach taken in this work by studying second generation effects and also by encouraging the use of more sophisticated analytic techniques than are typically used in order to decrease bias in estimates and offer a transparent solution that will enhance the level of confidence in reported findings.
CHAPTER 2

Intimate Partner Violence: Childhood Witnessing and Subsequent Experiences of College Undergraduates

ABSTRACT

Objective: The objective was two-pronged: 1) to examine associations between witnessing adult violence at home as a child and experiencing adolescent physical, sexual and emotional relationship violence during adolescence and 2) to determine if gender moderates these effects.

Patients and Methods: Cross-sectional survey administered to male and female undergraduates on three urban college campuses in one East Coast city. Surveys were analyzed from 907/911 (99.6%) eligible students aged 17-22 years attending randomly-selected classes. The survey asked about childhood witnessing (exposure) and subsequent experiences with physical, sexual, and emotional victimization and perpetration (outcomes). Experience with multiple types of victimization (polyvictimization) and perpetration (polyperpetration) was assessed.

Results: 214 (24%) students witnessed adult violence at home as a child, and 403 (44%) experienced adolescent relationship violence. In full sample comparisons standardized for gender, age, race, school, and community violence, witnesses were more likely to experience adolescent relationship violence compared to non-witnesses. While the multiplicative interaction term was not statistically significant, stratified analyses indicated additive effect modification by gender. Except for sexual victimization, female witnesses were more likely than female non-witnesses to experience all forms of victimization as well as have higher risk for perpetration, particularly physical perpetration. In contrast, there were no significant differences between male witnesses and non-witnesses on victimization outcomes, but male witnesses were more likely than male non-witnesses to perpetrate all forms of violence.
**Conclusions:** College students who witnessed adult violence at home during childhood were at increased the risk for all types of relationship violence, and patterns of violence differed by sex. Female witnesses’ experiences were predominantly associated with victimization, while male witnesses’ experiences were largely aligned with perpetration.
BACKGROUND

More than 15 million children are exposed to adult partner violence in their home annually. This is particularly worrisome in light of evidence suggesting that childhood witnesses of adult violence are at risk for a variety of negative mental and physical health outcomes, ranging from depression, anxiety and suicidality to chronic conditions such as obesity and heart disease. Some studies have found that exposure to witnessing during childhood increases the likelihood for future involvement with violence in one’s adult relationships.

Relationship violence, violence that occurs in the context of a relationship, frequently occurs during early and mid-adolescence with prevalence rates ranging from 10-80%, depending on the sample and measurement techniques used. Some studies have identified a connection between witnessing domestic violence as a child and subsequent involvement with adolescent relationship violence. Although some of these have examined whether gender affects the association between childhood witnessing and adolescent relationship violence, findings have varied.

A key challenge within this area of research is comparing rates across studies, mostly because investigators often have explored only one outcome at a time (victimization or perpetration), one type of violence (physical, sexual, emotional), one gender (usually female), or outcomes based on stereotypical patterns (e.g., female victimization and male perpetration). In addition, many studies have measured violence experiences over the past 12-18 months. This short measurement period potentially underestimates actual lifetime experiences and limits assessment of having more than one type of violence exposure. The terms polyvictimization and polyperpetration are used to describe experienced with more than one type of violence (i.e., physical, sexual, and emotional). This distinction is significant for various reasons: there is a dose-response effect to trauma exposures during childhood, polyvictimization has been linked to worse mental health outcomes and is more detrimental to future health than experiencing recurrent episodes of the same type of violence.
To address some of these challenges, this work utilized a survey design that allows direct cross-comparisons of lifetime victimization and perpetration status for three type of violence exposure (physical, sexual, and emotional) for men and women. While studies specific to adolescents and young adults have mostly been based on college populations consisting of convenience samples typically selected from introductory social science classes, this study uses randomly selected courses stratified across disciplines to enhance the generalizability of findings. The objectives of the current study were two-fold. First, associations were measured between exposure to childhood witnessing of adult violence at home and adolescent relationship violence. Specifically, analyses examined victimization and perpetration of physical, sexual, and emotional relationship violence, as well as polyvictimization and perpetration. Second, tests of interaction were used to assess whether gender moderates these effects.

METHODS

Data Collection

This cross-sectional study included students attending three urban colleges in one East Coast city specifically to provide a broad diversity of students, socioeconomic strata and social experiences. Participating campuses included an Ivy League institution, a religious-affiliated university, and a local community college. After receiving Institutional Review Board approval from all participating institutions, 298 daytime classes were randomly selected from undergraduate course rosters stratified within school by discipline (arts and humanities, business, health, science, social science). Professors were contacted by email requesting permission to distribute a 10-minute, anonymous survey to students at the end of class. Multiple attempts were made to contact non-responding professors. Professors for 128 (43%) classes replied and gave approval to survey 106 of these (83%). Surveys required the on-site presence of the research team, and conflicts occurred across the three campuses between class times, and exam and holiday schedules; as a result, it was feasible for the research team to administer surveys in 67 (63%) of classes. However, by discipline, there were no differences between professors who
replied vs did not, agreed vs refused, and those who were surveyed vs not. There were 1,325 students that participated, representing approximately 97% of students attending class during survey administration. Because our primary interest lies with adolescent experiences, this paper focuses on the 911 adolescent-aged (17-22 years) full-time students who participated.

Before the paper-and-pencil survey was given, a member of the research team described the survey and informed students that returning a survey indicated consent (written consent was waived). Students were told they could leave questions blank if they were uncomfortable responding and could return a blank survey if they chose not to participate. If students completed the survey in another class, they were asked not to complete it again. The survey included questions on: demographics (gender, age, race, years in school); the number of victims and perpetrators on campus that the student knew (community violence proxy); childhood witnessing; and adolescent victimization and perpetration of three types of relationship violence (physical, sexual, emotional). Upon returning a survey, students received wallet-sized resource cards with contact information for campus and local area violence resources. A clinically-trained team member was available to answer questions about the study or discuss untoward emotions that surfaced as a result of participating; this service was never needed.

Definitions for Variables of Interest

Childhood witnessing of adult violence (referred to hereafter as “witnessing”), was assessed by asking, “Growing up, did you witness adults in your home being violent (physically, sexually, and/or emotionally) towards one another?” If participants responded affirmatively they were asked, “At what age do you first remember witnessing violence in your home?”

Lifetime experiences with adolescent relationship victimization and perpetration of physical, sexual, and emotional violence were assessed with questions adapted from previously validated measures\textsuperscript{64,65} (Table 2-1). Polyvictimization and polyperpetration are defined as having experience with more than one type of victimization or perpetration;\textsuperscript{47,48} these multiple experiences may occur in the same episode or over various incidents. For example, if an
adolescent respondent reports emotional victimization, physical victimization, and sexual
perpetration over the course of adolescence, that person would be categorized as experiencing
polyvictimization (two types of victimization experienced), but not polyperpetration (one type of
perpetration experienced).

Statistical Analysis

Because the primary interest focused on adult family violence at home, adolescent
respondents who only witnessed male-male violence (i.e., dad and participant’s boyfriend, uncle
and brother, mother’s boyfriend and participant’s boyfriend) were excluded. One student who
reported experiencing relationship violence before witnessing also was excluded, as the paper
focuses on predicting outcomes based on prior witnessing exposure. The final eligible sample
included 907/911 (99.6%) students.

Missing Data

There were fewer than 3.3% of missing values for any variables of interest. After
examining patterns of missingness, data were assumed to be missing at random (MAR),66 and
multiple imputation was chosen for analysis, as it is the method of choice for handling MAR
data.67 While multiple imputation assumes MAR data, this is not a fully testable assumption;
therefore, auxiliary variables were included in imputation models. Adding auxiliary variables
increases the plausibility of the MAR assumption due to their relationship with both the variable of
interest and the missingness of that variable.66,68-72

Imputation Models

Multiple imputation using chained equations (MICE)73 was employed to impute missing
data. Not only is MICE a well-regarded choice for imputing MAR data, it is not limited to normally
distributed variables.73,74 Furthermore, because MICE is highly customizable, it can account for
additional complexities within the data (i.e., skip patterns, dependencies, collinearity, etc.). There
were 20 imputed data sets created; this meets guidelines set by Graham et al based on a 1% power loss and a maximum fraction of missing data equal to 14%,\textsuperscript{75} and also meets the recommendation of both Bodner\textsuperscript{76} and White, et al\textsuperscript{77} which suggest that the number of imputations should match the percentage of missing cases. Predictive imputation models included linear, logistic, and multinomial regression models as appropriate. Augmented regression was used where perfect prediction occurred.\textsuperscript{77} Stata version 14 was utilized for imputation modeling using the “mi impute chained” command.\textsuperscript{78}

It is recommended that dependent variables and potential interaction terms be included in imputation models.\textsuperscript{79} In this case, the outcome variables were lifetime estimates that were generated by combining imputed variables post-imputation and therefore were unavailable for inclusion in the imputation models. Table 2-2 lists all dependent variables and their component variables. For example, one outcome of interest was sexual victimization, which was comprised of four separate questions: being a victim of 1) sexual coercion or 2) sexual force; questions were asked before college and during college. While these component variables for sexual coercion and sexual force were included in the imputation models when possible, the final outcome variable (sexual victimization) was not created until after imputation, so it could not be included in the imputation model. Additionally, because many component variables were collinear, it was impossible to simultaneously include all of them in the imputation models. With this in mind, as many dependent variable component variables and interaction terms were included in prediction equations as possible;\textsuperscript{80} all predictive equations included at least one, but often times >1, component variables. The “just another variable” approach,\textsuperscript{71,72,81} was used to create interaction terms before imputing, as opposed to after, as this method produces less biased estimates. Furthermore, auxiliary variables were added to imputation models for the dependent component variables which enhances prediction by stabilizing estimates\textsuperscript{72,82,83} and increases power.\textsuperscript{83,84} Finally, imputed and observed data were compared to verify the imputations were reasonable.
**Post-Imputation Analyses**

Outcome variables were created using the combinations of variables in Table 2-2. Imputed ages were rounded to the nearest whole number. Age of first witnessing was truncated at lower and upper limits of 2 years and current age, respectively.

**Prediction Estimates Using Multiply Imputed Data**

Post-estimation was done using Stata version 14. \( M=0 \) (non-imputed data) was used to describe simple cross-classifications of witnessing (the exposure of interest) and adolescent victimization and perpetration experiences (outcomes) with each form of violence. Separate logistic regression models were used to identify the main effects of witnessing exposure on each adolescent relationship violence outcome (physical, sexual, and emotional victimization and perpetration, polyvictimization and polyperpetration). Models were standardized for gender, age, race, school and a proxy for community violence (knowing victims and/or perpetrators on campus). Additive and multiplicative effect modification was tested, respectively, by stratifying by gender and comparing the relationship between witnessing and adolescent relationship violence outcome for each strata and also by adding an interaction term (gender*witnessing) to our regression models. Additive interaction was indicated when the risk differences between females and males differed, or when the observed joint effect minus the expected joint effect was not equal to zero. Multiplicative interaction was indicated when interaction terms statistically differed from zero. Using parameter estimates from the regression models defined above, marginal standardization was used to estimate predicted probabilities of experiencing the outcome for witnesses and non-witnesses when holding other variables constant. Standardized average marginal effects (represented as \( \Delta \)) were used to represent the change in probability associated with witnessing. Average marginal effects are presented with 95% confidence intervals (CI). There are a few instances when the confidence bounds of the marginal estimates cross 1.0, but estimates and confidence bounds on the log-odds scale are significant at \( p<0.05 \). Because margins are computed by converting the estimates from the log-odds scale, the precision of the
marginal estimates may be less precise. Therefore, when discrepancies exist, the determination of significance was based on estimates from the log-odds scale.

RESULTS

This sample was diverse in terms of race, gender, age, and year in school (Table 2-3). The mean age of the 907 respondents in the sample was 20.0 years (min=17, max=22), 58.9% were White, and 57.1% were female. Of the 907 participants, 214 (23.6%) reported witnessing adult violence in the home as a child, with the median age of first witnessing being 7.5 years (range 2 to 16, inter-quartile range: 5, 10). A total of 404 (44.5%) students reported some form of adolescent relationship violence victimization (n=380, 41.9%) or perpetration (n=155, 17.1%). The most common form of adolescent relationship violence victimization experienced by students in our sample was emotional (n=235, 25.9%) followed by sexual (n=206, 22.7%), polyvictimization (n=162, 17.9%), and physical (n=154, 17.0%) victimization. The most common form of adolescent relationship violence perpetration experienced in our sample was physical (n=103, 11.4%), followed by emotional (n=57, 6.3%), sexual (n=37, 4.1%) perpetration and polyperpetration (n=37, 4.1%). Of note, although sexual perpetration and polyperpetration were equally prevalent (n=37), there was little overlap between the two; only 12 (32.4%) people who committed sexual perpetration also committed polyperpetration.

The numbers of witnesses and non-witnesses experiencing each adolescent relationship violence outcome are depicted by gender in Table 2-4. Figure 2-1 provides a visual representation of the predicted probabilities for each type of violence in the full sample standardized by gender, age, race, school, and community violence. Witnessing exposure was significantly associated with all types of violence measured, including polyvictimization and polyperpetration.

In unstandardized gender-stratified multivariate logistic regression models (Table 2-5), male and female witnesses were more likely than non-witnesses to experience each type of victimization, except for sexual victimization. In addition, male witnesses were more likely than
male non-witnesses to report each type of perpetration in unstandardized models, but female witnesses only had a higher probability than female non-witnesses for overall perpetration, and specifically for physical perpetration.

Gender-stratified multivariate logistic regression models controlling for age, race, school, and community violence are shown in Table 2-6. In standardized models, the effects of childhood witnessing on adolescent relationship violence outcomes remained the same for females. Female witnesses had a 17% (CI: 0.08, 0.27) increased probability of adolescent victimization. More specifically, female witnesses had increased probability for physical victimization ($\Delta=0.12$; CI: 0.03, 0.21), emotional victimization ($\Delta=0.14$; CI: 0.05 0.24), and polyvictimization ($\Delta=0.12$; CI: 0.03, 0.21). Female witnesses compared to female non-witnesses also had higher probabilities for adolescent relationship violence perpetration ($\Delta=0.11$; CI: 0.03, 0.18), specifically physical perpetration ($\Delta=0.10$, CI: 0.03, 0.17). Of note, community violence was a significant predictor of sexual victimization ($\Delta=0.13$, CI: 0.05, 0.21) and polyvictimization ($\Delta=0.01$, CI: 0.02, 0.17) for females, but this relationship did not change the association between female witnessing and adolescent relationship violence outcomes.

After standardization, males who witnessed adult violence at home as a child had a 17% (CI: 0.06, 0.28) higher probability of perpetrating adolescent relationship violence compared to male non-witnesses. In particular, male witnesses were more likely than male non-witnesses to perpetrate emotional ($\Delta=0.12$, CI: 0.03, 0.21) adolescent relationship violence and polyperpetration ($\Delta=0.09$, CI: 0.01, 0.17). There were discrepant findings on the probability versus the log-odds scale for two variables: physical perpetration ($\Delta=0.08$; CI: -0.004, 0.16; $p=0.06$ versus OR=3.04; CI: 1.18, 7.87; $p=0.02$) and sexual perpetration ($\Delta=0.08$, CI: -0.002, 0.17, $p=0.06$ versus OR=2.85; CI: 1.15, 7.03; $p=0.02$). In these cases, we based significance on the log-odds scale findings, as they are considered more reliable than the marginal estimates; therefore, male witnesses were more likely than male non-witnesses to experience all forms of perpetration. After standardization, witnessing adult violence at home no longer increased the probability for any type of male victimization. Notably, this change was primarily due to the strong
and significant influence of community violence for males in our models, with marginal probabilities ranging from 6% (CI: 0.03, 0.08) to 24% (CI: 0.14, 0.33). Community violence significantly predicted all male outcomes except for physical perpetration (Δ=0.05, CI: -0.004, 0.10; p=0.07) and polyperpetration (Δ=0.03, CI: -0.01, 0.07, p= 0.12).

Of particular interest, after standardization, marginal effects for males and females were noticeably different, indicating an additive interaction. Average marginal effects were higher for females compared to males for: victimization (18% vs 14%), physical victimization (15% vs 10%), emotional victimization (15% vs 12%) and polyvictimization (13% vs 11%). In contrast, average marginal effects were higher for males compared to females for: perpetration (17% vs 11%), sexual perpetration (8% vs. 1%), emotional perpetration (12% vs. 4%) and polyperpetration (9% vs 4%). In the multiplicative models, the gender*witnessing interaction term did not reach statistical significance (p<0.05) for any of the outcomes.85,86

**DISCUSSION**

Among college students from three diverse schools, nearly one in four respondents reported witnessing adult violence in the home as a child and almost half of participants reported lifetime experience with adolescent relationship violence either as a victim or perpetrator. In the full sample, victimization rates were higher than perpetration rates, and emotional victimization and sexual victimization were the most common forms of victimization experienced. There were strong associations in this study between witnessing and subsequent adolescent relationship violence including polyvictimization and polyperpetration, even after controlling for age, race, school and community violence. There was also evidence for effect modification by gender.

Rates of witnessing and adolescent relationship violence outcomes are comparable to those of other studies. In a national study of children aged 1-17 years old, Finkelhor found 25-32% of youth were exposed to witnessing, with older children having more exposure.88 In a sample of college students in a Southeastern university, 29% reported physical victimization within adolescent dating relationships and 22% reported physical perpetration,18 compared to our
17% and 11%, respectively. Higher rates of adolescent relationship violence found in that study may be a result of regional differences, as another study of rural college students conducted in the northeast U.S. reported rates of physical victimization (14%) and perpetration (7%) that were more similar to what was found in this study.

Similar to findings from other adult studies, childhood witnesses in the current study sample were more likely than non-witnesses to experience victimization and perpetration during adolescence. Various theories exist to explain the association between witnessing violence as a child and subsequent violent behaviors. Whether we consider the principles of Social Learning Theory, the basic tenets of attachment theory, or the harmful effects that trauma has on cognitive development and function we would expect childhood witnessing to have a substantial association on future experiences with relationship violence. That association is precisely what was found, although there was observed variability in the strength and direction of association across outcomes and between genders.

### Outcomes by Gender

While past studies have primarily reported the effects of witnessing only on physical victimization and perpetration, this study uncovered the effects of gender and witnessing on a broader range of outcomes. In non-stratified analyses, witnessing violence at home during childhood was associated with increased probability for all forms of victimization and perpetration in the current study. However, when results were stratified by gender and standardized by age, race, school and community violence, witnessing generally was more predictive of victimization outcomes for females and perpetration outcomes for males. Past studies on witnessing and subsequent relationship violence have found mixed results based on gender. To gain clarity on the role of gender, Stith and colleagues assimilated findings across studies into a meta-analysis to compare whether exposure to family violence differentially increased the risk for physical violence during marriage for men and women. They found weak to moderate associations showing that adult women who witnessed violence as children were more likely to
become victims of physical violence in their marriage, while adult males who witnessed adult violence were more likely to perpetrate physical violence.95 The findings in the current study were similar.

Also, some investigators have sought to explain gender effects of witnessing based on Social Learning Theory and behavior modeling by considering whether children are witnessing their mother or father perpetrating the violence.18,21,41 These studies provide evidence that physical victimization and perpetration outcomes differ for boys and girls depending on the gender of the perpetrating parent, but findings are inconsistent, suggesting a need for additional work in this area. Gender variations also may be due, in part, to factors at the individual, family or even community level.96 For example, the patterns found in the current study are consistent with societal norms in the United States which have historically encouraged male domination or aggression and female demureness and subservience.26 Personal traits, such as resilience or connectedness, may also mitigate the effects of witnessing on our measured outcomes,94 and it is also possible that there are unmeasured contextual aspects of adolescent relationships that may differ for males and females.62

Experiences with Multiple Types of Adolescent Relationship Violence

Of particular note are the experiences with polyvictimization and polyperpetration reported by witnesses during adolescence, suggesting that violence has become a pervasive pattern in these students’ early relationships. Approximately one-quarter of witnesses in the current sample experienced polyvictimization, and almost one in ten witnesses experienced polyperpetration. It is important to recognize that polyvictimization and polyperpetration in this study can represent either multiple discrete experiences with violence in different relationships or exposures to multiple forms of violence within the same relationship. Either scenario is troublesome, as exposure to multiple types of violence has been shown to be more detrimental to future health than having many experiences of the same kind of violence.44,63,97 While not strictly limited to witnessing, studies exploring the effects of adverse childhood events (ACEs), which
include witnessing parental violence and experiencing child abuse among others, have shown a significant dose-response relationship between the number of ACEs experienced and risk for a host of unfavorable mental and physical health outcomes.\textsuperscript{51,98}

Witnessing adult violence in the home may be an indicator of future violence in one's own relationships. Current work is underway in local children's hospitals using multi-disciplinary teams to identify families that are experiencing violence within the home and to offer early education and services to help mitigate the effects of witnessing and the potential for concomitant violence.\textsuperscript{99}

There are several limitations to this study. First, the design is not a probability sample; thus, inferences cannot be made about overall prevalence of witnessing, victimization, or violence beyond this sample, as rates in non-participants are unknown. This does not, however, limit the ability to estimate associations between witnessing and outcomes in this sample. Second, self-reported data relied on recall as far back as childhood; the ability to recall specific details, such as the age of first witnessing, may be limited. However, given that many prior assessments of witnessing in the literature have surveyed adults,\textsuperscript{4,13,22,24,25,92} it is reasonable to assume there would be less reporting bias in this adolescent sample since less time has lapsed since witnessing the event. Third, respondents might have underreported victimization and perpetration given societal stigma,\textsuperscript{100-102} although the anonymity and confidentiality of our survey may counterbalance this effect. Fourth, the type(s) of violence that children witnessed at home were not measured; thus, it is impossible to compare the type of violence witnessed by type of violence later experienced. Fifth, it is important to recognize that those fortunate enough to attend college may have different levels of risk than those without the same financial opportunity. However, schools were specifically chosen that included students from varied economic strata, various racial and cultural backgrounds, and a number of states and countries in order to minimize selection bias. While these data may not generalize to non-college bound individuals, the rates of adolescent relationship violence in a non-college sample of adolescents may be even higher than what was found here. Finally, given the time available to conduct the survey, it was
not feasible to measure other constructs that may modify some of the effects between witnessing and our outcomes, such as alcohol use, mental health disorders, or concomitant child abuse. One of the greatest challenges in this field is untangling the effects of interrelated factors that occur with witnessing in observational studies of family violence; without additional studies that employ more sophisticated approaches by controlling for a large number of confounders, it is difficult to tease apart whether the effects of witnessing are spurious or causal.

These findings suggest that childhood witnesses of adult violence have an elevated risk for early involvement with future violent relationships in adolescence. Witnesses experience higher rates of adolescent relationship violence victimization and perpetration, in addition to experiencing multiple forms of adolescent relationship violence. Female and male witnesses appear to have different patterns of adolescent relationship violence victimization and perpetration. Given the millions of households in which children witness adult violence, the public health ramifications for witnessing adult violence, the danger associated with increasing severity of violence over time, and the intergenerational repercussions, early identification of violence occurring in the home followed by support and intervention are critical.
Table 2-1. Types of relationship violence outcomes assessed among a sample of 907 undergraduate students from three college campuses in the Northeast United States.

<table>
<thead>
<tr>
<th>Type of Violence</th>
<th>Victimization</th>
<th>Perpetration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Someone…</td>
<td>You…</td>
</tr>
<tr>
<td>Physical</td>
<td>Pushed, grabbed, slapped, choked, or hit you</td>
<td>Pushed, grabbed, slapped, choked, or hit someone</td>
</tr>
<tr>
<td>Sexual</td>
<td>Pressured/coerced or forced you into having sexual contact</td>
<td>Pressured/coerced or forced someone to have sexual contact</td>
</tr>
<tr>
<td>Emotional</td>
<td>Someone put you down, made you feel bad about yourself, was possessive, or isolated you from family or friends</td>
<td>Put someone down, made someone feel bad about himself/herself, acted in a possessive manner, or isolated someone from family or friends</td>
</tr>
<tr>
<td>Poly</td>
<td>Polyvictimization: Victimization of &gt;1 type of violence (physical, sexual, emotional)</td>
<td>Polyperpetration: Perpetration of &gt;1 type of violence (physical, sexual, emotional)</td>
</tr>
</tbody>
</table>

Note: All questions were asked in the context of being experienced within a relationship.
<table>
<thead>
<tr>
<th>Outcomes of Interest</th>
<th>Component Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Victimization</strong></td>
<td>Any (physical, sexual or emotional) victimization before or during college OR Any (physical, sexual or emotional) victimization during college</td>
</tr>
<tr>
<td>Physical</td>
<td>Physical victimization before college OR Physical victimization during college</td>
</tr>
<tr>
<td>Sexual</td>
<td>Sexual victimization before college OR Sexual victimization during college</td>
</tr>
<tr>
<td>Emotional</td>
<td>Emotional victimization before college OR Emotional victimization during college</td>
</tr>
<tr>
<td>Polyvictimization</td>
<td>Victimization of &gt;1 type of violence (options include: physical, sexual, and emotional; physical and sexual; physical and emotional, sexual and emotional)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perpetration</th>
<th>Any (physical, sexual or emotional) perpetration before college OR Any (physical, sexual or emotional) perpetration during college</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Physical perpetration before college OR Physical perpetration during college</td>
</tr>
<tr>
<td>Sexual</td>
<td>Sexual perpetration before college OR Sexual perpetration during college</td>
</tr>
<tr>
<td>Emotional</td>
<td>Emotional perpetration before college OR Emotional perpetration during college</td>
</tr>
<tr>
<td>Polyperpetration</td>
<td>Perpetration of &gt;1 type of violence (options include: physical, sexual, and emotional; physical and sexual; physical and emotional, sexual and emotional)</td>
</tr>
</tbody>
</table>

Note: All questions were asked in the context of being experienced within a relationship.
Table 2-3. Demographic characteristics for the sample of 907 college undergraduate respondents from the three participating college campuses in the Northeast U.S.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total N=907</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>518 (57.1)</td>
</tr>
<tr>
<td>Age, yrs (mean, min max)</td>
<td>mean: 20.0 (range: 17 to 22)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>534 (58.9)</td>
</tr>
<tr>
<td>African American</td>
<td>146 (16.1)</td>
</tr>
<tr>
<td>Asian</td>
<td>136 (15.0)</td>
</tr>
<tr>
<td>Other</td>
<td>86 (9.5)</td>
</tr>
<tr>
<td>School</td>
<td></td>
</tr>
<tr>
<td>School A</td>
<td>377 (41.6)</td>
</tr>
<tr>
<td>School B</td>
<td>317 (35.0)</td>
</tr>
<tr>
<td>School C</td>
<td>213 (23.5)</td>
</tr>
<tr>
<td>Year in school</td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>213 (23.5)</td>
</tr>
<tr>
<td>Second</td>
<td>338 (37.3)</td>
</tr>
<tr>
<td>Third</td>
<td>251 (27.7)</td>
</tr>
<tr>
<td>Fourth or higher</td>
<td>104 (11.5)</td>
</tr>
</tbody>
</table>
Table 2-4. Proportion of male and female respondents from three participating college campuses in the Northeast U.S. that experienced each adolescent relationship violence outcome based on witnessing or not witnessing violence as a child.\(^a\)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Female</th>
<th></th>
<th></th>
<th></th>
<th>Male</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total(^b)</td>
<td>Witnesses</td>
<td>Non-witnesses</td>
<td>Total(^c)</td>
<td>Witnesses</td>
<td>Non-witnesses</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=518</td>
<td>n=141</td>
<td>n=372</td>
<td>n=389</td>
<td>n=73</td>
<td>n=312</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Victimization(^d)</strong></td>
<td>274 (53.5)</td>
<td>93 (66.4)</td>
<td>176 (48.0)</td>
<td>106 (28.2)</td>
<td>29 (40.3)</td>
<td>77 (25.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>115 (22.6)</td>
<td>47 (33.6)</td>
<td>66 (18.1)</td>
<td>39 (10.4)</td>
<td>14 (19.4)</td>
<td>25 (8.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual</td>
<td>160 (31.0)</td>
<td>48 (34.3)</td>
<td>108 (29.0)</td>
<td>46 (12.0)</td>
<td>13 (18.1)</td>
<td>33 (10.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional</td>
<td>171 (33.1)</td>
<td>61 (43.6)</td>
<td>106 (28.6)</td>
<td>64 (16.6)</td>
<td>19 (26.4)</td>
<td>45 (14.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyvictimization</td>
<td>127 (24.9)</td>
<td>47 (33.6)</td>
<td>76 (20.8)</td>
<td>35 (9.3)</td>
<td>13 (18.1)</td>
<td>22 (7.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perpetration(^d)</strong></td>
<td>98 (19.0)</td>
<td>42 (30.0)</td>
<td>54 (14.6)</td>
<td>57 (14.8)</td>
<td>23 (31.9)</td>
<td>34 (10.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>80 (15.5)</td>
<td>37 (26.4)</td>
<td>42 (11.3)</td>
<td>23 (6.0)</td>
<td>10 (13.9)</td>
<td>13 (4.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual</td>
<td>8 (1.6)</td>
<td>3 (2.1)</td>
<td>5 (1.4)</td>
<td>29 (7.5)</td>
<td>12 (16.7)</td>
<td>17 (5.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional</td>
<td>33 (6.4)</td>
<td>13 (9.4)</td>
<td>19 (5.1)</td>
<td>24 (6.2)</td>
<td>12 (16.7)</td>
<td>12 (3.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyperpetration</td>
<td>21 (4.1)</td>
<td>10 (7.2)</td>
<td>11 (3.0)</td>
<td>16 (4.2)</td>
<td>9 (12.5)</td>
<td>7 (2.2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Values represent the number of respondents having the outcome, with the equivalent column percentage represented in parentheses.

\(^b\) Five females did not provide their witnessing status; therefore, the total number of witnesses and non-witnesses does not add to the total number of female respondents. Some who were missing witnessing data were also missing outcome data, so female column totals do not necessarily sum to the total of women having each outcome.

\(^c\) Four males did not provide their witnessing status; therefore, the total number of witnesses and non-witnesses does not add to the total number of male respondents. However, everyone who provided witnessing data also provided outcome data, so male column totals sum to the total men having each outcome.

\(^d\) Numbers may not sum to 100 percent for victimization and perpetration categories since some people experienced more than one type of violence.
Table 2-5. Unstandardized predicted probabilities with average marginal effects and 95% confidence intervals (CI) for each form of adolescent relationship violence victimization and perpetration that was experienced by male and female respondents who witnessed or did not witness adult violence in the home during childhood.\textsuperscript{a}

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Witness</td>
<td>Non-Witness</td>
</tr>
<tr>
<td><strong>Victimization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>0.67</td>
<td>0.48</td>
</tr>
<tr>
<td>Sexual\textsuperscript{d}</td>
<td>0.34</td>
<td>0.19</td>
</tr>
<tr>
<td>Emotional</td>
<td>0.44</td>
<td>0.29</td>
</tr>
<tr>
<td>Polyvictimization</td>
<td>0.34</td>
<td>0.21</td>
</tr>
<tr>
<td><strong>Perpetration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>0.30</td>
<td>0.15</td>
</tr>
<tr>
<td>Sexual</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>Emotional</td>
<td>0.09</td>
<td>0.05</td>
</tr>
<tr>
<td>Polyperpetration</td>
<td>0.07</td>
<td>0.03</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Logistic regression models for adolescent relationship violence outcomes include witnessing status and the outcome of interest. Predicted probabilities and average marginal effects with 95% CI were generated using post-estimation commands in Stata version 14.0.\textsuperscript{85}

\textsuperscript{b} Delta values represent average marginal effects for the change in probability associated with witnessing compared to non-witnessing [Pr(Outcome|Witness)-Pr(Outcome|Non-Witness)]. Values may appear slightly off due to rounding.
Table 2-6. Standardized probabilities with marginal effects and 95% confidence intervals (CI) for each form of adolescent relationship violence victimization and perpetration that was experienced by male and female respondents who witnessed or did not witness adult violence in the home during childhood. Results are standardized by age, race school, and community violence.\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th></th>
<th>Male</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Witness</td>
<td>Non-Witness</td>
<td>Δ(^b)</td>
<td>p-val</td>
<td>95% CI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Victimization</strong></td>
<td>0.66</td>
<td>0.49</td>
<td>0.17</td>
<td>&lt;0.001</td>
<td>0.08, 0.27</td>
</tr>
<tr>
<td>Physical</td>
<td>0.31</td>
<td>0.19</td>
<td>0.12</td>
<td>0.007</td>
<td>0.03, 0.21</td>
</tr>
<tr>
<td>Sexual</td>
<td>0.35</td>
<td>0.30</td>
<td>0.05</td>
<td>0.28</td>
<td>-0.04, 0.14</td>
</tr>
<tr>
<td>Emotional</td>
<td>0.44</td>
<td>0.29</td>
<td>0.14</td>
<td>0.003</td>
<td>0.05, 0.24</td>
</tr>
<tr>
<td>Polyvictimization</td>
<td>0.33</td>
<td>0.21</td>
<td>0.12</td>
<td>0.01</td>
<td>0.03, 0.21</td>
</tr>
<tr>
<td><strong>Perpetration</strong></td>
<td>0.26</td>
<td>0.16</td>
<td>0.11</td>
<td>0.01</td>
<td>0.03, 0.18</td>
</tr>
<tr>
<td>Physical</td>
<td>0.23</td>
<td>0.12</td>
<td>0.10</td>
<td>0.01</td>
<td>0.03, 0.17</td>
</tr>
<tr>
<td>Sexual</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
<td>0.59</td>
<td>-0.02, 0.03</td>
</tr>
<tr>
<td>Emotional</td>
<td>0.09</td>
<td>0.05</td>
<td>0.04</td>
<td>0.18</td>
<td>-0.02, 0.09</td>
</tr>
<tr>
<td>Polyperpetration</td>
<td>0.07</td>
<td>0.03</td>
<td>0.04</td>
<td>0.12</td>
<td>-0.01, 0.08</td>
</tr>
</tbody>
</table>

\(^a\) Logistic regression models for adolescent relationship violence outcomes include witnessing status, age, race (4-level), school, community violence indicator (2-level). Predicted probabilities and average marginal effects with 95% CI were generated using post-estimation commands in Stata version 14.0.\(^85\)

\(^b\) Delta values may appear slightly off due to rounding.

\(^c\) For these variables, while the marginal estimates show confidence intervals crossing 1.0, point estimates and confidence bounds on the log-odds scale indicated significant at p<0.05. Because margins are computed by converting the estimates from the log-odds scale, the precision of the marginal estimates may be less precise.\(^85\) Therefore, when there were discrepancies between the two scales, we have based our determination of significance using the findings from the log-odds scale. Log-odds results for physical perpetration (OR=3.04; CI: 1.18, 7.87; p=0.02) and sexual perpetration (OR=2.85; CI: 1.15, 7.03; p=0.02) were significant.
Figure 2-1. Standardized predicted probabilities of adolescent relationship violence outcomes in the full sample based on witnessing exposure. All comparisons are standardized for gender, age, race, school, and community violence and are significant at p<0.05.
CHAPTER 3
Can The Gender of Domestic Violence Perpetrators and Their Witnesses Predict Adolescent Relationship Violence Outcomes?

ABSTRACT

Objectives: Childhood witnesses of adult violence at home are at risk for future violence. It is unclear how gender of the child and adult perpetrator are related to subsequent adolescent relationship violence. This work explores how childhood witnessing of same-gender, opposite-gender, and bidirectional perpetration by adults is associated with adolescent relationship violence victimization only, perpetration only, and combined victimization/perpetration for male and female undergraduates.

Methods: A cross-sectional study was conducted in which a written survey was administered to 67 randomly selected classes at three urban college campuses. Undergraduates aged 17-22 years returned 911 surveys; 907 met eligibility criteria. Participants reported whether they witnessed same-gender, opposite-gender, and bidirectional perpetration by adults at home during childhood. Outcomes included adolescent relationship violence victimization only, perpetration only, and combined victimization/perpetration of physical, sexual and/or emotional violence. Multinomial regression models controlling for gender, age, race, school, and community violence predicted adolescent outcomes for each witnessing exposure. Relative risk ratios (RRR) and standardized average adjusted probabilities with 95% confidence intervals (CI) are presented.

Results: Outcomes significantly differed by the type of witnessing and gender of the witness. Boys who witnessed adult males perpetrate had higher rates of adolescent perpetration (10% vs 2%; RRR=8.0). In contrast, girls had increased adolescent victimization if they witnessed males and females perpetrating together (48% vs. 34%, RRR=2.9) and had a tendency toward higher victimization when witnessing males perpetrate alone (trend: 42% vs. 34%; RRR=1.9; CI: 0.99,
3.5). Also, girls who witnessed adult males perpetrating alone had a higher risk for combined victimization/perpetration (23% vs. 14%; RRR=2.6). Although differences were found between boys and girls, there were notable similarities. Boys (24% vs 9%; RRR=3.7) and girls (25% vs 14%; RRR=3.8) who witnessed bidirectional violence had increased risk for combined victimization/perpetration. Likewise, boys (68% vs 9%; RRR=27.4) and girls (52% vs 14%; RRR=6.0) who witnessed adult females perpetrate had a higher risk for combined victimization/perpetration.

Conclusions: Adolescent relationship violence outcomes vary based on the gender of the child witness and the adult perpetrator. Witnessing perpetration by an adult male is associated with higher perpetration for boys, and increased victimization for girls. Perpetration by either a female caregiver or both caregivers is associated with increased risk for combined victimization/perpetration for boys and girls during adolescence. It is important to consider these gender distinctions when screening, as treatment modalities will vary accordingly.
BACKGROUND

Domestic violence is estimated to occur in approximately 13 million homes in the United States,\textsuperscript{7} with approximately one in four women and one in six men experiencing domestic violence at some point in their lives.\textsuperscript{1} Children reside in 59\% of homes where domestic violence occurs, exposing approximately 15 million children to domestic violence annually.\textsuperscript{7} Child witnesses of adult domestic violence are at risk for a variety of negative health outcomes throughout childhood and adulthood.\textsuperscript{4,8,10,13,53,103}

Childhood witnesses of domestic violence also are at increased risk of violence exposure later in life.\textsuperscript{4,13-25,56} Social Learning Theory is commonly applied to explain the cycle of intergenerational violence, suggesting that children typically model the aggressive behaviors of same-gender role models.\textsuperscript{45-47} Thus, one would expect a girl who witnessed her father perpetrating violence against her mother to be predisposed to future victimization, while a girl who witnessed her mother perpetrating violence would be predisposed to future perpetration. Similarly, we anticipate boys would model behaviors of their fathers in their future relationships, and if children are witnessing both caregivers being violent toward each other (bidirectional perpetration), we would anticipate higher rates of combined victimization/perpetration during adolescence and/or adulthood.

There have been few studies exploring the associations between the gender of the adult perpetrator, the gender of the child witness, and the role of the witness as a victim or perpetrator in subsequent adolescent relationship violence. Prior studies suggest that the gender of the perpetrator and gender of the witness do not consistently influence subsequent violence outcomes, and that witnessing affects males and females differently.\textsuperscript{18,20,21,24-26,37,38,41,43,48} However, most studies have focused on whether children have witnessed males perpetrating against females or females perpetrating against males,\textsuperscript{18,21,26,41,43} neglecting to examine bidirectional perpetration. Furthermore, few studies examine the association between witnessing and having combined victimization/perpetration outcomes during adolescence. Therefore, it is possible that there is an association between witnessing bidirectional perpetration as a child and
experiencing combined victimization/perpetration during adolescence, and that these unmeasured factors may help explain some of inconsistency of findings in the literature. In addition to these limitations, studies exploring the associations between the gender of the adult perpetrator, gender of the child witness and adolescent relationship violence outcomes have utilized convenience samples limited to social science students,\textsuperscript{20,37,38} and they frequently only explore the association with physical or emotional violence.

The objective of this study was to explore associations between childhood witnessing of adult violence at home and subsequent adolescent relationship violence outcomes. Specifically, this work describes how childhood witnessing of same-gender, opposite-gender and bidirectional perpetration by adults is associated with subsequent victimization, perpetration, and combined victimization/perpetration during adolescence.

METHODS

Data Collection

Three urban college campuses were intentionally chosen to increase the demographic heterogeneity of participants for this cross-sectional study. Institutional Review Board approval was obtained before data collection, and included a waiver of written consent. Within each school and area of study (i.e., life sciences, social sciences, humanities, business, philosophy, etc.), classes were randomly selected and professors were contacted for permission to survey students at the end of the class period.

A ten-minute paper-and-pencil survey was distributed to all students attending class during survey administration. During a brief verbal introduction to the survey, students were informed that by returning a survey, they indicated consent. Students were told to skip any questions they felt uncomfortable answering and to return a blank survey if they preferred to not participate or if they had participated previously. When students returned a survey, they were given information cards identifying local and campus violence resources.
Surveys queried participants about age, gender, race, awareness of other students who were involved with violence on campus, childhood witnessing of adult violence at home, the direction of the violence witnessed, and subsequent victimization and perpetration of physical, sexual and emotional adolescent relationship violence. Childhood witnessing was assessed using two questions: 1) “Did you witness adults being violent (physically, sexually, and/or emotionally) towards one another in the home?” and 2) “Who was hurting whom?” Adolescent relationship violence outcomes for victimization and perpetration were assessed separately based on a slightly modified version of existing standardized measures of violence. Victimization and perpetration were identified based on participants’ combined responses to individual questions about physical, sexual and emotional violence. Physical violence was defined as being “pushed, grabbed, slapped, choked, or hit.” Sexual violence was indicated by a “yes” response to either of two questions: “being forced to have sexual contact against your will” or “being coerced or pressured into having sexual contact.” Emotional violence was described as having someone who “put you down or made you feel bad about yourself, was very possessive, or isolated you from friends and family.” Participants also were asked a series of four questions to identify their awareness of other students on campus that had been victims or perpetrators of violence; these variables were combined into a two-level indicator variable that serves as a proxy measure for community violence.

Participants

Professors from 298 classes were approached by email. 128 responded (43%); 106 of these (83%) accepted our request, and 67 of 106 (63%) classes were surveyed. Compared across disciplines, there were no differences for professors who replied to our request compared to those who did not, professors who agreed to have their class participate versus declined, and professors that had the survey administered versus not.

Because this study focused on experiences of adolescents, the sample was restricted to students who were less than 23 years old. There were 911 students aged 17 to 22 years who
returned non-blank surveys, which represents approximately 97% of class attendees during survey administration. Three participants whose witnessing exposure was limited to male-male violence and where it could not be verified that it was in the context of the home environment (e.g., father fighting with child’s boyfriend, uncle fighting with brother) were excluded. Additionally, one person who witnessed violence at home after experiencing adolescent relationship violence was excluded. The analysis sample, therefore, comprised 907 eligible participants.

**Statistical Analysis**

Based on patterns of missing values, data were assumed to be missing at random (MAR). Multiple imputation using chained equations (MICE)\(^{73}\) was utilized to impute missing data with Stata version 14.\(^{78}\) MICE is a highly regarded method for handling MAR data because it is not dependent on modeling normally distributed variables.\(^{73,74}\) MICE allows for extremely customizable model specification that takes into account nuances of the data (i.e., skip patterns, dependencies, collinearity, etc.). After imputation with 20 iterations, data was assessed for reasonableness before conducting post-imputation analyses. More specific details on our imputation models and methods are described elsewhere.\(^{104}\)

Students were uniquely categorized as having witnessed no adult violence in the home (None), having witnessed perpetration by an adult of the same-gender only (Same-gender perpetration), perpetration by an adult of the opposite gender only (Opposite-gender perpetration), or perpetration by both male and female adults (Bidirectional perpetration). Adolescent relationship violence was classified into four unique categories based on students' reported victimization or perpetration of any type of violence (physical, sexual or emotional) during adolescence. Respondents who had no adolescent relationship violence experiences were included in the "No adolescent relationship violence" category. Respondents who indicated some type of adolescent relationship violence victimization but no perpetration were included in the "Victimization" category; those who indicated some type of adolescent relationship violence
perpetration *but no victimization* were included in the “Perpetration” category. Finally, those who experienced both adolescent relationship violence victimization and perpetration were included in the “Combined victimization/perpetration” category. There are no restrictions on whether the combined victimization/perpetration group’s victimization and perpetration experiences occurred during the same violent event or during separate violent encounters.

Simple count data are used to describe the proportion of students in our sample who have experienced the exposure and outcome. Data were stratified by gender because prior work in Chapter 2 shows links between gender, witnessing exposure, and adolescent victimization and perpetration. Multinomial regression stratified by gender was used to identify whether the direction of adult violence witnessed was associated with the four adolescent relationship violence outcomes; participants with no adolescent relationship violence were used as the outcome reference category. For the 4-level primary exposure of interest, “no witnessing” served as the reference category to which we compared the effects of same-gender, opposite gender, and bidirectional witnessing on the four adolescent relationship violence outcomes. Models were standardized based on age, race, school, and community violence. Additionally, effect modification by gender*witnessing was assessed in two ways. First, models were stratified and assessed for whether additive effect modification was present by comparing expected and observed joint effects for the relationship between gender and witnessing on our outcomes. Multiplicative interaction was also tested by adding an interaction term to the multinomial regression model and determining if the interaction term differed from zero.

Relative risk ratios (RRR) for each level of witnessing exposure are reported for the final model. When interpreting RRRs, it is important to recognize that there are multiple simultaneous comparisons that produce the RRR. Using the equation below, one can see how to interpret the RRR in relation to the probability (Pr) of outcome. Since there are four categories of the outcome and exposure, the value for RRR is the probability of having a specific outcome compared to not having any outcome (reference category) at a certain level of exposure compared to the probability of having that specific outcome compared to not having any outcome (reference) while
having no exposure. This example provides the equation for the probability of victimization when exposed to bidirectional witnessing.

\[
RRR = \frac{Pr (+\text{ARV} | +\text{witness exposure})}{Pr (-\text{ARV} | +\text{witness exposure})} \div \frac{Pr (+\text{ARV} | \text{no witness exposure})}{Pr (-\text{ARV} | \text{no witness exposure})}
\]

\[
RRR_{\text{Vic}} = \frac{Pr (\text{Victimization} | \text{Witness Bidirectional})}{Pr (\text{No ARV} | \text{Witness Bidirectional})} \div \frac{Pr (\text{Victimization} | \text{no witness})}{Pr (\text{no ARV} | \text{no witness})}
\]

Standardized average adjusted predicted probabilities were computed based on multinomial regression parameters, and average marginal effects were calculated with 95% confidence intervals (CI) to indicate the risk for adolescent relationship violence based on witnessing status.\(^5\) Average adjusted probabilities are calculated by hypothetically assigning all cases to the same exposure status (i.e., no witnessing) and computing predicted probabilities of the outcome for each case. The process is again repeated assuming that all cases have the next level of exposure (i.e., same-gender witnessing) and computing predicted probabilities. The process continues by creating separate probabilities for each additional exposure status (i.e., opposite gender and bidirectional witnessing). For each exposure level, the probabilities are then averaged over all cases to obtain the average adjusted predicted probabilities of having the outcome at each level of exposure. During the process, all other values for other variables remain the same. Therefore, because the only factor that differs among each hypothetical group of cases is witnessing status, we can assume that the marginal effect, or change in probability between groups, is specifically a result of witnessing in a sample with characteristic similar to the one in this study.\(^5\)
RESULTS

Witnessing

Sociodemographic information and the prevalence of childhood witnessing and adolescent relationship violence outcomes are reported in Table 3-1. Approximately one-quarter of the sample (214/907, 23.6%) reported childhood witnessing of adult violence at home, and 141/214 (65.9%) witnesses were girls. Witnesses most frequently reported observing opposite-gender perpetration (n=77, 8.5%) followed by bidirectional (n=60, 6.6%) and same-gender perpetration (n=45, 5.0%).

Figure 3-1 presents the number of boys and girls who witnessed each type of perpetration as a child. Boys were more likely than girls to be in the non-witnessing category [372 (54.4%) vs. 312 (45.6%)]. Of note, most children who witnessed adult violence at home during childhood observed adult males perpetrating against adult females. Girls were more likely than boys to have witnessed opposite-gender perpetration by adults [73 (94.8%) vs. 4 (5.2%)] and adult bidirectional perpetration [41 (68.3%) vs. 19 (31.7%)]. On the other hand, boys were more likely to witness same gender perpetration than girls [36 (80.0%) vs. 9 (20.0%)].

Adolescent Outcomes

Of 907 participants, 484 (53.4%) experienced no adolescent relationship violence, 248 (27.3%) experienced victimization only, 24 (2.7%) experienced perpetration only, and 131 (14.4%) experienced combined victimization/perpetration (Table 3-1). The specific types of adolescent relationship violence that witnesses experienced are reported in Chapter 2. Of the 214 childhood witnesses of adult violence at home, 81 (37.9%) did not experience adolescent relationship violence, 66 (30.8%) experienced victimization only, 9 (4.2%) experienced perpetration only, and 56 (26.2%) experienced combined victimization/perpetration. Characteristics of students that experienced each of the four adolescent relationship violence outcome categories are shown in Table 3-2.
Results for the full sample model and gender-stratified multinomial regression models standardized for age, race, school, and community violence are provided in Table 3-3 (RRR) and Table 3-4 (Probabilities, Pr). When controlling for gender, age, race, school, and community violence in the full sample model, witnessing bidirectional violence was significantly associated with subsequent adolescent victimization (RRR=2.3; 95% CI: 1.2, 4.5; Pr=38% vs. 28%), while witnessing same-gender perpetration was significantly associated with adolescent perpetration (RRR=6.0; 95% CI: 1.9, 18.7; Pr=10% vs. 2%). Interestingly, exposure to all types of witnessing, regardless of who perpetrated, was associated with increased risk for combined victimization/perpetration of adolescent relationship violence; in other words, children who witnessed same-gender perpetration (RRR=2.3; 95% CI: 1.0, 5.3; Pr=24% vs. 12%), opposite-gender perpetration (RRR=3.1; 95% CI: 1.5, 6.1; Pr=23% vs. 12%) or bidirectional perpetration by adults (RRR=3.5; 95% CI: 1.6, 7.4; Pr=24% vs. 12%) were significantly more likely than non-witnesses to experience combined victimization/perpetration as adolescents.

We conducted separate models for boys and girls (Tables 3-3 and 3-4). When looking at the stratified models, differences by gender are apparent. First, boys who witnessed adult males perpetrating domestic violence had a significantly higher risk for perpetrating adolescent relationship violence (RRR=8.0; 95% CI: 2.2, 29.0; Pr=17% vs. 3%) than non-witnesses. In contrast, girls who witnessed bidirectional perpetration, were at increased risk for victimization of adolescent relationship violence (RRR=2.9; 95% CI: 1.3, 6.6; Pr=48% vs. 34%) compared to girls who did not witness. Of note, as we try to understand the bigger picture describing patterns of exposure, it is worth mentioning that girls who witnessed adult males perpetrate violence had a trend toward higher rates of victimization (42% vs. 34%; RRR=1.9; CI: 0.99, 3.5); while this finding was not significant at conventional levels, the 95% CI just crossed 1.0. Finally, if girls witnessed any domestic violence, they were more likely than non-witnesses to experience combined victimization/perpetration, regardless of who they saw perpetrating (Tables 3-3 and 3-4).
While there were differences in outcomes for boys and girls depending on the gender of the perpetrator, we also noted some parallel findings. For instance, compared to non-witnesses, boys and girls who witnessed bidirectional violence had higher risk for combined victimization/perpetration of adolescent dating violence (Boys: RRR=3.7; 95% CI: 1.0, 12.9; Pr=24% vs. 9%; Girls: RRR=3.8; 95% CI: 1.4, 9.8; Pr=25% vs. 14%). Additionally, boys and girls who witnessed adult females, either alone or mutually with an adult male, were at significantly higher risk for combined victimization/perpetration of adolescent dating violence compared to non-witnesses (Tables 3-3 and 3-4). Interestingly, boys’ victimization and girls’ perpetration were not associated with witnessing status, although some of these cell sizes were inadequate for proper comparisons.

Figures 3-2 and 3-3 provide graphical representation of the standardized probabilities of adolescent relationship violence outcomes by the type of witnessing exposure. Results are provided for the full sample and gender-stratified models. Although the gender*witnessing interaction term measuring multiplicative interaction did not reach conventional levels of statistical significance for any outcomes, observed and expected joint effects differed for boys and girls in stratified models on the risk difference scale, indicating the presence of an additive interaction.

**DISCUSSION**

Childhood witnessing of adult violence at home and subsequent experiences with adolescent relationship violence were common in this sample of urban college students. Approximately one in four students reported witnessing adult violence at home as a child, and 44% of students reported some form of adolescent relationship violence. Most children witnessed perpetration by adult males. Witnessing opposite-gender perpetration was most common, followed by bidirectional violence and same-gender violence, but there were differences in the types of adult violence that males and females witnessed.

Those exposed to adult violence at home were at increased risk for experiencing violent behaviors in their relationships as adolescents. Similar to findings from adult studies, 37,43,47,106
this study found that differences in adolescent relationship violence outcomes were dependent on whether boy and girl witnesses saw same-gender perpetration, opposite-gender perpetration, or bidirectional perpetration. Notably, gender of the child and perpetrator appears to be a key determinant in the relationship between the type of adult violence that was witnessed during childhood and the subsequent experiences with adolescent relationship violence. For example, among children who only witnessed adult male caregivers perpetrate violence, boys were more likely to become perpetrators of adolescent relationship violence. However, if boys or girls witnessed adult female caregivers perpetrate violence, either alone or in tandem with male perpetration, they were at higher risk than non-witnesses for combined victimization/perpetration during adolescence. This is demonstrated through higher rates of combined victimization-perpetration among girls who witnessed same-gender perpetration, boys who witnessed opposite-gender perpetration, and girls and boys who witnessed bidirectional violence.

Social Learning Theory

One of the most commonly cited explanations for the intergenerational transmission of violence is that children may model or imitate the aggressive behaviors they observe in their parents.\textsuperscript{46,107} Social Learning Theory suggests that a same sex parent is a stronger role model than an opposite sex parent due to greater identification with that parent. In the current study, boys’ outcomes in adolescence generally conformed to the expectations of Social Learning Theory, in that boys who saw their fathers perpetrating violence against their mothers had considerably higher risk for becoming perpetrators in their own adolescent relationships. In two other studies of college students, boys who witnessed their fathers perpetrating physical violence against their mothers were more likely to be physically aggressive in their dating relationships.\textsuperscript{20,41} In another study by Moretti and colleagues, although adolescent males who witnessed their fathers perpetrate against their mothers were not found to be aggressive toward their dating partners, they did show increased aggression toward friends.\textsuperscript{43}
For girls in this study, Social Learning Theory applies, but not as perfectly as it does for boys. Based on theory and supported by findings of Milletich and colleagues, it would be expected that girls who witnessed opposite-gender perpetration would have higher risk for victimization. While the association between opposite-gender perpetration and victimization for girls in the current study was not significant at conventional levels, the relationship trended in the right direction with the confidence interval just crossing one. Of interest, girls’ victimization in this study was associated with witnessing bidirectional violence, which is similar to what Jankowski and colleagues also found. Together, when trying to understand patterns within the bigger picture, these findings suggest that girls who witness adult males perpetrating, either alone or in tandem with an adult female, are at increased risk for victimization.

In the current study, boys and girls who witnessed adult bidirectional perpetration during childhood were more likely to be combined victims/perpetrators during adolescence. When comparing these findings to one of the few existing studies that examines bidirectional perpetration, these findings align with those by Jankowski and colleagues who found that perpetration by a single parent was not associated with victimization, but those who witnessed bidirectional adult perpetration were at higher risk for victimization. However, their sample was not large enough to distinguish effects for males and females separately, nor did they examine combined victimization/perpetration outcomes.

While past studies have not examined combined victimization/perpetration outcomes per se, the results from this study are in line with others that have explored the associations between the gender of the offending parent and subsequent victimization and perpetration. For example, two studies found that male college students who witnessed their mothers perpetrating violence were more likely to perpetrate in their own dating relationships. Additionally, females who witnessed their mothers perpetrate violence had increased risk for victimization and perpetration when measured separately.

The findings of this study may be impacted by the processes through which observed behavior and associated cognitive patterns are learned, depending on both the observed
consequences and expected outcomes of those behaviors. It has been suggested that, through Social Learning Theory, children witness how the abusive parent gains power and control in relationships. Thus, to gain control, remain safe, and avoid becoming a victim, the child may perceive that he or she must take on the perpetrator role in relationships. Adolescent girls who experience combined victimization/perpetration may represent those young women who try to take on the role of perpetrator in the context of a male dominated society and fail, thus also becoming a victim. While some work has been done to show that mutual violence is common in adolescents, future work is needed to understand the patterns of violence and other important factors that lead up to experiencing combined victimization/perpetration. Understanding this trajectory could help distinguish patterns of risk during adolescence and better inform interventions around victimization, perpetration or combined risk.

Attachment, Trauma, and Brain Function

Alternate theories have been posited to explain the pathway from witnessing to future violence outcomes. For example, the association between witnessing and adolescent relationship violence may stem from the lack of parental attachment or decreased support that may co-exist in the presence of family violence. The parental-child bond is the most natural to develop, and those who are deprived of it may also be inhibited from developing strong relationships in adolescence and adulthood, potentially priming witnesses for violent relationships. In the absence of bonding and attachment, children may suffer from emotional dysregulation and aggressive behaviors, and may have limited capacity for establishing healthy relationships because critical neural connections are under-developed.

Poor attachment and/or early exposure to stressful events or trauma can result in significant alterations in the hypothalamic-pituitary-adrenal (HPA) axis, the main system responsible for regulating the body’s stress response. Previous studies have shown that HPA axis activity is altered depending on the type of maltreatment experienced, age of experience, and gender of the child. Long-term effects of altered cortisol levels can range
from mood and anxiety disorders to impulsivity, and aggression.\textsuperscript{118} Even when cognitive development occurs along a normal trajectory during adolescence, decision-making during these years can rely more on reactive, rather than logical processes. This, combined with the neurobiological impact of early childhood trauma, such as alterations of the HPA axis development and functionality which have been shown to vary by gender,\textsuperscript{119} may help explain the association between witnessing and adolescent dating violence, as well as some of the gender differences noted in the sample in this study.

When coupled with the tenets of Social Learning Theory, Attachment Theory\textsuperscript{121} may help explain why, in this study, witnessing female caregivers perpetrating violence was consistently associated with combined victimization/perpetration, the highest risk outcome. Attachment Theory was built on the premise that there is one main attachment, which typically is formed with the primary caregiver, most often the mother.\textsuperscript{121} Perhaps this bond is most impacted in the case where a mother is a perpetrator,\textsuperscript{43} resulting in decreased conflict resolution skills for both girls and boys that can lead to the highest risk outcomes (combined victimization/perpetration). It is important to note, however, that these findings, particularly for boys, should be interpreted with caution until replicated with future studies, as boys witnessing opposite-gender perpetration was reported infrequently in this sample.

Several important limitations exist. First, this is a cross-sectional study of college students; therefore, it is not feasible to make causative inferences or extrapolate these findings beyond samples that are similar to this one. While the choice of schools allowed for a wide range of socioeconomic and demographic characteristics and the participants were similar across the disciplines used for selection, it is unrealistic to make conclusions about non-participants. Second, this study relied on students’ ability to recall childhood witnessing of adult violence; ability to recall details, such as who perpetrated the violence, may be limited. Third, although this survey was anonymous and confidential, rates of witnessing, victimization, and perpetration may be under-reported due to fear of stigma,\textsuperscript{100-102} and it is unclear whether men and women have differential reporting rates. Fourth, frequency and/or repetition of exposure to witnessing or
experiencing adolescent relationship violence were not assessed; future studies should explore whether these factors moderate the effects of childhood witnessing on adolescent relationship violence outcomes, particularly for combined victimization/perpetration. Fifth, concomitant child abuse was not measured. While Moretti, et al found that child abuse and witnessing often overlap, they found that the effects of witnessing remained when controlling for child abuse.\textsuperscript{43} Therefore, it is unlikely that concurrent child abuse would fully explain the results in this study, even if present. Finally, the type of adult violence that children witnessed is unknown, so it is impossible to assess how it might align with the specific types of violence that adolescents might experience in their own relationships (i.e., physical, sexual, emotional). However, outcomes were categorized broadly to match the assessment of witnessing exposure, in order to have a balanced comparison.

In conclusion, childhood witnessing of adult violence at home is an indicator of adolescent relationship violence, suggesting the importance of early identification and intervention for children who witness adult violence at home. Outcomes varied by gender and by the direction of adult violence witnessed in the home. For example, boys’ victimization and girls’ perpetration were not associated with the direction of violence witnessed in the home as a child. However, witnessing a male caregiver perpetrate violence in the home increased boys’ subsequent risk for perpetration of adolescent relationship violence, and it increased girls’ risk for victimization and combined victimization/perpetration during adolescence. Importantly, children who witnessed a female caregiver perpetrate adult violence at home – either as the sole perpetrator or in a mutually violent relationship with a male caregiver – had significantly increased risk for combined victimization/perpetration of adolescent relationship violence. Therefore, it is important to identify the gender of the perpetrating adult when family violence is suspected.

Future prevention efforts should target gender and direction of adult violence witnessed at home in order to have the most significant impact on reducing adolescent relationship violence. For example, primary prevention efforts targeted to females who witnessed bidirectional perpetration might focus more on prevention efforts related to both increasing self-esteem to
reduce subsequent victimization and anger management skills to prevent perpetration, while prevention efforts for male witnesses of same-gender perpetration could focus on decreasing aggression to prevent future perpetration. Furthermore, even if the direction of violence witnessed is unknown, it is clear that witnesses of adult violence in the home are at increased risk for future combined victimization/perpetration of violence, indicating the need to screen and intervene. For childhood witnesses, early intervention efforts addressing family violence, self-esteem, conflict resolution, and aggression reduction may be valuable in reducing subsequent relationship violence.
Table 3-1. Number and percentage of students with each demographic characteristic, the type of witnessing exposure they observed during childhood, and the adolescent relationship violence outcomes that were experienced by undergraduates in our sample.\(^a\)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total N=907</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Child</td>
<td></td>
</tr>
<tr>
<td>Current age (years)</td>
<td>20.0 ± 1.2 (range 17, 22)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>136 (15.0)</td>
</tr>
<tr>
<td>African American</td>
<td>146 (16.1)</td>
</tr>
<tr>
<td>White</td>
<td>534 (58.9)</td>
</tr>
<tr>
<td>Other</td>
<td>89 (9.5)</td>
</tr>
<tr>
<td>School</td>
<td></td>
</tr>
<tr>
<td>School A</td>
<td>377 (41.6)</td>
</tr>
<tr>
<td>School B</td>
<td>317 (35.0)</td>
</tr>
<tr>
<td>School C</td>
<td>213 (23.5)</td>
</tr>
<tr>
<td>Year in school</td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>213 (23.5)</td>
</tr>
<tr>
<td>Second</td>
<td>338 (37.3)</td>
</tr>
<tr>
<td>Third</td>
<td>251 (27.7)</td>
</tr>
<tr>
<td>Fourth or higher</td>
<td>104 (11.5)</td>
</tr>
<tr>
<td>Witnessed adult violence in the home as a child</td>
<td>214 (23.6)</td>
</tr>
<tr>
<td>Age witnessed adult violence in the home (years)</td>
<td>7.5 ± 3.0 (range: 2, 16)</td>
</tr>
<tr>
<td>Direction of adult violence witnessed in the home</td>
<td></td>
</tr>
<tr>
<td>Non-witness</td>
<td>684 (75.4)</td>
</tr>
<tr>
<td>Perpetration by same-gender only</td>
<td>45 (5.0)</td>
</tr>
<tr>
<td>Perpetration by opposite-gender only</td>
<td>77 (8.5)</td>
</tr>
<tr>
<td>Perpetration by both genders</td>
<td>60 (6.6)</td>
</tr>
</tbody>
</table>
Table 3-1 (continued). Number and percentage of students with each demographic characteristic, the type of witnessing exposure they observed during childhood, and the adolescent relationship violence outcomes that were experienced by undergraduates in our sample.\(^a\)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=907</td>
</tr>
<tr>
<td><strong>Adolescent relationship violence</strong></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>484 (53.4)</td>
</tr>
<tr>
<td>Victimization only</td>
<td>248 (27.3)</td>
</tr>
<tr>
<td>Perpetration only</td>
<td>24 (2.7)</td>
</tr>
<tr>
<td>Both victimization and perpetration</td>
<td>131 (14.4)</td>
</tr>
</tbody>
</table>

\(^a\) Numbers may not add to 907 due to missing data. Percentages are based off of a denominator of 907 to allow the reader to easily compute the proportion of missing values for each variable. Missing data points: race (n=2, 0.2%), years in school (n=1, 0.1%), witness violence at home (n=9, 1%), age of witnessing (n=17, 1.9%), direction witnessed (n=41, 4.5%), adolescent relationship violence (n=19, 2.1%).
Table 3-2. Prevalence for each of the four categories of adolescent relationship violence (ARV) based on demographic characteristics and the types of witnessing exposure for individuals in our sample of 907 college undergraduates. 

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No ARV (n=484)</th>
<th>ARV Victimization (n=248)</th>
<th>ARV Perpetration (n=24)</th>
<th>Combined Victimization/Perpetration (n=131)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female</td>
<td>229 (47.3)</td>
<td>184 (74.2)</td>
<td>9 (37.5)</td>
<td>89 (67.9)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>255 (52.7)</td>
<td>64 (25.8)</td>
<td>15 (62.5)</td>
<td>42 (32.1)</td>
<td></td>
</tr>
<tr>
<td>Current age, years (mean, range)</td>
<td>20.0 (17, 22)</td>
<td>20.0 (17, 22)</td>
<td>20.1 (18, 22)</td>
<td>20.0 (18, 22)</td>
<td>0.96</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Asian</td>
<td>92 (19.0)</td>
<td>26 (10.5)</td>
<td>3 (12.5)</td>
<td>12 (9.2)</td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>65 (13.4)</td>
<td>40 (16.1)</td>
<td>3 (12.5)</td>
<td>32 (24.4)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>292 (60.3)</td>
<td>155 (62.5)</td>
<td>13 (54.2)</td>
<td>65 (49.6)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>33 (6.8)</td>
<td>25 (10.1)</td>
<td>4 (16.7)</td>
<td>22 (16.8)</td>
<td></td>
</tr>
<tr>
<td>School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>School A</td>
<td>231 (47.7)</td>
<td>103 (41.5)</td>
<td>8 (33.3)</td>
<td>33 (25.2)</td>
<td></td>
</tr>
<tr>
<td>School B</td>
<td>157 (32.4)</td>
<td>94 (37.9)</td>
<td>11 (45.8)</td>
<td>47 (35.9)</td>
<td></td>
</tr>
<tr>
<td>School C</td>
<td>96 (19.8)</td>
<td>51 (20.6)</td>
<td>5 (20.8)</td>
<td>51 (38.9)</td>
<td></td>
</tr>
<tr>
<td>Year in school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.40</td>
</tr>
<tr>
<td>First</td>
<td>106 (21.9)</td>
<td>59 (23.8)</td>
<td>6 (25.0)</td>
<td>33 (25.2)</td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>172 (35.5)</td>
<td>98 (39.5)</td>
<td>10 (41.7)</td>
<td>52 (39.7)</td>
<td></td>
</tr>
<tr>
<td>Third</td>
<td>138 (28.5)</td>
<td>64 (25.8)</td>
<td>8 (33.3)</td>
<td>36 (27.5)</td>
<td></td>
</tr>
<tr>
<td>Fourth or higher</td>
<td>67 (13.8)</td>
<td>27 (10.9)</td>
<td>0 (0.0)</td>
<td>10 (7.6)</td>
<td></td>
</tr>
</tbody>
</table>
Table 3-2 (continued). Prevalence for each of the four categories of adolescent relationship violence (ARV) based on demographic characteristics of individuals in our sample of 907 college undergraduates.\(^a\)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No ARV (n=484)</th>
<th>ARV Victimization (n=248)</th>
<th>ARV Perpetration (n=24)</th>
<th>Combined Victimization/Perpetration (n=131)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Witnessed adult violence in the home as a child</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Yes*</td>
<td>81 (16.7)</td>
<td>66 (26.6)</td>
<td>9 (37.5)</td>
<td>56 (42.8)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>402 (83.1)</td>
<td>179 (72.2)</td>
<td>15 (62.5)</td>
<td>73 (55.7)</td>
<td></td>
</tr>
<tr>
<td>Age of first witnessing (mean, range)</td>
<td>8.1 (3, 16)</td>
<td>6.9 (2, 14)</td>
<td>8.3 (5, 11)</td>
<td>7.2 (2, 15)</td>
<td>0.11</td>
</tr>
<tr>
<td>Direction of adult violence witnessed in the home</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Non-witness</td>
<td>402 (83.1)</td>
<td>179 (72.2)</td>
<td>15 (62.5)</td>
<td>73 (55.7)</td>
<td></td>
</tr>
<tr>
<td>Perpetration by same-gender only</td>
<td>23 (4.8)</td>
<td>4 (1.6)</td>
<td>6 (25.0)</td>
<td>11 (8.4)</td>
<td></td>
</tr>
<tr>
<td>Perpetration by opposite-gender only</td>
<td>24 (5.0)</td>
<td>28 (11.3)</td>
<td>2 (8.3)</td>
<td>22 (16.8)</td>
<td></td>
</tr>
<tr>
<td>Perpetration by both genders</td>
<td>20 (4.1)</td>
<td>23 (9.3)</td>
<td>1 (4.2)</td>
<td>16 (12.2)</td>
<td></td>
</tr>
<tr>
<td>Age first relationship violence (mean, range)</td>
<td>NA</td>
<td>17.5 (12, 22)</td>
<td>18.0 (14, 21)</td>
<td>16.7 (12, 22)</td>
<td>0.003</td>
</tr>
</tbody>
</table>

\(^a\) Total N does not add to 907 because these values are based on the non-imputed data set, therefore, some students were missing either witnessing direction or ARV outcome. Results are expressed as number and (column percentage) or mean (range). Numbers may not add to 100 percent due to rounding. P-values are calculated using ANOVA, Pearson chi-square test, or Fisher’s exact test as appropriate.
Table 3-3. Relative risk ratios (RRR) with 95% confidence intervals (CI) for each adolescent relationship violence (ARV) outcome according to the type of witnessing that was observed as a child. Models are provided for the full sample and gender-specific subsamples.

<table>
<thead>
<tr>
<th>Direction of adult violence witnessed as a child</th>
<th>Victimization Only</th>
<th>Perpetration Only</th>
<th>Combined Victimization/Perpetration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Sample Model</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same-gender perpetrator</td>
<td>0.6 (0.2, 1.6)</td>
<td>6.0 (1.9, 18.7)</td>
<td>2.3 (1.0, 5.3)</td>
</tr>
<tr>
<td>Opposite-gender perpetrator</td>
<td>1.8 (0.95, 3.3)</td>
<td>2.6 (0.5, 13.2)</td>
<td>3.1 (1.5, 6.1)</td>
</tr>
<tr>
<td>Bidirectional perpetration</td>
<td>2.3 (1.2, 4.5)</td>
<td>1.4 (0.2, 11.1)</td>
<td>3.5 (1.6, 7.4)</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same-gender perpetrator</td>
<td>0.5 (0.1, 1.9)</td>
<td>8.0 (2.2, 29.0)</td>
<td>1.4 (0.5, 4.4)</td>
</tr>
<tr>
<td>Opposite-gender perpetrator</td>
<td>---</td>
<td>---</td>
<td>27.4 (2.3, 331.1)</td>
</tr>
<tr>
<td>Bidirectional</td>
<td>1.6 (0.4, 5.9)</td>
<td>---</td>
<td>3.7 (1.0, 12.9)</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same-gender perpetrator</td>
<td>0.4 (0.05, 4.3)</td>
<td>---</td>
<td>6.0 (1.2, 29.7)</td>
</tr>
<tr>
<td>Opposite-gender perpetrator</td>
<td>1.9 (0.99, 3.5)</td>
<td>2.2 (0.4, 12.7)</td>
<td>2.6 (1.2, 5.3)</td>
</tr>
<tr>
<td>Bidirectional</td>
<td>2.9 (1.3, 6.6)</td>
<td>2.6 (0.3, 25.5)</td>
<td>3.8 (1.4, 9.8)</td>
</tr>
</tbody>
</table>

\(^a\) Relative risk ratios (RRR) and 95% confidence intervals are presented; all comparisons are in reference to the non-witness group. Dashed lines represent cells that are too small to compute reliable estimates.

\(^b\) Multinomial regression model for the full sample includes the four adolescent relationship violence outcomes and four-level witnessing exposure and is standardized by gender, age, race, school, and a two-level community violence indicator.

\(^c\) In gender-stratified models, multinomial regression models predicting adolescent relationship violence outcomes based on witnessing status are standardized on age, race, school, and community violence.
Table 3-4. Standardized predicted probabilities with 95% confidence intervals (CI) for each adolescent relationship violence (ARV) outcome according to the type of witnessing that was observed as a child. Models are provided for the full sample and gender-stratified subsamples.a,b

<table>
<thead>
<tr>
<th>Direction of adult violence witnessed as a child</th>
<th>No ARV</th>
<th>Victimization Only</th>
<th>Perpetration Only</th>
<th>Combined Victimization/Perpetration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Sample Model</strong>^c^</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-witness</td>
<td>0.58 (0.54, 0.62)</td>
<td>0.28 (0.25, 0.31)</td>
<td>0.02 (0.01, 0.03)</td>
<td>0.12 (0.10, 0.15)</td>
</tr>
<tr>
<td>Same-gender perpetrator</td>
<td>0.52 (0.38, 0.67)</td>
<td>0.14 (0.02, 0.25)</td>
<td>0.10 (0.02, 0.19)*</td>
<td>0.24 (0.11, 0.36)*</td>
</tr>
<tr>
<td>Opposite-gender perpetrator</td>
<td>0.41 (0.29, 0.52)</td>
<td>0.32 (0.22, 0.43)</td>
<td>0.04 (0.00, 0.09)</td>
<td>0.23 (0.14, 0.32)*</td>
</tr>
<tr>
<td>Bidirectional perpetration</td>
<td>0.37 (0.25, 0.49)</td>
<td>0.38 (0.26, 0.50)*</td>
<td>0.02 (0.00, 0.05)</td>
<td>0.24 (0.13, 0.34)*</td>
</tr>
<tr>
<td><strong>Boys</strong>^d^</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-witness</td>
<td>0.69 (0.64, 0.74)</td>
<td>0.18 (0.14, 0.23)</td>
<td>0.03 (0.01, 0.05)</td>
<td>0.09 (0.06, 0.13)</td>
</tr>
<tr>
<td>Same-gender perpetrator</td>
<td>0.63 (0.48, 0.78)</td>
<td>0.08 (0.00, 0.17)</td>
<td>0.17 (0.04, 0.30)*</td>
<td>0.11 (0.02, 0.21)</td>
</tr>
<tr>
<td>Opposite-gender perpetrator</td>
<td>0.28 (0.00, 0.69)</td>
<td>0.04 (0.00, 0.26)</td>
<td>---</td>
<td>0.68 (0.25, 1.0)*</td>
</tr>
<tr>
<td>Bidirectional</td>
<td>0.54 (0.33, 0.75)</td>
<td>0.22 (0.03, 0.41)</td>
<td>---</td>
<td>0.24 (0.06, 0.42)*</td>
</tr>
<tr>
<td><strong>Girls</strong>^d^</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-witness</td>
<td>0.50 (0.45, 0.55)</td>
<td>0.34 (0.30, 0.39)</td>
<td>0.02 (0.003, 0.03)</td>
<td>0.14 (0.11, 0.18)</td>
</tr>
<tr>
<td>Same-gender perpetrator</td>
<td>0.36 (0.05, 0.67)</td>
<td>0.11 (0.00, 0.32)</td>
<td>---</td>
<td>0.52 (0.20, 0.85)*</td>
</tr>
<tr>
<td>Opposite-gender perpetrator</td>
<td>0.33 (0.22, 0.44)</td>
<td>0.42 (0.30, 0.53)</td>
<td>0.02 (0.00, 0.05)</td>
<td>0.23 (0.14, 0.32)*</td>
</tr>
<tr>
<td>Bidirectional</td>
<td>0.25 (0.12, 0.38)</td>
<td>0.48 (0.33, 0.64)*</td>
<td>0.02 (0.00, 0.06)</td>
<td>0.25 (0.12, 0.37)*</td>
</tr>
</tbody>
</table>

a Average adjusted predicted probabilities and 95% confidence intervals are presented. Dashed lines represent cells that are too small to compute reliable estimates.
Table 3-4 (continued). Standardized predicted probabilities with 95% confidence intervals (CI) for each adolescent relationship violence (ARV) outcome according to the type of witnessing that was observed as a child. Models are provided for the full sample and gender-stratified subsamples.

Significant comparisons (versus non-witnessing) are identified with an asterisk (*). In some instances, confidence intervals and p-values for marginal estimates indicated slightly different significance levels than confidence bounds and p-values on the log-odds scale. Because significance levels of marginal effects are computed by converting the estimates from the log-odds scale to the probability scale using mathematical transformations, marginal estimates will be less precise. Therefore, we report probabilities for ease of interpretation and practical reasons, but we have identified significant associations in this table based on the findings from the log-odds scale (Table 3-3).

Multinomial regression model for the full sample includes the four adolescent relationship violence outcomes and 4-level witnessing exposure and is standardized by gender, age, race, school, and a two-level community violence indicator.

In gender-stratified models, multinomial regression models predicting adolescent relationship violence outcomes based on witnessing status are standardized on age, race, school, and community violence.
Figure 3-1. The number of male and female undergraduates who witnessed adults perpetrating same-gender, opposite-gender, and bidirectional violence at home during childhood.
Figure 3-2. Standardized probabilities of experiencing or perpetrating adolescent relationship violence (ARV) based on the direction of adult violence that participants witnessed as a child.  

![ARV Outcomes Graph]

\(^a\) Average adjusted probabilities are standardized for gender, age, race, school and community violence. Values indicate the probability of having the outcome at each level of exposure, when holding all other variables constant.
Figure 3-3. Standardized probabilities of experiencing or perpetrating adolescent relationship violence (ARV) for boys and girls based on the direction of adult violence that participants witnessed as a child.*

*Average adjusted probabilities are standardized for age, race, school and community violence. Values indicate the probability of having the outcome at each level of exposure, when holding all other variables constant.
CHAPTER 4

Intergenerational Effects of Witnessing Domestic Violence:
Health of the Witnesses and Their Children

ABSTRACT

Objective: Witnessing domestic violence often co-occurs with other adversities, making it difficult to separate confounding effects. Using propensity score weighting to control for co-existing childhood factors and sensitivity analyses to interpret causal effects, this study examined the effects of witnessing domestic violence on general health status for both the adults who witnessed domestic violence during childhood and their children.

Methods: Phone interviews gathered demographic and health information for 329 parent-child pairs participating in a Philadelphia population-based survey. Additional data included parent’s childhood exposure to 14 adverse childhood experiences (ACEs), including witnessing domestic violence, our exposure of interest. Propensity scores predicting witnessing status based on childhood confounders were used to create inverse probability of treatment weights (IPTW), and survey sampling weights were used to generate population-based estimates. Separate standardized logistic regression response models identified associations between witnessing domestic violence as a child and below average health for both the adults who witnessed and their children. Average treatment effects on the treated (ATT) were computed with 95% confidence intervals, and sensitivity analyses assisted with interpreting causal effects.

Results: Mean adult age was 39.1 years (range 18 to 67); 49.9% of adults were Black, 35.4% were White, and 14.7% reported another race. Most (61.7%) received education beyond high school. Child proxies were often mothers (78.2%). Average child age was 9.5 years (range: <1 to 17). Groups were well balanced after applying the IPTW. In standardized models controlling for adult age, chronic disease, smoking, feeling unsafe in one’s current neighborhood, and SES,
there were no differences in adult health for witnesses vs. non-witnesses (0.45 vs 0.41; ATT=0.04; 95% CI: -0.12, 0.19). In contrast, children whose parents witnessed domestic violence had higher probability of having below average health than those whose parents did not witness (0.26 vs 0.11; ATT=0.15; 95% CI: 0.02, 0.28) when standardizing on parent age, parent health score, and child asthma diagnosis. However, if a weak (relative risk 1.2 to 1.3) unmeasured confounder was added, our effects would become insignificant.

**Conclusion:** Witnessing during childhood did not affect adult health in this population, and while significant effects of parent’s witnessing on child health were found, these effects were modest and would be negated in the presence of a weak unmeasured confounder.
BACKGROUND

Domestic violence has been estimated to occur in over 13 million homes. Approximately two-thirds of these homes also have children, resulting in approximately 15 million children who are exposed to witnessing domestic violence (hereafter referred to as witnessing). Witnessing is associated with a variety of negative mental, physical and behavioral health outcomes among children and adolescents. Children who witness domestic violence during childhood also are at increased risk for subsequent violence in their adolescent and adult relationships, potentially continuing the cycle of exposure into the next generation of offspring. Cannon and colleagues found that children born to women who witnessed domestic violence during childhood had a higher risk of witnessing compared to children born to parents who did not witness. Although these studies provide evidence supporting the intergenerational transmission of violence, studies have not explored the effects of these exposures on health outcomes across generations. In one study by Ehrensaft, data from a longitudinal cohort showed increased trauma symptoms in children of parents who witnessed domestic violence during childhood, but there are limited studies that examine the general health effects of witnessing into adulthood or in the next generation of children.

Prior studies have found that witnessing, often is associated with other adverse childhood experiences (ACEs) such as abuse, neglect, and household dysfunction including living with a parent who has a mental health condition, has been incarcerated, or has abused substances. Dube and colleagues found a graded effect between the frequency of witnessing and the relationship with co-occurring ACEs. These overlapping exposures make it difficult to control for confounding factors on health outcomes. One of the great challenges in this field is the inability to use randomized controlled trials (RCTs), the gold-standard for establishing cause and effect. Instead investigators must rely on observational studies, which can lead to biased estimates because the exposure is often highly associated with other factors that also affect the outcome.
Most studies utilize multivariate regression analyses to try to adjust for confounding factors, and some go a step further and try to assess mediating or moderating effects for one or a few select covariates, often child physical abuse, gender, socioeconomic status or race. However, conventional regression models are limited by the number of variables that can be included without risk of bias from overfitting, particularly without very large sample sizes. Therefore, results may remain biased because of the inability to control for a wider range of confounding effects that are likely to exist, such as having a foster care placement, exposure to community violence, and substance abuse or mental illness in the home.

Propensity score weighting provides a method to control for confounding factors, thereby attempting to mimic the balance achieved in an RCT. Decreasing the bias that occurs from non-random treatment assignment makes it possible to obtain a more precise estimate of the true effects of exposure on the outcomes of interest.\textsuperscript{133} This method is less restricted by sample size, is especially useful when there is not a high probability of outcome, and can easily adjust for a large number of measured confounding factors.\textsuperscript{133} In this case, it can be useful as we try to control for the effects of overlapping exposures that commonly co-occur with witnessing.

This study estimates the effects of witnessing on health outcomes across generations by using propensity scores and inverse probability treatment weighting (IPTW) to control for a large number of confounding factors.\textsuperscript{134} In addition, sensitivity analyses are implemented to provide guidance with interpreting the significance of our findings.\textsuperscript{135} Using these methods, this study begins to explore the causal effects of witnessing domestic violence across multiple generations. Specifically, this study examines how witnessing domestic violence as a child affects one’s general health status in adulthood and also how it impacts the general health status for the next generation of offspring. In other words, it studies the effects of witnessing for the adults who witnessed domestic violence as a child, as well as the effects on their children.
METHODS

The Southeastern Pennsylvania Household Health Survey (SEPA HHS) is a large-scale representative survey that is conducted every two years in the Philadelphia region by the Public Health Management Corporation (PHMC). The survey uses random-digit dialing to landlines and cell phones to gather data for a wide range of health behaviors and outcomes for more than 13,000 people. Data are captured for one randomly chosen adult and, when applicable, one randomly chosen child less than 18 years of age who lives in the home. Adults serve as child proxies, regardless of the child’s age. The SEPA HHS used in this analysis was conducted in summer of 2012. Additional details for the HHS are available from PHMC.

In Fall/Winter of 2012, SEPA HHS participants who lived in Philadelphia and who had an address on file (N=2,181) were notified by mail that they would be re-contacted with a request to complete an additional health-related interview. This follow-up interview queried adult participants about household and community level adversities that they experienced during childhood. This module, known as the Philadelphia ACE Survey, was developed by the Philadelphia ACE Task Force using these existing measures as a starting point: the California Health Interview Survey (CHIS) Adult Survey, Adverse Childhood Experiences International Questionnaire (ACEs-IQ), National Survey on Children’s Exposure to Violence, CDC’s Family Health History and Health Appraisal Questionnaire, and Perceptions of Racism in Children and Youth (PRaCY) instrument. Also incorporating current literature and qualitative research conducted with local residents, community level ACEs were identified for the Philadelphia ACE Survey, and a few of the traditional household questions were modified to increase their appropriateness for the Philadelphia community. Philadelphia ACE questions and response coding that are used in this paper are provided in Table 4-1, and additional details about the methodology and findings from the initial analyses have been reported elsewhere.

Multiple contacts were made by mail and phone when participants were not reached on the first attempt. At the end of 2012 through early 2013, there were 1,784 Philadelphians aged 18 or older who completed the additional interview to provide information for the Philadelphia
ACE Survey, resulting in a response rate of 67.1%, using the American Association for Public Opinion Research Response Rate calculation. Interviews were conducted by a professional research firm, Social Science Research Solutions (SSRS). Male interviewers conducted interviews with male respondents, and female interviewers conducted interviews with female respondents. Interviews were conducted in English or Spanish, as needed. On average, the original SEPA HHS interview took approximately 25 minutes, and the Philadelphia ACE module took approximately 12 minutes to complete.

Key Variables

The exposure of interest, witnessing domestic violence, was assessed using a series of three questions asking “How often, if ever, did you see or hear in your home a parent, step parent or another adult who was helping to raise you being…” 1) “yelled at, screamed at, sworn at, insulted, or humiliated?” 2) “slapped, kicked, punched, or beaten up?” or 3) “hit or cut with an object, such as a stick, cane, bottle, club, knife, or gun?” Response options included: “many times, a few times, once, never.” Any response greater than never was considered an exposure. Responses for the three questions were combined, so that an affirmative response to any one indicated exposure to witnessing.

Others have found that self-reported health is an accurate predictor of mortality and may even be better than measures that are considered more objective. The outcome measure in this study, general health status, was measured by asking the following: “Would you say your health in general is…?” Response options included: “excellent,” “very good,” “good,” “fair,” or “poor,” which were dichotomized into below average (poor, fair, and good categories) versus above average (very good or excellent categories) based on interest in identifying those who perceived anything other than high levels of health and natural distributions within the data. Parents reported on their own health and the health of their child using the same scale.

A measure for socioeconomic status (SES) that was developed in prior work by combining education and poverty levels and was used in this analysis. SES was derived by
combining reverse-coded poverty and education levels. Poverty was coded 0 to 4 based on the following categories: >200% above the federal poverty line (FPL), <150% and ≤ 200% FPL; <100% and < 150% FPL; <50% and ≤ 100% FPL; or ≤ 50% FPL. Education was coded 0-3 using the following: college graduate, some college, high school graduate; did not graduate high school. Poverty and education categories were summed to create the SES score, which ranged from zero (highest SES) to 7 (lowest SES). Of note, SSRS imputed missing income values (n=39, 11.9%) with the average income of others in the census tract who had the same education level and employment status as the main wage earner in the home. SSRS then created the poverty variable based on income of the main wage earner, number of people in the home, and federal poverty guidelines at the time.

Chronic disease was defined as having any of the following diagnoses identified by a health care provider: stroke, myocardial infarction, chronic obstructive pulmonary disease, liver disease, diabetes, asthma, cancer, or HIV.

**Statistical Analysis**

Because this study focused on adults and their children, analyses were limited to the 329 adult respondents who completed an interview for both themselves and their child. Figure 4-1 details the number of interviews that were completed and rationale for the analysis sample.

In addition to the IPTW described below, a raking procedure was used to create survey weights using QBal version 4.1.27 to account for the complex survey design and over- and under-sampling of certain subgroups. These weights were based on distributions of adult age, poverty status, gender, race, and Hispanic ethnicity in the population identified from the most recent Philadelphia census and American Community Survey.149
Propensity Score Model

Propensity score analysis occurred in a series of stages. First, the propensity score model was carefully created by fitting a logistic regression model to predict the probability of exposure (propensity score) in the unweighted survey sample. Specification of this model was important, as an incorrectly specified model can lead to biased estimates for the subsequent response model. Only “baseline” variables were included, or variables that would have been able to be balanced at the time of assignment into the treatment/exposure group if this were a true RCT; therefore, variables occurring after the exposure, or variables that potentially could be along the causal pathway between exposure and outcome, were not included in the propensity score model. Because the goal of propensity score weighting is to balance the exposed and unexposed groups across all measured confounding factors, any variables that potentially confounded the relationship between the exposure and outcome of interest were included. It is important to note that this step was completed in such a way that did not take health outcomes into account, except for theoretically considering whether covariates could possibly confound the relationship between the exposure and outcomes.

The propensity score model predicting witnessing was comprised of baseline (childhood) characteristics including sex; race; growing up in Philadelphia; >2 household ACEs; >1 community ACEs; >5 total ACEs; victim of physical abuse; victim of sexual abuse; victim of verbal abuse; victim of abuse that resulted in visible injury; food insecurity; sense of community in one’s neighborhood; victim of bullying; observed community violence during childhood; had a someone in childhood that made you feel special; lived in foster care; felt discriminated against; and lived with someone during childhood who had: a mental health condition, abused alcohol, abused drugs, been in prison.

Inverse Probability of Treatment Weighting (IPTW)

Once the propensity score was computed, it was used to create the inverse probability of treatment weight (IPTW) that was applied to the sample. This study was interested in
determining the average treatment effect on the treated (ATT). Essentially, the ATT is an indicator for how the outcome would change if we could undo the exposure from those who were exposed. Due to the ATT being the effect of interest, the IPTW in the exposed group was set to 1, and the IPTW in the unexposed group was set to \( \hat{p}/(1-\hat{p}) \), where \( \hat{p} = \) propensity score. It has been shown that when the weighted propensity score is balanced across exposure groups, then the covariates are balanced across groups as well.\(^{151}\)

Response Model

Once it was confirmed that covariates were balanced across witnessing groups, separate response models using logistic regression were developed to predict the probability of having below average health for the adult and his/her child. Both the original survey weights and the newly created IPTW were applied in this step in order to determine the ATT at the population level.\(^{150}\) Any unbalanced covariates that persisted after propensity score weighting was applied were added to both the unstandardized and standardized response models. Care was taken to avoid overfitting by using established guidelines in the literature\(^{152,153}\). In addition to the unbalanced confounders, the standardized model predicting below average health status for adults also included: witnessing domestic violence during childhood, adult age, chronic disease, smoking, feeling unsafe in one’s current neighborhood, and SES.

All the adult characteristics included in the parent model also would impact child health. However, instead of including all the parent variables in the child model, which would raise concerns for having too many levels of covariates in our model, instead data reduction was implemented to create a single “parent health score” that included all the pertinent parent variables from the model predicting adult health; unbalanced confounders were not included in the data reduction step, as they were entered separately into the child model. The parent health score was created by running a separate logistic regression model predicting adult health that included just the following factors from the original model: adult age, chronic disease, smoking, feeling unsafe in one’s current neighborhood, and SES. Predicted values (the parent health
score) were included in the child model as an indicator of all variables impacting parent health. Therefore, the standardized model predicting below average health status for children included: parents’ witnessing status from childhood, parent health score, and child asthma diagnosis. Unstandardized and standardized probabilities for having below average health and the average treatment effect on the treated (ATT) are provided with 95% confidence bounds. Finally, a sensitivity analysis was done to determine what level of influence any unmeasured confounders would need to have to negate the treatment effects that were found in this sample.\textsuperscript{135}

\textbf{RESULTS}

All results are reported using the aforementioned survey sampling weights, allowing for extrapolation of the findings to the population level. The mean age of adult respondents was 39.1 years (range 18 to 67). In our 329 parent-child pairs, 35.4% of adult respondents were White, 49.9% were Black and 14.7% reported another race. Almost two-thirds of participants had received education beyond high school: 39.3% had some college, 22.4% were college graduates, while 30.9% had a high school diploma, and 7.5% did not graduate high school. Income levels paralleled education levels, with 58.4% earning more than 200\% FPL, 9.7\% earning between 151\%-200\% FPL, 12.4\% earning between 101\%-150\% FPL, 10.1\% earning between 51\%-100\% FPL, and 9.4\% earning <50\% FPL. The mean SES score was 2.3, based on an indicator that combines education and poverty and which ranges from 0 (highest SES score) to 7 (lowest SES score). The majority of parents who provided proxy information for their children were mothers (78.2\%). The average age of children was 9.5 years (range: <1 to 17), and 46.7\% of children were female.

Figures 4-2 through 4-6 display balance measures across the witness and non-witness groups. Before weighting, the propensity scores were naturally higher in the witness group. After weighting, propensity scores were balanced across the groups (Figure 4-2). Density plots for the standardized percentage of bias before and after weighting of all covariates showed centering around zero and tightening of the bias interval post weighting, indicating an increase in balance.
across groups on the included covariates. There was considerable overlap of propensity scores between the witness and non-witness groups, with a region of common support ranging from 0.191 to 0.995 (Figures 4-4 and 4-5). Figure 4-6 displays the standardized percentage of bias before and after weighting for each variable included in the propensity score. As seen in this graphic, bias was reduced considerably and was closer to zero after weighting, for all but three variables: sex, spending time in foster care, and having someone who made you feel special during childhood; the latter two variables were limited by small cell sizes. Injury from abuse had a higher percentage of bias than other variables, even after balancing. When examining weighted 2x2 tables, three variables (sex, injury from abuse, and living in a household with someone who had a mental health condition) showed signs of imbalance; therefore, these three factors were included in the unstandardized and standardized final response models predicting health for adults and children.

In this sample, witnessing was common, 51% of adults reporting that they witnessed domestic violence during childhood, and 79% of witnesses were female. Almost half (42.9%) of adults in this sample reported below average overall health. Parent’s reports of child health were better, with only 29.2% of children reported to have below average overall health.

In unstandardized response models predicting below average adult health, those who witnessed domestic violence had a higher probability of having below average health in adulthood compared to non-witnesses (0.50 vs 0.37), with an ATT of 0.13 (95% CI: -0.07, 0.34, p=0.21), but this finding was not significant (Table 4-2). In the standardized models for adults, there also were no significant differences in health for those who witnessed domestic violence compared to those who did not witness (0.45 vs 0.41; ATT=0.04; 95% CI: -0.12, 0.19, p=0.65) when controlling for adult age, chronic disease, smoking, feeling unsafe in one’s current neighborhood, and SES.

In unstandardized response models predicting below average child health, children whose parents witnessed domestic violence had a significantly higher probability of having below average health than those whose parents did not witness (0.30 vs 0.09), with an ATT of 0.22 (95% CI: 0.10, 0.34, p=0.001). Although the effect was lower in the standardized models
adjusting for parent health score and child asthma diagnosis, the risk difference between exposure groups remained significant; children whose parents witnessed domestic violence had a significantly higher probability of having below average health compared to children whose parents did not witness domestic violence (0.26 vs 0.11), with an ATT of 0.15 (95% CI: 0.02, 0.28 p=0.02).

Ding and VanderWeele’s bounding factor was used to conduct a sensitivity analysis to project the effects of an unmeasured confounder. Sensitivity analysis shows how the true relative risk (RR\text{true}) for witnessing would change if a confounder with specific associations with the exposure (RR_{EU}) and outcome (RR_{UD}) were added to the model. In this example, RR_{EU} is the relative risk of having unmeasured confounder U, given exposure E. Similarly, RR_{UD} is the relative risk of having outcome D, given unmeasured confounder U. In the standardized model predicting poor child health, adding an unmeasured confounder with an RR_{EU}=1.2 and RR_{UD}=1.3 or vice versa would reduce the lower limit of the confidence bounds to 1.0. If the effects of the unmeasured confounder(s) were more substantial (i.e., RR_{EU}>1.2 or RR_{UD}>1.3), it would cause the lower confidence bounds associated with the RR\text{true} in this study to cross 1.0, rendering the effect insignificant.

**DISCUSSION**

This study utilized a novel approach to explore the intergenerational effects of witnessing domestic violence as a child by analyzing parent-child pairs to test the effects of witnessing on the overall health status across two generations – the parent who witnessed during childhood and the child who was subsequently born to that parent. In addition, propensity score weighting was implemented to mimic the balance achieved with a randomized controlled trial and sensitivity analysis was added to assist with interpreting the strength of these findings in the presence of an unmeasured confounder. In this study, perceived adult health was not impacted by witnessing status once other childhood adversities and baseline characteristics were balanced across witnessing exposure using propensity score analysis. This finding was consistent for
unstandardized and standardized models. Others have found somewhat conflicting results when studying the effects of witnessing on general health in adulthood. Using the Washington Behavioral Risk Factor Surveillance System (BRFSS) data, Bensley did not find differences in general health status for adults who witnessed domestic violence as a child compared to those who did not witness. They did find, however, that poor health was associated with increased exposure to other ACEs. In that study, adults were queried only about witnessing physical domestic violence as a child. Cannon and colleagues only assessed witnessing physical domestic violence and measured adult health using the general health item and individual subscales from the Short-From 36 (SF36) Health Survey. Their sample consisted of 3,568 insured women between 18-64 years of age whose data was provided via phone survey and health plan database. Because of evidence indicating overlap between child abuse and witnessing, they examined health outcomes separately for those who witnessed only versus those who witnessed and experienced child abuse. They found lower mental health status and higher use of services for those who witnessed only compared to those who did not witness, but they did not find differences in general health when controlling for age and education. However, adults who witnessed domestic violence and experienced child abuse identified worse general health compared to those who did not witness or have child abuse exposure. In a separate study using population-based data from the Ontario Health Survey, Chartier and colleagues captured self-reported health using a question similar to ours and Cannon’s. When comparing “fair/poor” health to “good, very good, excellent” health, they found no effects of witnessing on general health in models that were unadjusted or models that were adjusted for age, marital status and education. However, when using a sum score of ACEs which included witnessing to predict health, they found that each additional ACE increased the risk for poor health (odds ratio=1.18; 95% CI: 1.08, 1.29). Together, these findings suggest that witnessing alone may not be sufficient to influence general health in adulthood, but that negative effects on health may be exacerbated in the presence of multiple traumatic exposures, likely because of the detrimental cumulative impact on the stress-response system and brain development.
Interestingly, other studies have found associations between witnessing and adult mental health outcomes that should impact general health, such as depression or substance use. Given the effects found in those studies, it is somewhat surprising that stronger associations between witnessing and poor adult health have not been found. Notably, the definition used for witnessing in the current study and the studies mentioned above was a more encompassing measure than that used by Dube and colleagues. Some studies added witnessing verbal violence and/or violence with an object in addition to witnessing physical domestic violence; others utilized a lower frequency of exposure. Since increasing frequency and severity of witnessing has a graded effect on poor health outcomes, perhaps the use of a lower threshold for defining witnessing may dilute the measurable effects of witnessing on general health outcomes.

After adjusting for confounding baseline factors with propensity score analysis and controlling for parent’s health score and child asthma diagnosis, results showed that child health reported in this population was significantly affected by their parent’s witnessing domestic violence during childhood. The results from this study seem to suggest that while parent’s exposure to witnessing domestic violence as a child has an effect on the overall health in their children, this effect does not appear to be strong.

Even with a higher level of rigor offered by propensity score weighting and sensitivity analysis used in this study, there are several limitations that must be considered when interpreting these findings. First, because there is a well-established association between childhood witnessing and subsequent domestic violence involvement during adulthood, it is plausible that domestic violence currently exists in the homes of the adults who witnessed during childhood. In that case, child health should be negatively affected, as it was in this study. After controlling for parent’s health score and child asthma diagnosis, modest witnessing effects remained in this study, but these were not as strong as one would expect if there were current domestic violence exposure. Additionally, if domestic violence did exist currently in the home, it would be expected that the health status of the parent also would be impacted negatively, but
that is not what was found. Unfortunately, the SEPA HHS did not collect data about current domestic violence exposure for either the adult or the child living in the home, so it is impossible to confirm if the effects that were found are solely due to past witnessing of the parent or if the child is currently being exposed to domestic violence. Regardless of whether there is or is not current domestic violence in the home, this study suggests that the negative health effects resulting from witnessing may carry across generations and impact the children of those who witnessed; however, the negative health effect on children is modest, and it is not feasible to determine if it is solely due to the child’s parent witnessing, or if it is a combination of the parent’s witnessing that increases their own risk for domestic violence in adulthood, which in turn increases the likelihood that their child is exposed to domestic violence as well.

Additionally, it is important to note that, the subsample of parent-child pairs who completed the ACE Survey in this study may inherently represent a lower risk group than the general population. Participants not only agreed to participate in the first SEPA HHS interview and provide data for themselves and a child, but they also agreed to complete the add-on module that was conducted a few months later. Third, a common limitation in this work is the reliance on parents providing proxy information about their children; mother’s reports about their child’s health may be under- or over-reported. Ragavan and colleagues\textsuperscript{157} found that mothers’ who were in transitional housing after escaping a violent home overstated poor health for their teens when compared to the teens’ own reports. It is unclear whether the same pattern holds for younger children, although in that study, mothers reported better health for their younger children than they did for their teenage children. Fourth, there is always concern with the accuracy of self-report data on sensitive issues; Dube and colleagues reported good test-retest reliability for self-reported ACEs over time\textsuperscript{158} providing an additional level of credibility to the measures. Finally, this study could control only for measured confounders. While a host of known confounders were included, it is possible there are other confounders that were not measured; thus, sensitivity analysis was added to provide a better sense of confidence with interpreting the strength of these findings.
Comparing the effects of witnessing domestic violence on first- and second-generation health outcomes using parent-child pairs from a population-based study, this study found no effect of witnessing on the general health of adults who witnessed domestic violence during childhood. Although children whose parents witnessed domestic violence had significantly worse health compared to children with non-witnessing parents, these effects were modest and would become negligible in the presence of a weak unmeasured confounder.

This work further supports the theory of intergenerational violence transmission and provides a springboard for future studies by offering a novel approach to studying multi-generational effects of witnessing and other adverse childhood experiences, as well as promoting the use of more rigorous methods to separate the effects of commonly confounding exposures.
Table 4-1. Questions included in the Philadelphia adverse childhood experiences (ACEs) module that was conducted as an add-on to the 2012 Southeast Pennsylvania Household Health Survey (SEPA HHS).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Question</th>
<th>Response threshold applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Witness domestic violence</td>
<td>How often, if ever, did you see or hear in your home a parent, step parent or another adult who was helping to raise you being yelled at, screamed at, sworn at, insulted, or humiliated?</td>
<td>Never vs &gt; once</td>
</tr>
<tr>
<td></td>
<td>How often, if ever, did you see or hear in your home a parent, step parent, or another adult who was helping to raise you being slapped, kicked, punched, or beaten up?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How often, if ever, did you see or hear in your home a parent, step parent, or another adult who was helping to raise you being hit or cut with an object, such as a stick, cane, bottle, club, knife or gun?</td>
<td></td>
</tr>
<tr>
<td>Physical abuse</td>
<td>While you were growing up did a parent, step-parent, or another adult living in your home push, grab, shove, or slap you?</td>
<td>Never vs &gt; once</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>During the first 18 years of life, did an adult or older relative, family friend, or stranger who was at least five years older than yourself ever touch or fondle you in a sexual way or have you touch their body in a sexual way?</td>
<td>No vs Yes</td>
</tr>
<tr>
<td></td>
<td>Attempt to have or actually have any type of sexual intercourse, oral, anal or vaginal with you?</td>
<td></td>
</tr>
<tr>
<td>Verbal abuse</td>
<td>While you were growing up how often did a parent, step-parent, or another adult living in your home swear at you, insult you, or put you down?</td>
<td>Never vs &gt; once</td>
</tr>
<tr>
<td></td>
<td>While you were growing up how often did a parent, step-parent, or another adult living in your home act in a way that made you afraid that you would be physically hurt?</td>
<td></td>
</tr>
<tr>
<td>Visible injury from abuse</td>
<td>While you were growing up did a parent, step-parent, or another adult living in your home hit you so hard that you had marks or were injured?</td>
<td>Never vs &gt; once</td>
</tr>
</tbody>
</table>
Table 4-1 (continued). Questions included in the Philadelphia adverse childhood experiences (ACEs) module that was conducted as an add-on the 2012 Southeast Pennsylvania Household Health Survey (SEPA HHS).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Question</th>
<th>Response threshold applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food insecurity</td>
<td>Your family sometimes cut the size of meals or skipped meals because there was not enough money in the budget for food.</td>
<td>Never/rarely/sometimes vs Very often/often</td>
</tr>
<tr>
<td>Sense of community in neighborhood</td>
<td>Did you feel safe in your neighborhood?</td>
<td>None/some of the time vs most/all of the time</td>
</tr>
<tr>
<td></td>
<td>Did you feel people in your neighborhood looked out for each other, stood up for each other, and could be trusted?</td>
<td></td>
</tr>
<tr>
<td>Victim of bullying</td>
<td>How often were you bullied by a peer or classmate?</td>
<td>None of the time vs some/most/all of the time</td>
</tr>
<tr>
<td>Observed community violence</td>
<td>How often, if ever, did you see or hear someone being beaten up, stabbed, or shot in real life?</td>
<td>Never vs ≥ once</td>
</tr>
<tr>
<td>Someone made you feel special</td>
<td>There was someone in your life who helped you feel important or special</td>
<td>Often true/very often true vs never/rarely/sometimes true</td>
</tr>
<tr>
<td>Lived in foster care</td>
<td>Were you ever in foster care?</td>
<td>No vs Yes</td>
</tr>
<tr>
<td>Felt discrimination</td>
<td>While you were growing up…How often did you feel that you were treated badly or unfairly because of your race or ethnicity?</td>
<td>Never/rarely vs sometimes/often/very often</td>
</tr>
<tr>
<td>Household mental illness</td>
<td>While you were growing up, did you live with anyone who was depressed or mentally ill?</td>
<td>No vs Yes</td>
</tr>
<tr>
<td></td>
<td>Did you live with anyone who was suicidal?</td>
<td></td>
</tr>
<tr>
<td>Household alcohol abuse</td>
<td>Did you live with anyone who was a problem drinker or alcoholic?</td>
<td>No vs Yes</td>
</tr>
<tr>
<td>Household substance abuse</td>
<td>Did you live with anyone who used illegal street drugs or who abused prescription medications?</td>
<td>No vs Yes</td>
</tr>
<tr>
<td>Incarcerated household member</td>
<td>Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?</td>
<td>No vs Yes</td>
</tr>
</tbody>
</table>
Table 4-2. Standardized and unstandardized predicted probabilities and average treatment effects on the treated (ATT) associated with having below average general health for adults and their children based on whether the adults witnessed or did not witness domestic violence during childhood.\(^a\)

<table>
<thead>
<tr>
<th>Outcome of Interest</th>
<th>Non-Witness</th>
<th>Witness</th>
<th>ATT</th>
<th>95% CI</th>
<th>p-value</th>
<th>Non-Witness</th>
<th>Witness</th>
<th>ATT</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor adult health</td>
<td>0.41</td>
<td>0.45</td>
<td>0.04</td>
<td>-0.12, 0.19</td>
<td>0.65</td>
<td>0.37</td>
<td>0.50</td>
<td>0.13</td>
<td>-0.07, 0.34</td>
<td>0.21</td>
</tr>
<tr>
<td>Poor child health</td>
<td>0.11</td>
<td>0.26</td>
<td>0.15</td>
<td>0.02, 0.28</td>
<td>0.02</td>
<td>0.09</td>
<td>0.30</td>
<td>0.22</td>
<td>0.10, 0.34</td>
<td>0.001</td>
</tr>
</tbody>
</table>

\(^a\) Inverse probability of treatment weighting (IPTW) is used for all models to compute average treatment effects on the treated (ATT). Propensity scores for the IPTW models were comprised of baseline (childhood) characteristics including sex; race; growing up in Philadelphia; >2 household ACEs; >1 community ACEs; >5 total ACEs; victim of physical abuse; victim of sexual abuse; victim of verbal abuse; victim of abuse that resulted in visible injury; food insecurity; sense of community in one’s neighborhood; victim of bullying; observed community violence during childhood; had a supportive adult in childhood that made you feel special; lived in foster care; felt discriminated against; and lived with someone during childhood who had: a mental health condition, abused alcohol, abused drugs, been in prison. After applying the IPTW, balance was achieved for all covariates across witnessing groups except for: respondent sex, injury from abuse as a child, and living with adult who had a mental health condition during childhood; thus, these factors were added to all response models. The survey sample was weighted to account for adult age, poverty status, gender, race, and Hispanic ethnicity distributions from the most recent Philadelphia census and American Community Survey.\(^149\)

\(^b\) Standardized adult models include: witnessing domestic violence during childhood, adult age, chronic disease, smoking, feeling unsafe in one’s current neighborhood, and SES. Standardized child models include: parents’ witnessing status from childhood, parent health score (comprised of: adult age, chronic disease, smoking, feeling unsafe in one’s current neighborhood, and SES), and child asthma diagnosis.
Figure 4-1. Sample of adult respondents who completed interviews for themselves and a child under the age of 18 years of age who was living in the home at the time of interview.

Adult HHS/ACE Interview Respondents

Adults reporting on children <18 yrs old

Child’s Proxy is a Parent

Parent also completed an Adult Interview

Yes
n=386

No
n=1,398

Yes
n=356

No
n=30

Yes
n=329

No
n=27
Figure 4-2. Estimated propensity scores for the witness and non-witness groups before and after balancing with the inverse probability of treatment weight (IPTW).

Unbalanced

Balanced with IPTW
Figure 4-3. Standardized percentage of bias across all covariates in the weighted and unweighted samples. The more narrow interval and centering around zero after weighting represents a reduction in bias across the covariates and better balance across groups.
Figure 4-4. Propensity score distributions for the witness and non-witness groups, showing scores that are on and off the region of common support.
Figure 4-5. Kernel density of propensity scores for the witness and non-witness groups, with overlapping propensity scores representing the region of common support (0.191, 0.995).
Figure 4-6. Standardized percentage of bias associated with each covariate in the propensity score model before and after weighting with the inverse probability of treatment weight (IPTW).
CHAPTER 5

Conclusion

SUMMARY

This work addressed a series of questions to help better understand the effects of witnessing domestic violence on subsequent outcomes during adolescence, adulthood, and into the next generation of children. In doing so, methods were selected to help address some of the existing limitations in the literature. First, by identifying a sample of college students that would be more generalizable than what has conventionally been used and simultaneously measuring a variety of relationship violence outcomes for males and females, this work examined whether witnessing domestic violence during childhood was associated with multiple types of adolescent relationship violence experiences for both genders. Second, Social Learning Theory was used as a framework to test whether the gender of the adult perpetrators and child witnesses was associated with subsequent victimization, perpetration, or a combination of the two. Finally, this work expanded on what is typically explored in the field to include outcomes beyond adolescence, It also used causal analysis to discover how witnessing domestic violence in childhood impacts general health during adulthood and also the health for children of adults who witnessed domestic violence during childhood.

Outcomes for Adolescents

In Chapter 2, results showed that witnessing domestic violence was significantly associated with all forms of violence that were measured (Figure 2-1); however, there were clear differences by gender. Table 5-1 indicates a summary table of the significant associations in the full sample as well as those specific to boys and girls. Girls who witnessed domestic violence as children were significantly more likely than girls who did not witness to experience all forms of victimization, except for sexual victimization. In addition, although overall perpetration was higher
for girls who witnessed compared to those who did not, this result was driven by the higher rates of physical perpetration in girls. In contrast to girls, witnessing did not increase boys’ risk for victimization in adolescence, but it was significantly associated with higher risk for perpetration among boys across all forms of violence measured. Of interest, polyvictimization and polyperpetration were higher for girls and boys who witnessed, respectively. Given the detrimental health effects associated with experiencing multiple types of violence, this finding is particularly concerning.

After identifying which types of adolescent relationship violence were associated with witnessing domestic violence as a child, this work focused on understanding how gender of the adult perpetrator and child witness were associated with adolescent victimization and perpetration. Differences in victimization and perpetration outcomes were identified based on the gender of the adult perpetrator and child witness (Chapter 3). For example, when comparing differences for boys and girls, this work found that boys who only witnessed adult males perpetrating violence had a significantly increased risk for perpetrating adolescent relationship violence themselves. In contrast, girls who witnessed adult males perpetrating violence, either alone or in the form of mutual violence with an adult female, were at increased risk for victimization of adolescent relationship violence.

While differences in outcomes were found for boys and girls depending on what they witnessed, there also were some similarities. For example, boys and girls who witnessed bidirectional violence between adult males and females were at increased risk for combined victimization/perpetration of adolescent dating violence. Additionally, boys and girls who witnessed adult females, either alone or mutually with an adult male, were at significantly higher risk for combined victimization/perpetration of adolescent dating violence. Of note, victimization for boys and perpetration by girls was not associated with the gender of the adult perpetrator or the child victim. Notably, many of these findings are in line with what would be expected based on Social Learning Theory.
Outcomes for Adults and Their Children

After gaining a better understanding of how witnessing domestic violence during childhood was associated with adolescent outcomes, attention was refocused on assessing the effects of witnessing further into the future and found that using second-generation data can be a useful next step in understanding the long-term health impacts of domestic violence on families. Chapter 4 used propensity score analysis to control for a variety of confounding factors that often co-occur with witnessing in order to increase our ability to assess causal effects. Sensitivity analysis also were added to help explain how the effects might change if there were unmeasured confounders that could not be included. Witnessing domestic violence during childhood did not have a direct impact on adult general health, but witnessing did have impacts on health across generations, with significantly lower general health found in children of adults who witnessed domestic violence during their childhood. These effects, however, were modest; after conducting sensitivity analysis, it was apparent that the addition of a weak unmeasured confounder would change the significance of these findings.

IMPLICATIONS

Screening

This work demonstrates that witnessing domestic violence as a child was associated with significant consequences throughout life, both in adolescence and into the next generation of children. Witnessing domestic violence considerably impacts children, and there is increased harm associated with co-occurring exposure to trauma during childhood. Given the potential for early intervention, advocates have supported the notion of screening for IPV and witnessing during childhood health care visits. These results indicate that when assessing for the presence of domestic violence in the home, we may want to expand our assessment beyond considering just, “Are you witnessing?” In this work, differences in outcomes were identified based on the gender of the adult perpetrator and the child witness. Therefore, it is important to
also evaluate “who are you witnessing?” in addition to the gender of the child as we identify potential outcomes and devise care plans for early intervention with these children and families.

In the adult care setting, screening for domestic violence is recommended as a standard of care. In the screening model that presently exists, the focus is on current domestic violence and the safety of the adult victim and any children in the home. Based on these findings, it may be important to consider expanding our inquiry to address whether the adult witnessed domestic violence as a child, as it appears that childhood witnessing may have an effect on the overall health of the adult’s children, which can potentially affect the entire family unit.

Violence on College Campuses

While not a direct focus of this work, it is impossible to ignore the level of adolescent relationship violence found in this college sample. Although it is not appropriate to make inferences about prevalence to the entire population because not all students participated, this study made a concerted effort and succeeded in capturing a broad diversity of students in 67 classes across all disciplines. In this group, almost half of students reported victimization or perpetration of adolescent relationship violence.

College is a unique time of transition where teens have a newly found freedom. For the first time, many have complete autonomy in their decision-making. This dynamic, along with the intense peer pressure and desire to fit in when establishing new friendships, there is an increased vulnerability that can heighten the risk for victimization, especially early in the college transition. For this reason, it is ideal for colleges to have clearly-established and widely-distributed expectations, guidelines, and zero-tolerance policies for violence that are openly discussed and well-documented to help protect students and promote a positive, safe, and successful college experience for everyone.

Prevention, screening, and intervention are critical to keeping students safe. High school counselors and nurses can play a critical role in educating students about the potential risk for violence and the warning signs of a violent relationship before they even transition to college.
This is important because students often are unaware of red flags, and therefore can overlook them when they occur. Health providers who care for high-school and college students, including those in college health services, should both screen for exposure to adolescent dating violence and also provide anticipatory guidance regarding warning signs and safety tips, particularly around the transition to college.

When a student is involved in a violent relationship, quick intervention is often critical to maintaining safety. The effects of violence can be devastating and impact students’ ability to succeed in their studies. Because of the unique situation at college, victims and perpetrators likely are in the same classes or have similar circles of friends, injecting a great deal of additional stress into an already difficult situation. Having dedicated services on campus with people who are trained to handle these issues in a sensitive way is important. When a violence incident occurs, it is crucial for administration to address it with a concerted multidisciplinary effort that includes, but is not limited to, representatives from the college judiciary committee, campus security/law enforcement, student health services, and the students’ academic advisors.

Because this is a multifaceted issue, collaborative efforts are more conducive to addressing the challenges that surface when a violent incident occurs. It is important to be sensitive to issues such as victim-blaming or shaming and likewise, too quickly jumping to conclusions about guilt or innocence of the accused perpetrator.

Measurement

Study Design

Prospective data collection is the ideal way to establish causal effects. Longitudinal cohorts could be beneficial in many regards, particularly when examining multi-generational effects on outcomes. However, it is important to acknowledge the ethical and methodological challenges with studying concurrent violence exposure, particularly among children, using prospective designs. For example, many states have mandatory reporting guidelines that are triggered when a child’s safety is called into question. Therefore, transparency is critical and
additional levels of protection for participants need to be implemented when conducting this work. There should be well-documented procedures that identify what responses would trigger concern for a child’s safety as well as training for the proper protocols that would be followed in that instance. Additionally, extreme care must be taken when reviewing consent documentation with participants; researchers must clearly acknowledge and convey the legal reporting requirements and responsibilities of the investigative team if children are considered at risk. Because of the inherent risks to families, investigators must recognize that parents may decline participation for fear of triggering a social services investigation; this, in turn, could cause a significant problem related to selection bias by precluding participation from those at highest risk. Alternatively, parents may participate, but they may not be forthright in responding if they know that their answers may prompt an investigation or legal action. For these reasons, investigators in this field may consider retrospective data, even with its limitations, to be less biased and problematic than prospective data might be.

Causal Analytic Methods

Measuring the effects of witnessing with observational studies, however, also comes with challenges. For example, relatively recent research has uncovered many factors that co-occur with witnessing domestic violence, and controlling for large numbers of confounders can be a challenge when using traditional analytic methods with observational studies. Thus, when relying on observational studies, investigators should be encouraged to consider more advanced analytic methods that can help control for many co-existing confounders at once, and thereby increase confidence in the estimates that are obtained. Propensity score weighting is one method that can accomplish this. As such, it can be a useful tool for use within this field. Using propensity score weighting, this study was able to control for a host of factors, create balance between exposure groups, and assess causal effects. However, because propensity score analysis can only account for measured confounders, investigators may want to contemplate coupling propensity score analysis with sensitivity analysis to understand the implications for what
would happen in the presence of an unmeasured confounder. Ding and VanderWeele’s bounding factor\textsuperscript{135} is a broad-based measure that is easy to apply, yet can add substantially to investigators’ confidence in their findings.

\textit{2\textsuperscript{nd} generation observations}

This study used a novel approach to study the effects of domestic violence by looking not only at the person exposed, but also by looking at the effect of the exposure into the next generation of children. Findings indicated that there were differences in child health based on whether their parent’s witnessed domestic violence during their own childhood. While these effects were modest, these results suggest that it may be prudent to add second generation data to future studies so we can further explore the long-term effects of domestic violence on health.
Table 5-1. Significant associations between witnessing domestic violence as a child and subsequent experiences with adolescent relationship violence.\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
<th>Girls</th>
<th>Boys</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Victimization</strong></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Sexual</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Polyvictimization</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Perpetration</strong></td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Physical</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Sexual</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Emotional</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Polyperpetration</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

\(^a\) Results are standardized by gender, age, race, school, and community violence.
BIBLIOGRAPHY


20. Jankowski MK, Leitenberg H, Henning K, Coffey P. Intergenerational transmission of dating aggression as a function of witnessing only same sex parents vs. opposite sex parents vs. both parents as perpetrators of domestic violence. *J Fam Violence*. 1999;14(3):267-279.


presented at: Children and Violence, Report of the Twenty-Third Ross Roundtable on Critical Approaches to Common Pediatric Problems. 1992; Columbus, OH.


78. *Stata/SE* [computer program]. Version 14.0. College Station, TX: StataCorp LP.


