RELATIONSHIPS AMONG CYBER DATING ABUSE, BINGE DRINKING, AND

EMOTION DYSREGULATION IN COLLEGE STUDENTS

by

Linden Wu

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This dissertation was presented

by

Linden Wu

It was defended on

November 6, 2019

and approved by

Elizabeth Miller, MD, PhD, Chief, Division of Adolescent and Young Adult Medicine, Children's Hospital of Pittsburgh UPMC; Professor, University of Pittsburgh School of Medicine, Department of Pediatrics

Dianxu Ren, MD, PhD, Associate Director of Statistical Support Services; Associate Professor, University of Pittsburgh School of Nursing, Health and Community Systems

Young Ji Lee, PhD, MS, RN, Assistant Professor, University of Pittsburgh School of Nursing, Health and Community Systems

Dissertation Advisor: Elizabeth A. Schlenk, PhD, RN, FAAN, Associate Professor, University of Pittsburgh School of Nursing, Health and Community Systems

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Linden Wu, PhD, MSN, BSN, RN

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Aims

Cyber dating abuse (CDA) is an emerging problem for college students, with prevalence ranging from 20% to 74%. Students experiencing CDA are at increased risk of experiencing poor emotional control (i.e., emotion dysregulation). Additionally, more than half of students report drinking alcohol in the past month with two-thirds binge drinking. Alcohol use is shown to negatively affect emotional responses. Thus, this study examined the relationships among CDA, binge drinking, and emotion dysregulation in college students.

Methods

A longitudinal, descriptive correlational design was used for this secondary analysis of data from a parent study of 2,092 students from 27 college health or counseling centers in Pennsylvania and West Virginia. Students completed CDA, binge drinking, and emotion dysregulation surveys at baseline and 4- and 12-month follow-up. This sample consisted of 740 students who completed all survey items. A clustered negative binomial model with a generalized estimating equation was used to test the effects of baseline CDA on binge drinking at 4- and 12-month follow-up. A linear mixed model was used to test the association between baseline CDA on emotion dysregulation at 12-month follow-up, and binge drinking at 4- and 12-month follow-up on emotion dysregulation at 12-month follow-up. All analyses accounted for clustering of students nested within schools.

Results

Results showed CDA significantly predicted binge drinking at 4- and 12- month-follow-up in the unadjusted models but not in the adjusted models. However, in the adjusted models, baseline binge drinking significantly predicted binge drinking at 4- and 12-month follow-up. There was no significant association between CDA and emotion dysregulation at 12-month follow-up and no significant association between binge drinking at 4- and 12-month follow-up and emotion dysregulation at 12-month follow-up.

Conclusion

Although CDA did not significantly predict binge drinking at 4- and 12-month follow-up, this finding may be attributed to the highly significant covariate of baseline binge drinking. Previous research found that baseline binge drinking is a strong predictor of future drinking in students. This study is impactful for guiding future research in developing and examining prevention and intervention strategies for students who experience a combination of CDA, binge drinking, and emotion dysregulation.

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1 Proposal

1.1 Specific Aims

1.1.1 Background

The goal of the proposed study is to evaluate the associations among cyber dating abuse (CDA) (i.e., use of technology such as social media and texting to abuse an intimate partner), binge drinking, and emotion dysregulation in college students. This study is guided by the Intimate Partner Violence (IPV) and Post Traumatic Stress Disorder (PTSD) Model (Dutton, 2009) of mental health illnesses and dating violence. Research has established that dating violence increases a victim's risk of developing mental health conditions (i.e., anxiety, depressive symptoms, and PTSD); emotion dysregulation is an underling feature of these mental health conditions.

1.1.2 Purpose and Aims

The purpose of this project is to examine the relationships among CDA, binge drinking, and emotion dysregulation in college students. A secondary analysis will be conducted using data from a completed longitudinal study of 2,294 college students recruited from 28 universities across Pennsylvania and West Virginia (R01AA023260, PI Miller).

To meet the overarching goal, four aims are proposed:

Aim 1: Test the short-term effects of CDA at baseline (T1) on binge drinking at 4-month follow-up (T2).
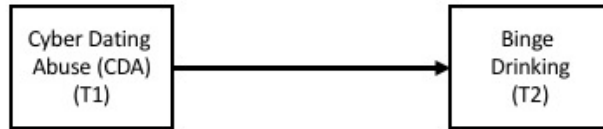
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Aim 2: Test the long-term effects of CDA at baseline (T1) on binge drinking at 12-month follow-up (T3a).
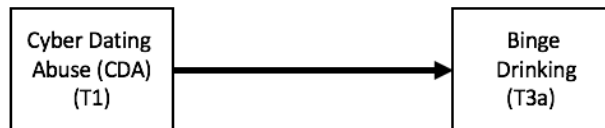
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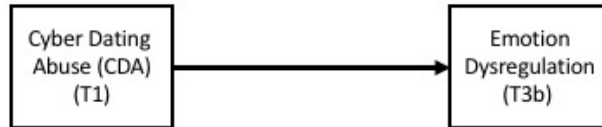
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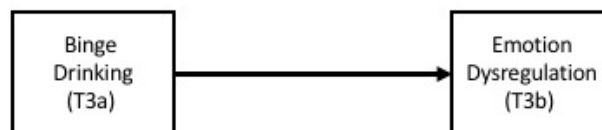
Figure 4 Exploratory Aim 2 Model

1.2 Introduction

1.2.1 Background

1.2.1.1 Background on Cyber Dating Abuse

With the ubiquity of personal technology (i.e., smart phones and social media), CDA is an emerging problem for college students, with prevalence estimates ranging from 20% to 74% (Lindsay, Booth, Messing, & Thaller, 2016; Reed, Tolman, & Ward, 2016). CDA is psychological and/or sexual harm perpetrated via technology (e.g., cell phones, social media, email, etc.) to threaten and/or harass a current or former dating partner (Bennett, Guran, Ramos, & Margolin, 2011; Marganski & Melander, 2015; National Institute of Justice (NIJ), 2007; Reed et al., 2016; Sargent, Krauss, Jouriles, & McDonald, 2016; Wolford-Clevenger et al., 2016; World Health Organization (WHO), 2013).

CDA is an invasive form of violence that may be associated with increased adverse mental health outcomes. First, CDA can occur without the victim's knowledge. Global positioning system (GPS) devices are small devices that use satellite navigational technology to give precise worldwide positioning locations. CDA perpetrators are able to manipulate GPS signals in cell phones to track their intimate partners because the Federal Communications Commission mandated that by 2005 all wireless carriers must install GPS into cell phones to facilitate 911 emergency responses (Southworth, Finn, Dawson, Fraser, & Tucker, 2007). Abusers are also using spyware programs to monitor the activities of their victims. Spyware such as "keystroke loggers" can be physically installed into technological devices or downloaded through software programs (Southworth et al., 2007). Spyware can record every key typed, including all passwords, PIN numbers, Web sites, and e-mail account information.

IPV perpetrators also have access to cameras that have become more powerful, affordable, smaller, and easier to disguise. For example, if a perpetrator is technological savvy, he or she may install a tiny wireless camera in discreet and secret places, such as smoke detectors or pin-sized holes in a wall. The camera videos may be continuously filmed, recorded, or viewed remotely from a perpetrator's computer (Southworth et al., 2007). Other times, perpetrators may intercept a victim's wireless signal by default of knowing their wireless password or hacking into the wireless system (Southworth et al., 2007).

Abusers may also use smart phone consumer applications for daily lives such as the "Find My Friend" app, "Find My Phone" app, emergency response apps, and parental control apps to spy on victims (Freed et al., 2018; Woodlock, 2017). Researchers have found that some perpetrators may resort to "proxy stalking" (i.e., when the perpetrators ask other people, such as family or friends, to use social media to keep track of their romantic partner for them) (Woodlock, 2017). Some victims state that they constantly receive texts messages from the perpetrator's family or friends. By using "proxy stalking", researchers suggest that the perpetrators create a sense of fear in the victims, because no matter where the victims go, they may be terrified that other people will be following and tracking them, and reporting their location to the perpetrators (Woodlock, 2017).

Second, technology can be applied as a public forum for violence perpetration. Posting on a public forum is seen as a tactic to punish, humiliate, or shame victims. Perpetrators can post humiliating personal content not only to friends and family, but to the rest of the world (Freed et al., 2018; Woodlock, 2017). Once messages, images, or videos are posted online, it is often difficult to identify the author of the post, thus it is difficult to hold perpetrators accountable for their actions (Flach & Deslandes, 2017). It is also immensely challenging to prevent media from

going "viral" or being copied and reproduced by others (Flach & Deslandes, 2017). One common tactic of public exposure-based threats is the posting of intimate photos or videos of the victims without their consent (Freed et al., 2018). The abuser may distribute the photos or videos via social media through either personal or fake social media accounts. Other tactics may include creating fake profiles of the victims or impersonating the victim. Extreme cases involve abusers creating fake dating profiles of their victims or creating website profiles that victims are prostitutes, with the address of the victims provided to solicit sexual services (Freed et al., 2018).

Third, technology-based posts are relatively permanent, allowing the victim to view and re-view disturbing texts or emails multiple times. Perpetrators can post harassing, embarrassing, derogatory, and degrading content or comments. Although most social media companies have developed algorithms and mechanisms to try to detect harassing posts, some abusers may use code languages to threaten their victim. These posts may not be viewed as a threat by bystanders or computer algorithms because these posts only have significant personal meaning to the victim (Freed et al., 2018).

1.2.1.2 Background on Binge Drinking

In addition to being at risk for CDA, college students are susceptible to high risk of binge drinking. Binge drinking is defined as a pattern of drinking alcohol that leads to a blood alcohol concentration (BAC) of 0.08 g/dL, which normally occurs after 4 drinks for women and 5 drinks for men in a course of 2 hours (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2018). Research has consistently shown that the highest drinking rates in a person's lifetime happen during their college years (Hove, Parkhill, Neighbors, McConchie, & Fossos, 2010; Johnston, O'Malley, & Bachman, 2003). For college students, weekends, 21st birthdays, football tailgating, Greek life involvement (i.e., fraternities and sororities), and pregame partying have been

associated with binge drinking (Krieger, Young, Anthenien, & Neighbors, 2018). A national study found that 60% of college students between the ages of 18-22 years drank alcohol in the past month and 2 out of 3 of these students engaged in binge drinking (National Institute on Alcohol Abuse and Alcoholim (NIAAA), 2019; Substance Abuse and Mental Health Services Administration (SAMHSA) and the Center for Behavioral Health Statistics and Quality, 2017).

1.2.1.3 Background on Emotion Dysregulation

The American College Health Association (ACHA) (2017) has reported the following data in the past year: 17.3% of college students have been diagnosed with or treated for anxiety by a professional, 14.5% of college students have been diagnosed with or treated for depression by a professional, and 9.6% of college students reported to have seriously considered suicide. Students who experience CDA are at increased risk of developing mental health conditions (i.e., anxiety, depressive symptoms, and fear) (Watkins, Maldonado, & DiLillo, 2016). Emotion dysregulation is difficulty in tolerating one's emotional experience and engaging in healthy, goal-directed behavior while emotionally distressed. Prior research has established poor emotion regulation and impulse control to be predictors of heavy alcohol use, which in turn may predict aggression, including dating violence (Gratz & Roemer, 2004; Veilleux, Skinner, Reese, & Shaver, 2014). As emotion dysregulation is an underlying feature of all of these mental health conditions (Lindsay et al., 2016), it may represent a mechanism through which other negative outcomes associated with dating abuse occur. While research points to a strong association between both 1) dating abuse and binge drinking, and 2) binge drinking and emotion dysregulation, no studies have examined how CDA may contribute to binge drinking and emotion dysregulation.

1.2.2 Theoretical Model

The proposed study is grounded in the dating abuse model called the IPV and PTSD Model (Dutton, 2009). Using the ecological model of IPV applied to battered women, Dutton created a pathway framework to guide research examining adverse mental health outcomes, specifically PTSD on the impact of IPV. The ecological model provides direction for examining the psychological, social, political, economic, and cultural contexts between IPV and adverse mental health outcomes (Dutton, 2009). Dutton's pathway framework shows the direct relationships of IPV among 1) covariates (i.e., past trauma), 2) moderating variables (i.e., demographics), 3) mental health outcomes, and 4) distal IPV-related outcomes (i.e., chronic health conditions).

Based on framework by Dutton, this proposed study will use lifetime experience of sexual violence and physical PV as the past trauma covariate. Demographic variables will include school level, gender, age, race, ethnicity, athletic team involvement, and Greek life (i.e., fraternity or sorority involvement. The experience of dating abuse for both men and women has also been associated with binge drinking (Silverman, Raj, Mucci, & Hathaway, 2001). Even though the association between dating abuse and binge drinking has been well established, the association between various forms of dating abuse, including CDA, and binge drinking is not well understood (Selkie, Kota, Chan, & Moreno, 2015). Thus, a distal IPV-related outcome used in this proposed study will be binge drinking.

Dutton's model shows that IPV, which includes CDA, is related to many negative mental health outcomes including, but not limited to, PTSD, depression, and anxiety (Lindsay et al., 2016). To capture the wide experiences of negative mental health attributed to CDA, the proposed study will specifically examine emotion dysregulation as a novel mental health outcome resulting from CDA experience. Emotion dysregulation is a trans-diagnostic, malleable treatment target for

which evidence-based interventions for college students already exist (Kaufman et al., 2016). Individuals who experience violence, including dating abuse, often exhibit multiple aspects of emotion dysregulation. For example, individuals may have difficulty identifying and regulating emotional states, have lower levels of emotional acceptance, and have increased experiential avoidance (Batten, Follette, & Aban, 2002; Gratz, Bornovalova, Delany-Brumsey, Nick, & Lejuez, 2007; Messman-Moore, Walsh, & DiLillo, 2010). Thus, emotion dysregulation is an important variable to study because it better captures the many mental health outcomes that often are attributed to dating abuse.

Dutton's model suggests there are effects of IPV on distal IPV-related outcomes mediated through mental health outcomes. Although this current study will not investigate a mediation analysis as proposed in Dutton's model, this study will examine the relationship between the distal-IPV-related outcome of binge drinking and the mental health outcome of emotion dysregulation. Research has found that alcohol use, which includes binge drinking, impairs one's cognitive-processing capacity, leading to decreased emotional responsiveness and other maladaptive outcomes (Curtin, Patrick, Lang, Cacioppo, & Birbaumer, 2001). There is also well-established literature that indicates people engage in binging behaviors, such as binge drinking, as a way to regulate the high levels of negative affect or experiences (Ferriter & Ray, 2011).

1.2.3 Scientific Premise

Young adults are also at high risk for experiencing dating abuse. Approximately 47% of female victims and 39% of male victims were between 18 and 24 years of age when they first experienced dating abuse (i.e., physical, emotional, or sexual violence). Unfortunately, the technological revolution has brought dating abuse into cyberspace. Young adults are mass adopters

of technological communication tools and platforms. Researchers report that about 94% of young adults 18-24 years of age have used at least one type of social media (e.g., YouTube, Snapchat, Instagram, Twitter, etc.) (Smith & Anderson, 2018).

With these technological advancements, abusers can use GPS devices or wireless video cameras built into smart phones to frighten, stalk, control, and monitor their victims (Southworth et al., 2007). Individuals with a history of dating abuse are significantly more likely to be binge drinkers and report poor mental health outcomes (i.e., depressive symptomatology, anxiety, PTSD, and suicidal ideation) (Bosch, Weaver, Arnold, & Clark, 2017; Parker & Bradshaw, 2015). While research has linked dating abuse with both alcohol misuse and mental health problems, no work to date has explored the effects of CDA on these outcomes. In particular, emotion dysregulation is an important mental health outcome to investigate because it is an underlying feature of many psychological disorders (Kaufman et al., 2016; Macklem, 2007).

1.2.4 Evidence to Support Aims

1.2.4.1 Evidence of the Relationship Between Cyber Dating Abuse and Binge Drinking (Aims 1 and 2)

Binge drinkers experience greater cognitive deficits when intoxicated compared to non-binge drinkers, including worse inhibitory control (Marczinski, Combs, & Fillmore, 2007), sustained attention, episodic memory, planning abilities (Hartley, Elsabagh, & File, 2004), and decision making abilities (Goudriaan, Grekin, & Sher, 2007). Thus, while binge drinking is associated with multiple factors including social norms that condone such behavior, it is likely that exposure to CDA is an under-recognized factor that contributes to unhealthy drinking patterns among college students.

Past literature suggests that female victims of sexual and physical IPV report more frequent alcohol use than non-victims (Bedard-Gilligan, Kaysen, Desai, & Lee, 2011; Corbin, Bernat, Calhoun, McNair, & Seals, 2001; Shorey, McNulty, Moore, & Stuart, 2016; Shorey, Stuart, & Cornelius, 2011). Research also suggest that women who experience severe abuse not only drink more alcohol but also have greater expectations of the positive effects from consuming alcohol (Corbin et al., 2001). Researchers have found that women victims of severe abuse such as sexual violence anticipate feeling more relaxed after alcohol consumption (Corbin et al., 2001). It is well documented that victims of dating abuse are more at risk to develop depression, suicidality, PTSD, and substance abuse (Dutton et al., 2006; Golding, 1999). Thus, it has been hypothesized that IPV victims may drink more alcohol as a way to alleviate their psychological distress and emotional pain (Parks, Hsieh, Taggart, & Bradizza, 2014).

1.2.4.2 Evidence of the Relationship Between Cyber Dating Abuse and Emotion
   Dysregulation (Exploratory Aim 1)

Experience of online harassment often triggers fear and vulnerability in women who experienced violence. Consistent with mental health outcomes of traditional dating abuse, if a women experienced CDA, odds of anxiety increased by 71%, and 37% of women report feeling depressed (Lindsay et al., 2016). Males who experience CDA were 99% more likely to have experienced anxiety and 133% more likely to report depression (Lindsay et al., 2016). Viewing harassing messages and posts has also been linked to panic attacks and in extreme cases anorexia nervosa (Citron & Franks, 2014).

While most violence research focuses on specific disorders, including depression, anxiety, PTSD, and other mental health outcomes (Dutton et al., 2006), the proposed study will investigate emotion dysregulation, which is a primary component of most psychological disorders (Kaufman

et al., 2016; Veilleux et al., 2014). Emotion dysregulation can be conceptualized as involving a lack of 1) awareness and understanding of one's emotions, 2) acceptance of emotions, 3) ability to control one's behavior when experiencing negative emotions, and 4) ability to use appropriate adaptive emotion regulation strategies in response to situational stressors or demands (Gratz & Roemer, 2004). Research has found that victims of abuse may experience more maladaptive skills such as binging behavior substance use to address deficits of emotion regulation (Messman-Moore et al., 2010).

1.2.4.3 Evidence of the Relationship Between Binge Drinking and Emotion Dysregulation (Exploratory Aim 2)

Binge drinking is responsible for approximately 100,000 alcohol-related deaths per year in the United States, and is attributable to many adverse health outcomes including interpersonal problems (i.e., dating abuse), suicides, and emotional problems (Okoro et al., 2004). It has been theorized that binge drinking may help individuals manage negative emotions that they experience during times of high stress (Ferriter & Ray, 2011). When individuals experience negative emotions, a cognitive-behavioral response occurs to manage, minimize, or eliminate the cause. Expectancies are anticipated consequences of an action that influence the cognitive-behavioral response (Cooper, Frone, Russell, & Mudar, 1995). Accordingly, alcohol expectancy refers to the anticipation of an emotional experience because of consuming alcohol. In other words, people may drink more because they believe alcohol reduces negative affect. People may also drink more because they believe that alcohol will enhance their emotional experiences (Cooper et al., 1995).

It is well established from the literature that binge drinkers experience greater cognitive deficits and worse inhibitory control (Marczinski et al., 2007). From a physiological stand point, researchers have found that alcohol may alter a person's emotional response by impairing the high

cognitive functions that are essential for processing affective cues (Curtin et al., 2001). Research has found that alcohol impairs and diminishes hippocampus function in the brain, thus affecting emotional responses as well as detection and recognition of affective cues (Curtin et al., 2001).

1.3 Significance and Innovation

The current generation of young adults is more connected to technology as a form of communication than ever before, thus CDA is likely to become an increasingly common form of violence for future generations. College students, who are already at high risk for binge drinking and poor mental health, may be particularly susceptible to the negative sequelae of CDA. Therefore, understanding the relations among these constructs is imperative in developing future prevention and intervention techniques to address the diverse health needs of this large and vulnerable population.

This proposed study lays a foundation for examining future screening, prevention, and intervention strategies in the clinical setting. The National Academy of Medicine and the U.S. Preventive Services Task Force currently recommend IPV screening as part of preventive care (Hamberger, Rhodes, & Brown, 2015). However, victims of CDA seek help less often, which decreases their level of support and increases their risk for negative mental health outcomes and binge drinking (Alavi et al., 2017). Understanding the relationship among CDA, binge drinking, and negative mental health outcomes, such as emotion dysregulation, is consistent with the mission of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) to disseminate knowledge about alcohol's impact on an individual's health and well-being across the lifespan. In the NIAAA 2017-2021 strategic plan (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2017),

Objective 4A is to improve existing behavioral treatment for alcohol use disorder and co-occurring conditions (i.e., psychiatric conditions).

Currently, the majority of college campuses have implemented some type of alcoholism prevention programming in response to the identified risk for and consequences of heavy episodic drinking by college students (Larimer, Cronce, Lee, & Kilmer, 2004). In a large national study, 55% of college students utilized their mental health services on the college campus (Gruttadaro & Crudo, 2012). If relationships are found among CDA, binge drinking, and emotion dysregulation in this proposed study, the results will be impactful in guiding a harmonized approach to screening for CDA, binge drinking, and emotion dysregulation instead of screening for each component separately.

Attention to new challenges, such as CDA, provides an innovative direction for prevention interventions that may help address binge drinking for college students at elevated risk for poor health outcomes. This proposed study is innovative because:

1. This study will investigate CDA as a novel predictor that may lead to increased binge drinking in college students. Dating and sexual abuse has been linked to alcohol consumption by the perpetrator, the victim, or both individuals (Abbey, Ross, McDuffie, & McAuslan, 1996; Silverman et al., 2001). However, very few research studies have examined binge drinking in the context of CDA.

2. This is the first study to include emotion dysregulation as an outcome of CDA. Previous studies on CDA have examined different mental health outcomes, such as of fear, anxiety, and depression (Lindsay et al., 2016). No studies have used emotion dysregulation as a trans-diagnostic indicator of mental health outcomes for college students who experience CDA. Emotion dysregulation is associated with various forms of psychiatric problems (i.e.,

depression, anxiety, substance use disorder, etc.), thus it may play a pivotal role in the development, maintenance, and treatment for mental health diagnosis and symptoms (Berking & Wupperman, 2012).

1.4 Preliminary Studies

Preliminary studies included 1) a factor analysis of the 7-item CDA measure used in the dissertation, 2) an integrative review focusing on binge drinking and IPV in college students, and 3) an overview of cyber dating abuse in college students.

1.4.1 Factor Analysis

The purpose of the factor analysis was to examine dimensions of the 7-item CDA measure in high school and college students. This work was presented as a poster at the 30th Annual Eastern Nursing Research Society (ENRS) Conference, 8th Annual Children's Hospital Rangos Research Symposium, and 6th Annual Adolescent and Young Adult Health Research Symposium. A manuscript has been resubmitted for peer review at the *Journal of Interpersonal Violence.*

1.4.2 Integrative Review of Binge Drinking and IPV in College Students

The purpose of the literature review was to 1) examine the associations between IPV victimization, IPV perpetration, and binge drinking in college students, 2) describe the theories used by researchers to describe these associations, and 3) propose a summary model for the

associations of binge drinking to IPV. A manuscript is pending submission to the *Journal of Studies on Alcohol and Drugs*.

1.4.3 Overview of CDA in College Students

The overview of CDA in college students had two phases. The first phase included completing a literature review of CDA on definitions, theories, and measures in college students. This literature review was presented at the Eta Chapter Sigma Theta Tau Scholars Night 2017, University of Pittsburgh School of Nursing 7th Annual Scholarly Poster Presentation Symposium, and Sigma Theta Tau International Honor Society of Nursing Rising Star 29th International Nursing Research Congress. The second phase included narrowing the focus of the literature review to areas of agreement as well as potential incongruence of CDA measurement tools used with college students.

1.5 Research Design and Methodology

1.5.1 Study Design

To examine the relationships among CDA, binge drinking, and emotion dysregulation, a longitudinal, descriptive correlational design will be used to analyze survey data collected from a completed NIAAA-funded study (R01 AA023260; PI Miller; ClinicalTrials.gov NCT02355470).

1.5.2 Setting and Sample

The parent study for this proposed study was a 2-arm cluster randomized controlled trial of a brief harm reduction intervention to reduce alcohol-related sexual violence risk among college students receiving services in their campus health or counseling clinic. The parent study included 2,292 students from 28 university campuses in Pennsylvania and West Virginia. However, only 2,092 students from 27 schools will be used for this study because one school declined to participate in the T3b Emotion Dysregulation Survey. The campuses were randomized to either the intervention group or the control group. The intervention group campuses received a small palm-sized card containing information about alcohol-related sexual violence and harm reduction. During a participant's clinic visit, the clinician reviewed specific card panels to reinforce the universal education message regarding sexual violence, discussed behaviors to reduce alcohol-related sexual violence, and provided referrals to victim services. The control group campuses received palm-sized cards with universal information containing NIAAA recommended information of alcohol misuse and abuse. Student eligibility included 1) 18-24 years old, 2) literate in the English language, 3) seeking care at the college health or counseling center for any issue, and 4) have plans to remain living on or around the college area in the next 18 months. A secondary analysis using this parent data set is proposed because it is based on a well-established research infrastructure with access to a large sample of students from multiple sites. The longitudinal nature of the parent study allows for analysis of how the relationship between CDA and binge drinking changes at 4-month follow-up and 12-month follow-up.

1.5.3 Protection of Research Participants

Access to the data for this study was granted under the University of Pittsburgh Institutional Review Board protocol of the parent study (see Appendix A). This proposed study and the parent study follow the United States Federal Policy for the Protection of Human Subjects. Due to the sensitive nature of the parent study's topic of sexual violence and alcohol consumption, an internal data and safety monitoring process as well as an external advisory group were created. Prior to participation in the study, the college students completed an informed consent form.

1.5.4 Descriptions of Variables and Measures

1.5.4.1 Variables Describing Participant Characteristics

The college student participants were asked to complete nominal level items regarding their gender, race, and ethnicity and ordinal level items of school level and age. They were asked a series of dichotomous "yes or no" items regarding being involved in an athletic team and fraternity or sorority.

1.5.4.2 Independent Variables for the Aims

1.5.4.2.1 For Aims 1, 2, and Exploratory Aim 1, the Independent Variable is Cyber Dating Abuse

The 7 CDA items were modified from the 12-item Internet Perpetration and Victim subscale of The Growing Up with Media Survey (Cronbach alpha = .72) (Bennett et al., 2011; Dick et al., 2014; Ybarra, Espelage, & Mitchell, 2007). In a preliminary study, the investigator

conducted an exploratory factor analysis on high school students (α=0.580) and confirmatory factor analysis on college students (α=0.726) using this 7-item CDA measure. Each item was answered first using a dichotomous "yes" or "no" to lifetime CDA; then if "yes", the participant would answer the same items using an ordinal 5-point Likert scale ranging from "never" to "every day/almost every day". These Likert answers reflect the frequency of CDA in the past four months. If the students answered "no" to lifetime CDA, their responses will be recoded to "never" in the 5-point Likert scale version. For the purpose of this data analysis, an average score of all 7 CDA items will be used in the analysis, which will be a continuous variable.

1.5.4.2.2 For Exploratory Aim 2, the Independent Variable is Binge Drinking

The parent study used 8 alcohol assessment items based on the NIAAA recommended questions (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2003). From these 8 items, only the items assessing men and women's binge drinking in the past 30 days will be used for this proposed study. The responses range from 0 to 30. Thus, binge drinking is a ratio and continuous variable. A binary "yes" or "no" binge drinking variable will also be created. For the purpose of the proposed study, both the continuous and binary binge drinking variable will be used.

1.5.4.3 Dependent Variables for the Aims

1.5.4.3.1 For Aims 1 and 2, the Dependent Variable is Binge Drinking

See above for a description of the binge drinking continuous and binary variables.

1.5.4.3.2 For Exploratory Aims 1 and 2, the Dependent Variable is Emotion Dysregulation

The Difficulties in Emotion Regulation Scale–Short Form (DERS-SF) consists of 18 items measuring 6 domains: 1) non-acceptance of emotional response, 2) difficulties engaging in goal-directed behavior, 3) impulse control difficulties, 4) lack of emotional awareness, 5) limited access to emotion regulation strategies, and 6) lack of emotional clarity. All 18 items use a 5-point Likert scale ranging from "1, almost never" to "5, almost always". Prior research on a college-age population found that the Cronbach's alpha coefficient of the total scale was 0.89 (Kaufmann, O'Farrell, Murphy, Murphy, & Muchowski, 2014). For the proposed study, an average score for the total DERS-SF scale will be computed for the analysis by summing all the DERS-SF items together. Thus, the total DERS-SF score will be continuous variable.

1.5.5 Power Analysis

From the original parent study's sample of 2,092, a response rate of at least 50% of the survey was expected so that at least 1,046 subjects were available for this study. The 50% response rate was chosen as a conservative measure because national studies with college students have found typical response rates from 60% to 80% with very few response rates less than 50% (Wechsler et al., 1994). Because students were clustered in 27 schools (average 39 students per school) and based on the baseline data, we calculated the intraclass correlation coefficient (ICC) for binge drinking as 0.0089. Adjusting for clustering within schools and using an estimated ICC of 0.0089, the sample size of 1,046 is equivalent to 782 independent samples (1046/(1+(39-1)*0.0089).

A sample size of 782 achieves 80% power to detect an R^2 of 0.009 attributed to 1 independent variable(s) using an F-Test with a significance level (alpha) of 0.050. The variables

tested were adjusted for an additional nine independent variable(s) with an R^2 of 0.100. The power analysis was computed using the statistical software PASS version 16 (PASS 16 Power Analysis and Sample Size Software, 2018) and took into account CDA, binge drinking, and emotion dysregulation when controlling for nine covariates of lifetime experience of sexual violence and physical IPV, school level, gender, age, race, ethnicity, athletic team involvement, and fraternity or sorority involvement, and treatment group assignment,.

1.5.6 Procedures for Data Collection

In the parent study, students completed surveys at baseline (T1), 4 months (T2), and 12 months (T3a). Sociodemographic measures included school level, gender, age, race, ethnicity, athletic team involvement, and Greek life involvement (i.e., fraternities and sororities). Students also completed surveys regarding lifetime experience of sexual violence and physical IPV, CDA, binge drinking, and emotion dysregulation.

1.5.7 Data Analysis

1.5.7.1 Data Screening Procedures

1.5.7.1.1 Treatment of Missing Data

The first step for dealing with missing data is to observe its patterns and to determine if data are missing completely at random or missing at random. If missing values are concentrated around a few variables that are not critical to the analysis, and these missing variables are highly correlated with each other, then they can be dropped (Tabachnick, Fidell, & Osterlind, 2001).

However, if there is 'non-randomness", methods should be used to preserve all cases. If there are a lot of missing values scattered throughout the cases and variables, one option is to estimate (impute) these missing values, using prior knowledge, by inserting mean values. If the missing values are stochastic, the investigator can consider using regression, expectation maximization, and multiple imputation. Another option is to treat the missing data as data using a dummy variable with complete cases as 0 and missing cases as 1. Then the mean can be inserted for missing values and analyzed.

1.5.7.1.2 Outlier Assessment

For the dichotomous variable of binge drinking, univariate outliers need to be examined using frequency distributions. For the continuous variables of CDA, binge drinking, and emotion dysregulation, univariate outliers can be determined by calculating z-scores for binge drinking. Any cases with z-scores greater than 3.29 ($p<0.001$, two-tailed test) are potential outliers. Histograms can be used to visually screen for univariate outliers, which are seen as "unattached" to the rest of the distribution (Tabachnick et al., 2001). Box plots can be used to screen for outlying or extreme values for continuous type variables, since observations center around the median. Cases that are far away from the box are viewed as extreme cases or outliers (Tabachnick et al., 2001).

For pairs of continuous variables of 1) CDA and binge drinking, 2) CDA and emotion dysregulation, and 3) binge drinking and emotion dysregulation, bivariate plots between variables or scatterplots can be used to determine the outliers. The Mahalanobis distance, which is the distance of a case from the centroid of the remaining cases, will also be calculated.

After identifying and describing outliers, the influence of the outlier for generalized estimating equations must be considered by assessing the influence of assessing deletion on the

fitted values (Preisser & Qaqish, 1996). To detect the influence of outliers for the linear mixed models, a local approach will be used. In the local approach, each case is given a weight, and the effect on the parameter estimation is measured by perturbing (i.e., moving) the weights around. (Lesaffre & Verbeke, 1998).

1.5.7.1.3 Multicollinearity

This screening procedure can be determined using a correlation matrix among the predictor variables. For simple multicollinearity cases, if the correlation coefficients among the independent variables are less than 0.90, then this assumption can be met (Tabachnick et al., 2001). Another way to determine if there is multicollinearity among the predictors is to examine the Variance Inflation Factor (VIF). A VIF of 1 represents the absence of multicollinearity. However, VIF values of 10 or more suggest serious multicollinearity, and the greater the VIF, the greater the degree of collinearity (Hair, Babin, Anderson, & Black, 2018). Tolerance can also be considered when determining multicollinearity. Tolerance is estimated by 1-R2. The minimum value of 0.10 will be used as the threshold for tolerance (Tabachnick et al., 2001).

1.5.7.1.4 Checking Underlying Assumptions for Generalized Estimating Equations

Due to the dichotomous nature of the binge drinking item on the survey, a generalized estimating equation will be used. The assumptions are as follows (Ballinger, 2004):

1. Specify a link transformation function allowing the dependent variable to be expressed as a vector of the parameter estimate. The standard linking function for binary dependent variables is known as the logit link.

2. Express the variance as a function of the mean. For binary data, the binomial distribution should be specified.

3. Specify the form of the correlation of response within subjects or nested within group in the sample. If the data are correlated within clusters over time, an autoregressive correlation structure can be specified by setting the within-subject correlations as an exponential function for the lag period.

4. Check residuals for the presence of outliers. This assumption can include analyzing Discriminant Function Beta (DFBeta) to determine the change in the fitted coefficient vector when a case is removed. Other tests include creating graphs showing the residual versus fitted plot. From the graphs, there should be patterns suggesting a random distribution of residuals, and not clustering around certain values.

1.5.7.1.5 Checking Underlying Assumption for Linear Mixed Models

A linear mixed model will be used to account for the continuous nature of the binge drinking items. The linear mixed model has similar assumptions to the linear models, and include the following (Winter, 2013):

3. There must be a linear relationship between the independent and dependent variables. To check for linearity, scatterplots of the relationship between the independent variable of CDA on the x-axis and each binge drinking dependent variables on the y-axis can be generated (SPSS Tutorials). A residual plot, which has the predicted value of CDA on the x-axis and the residuals on the y-axis, can detect non-linearity (SPSS Tutorials).

4. There should be absence of collinearity. This assumption can be checked by correlational matrices.

5. Residuals must be normally distributed. This assumption can be checked by examining the skewness, kurtosis, and P-P plot (Osborne & Waters, 2002). For P-P plots, the closer the values of the data points fit on the diagonal line, the more normally distributed the variable's

distribution. The Kolmogorov-Smirnov test can also be used to determine normality. To improve normality, either the univariate and bivariate outliers can be removed or, if that is not possible, data transformations, such as square root, logarithmic, or inverse transformations need to be considered (Osborne & Waters, 2002).

6. Residuals should have homoscedasticity and there needs to be a constant error variance. To check homoscedasticity, a plot of standardized residuals by the regression standardized predicted value can be generated as well as Q-Q plots (Winter, 2013).

1.5.7.1.6 Transformation of Data

Transformation of the data will be used if nonlinearity in the logit is found. Transformations depend on the shape and the degree that the sample distribution diverges from the normal distribution (Tabachnick et al., 2001). A scatter plot can help suggest which type of transformation to choose. If there is a moderate difference between the sample distribution and the normal distribution, then a square root transformation can be used (Tabachnick et al., 2001). However, if there is a substantial difference, then a log transformation should be considered (Tabachnick et al., 2001). If there is severe distribution, then the inverse transformation should be tried (Tabachnick et al., 2001).

1.5.7.2 Treatment of Covariate Variables

For both the generalized estimating equation and the linear mixed model, it is important to take into account clustering of students within the 27 college campuses. The lifetime experience of sexual violence and physical IPV, school level, gender, age, race, ethnicity, athletic team involvement, Greek life (i.e., fraternity or sorority) involvement, and parent study's treatment group (i.e., control or experimental) will all be included as covariates because they have been

shown in the literature to be important contributors to binge drinking among college students (Krieger et al., 2018).

1.5.7.3 Descriptive Statistics

For CDA, frequency distributions will be generated to determine frequency counts and percentages. Central tendency will include examining the mean, and the variability can be examined by the standard deviation. For the binge drinking variable that is dichotomous and nominal, frequencies will be used to determine frequency counts and percentages because binge drinking is a dichotomous nominal variable. For the binge drinking variable that is continuous and ratio, the central tendency can be summarized using the mean and the variability can be summarized using the standard deviation and the standard error of the mean. If there is skewness in the histogram, then the robust measure of central tendency, the median, will be used because the median does not depend on the other values, such as the outliers in the dataset. For emotion dysregulation, frequencies will be run to determine the simple counts and percentages because emotion dysregulation is an ordinal variable. The measure of central tendency of median can be used, and variability can be examined with the range and boxplots.

1.5.7.4 Aim 1: Test the Short-Term Effects of Cyber Dating Abuse at Baseline (T1) on Binge Drinking at 4-Month Follow-Up (T2)

To account for the hierarchical structure of the data and the dichotomous nature of the dependent variable of binge drinking in the past 30 days as well as the clustering within schools, generalized estimating equations analysis will be used in SPSS 26 (IBM Corporation, 2019). A separate linear mixed model will be used to account for the continuous nature of the dependent variable of binge drinking in the past 30 days and the clustering within schools.

The binge drinking item may need to be centered and/or scaled (Chatterjee & Hadi, 2015). For example, it may be worthwhile to convert all minutes into hours. A centered variable can be calculated by subtracting each of the observations from the mean of all observations. There are two types of scaling that can be used: unit-length scaling or standardizing (Chatterjee & Hadi, 2015).

Goodness of fit tests can be used to 1) compare the empirical estimates of the standard errors and the covariance of the generalized estimating equation model to the model-based estimates, and 2) the model fit of the linear mixed model (Tabachnick et al., 2001). Goodness of fit tests for the generalized estimating equation model include examining the Pearson chi-square and an unweighted sum of residual squares (Pan, 2002). For the linear mixed model, the goodness of fit tests used will include the Kolmogorov-Smirnov statistic, the Cramér–von Mises statistic, and the Anderson–Darling statistic (Ritz, 2004).

For both the generalized estimating equation model and linear mixed model, all the models will include main effects of CDA and the interaction effect of CDA and group assignment (i.e., control or intervention group). The full model will include all the interactions of CDA and emotion dysregulation. The generalized mixed model results will report the odds ratios, the 95% confidence intervals, and the p-values. The linear mixed model results will report the standardized regression coefficients.

1.5.7.5 Aim 2: Test the Long-Term Effects of Cyber Dating Abuse at Baseline (T1) on Binge Drinking at 12-Month Follow-Up (T3a)

For Aim 2, the same data analysis procedures will be used as in Aim 1; however, the binge drinking variable will now be evaluated at the 12-month follow-up time point.

1.5.7.6 Exploratory Aim 1: Explore the Relationship Between Cyber Dating Abuse at Baseline (T1) and Emotion Dysregulation at 12-Month Follow-Up (T3b)

For Exploratory Aim 1, a linear mixed model will be used to account for the continuous nature of the average DERS-SF score at 12-month follow-up, the clustering within schools, and the interaction effect of CDA and group assignment (i.e., control or intervention group). The same linear mixed model procedures will be used as above.

1.5.7.7 Exploratory Aim 2: Explore the Relationship Between Binge Drinking at 12-Month Follow-Up (T3a) and Emotion Dysregulation at 12-Month Follow-Up (T3b)

For Exploratory Aim 2, a linear mixed model procedure will as be used as above in Exploratory Aim 1. There will be two interaction terms. The first interaction term is dichotomous binge drinking and group assignment (i.e., control or intervention), and the second interaction term is continuous binge drinking and group assignment (i.e., control or intervention).

1.6 Limitations and Alternative Strategies

A limitation of the proposed study is that the sample demographics may not be representative of the general population of college students. In addition, data on emotion dysregulation is collected at T3b, after the data collection for binge drinking at T2 and T3a. However, T3a and T3b are back-to-back assessments. There are known limitations of a secondary analysis, such as how the parent study measured the concepts and took into account missing data. Due to the nature of the time points of data collection, the conceptual model cannot demonstrate temporal causation, only correlation. Also, the effect of the parent study's intervention on the

students' responses to the survey items is unknown. Thus, intervention effects will be included as a covariate. Interaction terms of the independent variable and group assignment will also be created. Threats to internal validity include using a convenience sample.

1.7 Strength and Impact

The strengths of this proposed study include the well-established research infrastructure of the parent study with a large sample size including multiple sites. Further, this proposed longitudinal study will be able to examine short- and long-term effects of CDA, whereas past CDA research has used mostly cross-sectional designs. This research lays a foundation for examining future screening, prevention, and intervention strategies in college student health clinics. The National Academy of Medicine and the U.S. Preventive Services Task Force currently recommend IPV screening as part of preventive care (Hamberger et al., 2015). Understanding the relationship among CDA, binge drinking, and emotion dysregulation is consistent with the current strategic plan of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) objective 4A, "to improve existing behavioral treatment for alcohol use disorder and co-occurring conditions" (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2017). Currently, the majority of college campuses have implemented some type of alcoholism prevention programming in response to the identified risk for and consequences of heavy episodic drinking by college students (Larimer et al., 2004). In a large national study, 55% of college students utilized campus mental health services (Gruttadaro & Crudo, 2012). If relationships are found among CDA, binge drinking, and emotion dysregulation, it will have important implications for future approaches to screening, prevention, and intervention programs designed to address CDA, binge drinking, and emotion

dysregulation. Future research implications include developing and testing intervention studies informed by relationships found in this proposed study.

2 Transitions and Problems Encountered

2.1 Changes to Aims

The dissertation proposal had two exploratory aims. The first exploratory aim was to explore the relationship between cyber dating abuse (CDA) at baseline (T1) and emotion dysregulation at 12-month follow-up (T3b). The second exploratory aim was to explore the relationship between binge drinking at 12-month follow-up (T3a) and emotion dysregulation at 12-month follow-up (T3b). The analysis of the second exploratory aim only showed the relationship of long-term binge drinking and emotion dysregulation. Thus, a new exploratory aim was added to explore the relationship between binge drinking at 4-month follow-up (T2) and emotion dysregulation at 12-month follow-up (T3b). This new exploratory aim was added to show the relationship between short-term binge drinking and emotion dysregulation. Thus, three exploratory aims were addressed in the dissertation manuscript.

2.2 Changes to Main Variables

2.2.1 Removal of Average CDA Score Variable

The dissertation proposal included both an average CDA score variable and a dichotomous "yes/no" CDA variable. During the analysis process, the average CDA score was found to be

negatively skewed towards zero, thus the average CDA score variable was removed in the dissertation manuscript.

2.2.2 Changes to Binge Drinking Variable

2.2.2.1 Removal of "Yes/No" Binge Drinking Variable

For Aim 1, Aim 2, Exploratory Aim 2, and Exploratory Aim 3, the dissertation proposal included both a "yes/no" binge drinking variable and the number of binge drinking days ranging from 0 to 30 days. From the descriptive frequencies, it was found that 61.4% of the students binge drank at 4-month follow up and 62.7% of the students binge drank at 12-month follow up. This finding was consistent with prior literature that two-thirds of college students binge drink. However, compared to the continuous binge drinking variable, the "yes/no" binge drinking variable did not take into account the severity and frequency of binge drinking. Thus, to have a more robust discussion, the "yes/no" binge drinking variable was removed from Aim 1, Aim 2, Exploratory Aim 2, and Exploratory Aim 3.

2.2.2.2 Binge Drinking as a Categorical Variable

For Exploratory Aim 2 and Exploratory Aim 3, binge drinking was used as a categorical variable instead of a continuous variable because there was non-linearity between the relationship of binge drinking and emotion dysregulation. Binge drinking was recoded into three levels: 1) no binge drinking days, 2) normal binge drinking days (i.e., 1 to 4 binge drinking days per one month), and 3) heavy binge drinking days (i.e., 5 to 30 binge drinking days per one month). These three levels were created based on the Substance Abuse and Mental Health Services Administration (SAMHSA) definition of heavy alcohol use.

2.2.2.3 Addition of Baseline Binge Drinking

The dissertation proposal did not include baseline binge drinking as a covariate because baseline binge drinking did not represent a true baseline. Specifically, the CDA variable at baseline preceded the baseline binge drinking variable. However, literature has shown the importance of using baseline binge drinking as a covariate of future binge drinking. Thus, baseline binge drinking was added to the analysis of Aim 1 and Aim 2 because binge drinking at 4- and 12-month follow-up were the dependent variables, respectively. Baseline binge drinking was not added to Exploratory Aim 1 because binge drinking was neither an independent variable nor a dependent variable in the model. Baseline binge drinking was not added to Exploratory Aim 2 and Exploratory Aim 3 because it was used as an independent variable and not a dependent variable.

2.3 Changes to Covariates and Interaction Terms

2.3.1 Removal of Covariate of School Level

The dissertation proposal included the variance inflation factor (VIF) as a way to screen for multicollinearity. However, the VIF was not used because age and school level were not linear, thus the Spearman Rho Correlation was used. It was found that age and school level were multicollinear. To determine which of these two variables to keep, age and school level were each removed respectively from the Aim 1, Aim 2, Exploratory Aim1, Exploratory Aim 2, and Exploratory Aim 3 models. To determine goodness of fit, the Quasi likelihood under the Independence model Criterion (QIC) statistics were compared, and the model with the lowest QIC was retained. Thus, school level was removed and age was retained in the models.

2.3.2 Addition of Interaction Terms

In the dissertation manuscript, interaction terms were created between the dependent variable and the parent group assignment. For Aim 1, Aim 2, and Exploratory Aim 1, the interaction term created was "CDA x Parent Group Assignment". For Exploratory Aim 2 and Exploratory Aim 3, two interaction terms were created: "Heavy Binge Drinking x Parent Group Assignment" and "Normal Binge Drinking x Parent Group Assignment". These interaction terms were important to determine if there were differences between the parent study's control group and intervention group on the dependent variable in each aim.

2.4 Changes to Power Analysis

The power analysis was changed to remove school level as a covariate and to add baseline binge drinking as a covariate and the interaction term of "CDA x Parent Group Assignment". The intraclass correlation coefficient, sample size, alpha level, power, and R2 remained the same.

2.5 Changes to Statistical Analysis Plan

To provide a more robust discussion, the dissertation manuscript included a log-linear analysis, a Mann Whitney U test, and a t-test to test for differences in participant characteristics between students experiencing CDA and those not experiencing CDA. When using the proposed generalized estimating equation model for Aim 1 and Aim 2, the CDA variable was very unstable

due to skewness toward zero. Due to this instability, a negative inflated Poisson model with a generalized estimating equation model was first used to take into account binge drinking as a count variable. However, this approach resulted in over-dispersion of binge drinking in the model. Thus, the negative binomial model with a generalized estimating equation model was used. This approach also took into account the clustering within schools. The negative inflated Poisson model was not used in this study because the negative binomial model provided better goodness of fit.

2.6 Addition of Three Ancillary Analyses

2.6.1 Ancillary Aim 1 to Explore the Relationship Between Lifetime Experience of Sexual Violence and Physical IPV and Emotion Dysregulation

Prior literature has reported co-occurrence of CDA and IPV (Dick et al., 2014; Zweig, Dank, Yahner, & Lachman, 2013). The results of Exploratory Aim 1 showed that the covariate of lifetime experience of sexual violence and physical IPV was significant in predicting emotion dysregulation at 12-month follow-up ($p = 0.018$). Thus, lifetime experience of sexual violence and physical IPV was specifically examined as a main effect variable on emotion dysregulation at 12-month follow-up.

2.6.2 Ancillary Aim 2 to Test the Moderation Effect of Binge Drinking at 4- and 12-Month

        Follow-up on the Relationship Between CDA and Emotion Dysregulation at 12-

        Month Follow-up

Previous research has suggested that substance use, including binge drinking, may be linked to the relationship between experience of abuse and negative affective states (Messman-Moore et al., 2010). The results of Exploratory Aim 2 and Exploratory Aim 3 showed that binge drinking at 4- and 12-month follow-up was not a significant predictor of emotion dysregulation at 12-month follow-up, respectively. Because there was no direct effect of binge drinking on emotion dysregulation, binge drinking as a mediating variable between the relationship of CDA and emotion dysregulation was not examined. The moderation effect of binge drinking at 4- and 12-month follow-up on the relationship between CDA and emotion dysregulation at 12-month follow-up was examined by creating two interaction terms: "Heavy Binge Drinking x CDA" and "Normal Binge Drinking x CDA".

2.6.3 Ancillary Aim 3 to Test the Moderation Effect of Binge Drinking at 4- and 12-Month

        Follow-up on the Relationship Between Lifetime Experience of Sexual Violence and

        Physical IPV and Emotion Dysregulation at 12-Month Follow-up

Similar to Ancillary Aim 2, binge drinking was examined as a moderating variable on the relationship between lifetime experience of sexual violence and physical IPV and emotion dysregulation at 12-month follow-up. The results of Exploratory Aim 1 showed that lifetime experience of sexual violence and physical IPV was significant in predicting emotion dysregulation at 12-month follow-up. However, because the results of Exploratory Aim 2 and

Exploratory Aim 3 showed that binge drinking at 4- and 12-month follow-up was not significantly associated with emotion dysregulation at 12-month follow-up, a mediation analysis was not examined. The moderation effect of binge drinking at 4- and 12- month follow-up on the relationship between lifetime experience of sexual violence and physical IPV and emotion dysregulation at 12-month follow-up was examined by creating two interaction terms: "Heavy Binge Drinking x Lifetime Experience of Sexual Violence and Physical IPV" and "Normal Binge Drinking x Lifetime Experience of Sexual Violence and Physical IPV".

3 Dissertation Manuscript

3.1.1 Background on Cyber Dating Abuse

Researchers report that about 94% of young adults 18-24 years of age have used at least one type of social media (e.g., YouTube, Snapchat, Instagram, Twitter, etc.) (Smith & Anderson, 2018). With the ubiquity of personal technology (i.e., smart phones and social media), cyber dating abuse (CDA) is an emerging problem for college students with prevalence estimates ranging from 20% to 74%. CDA is psychological and/or sexual harm perpetrated via technology (e.g., cell phones, social media, email, etc.) to threaten and/or harass a current or former dating partner (Bennett et al., 2011; Marganski & Melander, 2015; National Institute of Justice (NIJ), 2007; Reed et al., 2016; Sargent et al., 2016; Wolford-Clevenger et al., 2016; World Health Organization (WHO), 2013).

3.1.2 Background on Binge Drinking

In addition to being at risk for CDA, college students are susceptible to high risk of binge drinking. A national study found that 60% of college students between the ages of 18-22 years drank alcohol in the past month and 2 out of 3 of these students engaged in binge drinking (National Institute on Alcohol Abuse and Alcoholim (NIAAA), 2019; Substance Abuse and Mental Health Services Administration (SAMHSA) and the Center for Behavioral Health Statistics and Quality, 2017). Research has found that alcohol impairs and diminishes hippocampus function in the brain,

which affects emotional responses as well as detection and recognition of affective cues (Curtin et al., 2001).

3.1.3 Background on Emotion Dysregulation

Students who experience CDA are at increased risk of developing mental health conditions (i.e., anxiety, depressive symptoms, and fear) (Watkins et al., 2016). While most dating abuse and violence research focuses on specific mental health conditions, this study will investigate emotion dysregulation, which is a primary component of most psychological disorders (Kaufman et al., 2016; Veilleux et al., 2014). Emotion dysregulation can be conceptualized as involving a lack of 1) awareness and understanding of one's emotions, 2) acceptance of emotions, 3) ability to control one's behavior when experiencing negative emotions, and 4) ability to use appropriate adaptive emotion regulation strategies in response to situational stressors or demands (Gratz & Roemer, 2004).

3.1.4 Theoretical Model

This study was grounded in the dating abuse model called Dutton's intimate partner violence (IPV) and post-traumatic stress disorder (PTSD) Model (Dutton, 2009). Dutton's pathway framework shows the direct relationships of IPV among 1) covariates (i.e., past trauma), 2) moderating variables (i.e., demographics), 3) mental health outcomes, and 4) distal IPV-related outcomes (i.e., chronic health conditions) (Dutton, 2009). Specifically, IPV, which includes CDA, is related to many negative mental health outcomes including, but not limited to, substance and alcohol use, PTSD, depression, and anxiety (Lindsay et al., 2016). To capture the wide experiences

of negative mental health attributed to CDA, this study examined emotion dysregulation as a novel mental health outcome resulting from CDA experience.

3.1.5 Evidence of the Relationship Between CDA and Binge Drinking (Aims 1 and 2)

Past literature suggests that victims of dating abuse report more frequent alcohol use than non-victims (Bedard-Gilligan et al., 2011; Corbin et al., 2001; Shorey et al., 2016; Shorey et al., 2011). Research suggests that dating abuse victims not only drink more alcohol but also have greater expectations of the positive effects from consuming alcohol (Corbin et al., 2001). Thus, some researchers hypothesize that victims of dating abuse (which includes CDA) may drink more alcohol as a way to alleviate their psychological distress and emotional pain (Parks et al., 2014).

3.1.6 Evidence of the Relationship Between CDA and Emotion Dysregulation (Exploratory Aim 1)

Individuals who experience dating abuse, which includes CDA, may exhibit multiple aspects of emotion dysregulation. For example, individuals may have difficulty identifying and regulating emotional states, have lower levels of emotional acceptance, and have increased experiential avoidance (Batten et al., 2002; Gratz et al., 2007; Messman-Moore et al., 2010). Research has found that victims of abuse may experience more maladaptive skills, such as binging behavior and substance use to address deficits of emotion regulation (Messman-Moore et al., 2010).

3.1.7 Evidence of the Relationship Between Binge Drinking and Emotion Dysregulation (Exploratory Aims 2 and 3)

It has been theorized that binge drinking may help individuals manage negative emotions that they experience during times of high stress (Ferriter & Ray, 2011). When individuals experience negative emotions, a cognitive-behavioral response occurs to manage, minimize, or eliminate the cause. Expectancies are anticipated consequences of an action that influences the cognitive-behavioral response (Cooper et al., 1995). Accordingly, alcohol expectancy refers to the anticipation of an emotional experience because of consuming alcohol. In other words, people may drink more because they believe that alcohol reduces negative affect and that alcohol will enhance their emotional experiences (Cooper et al., 1995).

3.2 Purpose

The current generation of young adults is more connected to technology as a form of communication than ever before, thus CDA is likely to become an increasingly common form of violence for future generations. College students, who are already at high risk for binge drinking and poor mental health, may be particularly susceptible to the negative sequelae of CDA. Therefore, understanding the relationships among these constructs is imperative in developing future prevention and intervention techniques to address the diverse health needs of this large and vulnerable population.

Thus, the purpose of this study was to examine the relationships among CDA, binge drinking, and emotion dysregulation in college students. Two main aims were proposed: 1) Test

the short-term effects of CDA at baseline (T1) on binge drinking at 4-month follow-up (T2); 2) Test the long-term effects of CDA at baseline (T1) on binge drinking at 12-month follow-up (T3a). It was hypothesized that CDA will predict binge drinking at both 4-month and 12-month follow-up. Three exploratory aims were also proposed: 1) Explore the relationship between CDA at baseline (T1) and emotion dysregulation at 12-month follow-up (T3b); 2) Explore the relationship between binge drinking at 4-month follow-up (T2) and emotion dysregulation at 12-month follow-up (T3b); 3) Explore the relationship between binge drinking at 12-month follow-up (T3a) and emotion dysregulation at 12-month follow-up (T3b).

3.3 Method

3.3.1 Study Design

To examine the prevalence of and relationships between CDA, binge drinking, and emotion dysregulation, a longitudinal, descriptive correlational design was used to analyze survey data collected from a completed NIAAA-funded study (R01 AA023260; PI Miller; ClinicalTrials.gov NCT02355470).

3.3.2 Setting and Sample

The parent study for this study was a 2-arm cluster randomized controlled trial of a brief harm reduction intervention to reduce alcohol-related sexual violence risk among college students receiving services in their campus health or counseling clinic. The parent study included 2,292

students from 28 university campuses in Pennsylvania and West Virginia. For purposes of this study, only 2,092 students from 27 university campuses were included because one school declined participation in the emotion dysregulation survey. Student eligibility included 1) 18-24 years old, 2) literate in the English language, 3) seeking care at the college health or counseling center for any issue, and 4) have plans to remain living in or around the college area in the next 18 months.

3.3.3 Protection of Research Participants

Access to the data for this study was granted under the University of Pittsburgh Institutional Review Board approved protocol of the parent study. This study and the parent study follow the United States Federal Policy for the Protection of Human Subjects. Due to the sensitive nature of the parent study's topic of sexual violence and alcohol consumption, an internal data and safety monitoring process as well as an external advisory group were created. Prior to participation in the parent study, the college students completed an informed consent form.

3.3.4 Measures

3.3.4.1 Variables Describing Participant Characteristics

The college student participants were asked to complete nominal level items regarding their gender, race, and ethnicity, and a continuous level item of age in years, which was collapsed to two categories of 18-20 and 21-24. They were asked a series of dichotomous "yes" or "no" items regarding being involved in an athletic team, fraternity or sorority, and lifetime experience of sexual violence and physical IPV.

3.3.4.2 7-Item CDA Measure

The 7 CDA items were modified from the 12-item Internet Perpetration and Victim subscale of The Growing Up with Media Survey (Cronbach alpha=.72) (Bennett et al., 2011; Dick et al., 2014; Ybarra et al., 2007). An exploratory factor analysis on high school students (α=0.580) and confirmatory factor analysis on college students (α=0.726) were conducted using this 7-item CDA measure. Each item was answered first using a dichotomous "yes" or "no" to lifetime CDA. If students answered "yes" to lifetime CDA, they were prompted to answer a 5-point Likert scale for CDA in the last 4 months. If students answered "no" to lifetime CDA, their response was recoded to "never" in the last 4 months. An average score for the total scale was created. From this average score, a binary "yes" or "no" CDA variable for the last 4 months was created.

3.3.4.3 Binge Drinking Measure

The parent study used eight alcohol assessment items based on the NIAAA recommended questions (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2003). From these eight items, only the item assessing number of binge drinking days (0 to 30 days) in the past 30 days was used in Aim 1 and Aim 2 for this study. For Exploratory Aim 2 and Exploratory Aim 3, binge drinking was recoded into three different categories: 1) no binge drinking days, 2) normal binge drinking days (i.e., 1 to 4 binge drinking days per one month), and 3) heavy binge drinking days (i.e., 5 to 30 binge drinking days per one month). These three levels were created based on the Substance Abuse and Mental Health Services Administration (SAMHSA) definition of heavy alcohol use (i.e., binge drinking on 5 or more days in the past month (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2018).

3.3.4.4 Emotion Dysregulation Measure

The Difficulties in Emotion Regulation Scale-Short Form (DERS-SF) consists of 18 items measuring 6 domains: 1) non-acceptance of emotional response, 2) difficulties engaging in goal-directed behavior, 3) impulse control difficulties, 4) lack of emotional awareness, 5) limited access to emotion regulation strategies, and 6) lack of emotional clarity (Kaufmann et al., 2014). All 18 items use a 5-point Likert scale ranging from "1, almost never" to "5, almost always". Prior research on a college-age population found that the Cronbach's alpha coefficient of the total scale was 0.89 (Kaufmann et al., 2014). For this study, an average score for the total DERS-SF scale was computed by summing all the DERS-SF items together.

3.3.5 Power Analysis

From the original parent study's sample of 2,092, a response rate of at least 50% of the survey was expected so that at least 1,046 subjects were available for this study. The 50% response rate was chosen as a conservative measure because national studies with college students have found typical response rates from 60% to 80% with very few response rates less than 50% (Wechsler et al., 1994). Because students were clustered in 27 schools (average 39 students per school) and based on the baseline data, we calculated the intraclass correlation coefficient (ICC) for binge drinking as 0.0089. Adjusting for clustering within schools and using an estimated ICC of 0.0089, the sample size of 1,046 is equivalent to 782 independent samples (1046/(1+(39-1)*0.0089).

A sample size of 782 achieves 80% power to detect an R^2 of 0.009 attributed to 1 independent variable(s) using an F-Test with a significance level (alpha) of 0.050. The variables tested were adjusted for an additional nine independent variable(s) with an R^2 of 0.100. The power

analysis was computed using the statistical software PASS version 16 (PASS 16 Power Analysis and Sample Size Software, 2018) and took into account CDA, binge drinking, and emotion dysregulation when controlling for nine covariates of baseline binge drinking, lifetime experience of sexual violence and physical IPV, age, gender, race, ethnicity, athletic team involvement, and fraternity or sorority involvement, and parent group assignment, plus an interaction term of CDA and parent group assignment.

3.3.6 Procedure for Data Collection

In the parent study, students completed surveys at baseline (T1), 4 months (T2), and 12 months (T3a and T3b). Sociodemographic measures included age, gender, race, ethnicity, athletic team involvement, and Greek life involvement (i.e., fraternities and sororities). Students also completed surveys regarding lifetime experience of sexual violence and physical IPV, CDA, binge drinking, and emotion dysregulation.

3.4 Data Analysis

3.4.1 Preliminary Data Analysis

The sample was assessed for outliers using histograms, box plots and z-scores. After assessing deletion of the outliers, the results of the generalized estimating equations and the linear mixed models did not change, thus the outliers were retained for the analysis. Multicollinearity of the variables was assessed using Spearman Rho Correlation. No multicollinearity was found

between any of the main variables and the co-variates. All assumptions of the generalized estimating equation and the linear mixed models were checked prior to analyzing the data and assumptions were met.

3.4.2 Participant Characteristics

Frequency counts and percentages were generated for the participant characteristics of age, gender, race, ethnicity, athletic team involvement, Greek life involvement, parent group assignment, and lifetime experience of sexual violence and physical IPV. The log-linear analysis was used to determine if there was a significant difference between the participant characteristics and students who did and did not experience CDA. Due to the skewness of the binge drinking variable, the median and range were generated. The Mann Whitney U test was used to examine the differences in number of binge drinking days by students who did and did not experience CDA. A mean and standard deviation were generated for emotion dysregulation variable. The independent sample t-test was used to compare whether there were differences in mean emotion dysregulation scores by students who did and did not experience CDA.

3.4.3 Aim 1

To test the short-term effects of CDA at baseline (T1) on binge drinking at 4-month follow-up (T2), a negative binomial model with a generalized estimating equation approach was used to account for the over-dispersion of the binge drinking variable and the clustering within school. The negative binomial model was used in lieu of a negative inflated Poisson model because the negative binomial model had better goodness of fit. The model included main effects of CDA, the

participant characteristic covariates of baseline binge drinking, lifetime experience of sexual violence and physical IPV, age, gender, race, ethnicity, athletic team involvement, Greek life involvement, and parent group assignment, and the interaction term of CDA and parent group assignment.

3.4.4 Aim 2

To test the long-term effects of CDA at baseline (T1) on binge drinking at 12-month follow-up (T3a), the same data analysis procedures was used as in Aim 1; however, the continuous binge drinking variable was evaluated at the 12-month follow-up time point.

3.4.5 Exploratory Aim 1

To explore the relationship between CDA at basline (T1) and emotion dysregulation at 12-month follow-up (T3b), a linear mixed model was used to account for the continuous nature of the average DERS-SF score at 12-month follow-up and the clustering within schools. The model included main effects of CDA and the same participant characteristic covariates as above, except baseline binge drinking. The interaction term was CDA and parent group assignment.

3.4.6 Exploratory Aim 2

To explore the relationship between binge drinking at 4-month follow-up (T2) and emotion dysregulation at 12-month follow-up (T3b), a linear mixed model procedure was also used. A 3-level categorical binge drinking variable was used in lieu of a continuous level binge drinking

variable because the continuous level binge drinking variable did not have a linear relationship with emotion dysregulation. The model included main effects of categorical binge drinking at 4-month follow-up and the same participant characteristic covariates as above, except baseline binge drinking. The interaction term was the categorical binge drinking variable at 4-month follow-up and parent group assignment.

3.4.7 Exploratory Aim 3

To explore the relationship between binge drinking at 12-month follow-up (T3a) and emotion dysregulation at 12-month follow-up (T3b), a linear mixed model procedure was also used. The model included main effects of categorical binge drinking at 12-month follow-up and the same participant characteristic covariates as above, except baseline binge drinking. The interaction term was the categorical binge drinking variable at 12-month follow-up and parent group assignment.

3.5 Results

3.5.1 Participants

The sample consisted of 740 students who completed all CDA, binge drinking, and emotion dysregulation surveys at all four time points T1, T2, T3a, and T3b (see Table 1). The ages of the students ranged from 18 to 24 years. There were 572 female (77.3%) and 168 (22.7%) male students. There was a majority of 634 (86.1%) Caucasian students, with 39 (5.3%) African

American students, 32 (4.3%) Asian students, and 32 (4.3%) students of other races. Eighty-seven (11.8%) of the students identified as Hispanic, Latino, or Latina. Ninety-three (12.6%) of the students participated on an athletic team, and 110 (14.9%) were involved with Greek life (i.e., fraternity or sorority). Based on parent group assignment, 342 (46.2%) students were in the intervention group. Over four-fifths (n=598, 80.8%) of the students reported not experiencing CDA.

Of the students experiencing CDA, 117 (84.2%) students also experienced sexual violence and physical IPV in their lifetime compared to 317 (55.6%) students not experiencing CDA. At baseline, the students experiencing CDA had a median of 1 binge drinking day per month with a range of 20 compared to 1 binge drinking day per month with a range of 25 for the students not experiencing CDA. At 4-month follow-up, the students experiencing CDA had a median of 2 binge drinking days with a range of 15 compared to a median of 1 binge drinking day per month with a range of 25 for students not experiencing CDA. At 12-month follow-up, the students experiencing CDA had a median of 2 binge drinking days per month with a range of 20, compared to 1 binge drinking day per month with a range of 20 for students not experiencing CDA.

When comparing the participant characteristics by students experiencing CDA versus the students not experiencing CDA, results showed there was a significant relationship between CDA experience and Hispanic, Latino, or Latina ethnicity ($\chi2(1,n=740)=6.350$, p=0.012). There was also a significant relationship between experience of CDA and lifetime experience of sexual violence and physical IPV ($\chi2(1, n=740)=38.387$, p<0.001). There was no significant association between CDA experience and the other participant characteristics.

When comparing the number of baseline binge drinking days by the students experiencing CDA versus the students not experiencing CDA, the results found the distribution between the two

groups to be significantly different (Mann-Whitney U=31064.00, n_1=142, n_2=598, p=0.045). When comparing the number of binge drinking days at 4-month follow-up by the students experiencing CDA versus the students not experiencing CDA, the results found the distribution between the two groups to be significantly different (Mann-Whitney U=36336.00, n_1=142, n_2=598, p=0.006). When comparing the number of binge drinking days at 12-month follow-up for the students experiencing CDA versus the students not experiencing CDA, the results found the distribution between the two groups to be significantly different (Mann-Whitney U=34883.50, n_1=142, n_2=598, p=0.001). There was a significant difference in the mean scores of emotion dysregulation for students experiencing CDA and students not experiencing CDA (t(738)=-2.876, p=0.004).

3.5.2 Results for Aim 1

When testing the short-term effects of CDA at baseline on binge drinking at 4-month follow-up, it was found that CDA significantly predicted binge drinking in the unadjusted but not in the adjusted model (see Table 2). In an unadjusted model, the mean number of days of binge drinking for students experiencing CDA was 1.343 times the mean number of days of binge drinking for students not experiencing CDA (p=0.002, 95% CI=1.113 - 1.622). When adjusting for covariates and an interaction between CDA and parent group assignment, there was no statistical significance for the interaction term, thus it was removed from the final adjusted negative binomial model.

In the final adjusted negative binomial model, baseline binge drinking significantly predicted binge drinking at 4-month follow-up. The mean number of days of binge drinking for students experiencing baseline binge drinking was 1.183 times the mean number of days of binge

drinking for students not experiencing baseline binge drinking controlling for all other variables (p<0.001, 95% CI=1.152 - 1.214). For every increase in the number of baseline binge drinking days per month, there was 1.183 times the mean number of days of binge drinking at 4-month follow-up controlling for all other variables. For African American students, the mean number of days of binge drinking at 4-month follow-up was 53.0% lower compared to Caucasian students given other variables are held constant (IRR=0.470, p=0.037, 95% CI=0.231 - 0.955). For students in the parent study's intervention group, the mean number of days of binge drinking at 4-month follow-up was 17.7% lower compared to the students in the parent study's control group given other variables are held constant (IRR=0.823, p=0.040, 95% CI=0.683 - 0.991). All other covariates were not statistically significant in predicting binge drinking at 4-month follow-up.

3.5.3 Results for Aim 2

After examining the long-term effects of CDA at baseline on binge drinking at 12-month follow-up, it was found that CDA significantly predicted binge drinking in the unadjusted model but not the adjusted model (see Table 2). When looking at the unadjusted model, the students experiencing CDA had 1.369 (p=0.027, 95% CI=1.037 - 1.807) times the mean number of days of binge drinking for students not experiencing CDA. When adjusting for covariates and an interaction between CDA and parent group assignment, there was no statistical significance for the interaction term, thus it was removed from the final adjusted negative binomial model.

In the final adjusted negative binomial model, baseline binge drinking significantly predicted binge drinking at 12-month follow-up. The mean number of days of binge drinking for students experiencing baseline binge drinking was 1.156 times the mean number of days of binge drinking for students not experiencing baseline binge drinking controlling for all other variables

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(p<0.001, 95% CI=1.132 - 1.181). For every increase in the number of baseline binge drinking days per month, there was 1.156 times the mean number of days of binge drinking at 12-month follow-up controlling for all other variables. For students, ages 18 through 20 years old, the mean number of days binge drinking was 1.636 times the mean number of binge drinking days for students who were 21 through 24 years old controlling for all other variables (p<0.001, 95% CI=1.345 - 1.989). For students who were Hispanic, Latino, or Latina ethnicity, the mean number of binge drinking days was 43.7% lower compared to students who were not of Hispanic, Latino, or Latina ethnicity given other variables are held constant (IRR=0.563, p<0.001, 95% CI=0.410 - 0.774). For students who were involved in Greek life, the mean number of binge drinking days was 1.280 times the mean number of binge drinking days for students who were not involved in Greek life given other variables are held constant (p=0.014, 95% CI=1.050 - 1.560). All other covariates were not statistically significant in predicting binge drinking at 12-month follow-up.

3.5.4 Results for Exploratory Aim 1

When exploring the relationship between CDA at baseline and emotion dysregulation at 12-month follow-up, CDA significantly predicted emotion dysregulation in the unadjusted model but not in the adjusted model (see Table 3). In the unadjusted model, students who experienced CDA had a 0.171 unit increase of emotion dysregulation compared to students who did not experience CDA (p=0.004, 95% CI=0.054 - 0.287). When adjusting for covariates and an interaction between CDA and parent group assignment in Exploratory Aim 1, there was no statistical significance for the interaction term, thus it was removed from the final adjusted linear mixed model for Exploratory Aim 1.

In the final adjusted linear mixed model, for students who experienced lifetime sexual violence and physical IPV, there was a predicted 0.130 unit increase of emotion dysregulation score compared to students who did not experience lifetime sexual violence and physical IPV given other variables are held constant (p=0.018, 95% CI=0.022 - 0.237). All other covariates were not statistically significant in predicting emotion dysregulation.

3.5.5 Results for Exploratory Aim 2

When exploring the relationship between binge drinking at 4-month follow-up and emotion dysregulation at 12-month follow-up, there was no significant relationship between binge drinking and emotion dysregulation in the unadjusted and adjusted models (see Table 4). When adjusting for covariates and an interaction between binge drinking at 4-month follow-up and parent group assignment in Exploratory Aim 2, there was no statistical significance for the interaction term, thus it was removed from the final adjusted linear mixed model for Exploratory Aim 2.

In the final adjusted linear mixed model, students who experienced lifetime sexual violence and physical IPV had a predicted 0.156 increase in emotion dysregulation score compared to students who did not experience lifetime sexual violence and physical IPV (p=0.003, 95% CI=0.053 - 0.259). Students of other races had a predicted 0.239 increase in emotion dysregulation score compared to Caucasian students (p=0.047, 95% CI=0.003 - 0.476). All other covariates were not statistically significant in predicting emotion dysregulation.

3.5.6 Results for Exploratory Aim 3

When exploring the relationship between binge drinking at 12-month follow-up and emotion dysregulation at 12-month follow-up, there was no significant relationship between binge drinking and emotion dysregulation in the unadjusted and adjusted models (see Table 4). When adjusting for covariates and an interaction between binge drinking at 12-month follow-up and parent group assignment in Exploratory Aim 3, there was no statistical significance for the interaction term, thus it was removed from the final adjusted linear mixed model for Exploratory Aim 3.

In the final adjusted linear mixed model, students who experienced lifetime sexual violence and physical IPV had a predicted 0.153 increase in emotion dysregulation score compared to students who did not experience lifetime sexual violence and physical IPV (p=0.004, 95% CI=0.050 - 0.256). Students of other races had a predicted 0.238 increase in emotion dysregulation score compared to Caucasian students (p=0.048, 95% CI=0.003 - 0.474). All other covariates were not statistically significant in predicting emotion dysregulation.

3.5.7 Results for Ancillary Aim 1

An ancillary analysis was conducted to explore the relationship between college students' lifetime experience of sexual violence and physical IPV and emotion dysregulation. In Exploratory Aim 1, both CDA and lifetime experience of sexual violence and physical IPV were examined as predictors of emotion dysregulation. Lifetime experience of sexual violence and physical IPV was found to be significant in Exploratory Aim 1 (p=0.018, Table 3). When exploring the relationship between lifetime experience of sexual violence and physical IPV (as a single independent variable,

without the CDA variable) on emotion dysregulation, it was found that lifetime experience of sexual violence and physical IPV significantly predicted emotion dysregulation after controlling for covariates (i.e., age, gender, race, ethnicity, athletic team involvement, Greek life involvement, and parent group assignment) and the interaction term of lifetime experience of sexual violence and physical IPV and parent group assignment. In the adjusted linear mixed model, students who experienced lifetime sexual violence and physical IPV had a 0.154 significant increase in emotion dysregulation score compared to students who did not experience lifetime sexual violence and physical IPV (p=0.004, 95% CI=0.050 - 0.258). See Table 5.

3.5.8 Results for Ancillary Aim 2

A second ancillary analysis was conducted to test for the moderation effect of binge drinking at 4- and 12-month follow-up on CDA at baseline and emotion dysregulation at 12-month follow-up. Two interaction terms between binge drinking on CDA were created for each model. For the moderation effect of binge drinking at 4-month follow-up, results showed that the interaction between "heavy binge drinking and CDA" was not statistically significant (p=0.325, Estimates of Fixed Effects=-0.162, 95% CI=-484 - 0.161). The interaction between "normal binge drinking and CDA" was also found to be not statistically significant (p=0.666, Estimates of Fixed Effects=-0.064, 95% CI=-0.227 - 0.355). For the moderation effect of binge drinking at 12-month follow-up, results showed that the interaction between "heavy binge drinking and CDA" was not statistically significant (p=0.198, Estimates of Fixed Effects=-0.242, 95% CI=-0.610 - 0.127). The interaction between "normal binge drinking and CDA" was also found to be not statistically significant (p=0.623, Estimates of Fixed Effects=-0.074, 95% CI=-0.367 - 0.220).

3.5.9 Results for Ancillary Aim 3

A third ancillary analysis was performed to test for the moderation effect of binge drinking at 4- and 12-month follow-up on lifetime experience of sexual violence and physical IPV at baseline and emotion dysregulation at 12-month follow-up. Two interaction terms between binge drinking and lifetime experience of sexual violence and physical IPV were created for each model. For the moderation effect of binge drinking at 4-month follow-up, results showed that the interaction between "heavy binge drinking and lifetime experience of sexual violence and physical IPV" was not statistically significant (p=0.071, Estimates of Fixed Effects=0.261, 95% CI=-0.022 - 0.544). The interaction between "normal binge drinking and lifetime experience of sexual violence and physical IPV" was also found to be not statistically significant (p=0.164, Estimates of Fixed Effects=0.156, 95% CI=-0.064 - 0.375). For the moderation effect of binge drinking at 12-month follow-up, results showed that the interaction between "heavy binge drinking and lifetime experience of sexual violence and physical IPV" was not statistically significant (p=0.890, Estimates of Fixed Effect=-0.021, 95% Wald CI=-0.323 - 0.280). Results showed that the interaction between "normal binge drinking and lifetime experience of sexual violence and physical IPV" was also found to be not statistically significant (p=0.281, Estimates of Fixed Effects=0.119, 95% Wald CI=-0.097 - 0.335).

3.6 Discussion

The results of this study showed that CDA significantly predicted binge drinking at 4-month follow-up (Aim 1) and binge drinking at 12-month follow-up (Aim 2) for unadjusted

models. However, in adjusted models, CDA was not significant in predicting binge drinking at 4-month follow-up and 12-month follow-up. This finding may be attributed to the highly significant covariate of baseline binge drinking, which shows that college students' baseline binge drinking is strongly associated with future binge drinking at 4-month follow-up and 12-month follow-up. The results are consistent with that of a 13-year longitudinal study on adolescence into adulthood, which found that an adult's alcohol use at 21 and 28 years of age was significantly predicted by alcohol use as an adolescent (Paavola, Vartiainen, & Haukkala, 2004).

Results for Aims 1 and 2 also found that lifetime experience of sexual violence and physical IPV did not significantly predicted binge drinking. This finding is contrary to established literature. Research has shown that for men and women, both sexual violence and physical IPV were significant independent predictors of binge drinking (Silverman et al., 2001). Other studies reported that the odds of experiencing sexual violence and physical IPV for college women were higher on days with binge drinking compared to days with no binge drinking (Parks & Fals-Stewart, 2004; Parks, Hsieh, Bradizza, & Romosz, 2008). Thus, university health clinics should still consider assessing for binge drinking and sexual violence and physical IPV concurrently as a way to provide a more holistic approach to students' health experiences instead of only treating experiences of dating abuse and binge drinking as two separate issues. Further research should explore the mechanisms between binge drinking and dating abuse.

Results for Aim 2 found that involvement in Greek Life (i.e., fraternity or sorority involvement) significantly predicted binge drinking in college students. This finding is consistent with well-established evidence that undergraduate fraternity and sorority members consume more alcohol, and engage in more binge drinking compared to the rest of the student population (Cashin, Presley, & Meilman, 1998; McGinley, Rospenda, Liu, & Richman, 2016). Studies have found that

upwards of 86% of fraternity members binge drank compared to 45% of non-fraternity members (Wechsler, Kuh, & Davenport, 2009). Prior studies also showed that the majority (57%) of fraternity members and almost half (43%) of sorority members binge drank three or more times in the past two weeks (Wechsler et al., 2009). Given the high prevalence of binge drinking of students who participate in Greek life, it may be important for researchers to examine the Greek life culture and determine if there are any differences in student characteristics for those who participate in Greek life and those who do not. Researchers may consider exploring preventative binge drinking interventions targeted specifically for students who participate in Greek life.

Aim 1 results of this study found that African American students had a 53.0% significant decrease in the mean number of binge drinking days compared to Caucasian students. This finding is consistent with prior research conducted by the National Survey on Drug Use and Health Surveys (NSDUH), which showed that African Americans between the ages of 12 to 25 years had significantly lower binge drinking compared to Caucasians (Zapolski, Baldwin, Banks, & Stump, 2017). However, Aim 2 results showed that African American students had a 40.4% non-significant increase in the mean number of binge drinking days compared to Caucasian students. Results may be different from those of Zapolski et al. (2017) because they used a cross-sectional design, whereas this current study used student data at 4-month and 12-month follow-up. Results for Aim 1 found that students of Hispanic, Latino, or Latina ethnicity had a 3.9% non-significant increase in the number of binge drinking days compared to non-Hispanic, non-Latino, or non-Latina students, which is consistent with findings from Zapolski et al. (2017). However, in results for Aim 2, students of Hispanic, Latino, or Latina ethnicity had a 43.7% significant decrease in number of binge drinking days compared to non-Hispanic, non-Latino, or non-Latina students. In addition, it is interesting to note that at 4-month follow-up (Aim 1), the IRR of binge drinking was

1.160 and not significant for students between the ages of 18 to 20 years old. However, the IRR of binge drinking was 1.636 and became significant at 12-month follow-up (Aim 2) for students between the ages of 18 to 20 years old. The results from this study show the importance of examining the short- and long-term changes in binge drinking.

It is interesting to note the non-significance of CDA in predicting emotion dysregulation in the adjusted model in Exploratory Aim 1 because past literature has found a significant relationship between CDA and IPV (Dick et al., 2014; Zweig et al., 2013). This result suggests that individuals who experience CDA may have different health outcomes compared to individuals who experience lifetime sexual violence and physical IPV. This result may be attributed to specific elements of CDA not found in lifetime experience of sexual violence and physical IPV. The omnipresence of mobile phones, laptops, computers, and tablets makes it easy to intertwine both the virtual and real worlds by allowing people to connect with one another via texting or social media posts. However, some researchers suggest that this ability to communicate across distance, regardless of location, raises some concerns about the effects on one's well-being, especially in the cases of CDA. Researchers have found that those who use technological tools to communicate are less inhibited in their online interactions, thus they may text or post things (i.e., sexual comments, nude pictures) that they would not text or post in "real life" (Bocij, 2004; Ellison, 2001; Marganski & Melander, 2015). Some young adults may view CDA behaviors such as sexting or monitoring their romantic partner's social media sites as part of normal interaction, thus trivializing CDA as an unimportant behavior (Borrajo, Gámez-Guadix, & Calvete, 2015; Ellison, 2001; Melander, 2010; Salter, Crofts, & Lee, 2013). Hence, this "normalization" of CDA as part of everyday communication between romantic partners may contribute to why CDA did not predict emotion dysregulation in college students.

While CDA did not predict emotion dysregulation in the adjusted model in Exploratory Aim 1, lifetime experience of sexual violence and physical IPV was a significant predictor of emotion dysregulation in this adjusted model. Thus, lifetime experience of sexual violence and physical IPV was further examined in an ancillary analysis without CDA. Results of this ancillary model showed that lifetime experience of sexual violence and physical IPV significantly predicted emotion dysregulation. Prior literature is congruent with this result of lifetime experience of sexual violence and physical IPV being associated with negative mental health outcomes (Dutton et al., 2006). This result is similar to another study showing that victims of IPV who had decreased problem solving skills and difficulties with positive reframing experienced more stress (Straight, Harper, & Arias, 2003). Victims of sexual abuse often experience increased experiential avoidance (Koss, Figueredo, Boeschen, & Coan, 2001).

Past studies have also suggested that risk factors including substance use (i.e., binge drinking) may be linked to failure to self-regulate negative affective states common in abuse victims (Messman-Moore et al., 2010). However, as shown by results for Exploratory Aim 2 and Exploratory Aim 3, binge drinking was not a significant predictor of emotion dysregulation. This result suggests that binge drinking is not on the mediator pathway between CDA and emotion dysregulation or between lifetime experience of sexual violence and physical IPV and emotion dysregulation. Another ancillary analysis was conducted to explore if binge drinking acted as a moderating variable between the relationship of CDA and emotion dysregulation as well as the between the relationship of lifetime experience of sexual violence and physical IPV and emotion dysregulation. Results showed that binge drinking was not a significant moderator for either relationship. One reason for these non-significant findings is that past literature suggests emotion dysregulation may precede binge drinking. Some researchers suggest that victims of IPV,

including CDA, may use binge drink as a way to alleviate or distract themselves from negative

emotional states (Shorey et al., 2016; Weiss et al., 2018). This result can also be explained by the

self-medication hypothesis suggesting that individuals use alcohol and/or drugs to manage trauma-

related distress and symptoms related to IPV (Khantzian, 1997).

3.7 Limitations

A limitation of this study is that the sample demographics may not be representative of the

general population of college students. In addition, data on emotion dysregulation was collected

at T3b, after the data collection for binge drinking at T2 and T3a. However, T3a and T3b were

back-to-back assessments. Given the nature of the data collection from the parent study, emotion

dysregulation could not be examined at baseline. Another limitation of this secondary analysis was

the measurement of the baseline binge drinking in the parent study. This baseline binge drinking

variable cannot be considered an accurate baseline because it was measured after the baseline CDA

measure. Thus, baseline binge drinking could be affected by CDA, although it was not statistically

significant. This study was underpowered, which may be attributed to the sample size collected by

the parent study. There are other known limitations of a secondary analysis, such as strategies the

parent study used to measure the concepts and take into account missing data. Due to the nature

of the time points of data collection, the conceptual model cannot demonstrate temporal causation,

only correlation. In addition, the effect of the parent study's intervention on the students' responses

to the survey items is unknown. Thus, to account for the intervention effects, the interaction terms

of the independent variable and parent group assignment were included in the models. Threats to

internal validity include using a convenience sample because there may be pre-existing differences

between students who volunteered to answer the survey items compared to students who did not participate in the surveys (Slack & Draugalis, 2001). Other threats to internal validity include history or external factors such as students who attended health clinics may have received outside referrals and treatment for alcohol use or mental health concerns (Slack & Draugalis, 2001). Thus, future studies could explore whether there are differences in student experiences of CDA, binge drinking, and emotion dysregulation for those students who attended counseling therapy or other community resources compared to only seeking care at the university health clinics.

3.8 Strengths

The strengths of this study include the well-established research infrastructure of the parent study with a large sample size including multiple sites. Further, this longitudinal study examined short- and long-term effects of CDA, whereas past CDA research has used mostly cross-sectional designs. The results from this study lay a foundation for examining future screening, prevention, and intervention strategies in college student health clinics. Understanding the relationships among CDA, binge drinking, and emotion dysregulation is consistent with the current strategic plan of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) objective 4A, "to improve existing behavioral treatment for alcohol use disorder and co-occurring conditions" (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2017). Currently, the majority of college campuses have implemented some type of alcoholism prevention programming in response to the identified risk for and consequences of heavy episodic drinking by college students (Larimer et al., 2004). This study provides guidance for these alcohol prevention programs, by supporting screening of CDA and lifetime experience of sexual violence and physical IPV. This study also

raises the awareness of the importance of CDA in college students, especially as the majority of young adults have at least one social media account. Even though CDA did not predict emotion dysregulation in this study, future studies should focus on understanding the mental health outcomes of college students who experience CDA as prior research has found a significant overlap between CDA and IPV (Dick et al., 2014; Zweig et al., 2013). There is a need to examine the associations between mental health outcomes and CDA, especially as past researchers how found victims of CDA experience anxiety, depression, panic attacks, and anorexia nervosa (Citron & Franks, 2014; Lindsay et al., 2016).

Table 1 Participant Charateristics

	Total CDA (N=740)		No CDA (n=598)		Yes CDA (n=142)		
	n	**%**	**n**	**%**	**n**	**%**	**χ^2 (p-value)**
Age[1]							
18 – 20 years	454	62.7%	361	61.6%	93	67.4%	1.600
21 – 24 years	270	37.3%	225	38.4%	45	32.6%	(0.206)
Gender							
Female	572	77.3%	465	77.8%	107	75.4%	0.379
Male	168	22.7%	133	22.2%	35	24.6%	(0.538)
Race[2]							
Other	32	4.3%	28	4.7%	4	2.8%	2.609
Asian	32	4.3%	28	4.7%	4	2.8%	(0.456)
African American	39	5.3%	33	5.5%	6	4.2%	
Caucasian	634	86.1%	506	85.1%	128	90.2%	
Ethnic Hispanic/Latino/Latina							
Yes	87	11.8%	79	13.2%	8	5.6%	6.350
No	653	88.2%	519	86.8%	134	94.4%	(0.012)
Athletic Team							
Yes	93	12.6%	76	12.7%	17	12.0%	0.029
No	647	87.4%	522	87.3%	125	88.0%	(0.864)
Greek Life							
Yes	110	14.9%	85	14.2%	25	17.6%	1.111
No	630	85.1%	513	85.8%	117	82.4%	(0.292)
Parent Group Assignment							
Intervention	342	46.2%	286	47.8%	56	39.4%	3.249
Control	398	53.8%	312	52.2%	86	60.6%	(0.071)
Lifetime Experience of Sexual Violence and Physical IPV[3]							
Yes	434	61.2%	317	55.6%	117	84.2%	38.387
No	275	38.8%	253	44.4%	22	15.8%	(<0.001)
	Median	**Range**	**Median**	**Range**	**Median**	**Range**	**Mann Whitney U (p-value)**
Experience of Binge Drinking							
Baseline	1	25	1	25	1	20	31064.00 (0.045)
4-month Follow-up	1	25	1	25	2	15	36336.00 (0.006)
12-month Follow-up	1	20	1	20	2	20	34883.50 (0.001)

	Mean	SD	Mean	SD	Mean	SD	t-test (p-value)
Emotion Dysregulation	2.571	0.639	2.538	0.628	2.709	0.668	-2.876 (0.004)

Note: CDA=cyber dating abuse; IPV=intimate partner violence
[1] Missing 16 Participants
[2] Missing 3 Participants
[3] Missing 31 Participants

Table 2 Effects of Cyber Dating Abuse on Binge Drinking at 4 Months and 12 Months

	CDA at T1 on Binge Drinking at T2[1]		CDA at T1 on Binge Drinking at T3a[2]	
	IRR (95% Wald CI)	p-value	IRR (95% Wald CI)	p-value
Unadjusted Variable				
CDA				
Yes	1.343 (1.113 – 1.622)	0.002	1.369 (1.037 –1.807)	0.027
No	1	--	1	--
Adjusted Variable				
CDA				
Yes	1.180 (0.917 – 1.520)	0.198	1.168 (0.861 – 1.586)	0.318
No	1	--	1	--
Covariates				
Baseline Binge Drinking	1.183 (1.152 – 1.214)	<0.001	1.156 (1.132 – 1.181)	<0.001
Sexual Violence and Physical IPV				
Yes	1.090 (0.881 – 1.350)	0.428	1.068 (0.903 – 1.263)	0.445
No	1	--	1	--
Age				
18 – 20	1.160 (0.891 – 1.511)	0.271	1.636 (1.345 – 1.989)	<0.001
21 – 24	1	--	1	--
Gender				
Female	1.171 (0.903 – 1.518)	0.235	0.984 (0.719 – 1.346)	0.918
Male	1	--	1	--
Race				

Other	1.269 (0.744 – 2.167)	0.382	1.497 (0.916 – 2.445)	0.107
Asian	0.984 (0.564 – 1.718)	0.956	1.118 (0.725 – 1.723)	0.614
African American	0.470 (0.231 – 0.955)	0.037	1.404 (0.756 – 2.606)	0.282
Caucasian	1	--	1	--
Ethnic Hispanic/Latino/Latina				
Yes	1.039 (0.625 – 1.726)	0.884	0.563 (0.410 – 0.774)	<0.001
No	1	--	1	--
Athletic Team				
Yes	1.021 (0.779 – 1.338)	0.879	0.865 (0.617 – 1.213)	0.401
No	1	--	1	--
Greek Life				
Yes	1.176 (0.972 – 1.422)	0.095	1.280 (1.050 – 1.560)	0.014
No	1	--	1	--
Parent Group Assignment				
Intervention	0.823 (0.683 – 0.991)	0.040	0.911 (0.768 – 1.080)	0.284
Control	1	--	1	--

Note: CDA=cyber dating abuse; IPV=intimate partner violence; T1=baseline; T2=4 months; T3a=12 months.

[1] "CDA x Parent Group Assignment" was not significant, thus it was removed from the model (p = 0.459, IRR = 0.848, 95% Wald CI = 0.549 – 1.311)

[2] "CDA x Parent Group Assignment" was not significant, thus it was removed from the model (p = 0.257, IRR = 0.707, 95% Wald CI = 0.388 – 1.288)

Table 3 Relationship Between Cyber Dating Abuse at Baseline and Emotion Dysregulation at 12 Months

	Emotion Dysregulation Estimates of Fixed Effects (95% Wald CI)[1]	p-value
Unadjusted Variable		
CDA		
Yes	0.171	0.004
	(0.054 – 0.287)	
No	0	--
Adjusted Variable		
CDA		
Yes	0.111	0.085
	(-0.015 – 0.236)	
No	0	--
Covariates		
Sexual Violence and Physical IPV		
Yes	0.130	0.018
	(0.022 – 0.237)	
No	0	--
Age		
18 – 20	0.084	0.104
	(-0.017 – 0.185)	
21 – 24	0	--
Gender		
Female	0.094	0.126
	(-0.026 – 0.214)	
Male	0	--
Race		
Other	0.173	0.163
	(-0.071 – 0.417)	
Asian	0.148	0.221
	(-0.089 – 0.386)	
African American	-0.051	0.640
	(-0.267 – 0.164)	
Caucasian	0	--
Ethnic Hispanic/Latino/Latina		
Yes	-0.070	0.369
	(-0.221 – 0.082)	
No	0	--
Athletic Team		
Yes	0.004	0.958
	(-0.141 – 0.149)	
No	0	--

Greek Life		
Yes	0.068	0.325
	(-0.068 – 0.204)	
No	0	--
Parent Group Assignment		
Intervention	0.072	0.153
	(-0.027 – 0.170)	
Control	0	--

Note: CDA=cyber dating abuse; IPB=intimate partner violence.

[1] Interaction term "CDA x Parent Group Assignment" was not significant, thus it was removed from the model (p = 0.725, Estimates of Fixed Effects = -0.044, 95% Wald CI = -0.289 – 0.201)

Table 4 Relationship Between Binge Drinking at 4 Months and 12 Months and Emotion Dysregulation at 12 Months

	Binge Drinking at T2 on Emotion Dysregulation at T3b[1,2]		Binge Drinking at T3a on Emotion Dysregulation at T3b[3,4]	
	Estimates of Fixed Effects (95% Wald CI)	p-value	Estimates of Fixed Effects (95% Wald CI)	p-value
Unadjusted Variable				
Binge Drinking				
Heavy Binge Drinking	0.039 (-0.089 – 0.167)	0.547	0.106 (-0.029 – 0.240)	0.125
Normal Binge Drinking	0.016 (-0.088 – 0.119)	0.766	0.030 (-0.071 – 0.132)	0.557
No Binge Drinking	0	--	0	--
Adjusted Variable				
Binge Drinking				
Heavy Binge Drinking	-0.013 (-0.147 – 0.121)	0.853	0.043 (-0.100 – 0.186)	0.555
Normal Binge Drinking	-0.011 (-0.120 – 0.097)	0.838	-0.002 (-0.107 – 0.104)	0.977
No Binge Drinking	0	--	0	--
Covariates				
Sexual Violence and Physical IPV				
Yes	0.156 (0.053 – 0.259)	0.003	0.153 (0.050 – 0.256)	0.004
No	0	--	0	--
Age				
18 – 20	0.087 (-0.012 – 0.186)	0.086	0.083 (-0.017 – 0.183)	0.105
21– 24	0	--	0	--
Gender				

Female	0.071 (-0.048 – 0.190)	0.239	0.070 (-0.048 – 0.189)	0.243
Male	0	--	0	--
Race				
Other	0.239 (0.003 – 0.476)	0.047	0.238 (0.003 – 0.474)	0.048
Asian	0.153 (-0.086 – 0.392)	0.209	0.153 (-0.086 – 0.391)	0.209
African American	-0.057 (-0.275 – 0.160)	0.605	-0.057 (-0.273 – 0.160)	0.608
Caucasian	0	--	0	--
Ethnic Hispanic/Latino/Latina				
Yes	-0.091 (-0.239 – 0.057)	0.229	-0.086 (-0.235 – 0.064)	0.261
No	0	--	0	--
Athletic Team				
Yes	0.021 (-0.121 – 0.164)	0.768	0.024 (-0.119 – 0.166)	0.745
No	0	--	0	--
Greek Life				
Yes	0.085 (-0.051 – 0.222)	0.220	0.076 (-0.060 – 0.212)	0.274
No	0	--	0	--
Parent Group Assignment				
Intervention	0.049 (-0.048 – 0.146)	0.326	0.049 (-0.048 – 0.146)	0.324
Control	0	--	0	--

Note: IPV=intimate partner violence; T2=4months; T3a=12 months; T3b=12 months.

[1] "Heavy Binge Drinking x Parent Group Assignment" was not significant, thus it was removed from the model (p = 0.173, Estimates of Fixed Effects = -0.183, 95% Wald CI = -0.448 – 0.081)

[2] "Normal Binge Drinking x Parent Group Assignment" was not significant, thus it was removed from the model (p = 0.932, Estimates of Fixed Effects = 0.009, 95% Wald CI = -0.206 – 0.224)

"Heavy Binge Drinking x Parent Group Assignment" was not significant, thus it was removed from the model (p = 0.067, Estimates of Fixed Effects = -0.259, 95% Wald CI = -0.0537 – 0.018)

[4] "Normal Binge Drinking x Parent Group Assignment" was not significant, thus it was removed from the model (p = 0.095, Estimates of Fixed Effects = 0.178, 95% Wald CI = -0.031 – 0.386)

Table 5 Relationship Between Lifetime Experience of Sexual Violence and Physical IPV at Baseline and Emotion Dysregulation at 12 Months

	Emotion Dysregulation Estimates of Fixed Effects (95% Wald CI)[1]	p-value
Unadjusted Variable		
Lifetime Experience of Sexual Violence and Physical IPV		
Yes	0.177 (0.080 – 0.274)	<0.001
No	0	
Adjusted Variable		--
Lifetime Experience of Sexual Violence and Physical IPV		
Yes	0.154 (0.050 – 0.258)	0.004
No	0	--
Covariates		
Age		
18 – 20	0.880 (-0.013 – 0.189)	0.086
21 – 24	0	--
Gender		
Female	0.082 (-0.037 – 0.202)	0.178
Male	0	--
Race		
Other	0.164 (-0.080 – 0.408)	0.189
Asian	0.143 (-0.095 – 0.381)	0.238
African American	-0.062 (-0.278 – 0.154)	0.574
Caucasian	0	--
Ethnic Hispanic/Latino/Latina		
Yes	-0.084 (-0.235 – 0.067)	0.275
No	0	--
Athletic Team		

Yes	0.004	0.955
	(-0.141 – 0.150)	
No	0	--
Greek Life		
Yes	0.066	0.339
	(-0.070 – 0.203)	
No	0	--
Parent Group Assignment		
Intervention	0.069	0.167
	(-0.029 – 0.168)	
Control	0	--

Note: IPV=intimate partner violence.

[1] Interaction term "Lifetime Experience of Sexual Violence and Physical IPV x Parent Group Assignment" was not significant, thus it was removed from the model (p = 0.267, Estimates of Fixed Effects = -0.112, 95% Wald CI = -0.309 – 0.086

Appendix A IRB Approval Letter for the Dissertation Study

University of Pittsburgh
Institutional Review Board

Memorandum

To: Elizabeth Miller, MD
From: IRB Office
Date: 12/5/2018
IRB#:   REN18110294 / PRO14050158
Subject: College Health Center-based Alcohol and Sexual Violence Intervention

Your renewal for the above referenced research study has received expedited review and approval from the Institutional Review Board under:

45 CFR 46.110.(7)

Please note the following information:

Approval Date: 12/5/2018
Expiration Date: 12/4/2019

Please note that it is the investigator's responsibility to report to the IRB any unanticipated problems involving risks to subjects or others [see 45 CFR 46.103(b)(5) and 21 CFR 56.108(b)]. Refer to the IRB Policy and Procedure Manual regarding the reporting requirements for unanticipated problems which include, but are not limited to, adverse events. If you have any questions about this process, please contact the Adverse Events Coordinator at 412-383-1480.

The protocol and consent forms, along with a brief progress report must be resubmitted at least **one month** prior to the renewal date noted above as required by FWA00006790 (University of Pittsburgh), FWA00006735 (University of Pittsburgh Medical Center), FWA00000600 (Children's Hospital of Pittsburgh), FWA00003567 (Magee-Womens Health Corporation), FWA00003338 (University of Pittsburgh Medical Center Cancer Institute).

Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.

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