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There's an App for that? Assessing the Efficacy of Sexual Violence Mobile Apps on Reducing Victimization, Increasing Feelings of Safety and Support, and Improving Mental Health of College Students

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Abstract

Sexual violence, including street harassment, sexual harassment, sexual assault, and rape, is a ubiquitous problem, particularly for college-aged women, with wide-reaching effects, such as increased anxiety, depression, stress, self-blame, guilt, and poorer sleep quality and lower self-esteem. Although there are federally-mandated sexual violence prevention efforts on college campuses, they are generally ineffective, thus, a new approach is needed to address this issue. One such approach is through the use of mobile applications. Studies have shown that there are over 200 sexual violence-related mobile apps currently on the market, but that the majority of them fall short when it comes to preventing sexual violence and reducing its harmful effects. The present study tested the efficacy of two sexual violence mobile apps (*Circle of* 6 and *Hollaback!*) on interpersonal (e.g., social support, communication efficacy, risk assessment, disclosure, etc.) and health outcomes (e.g., anxiety, depression, stress) using an experimental design and undergraduate participants. The Revelation Risk Model (RRM) was also applied in the new context of mobile apps and sexual violence. Results revealed: 1) no significant differences for either app use condition compared to the control condition on any of the outcome variables; 2) partial support for the RRM in the sexual violence context, with two of the risk protection motives (self and relationship) predicted willingness to disclose experiences with sexual violence and communication efficacy regarding sexual violence, but not discussion of sexual violence in general; and 3) significant associations between many of the outcome variables at Time 1, such as rape myth acceptance and attitudes toward establishing consent, suggesting that there are

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important relationships beyond app use that should be further explored. These findings can inform development of future interventions aimed at reducing the harmful effects of sexual violence, whether it be technology-based in the form of mobile apps or interpersonal-based in the form of promoting the discussion and destigmatization of sensitive issues such as sexual violence in order to increase disclosure and improve the health and wellbeing of individuals' interpersonal relationships, not just for victims, but for everyone.

Keywords: Sexual Violence, mHealth, Mobile Apps, Revelation Risk Model, Mental Health

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College Students

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Chapter 1: Introduction

Sexual violence, including street harassment, sexual harassment, sexual assault, and rape, is a ubiquitous problem, particularly for college-aged women, with wide-reaching effects (Cantor, et al., 2015; Rape, Abuse, Incest National Network, 2019; Yung, 2015). Numerous studies have demonstrated that there are high rates of sexual violence, especially on college campuses, and that these numbers are often under-reported (Breiding, 2014; DeMatteo, Galloway, Arnold, & Patel, 2015). These rates of sexual violence and underreporting are even higher at the intersection of gender, race, socioeconomic status, and sexual orientation, due in part to delegitimization of Black and trans women as victims of rape (Slatton & Richard, 2020), the fact that White women are more likely to report sexual violence and be believed than women of color and transgender women (Langenderfer-Magruder, et al., 2014; Olive, 2012; Sorenson & Siegal, 1992; Stotzer, 2009), and the social, emotional, and systemic barriers to reporting such as concerns about victim blaming, the fear that the perpetrator will not be sufficiently punished by the academic institution or criminal justice system, and incomplete, ineffective, or nonexistent institutional policies and practices (DeMatteo, Galloway, Arnold, & Patel, 2015). Instances of sexual violence result in significant negative effects such as increased anxiety, depression, stress, self-blame, guilt, and poorer sleep quality and lower self-esteem, again with increases for marginalized and/or disadvantaged groups (DelGreco & Christensen, 2020; Fairchild & Rudman, 2008; Kilpatrick, Resnick, Ruggiero, Conoscenti, & McCauley, 2007; Rape, Abuse, Incest National Network, 2019; Willness, Steel, & Lee, 2007).

Although there are federally-mandated sexual violence prevention efforts on college campuses, they are generally ineffective on most outcomes beyond increasing knowledge

surrounding sexual violence (Anderson & Whiston, 2005; DelGreco, McCullock, & Hamilton, 2018; Neville & Heppner, 2002); thus, a new approach is needed to address this issue.

One such approach to preventing sexual violence and mitigating its harmful effects is through the use of mobile applications. A mobile approach to health issues, or mHealth, is broadly defined as the use of mobile technologies (e.g., phones, tablets, etc.) to support the achievement of health objectives (Burns, Keating, & Free, 2016; Nurmi, 2013; World Health Organization, 2011). mHealth approaches have been used in numerous contexts such as sexual and reproductive health (Burns, Keating, & Free, 2016; Nurmi, 2013;), depression (Shen, et al., 2015), and sexual violence interventions (Moon, Park, & Sung, 2017; Salazar, Vivolo-Kantor, Hardin, & Berkowitz, 2014). There are currently over 100,000 health-related mobile apps in the Apple app store (iTunes) and the Google Play store (Becker, Miron-Shatz, Schumacher, Krocza, Diamantidis, & Albrecht, 2014), with over 200 of those created for a sexual violence context (Blayney, Jenzer, Read, Livingston, & Testa, 2018). The effects of mHealth interventions are generally mixed (Anderson, et al., 2019; Marcolino, et al., 2018), and the same can be said for sexual violence mobile apps where the majority of them fall short when it comes to preventing sexual violence and reducing its harmful effects (Blayney, Jenzer, Read, Livingston, & Testa, 2018). The efficacy of these apps is also understudied, such that only two sexual violence apps have been empirically tested – *Circle of 6* and *Hollaback!*. These two apps have also displayed mixed results when it comes to their efficacy on outcomes related to sexual violence, such as increased feelings of empowerment, social support, and disclosure/discussion of sexual violence with others, but no change for outcomes of sexual violence behaviors, perceived safety, and bystander intentions (Blayney, et al., 2018; Dimond, et al., 2013).

The goal of this study is to further tease apart the mixed results of the two previous studies that focused on the apps *Circle of 6* (Blayney, et al., 2018) and *Hollaback!* (Dimond, et al., 2013), and to take an interpersonal communication perspective to understand the communication processes that may help explain the effectiveness of these apps, which is lacking in previous studies. There may be interpersonal communication processes and variables, such as disclosure, discussion, and efficacy, that can help explain the effectiveness (or ineffectiveness) of these particular apps. Although sexual violence apps are generally designed for those that have experienced sexual violence, usage of these apps by a broader population that goes beyond individuals who have personally experienced sexual violence may encourage larger conversations and efficacy surrounding consent and sexual violence, which could lead to more positive outcomes such as increased rates of reporting and support for victims and decreased rates of sexual violence and harmful health effects. By incorporating the Revelation Risk Model (Afifi & Steuber, 2009), a model detailing predictors of disclosure in close relationships, and extending it to a sexual violence and mHealth context, this study can help determine whether sexual violence mobile app use facilitates disclosure and/or general discussion of sexual violence. In turn, such communicative process may have effects on numerous interpersonal and health outcomes such as anxiety, depression, perceived safety, and social support, not just for victims, but for anyone who might engage in larger conversations about sexual violence. Such results and understanding will offer valuable implications for designing and evaluating future interventions for larger populations as well as supporting the mental health of individuals who experience sexual violence. The following chapters will provide detail regarding the prevalence and effects of sexual violence (Chapter 2), followed by explanations of mHealth interventions and how they can be used to address sexual assault on college campuses (Chapter 3), an

incorporation of the Revelation Risk Model (RRM) to expand upon previous studies by including an interpersonal communication perspective to understanding the efficacy of mobile app interventions (Chapter 4), sections on the present study's methodology (Chapter 5) and results (Chapter 6), and will conclude with a detailed discussion of these findings with implications for scholars, app designers, and educators (Chapter 7).

Chapter 2: Understanding Sexual Violence and Its Prevalence

Before evaluations can be made of sexual violence mobile apps, it is important to first define and understand the impact of the many types of sexual violence, such as rape, sexual assault, sexual harassment, and street harassment, on various populations. Although there is substantial overlap in the definitions of different types of sexual violence (e.g., rape can also be considered sexual assault, street harassment can also be considered sexual harassment, etc.), it is important to clearly define each act. First, sexual violence is the umbrella term for any form of sexual activity that occurs without freely given consent (Centers for Disease Control and Prevention, 2019). This term can include behaviors such as sexual assault, rape, sexual harassment, and street harassment. Sexual assault is defined as "any nonconsensual sexual act proscribed by Federal, tribal, or State law, including when the victim lacks capacity to consent" (United States Department of Justice, 2019). Behaviors that can be considered sexual assault are forced sexual intercourse, forced sodomy, child molestation, incest, fondling, and attempted rape (United States Department of Justice, 2019).

The definition of rape has recently changed to include any gender of victim and perpetrator, as well as recognizing rape by an object and the capacity to consent. The old legal definition put forth by the FBI in the Uniform Crime Report Summary Reporting System remained unchanged since 1927 and only acknowledged forcible male penile penetration of a female vagina (Carbon, 2012). The new legal definition as of 2012 is "the penetration, no matter how slight, of the vagina or anus with any body part or object, or oral penetration by a sex organ of another person, without the consent of the victim" (Carbon, 2012). This new, broader definition now includes instances in which the victim is unable to give consent due to temporary or permanent mental or physical incapacity, such as due to the ingestion of drugs or alcohol, or

those who are legally incapable of consent due to age. Physical resistance from the victim is no longer a required component to be considered rape (Carbon, 2012). Other forms of sexual violence have also recently adopted updated, more inclusive definitions, such as sexual harassment (United States Equal Opportunity Commission, 2019).

Sexual harassment is defined as unwelcome sexual advances, requests for sexual favors, or other verbal or physical harassment of a sexual nature (United States Equal Employment Opportunity Commission, 2019). United States laws have now acknowledged that sexual harassment does not need to be of a sexual nature to be considered sexual harassment. For example, offensive remarks about a person's sex or gender is also considered sexual harassment and is illegal (United States Equal Employment Opportunity Commission, 2019). However, these remarks must be frequent or severe enough to be considered a hostile or offensive work environment and interfere with a person's ability to perform their job successfully (United States Equal Employment Opportunity Commission, 2019). The sexual harassment literature has been parsed into three main components: sexual coercion, gender harassment, and unwanted sexual attention (Gelfand, Fitzgerald, & Drasgow, 1995). Sexual coercion, or quid pro quo, is the direct request for sexual acts for job or school-related rewards; gender harassment involves making offensive jokes about someone based on their gender; and unwanted sexual attention involves objectifying an individual woman or man (Gelfand, Fitzgerald, & Drasgow, 1995).

A more specific type of sexual harassment that occurs in public spaces is referred to as street harassment. Street harassment is defined as "unwanted comments, gestures, and actions forced on a stranger in a public place without their consent and is directed at them because of their actual or perceived sex, gender, gender expression, or sexual orientation" (Stop Street Harassment, 2019). Street harassment can include behaviors such as graphic sexual comments on

a person's appearance, sexist, homophobic, or transphobic slurs, whistling, leering, public

masturbation, stalking, groping, sexual assault, and rape (Stop Street Harassment, 2019). Given

that there is considerable overlap in the definitions of different types of sexual violence, it would

follow that there is also considerable overlap in the frequencies and effects of these behaviors on

victims.

Sexual Violence Experiences from an Intersectional Feminist Perspective

Sexual violence is an inherently feminist issue due to the presence of power dynamics

and inequities at the intersection of gender, race, sexual orientation, and socioeconomic status

(Cuklanz, 2016; Manning & Denker, 2015), therefore it is important to note the different

experiences of sexual violence that individuals have at this intersection. Many feminist scholars

have analyzed and described sexual violence as a system of oppression that allows men to assert

their power over women, treat women as objects, blame women for their experiences, and further

create gender inequalities at the societal level (e.g., Baron & Straus, 1987; Bograd, 1988;

Brownmiller, 1993; Cherry, 1982; Clark & Lewis, 1977; Gruber & Bjorn, 1986; Lockwood

Harris, Palazzolo, & Savage, 2012; Pina, Gannon, & Saunders, 2009; Shorey, Cornelius & Bell,

2008; Vaux, 1993), Although earlier feminist theories and perspectives aimed to be critical of

how society and research traditionally excluded women's experiences while privileging men's,

they were limited in that they focused on western, middle-class, heterosexual, and White

women's perspectives (Davis, 2008; Frisby, Maguire, & Reid, 2009). More inclusive feminist

theories and perspectives, such as Intersectionality Theory (Crenshaw, 1991), Black Feminist

Theory (Collective, C. R., 1977; hooks, 1984), and Queer Theory (Butler, 1994) aim to account

for more diverse perspectives and experiences. Indeed, Intersectionality Theory was created by

Crenshaw (1991) with the goal of filling the gap of previous feminist theories by incorporating

multiple perspectives and critiquing the idea that all women share the same experience (Spencer, Mallory, Toews, Stith, & Wood, 2017). Within this perspective, intersectionality refers to "the interaction between gender, race, and other categories of difference in individual lives, social practices, institutional arrangements, and cultural ideologies on the outcomes of the interactions in terms of power" (Davis, 2008, p. 68). Numerous studies have shown that individuals of all ages, gender identities, racial backgrounds, and sexual orientations experience sexual violence, yet rates of sexual violence increases at the intersections discussed above, such that sexual violence disproportionately affects women more than men, LGBQ individuals more than heterosexual individuals, transgender individuals more than cisgender individuals, college aged women more than other ages (Cantor, et al., 2015; Rape, Abuse, Incest National Network, 2019), and individuals of color more than White individuals (Rothman, Exner, & Baughman, 2011; Slatton & Richard, 2020; Stop Street Harassment, 2014; Tillman, Bryant-Davis, Smith, & Marks, 2010; West, 2004). It should also be noted that much like the majority of social science research that has almost exclusively used samples that come from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies (Afifi & Cornejo, 2020; Henrich, Heine, & Norenzayan, 2010), this study is limited (as detailed later) in that it focuses primarily on heterosexual, White, college-aged individuals and is written from the perspective of a White, cisgender, heterosexual woman. Therefore, the present study, and much of the cited research in this review, does not fully address the experiences of women of color, non-binary women, transgender women, women of different ages, and non-heterosexual women.

Many women experience sexual violence in their lifetime. More specifically, studies have shown that approximately 1 out of 6 women have reported experiencing completed or attempted rape in their lifetime, and approximately 90% of adult rape victims are women (Rape, Abuse,

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Incest National Network, 2019). Additionally, approximately 25% of women report experiencing sexual assault (Cantor, et al., 2015) and sexual harassment in the workplace in their lifetime (Stop Street Harassment, 2018; National Defense Research Institute, 2014; Willness, Steel, & Lee, 2007). Street harassment is the most common form of sexual violence, with up to 90% of women reporting experiencing it in their lifetime (DelGreco & Christensen, 2020; Fairchild & Rudman, 2008; Stop Street Harassment, 2018). Given the limitations in the WEIRD samples of many of these studies, the present study included, these numbers are more reflective of White cisgender women's experiences than women of color and transgender women. Black women experience higher rates of sexual assault and rape than their White counterparts (Slatton & Richard, 2020). Black women are also much less likely to report or disclose their experiences with sexual violence compared to White women, and when they do disclose, they receive little support (Slatton & Richard, 2020). For example, although the #MeToo movement was started by Black women and meant to share their experiences of sexual violence, it ended up being shared widely by White women and focused on White women's experiences instead of Black women (Burke, 2017; Onwuachi-Willig, 2018). This is in part due to the delegitimization of Black women as victims of rape, the social construction of Black women as inordinately strong, and the sanctioning of intraracial sexual assault disclosure, making Black women one of the most vulnerable groups when it comes to sexual violence (Slatton & Richard, 2020). Transgender individuals, particularly transgender individuals of color, also experience higher rates of sexual assault and rape compared to cisgender individuals, and have less accessibility to support and services when they come forward (Hester et al, 2012; Testa, et al., 2012; Leonard, et al., 2012; Rymer & Cartei, 2015). There are also differences in rates of sexual violence at the intersection of gender, race, sexual orientation, and socioeconomic status. For example, bisexual Black

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women experience higher rates of sexual assaults on college campuses than Black heterosexual women (Krebs, Lindquist & Barrick, 2011; West & Johnson, 2013) and Black women who are of a lower socioeconomic status are more likely to experience sexual violence than Black women of a higher socioeconomic status (West & Johnson, 2013).

Although men are most likely to be the perpetrators of sexual violence, they can also be impacted as victims (Rape, Abuse, Incest National Network, 2019; Stop Street Harassment, 2014). Approximately 17% of men report experiencing sexual harassment in the workplace (Equal Employment Opportunity Commission, 2019), 25% of men report experiencing street harassment in public spaces (Stop Street Harassment, 2014), and 6% of men report experiencing sexual assault in their lifetime (Cantor, et al., 2015). Given that (White) women have been the primary focus of research and interventions in the areas of sexual violence, and the prevalence of male rape myths and homophobic attitudes (e.g., beliefs that only men can be perpetrators of sexual violence and that men who experience sexual violence are perceived as homosexual or less masculine), men are much less likely to disclose their experiences with sexual violence compared to women (Kassing, Beesly, & Frey, 2005; Melanson, 1999). As sexual violence affects individuals of all backgrounds and genders, it is important to be as inclusive as possible when researching victims' experiences and evaluating interventions.

Studies have shown that these statistics often underestimate the actual prevalence of sexual violence due to low levels of incident reporting (DeMatteo, Galloway, Arnold, & Patel, 2015). Using the National Crime Victimization Survey, which compiled data from 1995 to 2013, Sinozich and Langton (2014) found that only 20-30% of rapes and sexual assaults were reported to authorities. These report rates are even lower for women of color and transgender women, given that White women are more likely to report sexual violence and be believed than women

of color and transgender women (Langenderfer-Magruder, et al., 2014; Olive, 2012; Sorenson &

Siegal, 1992; Stotzer, 2009). Possible explanations for the low reporting rates include the desire

to avoid public disclosure, the victim knowing the perpetrator (which reduces the likelihood of

reporting), the uncertainty that there is sufficient evidence to prove that the sexual assault

occurred, the avoidance of further trauma and shame, not being sure if the incident constituted a

crime, the fear that the perpetrator will not be sufficiently punished by the academic institution or

criminal justice system, and incomplete, ineffective, or nonexistent institutional policies and

practices (DeMatteo, Galloway, Arnold, & Patel, 2015). Regardless of whether or not a victim of

sexual violence reported the behavior, it is clear that the high rates of sexual violence result in

substantial negative effects for victims.

Sexual violence is an especially important issue on college campuses, as it is more

prevalent on college campuses and with college aged individuals than any other crime (Cantor, et

al., 2015; Rape, Abuse, Incest National Network, 2019; Yung, 2015). In a campus climate survey

of nine colleges and universities funded by the Bureau of Justice Statistics and United States

Department of Justice, the authors found that approximately 21% of the undergraduate women

surveyed reported experiencing sexual assault since entering college (Krebs et al., 2016).

Similarly, Cantor and colleagues found that approximately 11% of undergraduate students

reported experiencing rape or sexual assault (Cantor, et al., 2015). The same study found that

there was a gender discrepancy, with approximately 25% of female students and five percent of

male students having reported experiencing rape or sexual assault (Cantor, et al., 2015). The

Centers for Disease Control and Prevention have found that nearly 50% of women report

experiencing their first incident of intimate partner violence between 18 and 24 years of age, the

ages when many women attend college (Breiding, 2014).

Health Effects of Sexual Violence

All forms of sexual violence have negative effects on victims, such as posttraumatic stress disorder, depression, anxiety, lower sleep quality, as well as alcohol and drug abuse (DelGreco & Christensen, 2020; Fairchild & Rudman, 2008; Kilpatrick, Resnick, Ruggiero, Conoscenti, & McCauley, 2007; Rape, Abuse, Incest National Network, 2019; Willness, Steel, & Lee, 2007). A nationally representative study conducted for the United States Department of Justice found that criteria for posttraumatic stress disorder were met by 23% of rape victims in the college sample and 34% of victims in the national sample (Kilpatrick et al., 2007). Depression was reported by 23% of sexual assault victims in the national sample and 33% of victims in the college sample (Kilpatrick, et al., 2007). Experiences of alcohol or drug abuse were reported by 10% of assault victims in the national sample and 40% of victims in the college sample (Kilpatrick, et al., 2007). Approximately 70% of sexual assault victims experience moderate to severe distress, which is a larger percentage than for any other violent crime (Rape, Abuse, Incest National Network, 2019). Even milder forms of sexual violence, such as street harassment, have substantial negative effects. Women who experience street harassment feel more unsafe, more anxious, more depressed, have a greater fear of sexual assault, experience more self-objectification, and have poorer sleep quality than women who do not experience street harassment (Davidson, et al., 2016; DelGreco & Christensen, 2020; Fairchild & Rudman, 2008; Kissling, 1991; Macmillan, et al., 2000; Stop Street Harassment, 2014). Taken together, these findings demonstrate that all forms of sexual violence have detrimental health effects on victims, particularly for transgender women (Testa, et al., 2012), women of color (Slatton & Richard, 2020), and college students (Kilpatrick, et al., 2007).

Chapter Summary

      As stated throughout the chapter, sexual violence takes many forms, such as rape, sexual assault, sexual harassment, and street harassment. All forms of sexual violence have harmful health effects and can impact all groups of people, but groups at the intersection of race, gender, socioeconomic status, and sexual orientation experience higher rates of sexual violence and are less likely to report compared to White, cisgender, affluent, and heterosexual individuals. Additionally, sexual violence is the most prevalent crime on college campuses, suggesting that there is still much work to be done when it comes to creating and evaluating interventions that can reduce these harmful behaviors.

Chapter 3: Using Mobile Applications to Address Sexual Assault on College Campuses

Sexual violence is a public health issue, and given the high frequencies on college campuses, there is a clear need for campus-based sexual violence intervention programs. Acknowledging the problem, the federal government has mandated that any institution that receives government funding is required to conduct sexual assault prevention efforts (Neville & Heppner, 2002). However, the typical one-shot video or workshop interventions that are provided to students at the start of their college career are generally only effective at increasing knowledge surrounding sexual violence, but do little in the way of changing other attitudes, such as empathizing with victims, or changing behaviors related to sexual violence (Anderson & Whiston, 2005; DelGreco, McCullock, & Hamilton, 2018). As a result, sexual assault and other forms of sexual violence remain prevalent on college campuses throughout the United States (Cantor, et al., 2015; Sinozich & Langton, 2014). It is clear that the current interventions are not working to reduce these behaviors and their effects on victims, and that something new is needed to solve this significant issue.

One novel approach to addressing sexual violence on college campuses is through the use of mobile applications, or apps. The use of mobile technologies in general, such as smart phones and mobile apps, has increased considerably in recent years (Burns, Keating, & Free, 2016). There are more than 7 billion active mobile phone subscriptions worldwide (Sanou, 2015) with more than 90% of adults in the United States owning a cell phone (Duggan, 2013) and more than 60% owning a smart phone (Pew Research Center, 2015). Young adults are particularly likely to use their cell phones to access health information, with 77% of 18 – 29-year olds reporting using their cell phone to search for health information (Pew Research Center, 2015).

Many organizations are taking advantage of this unprecedented use of mobile technologies and interest in health information by creating mobile approaches to health issues (Willoughby, Niu, & Liu, 2018). A mobile approach to health issues, or mHealth, is broadly defined as the use of mobile technologies (e.g., phones, tablets, etc.) to support the achievement of health objectives such as improving healthcare systems, supporting healthcare professionals, and providing better health outcomes for individuals and patients (Burns, Keating, & Free, 2016; Nurmi, 2013; World Health Organization, 2011). The use of mHealth worldwide has increased alongside the increase of the use of mobile technology, with over 80% of participating World Health Organization members reporting the presence of at least one mHealth initiative in their country (World Health Organization, 2011). There are currently over 100,000 health-related mobile apps in the Apple app store (iTunes) and the Google Play store, with approximately 1000 more being created each month (Becker, Miron-Shatz, Schumacher, Krocza, Diamantidis, & Albrecht, 2014). Due to its low cost and accessibility, mHealth approaches have been used in countries of various development and income levels (Nurmi, 2013; World Health Organization, 2011) and in numerous contexts such as sexual and reproductive health (Burns, Keating, & Free, 2016; Nurmi, 2013;), weight management (Azar, et al., 2013), exercise (Cowan, et al., 2013), depression (Shen, et al., 2015), smoking cessation (Abroms, et al., 2013), cancer (Pandey, Hasan, Dubey, & Sarangi, 2013), alcohol reduction (Crane, et al., 2015), bipolar disorder (Nicholas, Larsen, Proudfoot, & Christensen, 2015), asthma (Huckvale, et al., 2015), and sexual violence interventions (Moon, Park, & Sung, 2017; Salazar, Vivolo-Kantor, Hardin, & Berkowitz, 2014).

The effects of mHealth interventions are generally mixed, with limited evidence demonstrating if mHealth interventions are more effective than conventional interventions (Anderson, et al., 2019; Marcolino, et al., 2018). It has been noted that they have low cost, are

easily accessible, and are able to be used in many contexts and populations (Anderson, et al., 2019), but the majority do not use content targeted at non-WEIRD audiences, which is problematic because it does not acknowledge the varied experiences, behaviors, accessibility, and support of victims of sexual violence at the intersection of gender, race, sexual orientation, and socioeconomic status (Gurman, Rubin, & Roess, 2012; Waldman, 2016). Furthermore, many mHealth initiatives are lacking in theoretically-based content (Cowan, et al., 2013) which may reduce the quality of information and overall efficacy of the intervention.

Sexual Violence Prevention Apps

Regardless of the mixed findings on the efficacy of mHealth approaches, there are numerous mobile apps designed specifically for the health issue of sexual violence and there is encouragement to continue on this path. In 2010, the Obama administration created the "Apps Against Abuse" technology challenge to encourage the development of mobile apps that could help prevent sexual violence. The administration chose two winners, *Circle of 6* and *On Watch*. Both apps allow users to send messages and their location to pre-designated contacts in case of emergency or if they feel they are in an unsafe situation. The idea is that because sexual violence frequently begins in social settings where others are present, supporting the relationship between bystanders, such as members of one's social circle, and potential victims may help to reduce risk (Banyard, 2008; Blayney, et al., 2018; Burn, 2009; Levine, et al., 2002). Additionally, approximately 85% of college students own a smartphone and spend an average of five hours per day using it, which facilitates engagement with their social circle (Lepp, et al., 2014). Therefore, mobile technology is an accessible resource that could be incorporated into harm reduction approaches across a range of risk behaviors, including sexual violence (Blayney, et al., 2018; Kaplan & Stone, 2013).

Since the "Apps Against Abuse" challenge, numerous mobile apps have been created to deal with the issue of sexual violence, particularly for college students and campuses. For example, *Here For You* from Loyola University in Chicago and *TX Safety U* connect students with campus resources if they or their friends are victims of assault. *LiveSafe* allows students to track crimes on their campus, report incidents, view a list of reported activity, and reach out to family, friends, or campus police if they feel unsafe. *U ASK* and *Reach Out* allow victims to quickly contact police, support hotlines, medical centers, taxi services, and specific campus resources.

A recent content analysis identified over 200 mobile apps related to sexual violence on iTunes App Store and Google Play (Bivens & Hasinoff, 2018). Unfortunately, the same analysis found that the features of the apps, at best, left a lot to be desired, and at worst, reinforced problematic beliefs such as rape myths that may actually perpetuate sexual violence, given that acceptance of rape myths is correlated with perpetration of sexual violence (Bivens & Hasinoff, 2018). Generally, the apps were designed to target potential victims rather than potential perpetrators, and focused on preventing sexual violence through personal vigilance and risk-reduction, making it so that the responsibility of sexual violence falls on the victims (Bivens & Hasinoff, 2018). Additionally, most app features primarily work only in cases of attacks by strangers, such as enabling others to monitor the victim for signs of danger depending on their location, which reinforce a "stranger-danger" belief that most sexual assaults occur by strangers and in strange locations when, in fact, most sexual assaults occur close to the victim's home or work and by individuals that are known to the victim (Bivens & Hasinoff, 2018; Rape, Abuse, Incest, National Network, 2019). Of the 215 mobile apps analyzed, 87% of the features were designed for potential victims, 12% for bystanders, and only 1% for perpetrators (Bivens &

Hasinoff, 2018). The majority of the 807 features that were coded were designed for incident intervention (74%), such as specific incidents of violence (e.g., alerting others that an incident is happening), whereas the remaining features were education and awareness focused (e.g., providing information about sexual violence) (Bivens & Hasinoff, 2018).

The majority of incident features were designed to alert others during an incident, such as through a list of preset contacts or through a contact button for a local or national hotline; the majority of education features provided information and statistics about sexual violence and resources (Bivens & Hasinoff, 2018). Of the 6 features (less than 1%) that were designed for perpetrators, they aimed to guide users through the process of negotiating consent during a sexual encounter or provide information about their own abusive behavior (Bivens & Hasinoff, 2018). Although the majority of apps (70%) claimed they were designed to prevent or intervene in situations with *known* perpetrators, the features in the apps primarily only work in cases of assaults by strangers, such as allowing the victim to contact others for help or enabling others to monitor the victim's location for signs of danger (Bivens & Hasinoff, 2018). These features do not take into account the forms of coercion that known perpetrators typically use, such as emotional manipulation or targeting intoxicated victims, and do not offer much help in the way of assaults that occur in familiar locations, as location monitoring features only alert others when victims are in unexpected locations (Bivens & Hasinoff, 2018; Parkhill & Abbey, 2008).

Additionally, the apps focused on individual risk and incident prevention rather than using socially networked strategies to increase engagement, increase motivation, and communicate with friends (Bivens & Hasinoff, 2018). The apps that did involve friends primarily treated them as emergency responders and neglected to use the strength of interpersonal relationships and social support to aid in preventing sexual assault (Bivens &

Hasinoff, 2018). Unfortunately, most current sexual violence apps do not seem to be helping to stop sexual violence, but instead reinforce the myths that victims are responsible for preventing their assaults by controlling their own behavior and that sexual assaults are rare emergencies perpetuated by strangers in unknown locations, rather than acknowledging the common, pervasive behaviors that make up sexual violence (Bivens & Hasinoff, 2018; Elk & Devereaux, 2014).

However, other apps provide hope for better outcomes. Bivens and Hasinoff (2018) noted that there are a few current mobile apps that are not promoting rape myths, but instead are facilitating collective forms of resistance to rape culture by sharing testimonies of personal experiences, such as *Hollaback!* (Bivens & Hasinoff, 2018). *Hollaback!* is a social movement organization that aims to document street harassment and other forms of sexual violence by sharing anonymous stories and locations of where each incident occurred to increase awareness of the issue (Dimond, et al., 2013). *Hollaback!* began as a blog in 2005, but now has iPhone and Android apps and has collected over 3,000 stories of harassment worldwide (Dimond, et al., 2013).

A study that interviewed participants regarding their experiences with the *Hollaback!* app (Dimond, et al., 2013) is one of only two studies that collected participant data to understand the efficacy of sexual violence mobile apps, with the other study analyzing the *Circle of 6* mobile app (Blayney, et al., 2018). Findings from both studies (Dimond, et al., 2013 and Blayney, et al., 2018) are limited in that they used WEIRD samples that focused on the experiences of college-educated young adult women. Users of the *Hollaback!* app generally found it useful for a number of reasons (Dimond, et al., 2013). First, participants indicated that they felt there was a lack of ways to process and cope with their experiences with street harassment, especially because many

of them did not feel comfortable talking about their experience with other people due to family members, friends, or police responding judgmentally in the past (Dimond, et al., 2013). By using the *Hollaback!* website or app to share their stories and read the stories of others, participants were able to reframe how they thought about street harassment to be more of a problem related to the position of women in society instead of just a part of life. They were also able to see the extent that harassment happens on a wide-scale through the use of the map feature and changed the way they thought and felt about their experience (Dimond, et al., 2013). More specifically, participants noted that as part of sharing their experience, they felt validated, were able to reclaim some power, felt that they were helping others, and shifted the blame off of themselves and back onto the perpetrator (Dimond, et al., 2013). The majority of participants felt that the experience of sharing their story was therapeutic and cathartic, although one participant noted that posting her story made her feel like more of a victim and that she was not regaining any power back (Dimond, et al., 2013). In addition to sharing their stories and reading others, participants were able to thank those who helped them during the experience and share artwork related to the experience. As a result of using the app, some participants felt more empowered to talk to other people about their experiences and to stand up for themselves in future interactions (Dimond, et al., 2013). This study showed that something as simple as sharing a story can have an impact on how individuals cope with experiences of sexual violence.

Although the study of *Hollaback!* users offers promising findings regarding reducing some of the negative outcomes of sexual violence, only one study to date has empirically tested the efficacy of a sexual violence mobile app on attitudes and behavioral outcomes (Blayney, et al., 2018). The study analyzed *Circle of 6*, a sexual violence mobile app that was one of the winners of the Obama administration's "Apps Against Abuse" award and is now available in 36

countries in both iPhone and Android formats (Blayney, et al., 2018). *Circle of 6* asks users to

program the contact information of six trusted individuals into the user's safety network

(Blayney, et al., 2018). There are icons in the app that represent specific actions, such as sending

out pre-set group text messages to the user's safety network (i.e., circle). For example, users can

choose to send a "come and get me" message that includes their GPS location, a "call and

pretend you need me" message if the user needs an interruption, and more generic "I need to

talk" or "I am safe" messages (Blayney, et al., 2018). The app also provides links to health and

safety resources and national hotlines (Blayney, et al., 2018).

     Circle of 6 aims to employ the user's social network and bystander intervention strategies

to reduce risk for sexual violence, and is in use on several college campuses such as UCLA and

University of Houston (Blayney, et al., 2018). One study examined the efficacy of *Circle of 6*

app use on bystander intentions to help, bystander behaviors, and sexual victimization over the

two-month follow up, as well as attitudes toward the features of the app (Blayney, et al., 2018).

The majority of participants (70%) talked with their friends about the app (Blayney, et al., 2018).

The sample was mixed on the app's value, whether it made them feel safer from sexual violence,

and whether they would recommend it to a friend (Blayney, et al., 2018). Approximately half of

the participants (48%) liked that the app provided an easy way to contact multiple people at once

for help and approximately one-third (36%) liked the location sharing feature (Blayney, et al.,

2018). However, the majority of participants (55%) felt that the app was unnecessary, as most

smart phones come with many of the same features as the app and it is often easier to use those

features (e.g., texting a friend) rather than opening the app and selecting one of the pre-written

messages that may not fit their situation (Blayney, et al., 2018). Approximately one-third of

participants (32%) also indicated that they were uncomfortable with the group messaging feature

and would prefer to choose one friend to reach out to if they needed help (Blayney, et al., 2018). Additionally, 23% of participants felt that the app was an "emergency only" resource, echoing the limitations discussed earlier by the Bivens and Hasinoff (2018) content analysis, which is particularly concerning, as getting help in less severe situations could help prevent escalation to more severe forms of sexual violence (Blayney, et al., 2018). Overall, app use was low ($M = 1$ use over 2-month follow up, likely due to participants' viewing the app as an emergency only tool), did not change participants' already high intentions to help friends, and did not reduce sexual victimization rates over follow up (Blayney, et al., 2018). Although created with good intent, the results are mixed in whether these sexual violence mobile apps are effective at reducing instances of sexual violence as well as the negative effects of these behaviors.

Chapter Summary

As stated throughout the chapter, there are numerous sexual violence mobile apps on the market (Bivens & Hasinoff, 2018), but many of the features of the apps may contribute to problematic beliefs such as rape myths that may actually perpetuate sexual violence. Only two apps (*Circle of 6* and *Hollaback!*) have been empirically studied but these studies did not include interpersonal communication processes or non-WEIRD samples and results were mixed on whether these particular apps are effective at reducing rates of sexual violence rates and associated negative effects. Therefore, additional research is needed regarding the efficacy of sexual violence mobile apps, particularly from an interpersonal communication perspective.

Chapter 4: Present Study

To further tease apart the mixed results of the two previous studies that focused on the apps *Circle of 6* (Blayney, et al., 2018) and *Hollaback!* (Dimond, et al., 2013), the present study focused on these two apps using an interpersonal communication approach. These particular apps were selected for experimental testing for several reasons. First, they are the only two that have been empirically tested in previous studies, which will allow for a comparison and expansion upon previous results. Second, they are two of the more well-known and well-designed apps, with *Circle of 6* being specifically designed to combat sexual violence and chosen as a winner of the Obama administration's "Apps Against Abuse" challenge, and *Hollaback!* beginning as a blog in 2005 and identified by Bivens and Hasinoff (2018) as one of the few current apps that is facilitating a productive form of resistance to rape culture and not promoting rape myths. Additionally, both apps are available in both iPhone and Android formats and are available and used in dozens of cities and countries world-wide (Dimond, et al., 2013). Lastly, both apps take very different approaches to sexual violence interventions, with *Circle of 6* using a more practical, safety alert approach by allowing users to quickly reach out to preset contacts with programmed messages and their location when they feel they are in an unsafe situation and need help, and *Hollaback!* using a narrative collective-resistance approach where users are able to share anonymous stories and locations of where each incident occurred to increase awareness of the issue (Blayney, et al., 2018; Dimond, et al., 2013). These different approaches allow for comparisons of the unique features of each app on the outcome variables to determine if one approach is more effective for future apps.

The current study expands upon previous work by investigating interpersonal communication processes and variables that may help explain the effectiveness of these

particular apps, such as disclosure and communication efficacy. Currently, it is unknown if and how these apps might change the process of communication between partners, and how such changes may contribute to sexual violence prevention. For example, although previous studies have failed to demonstrate that these apps prevent sexual violence, it is possible that their usage provides a format for discussing sexual violence, a notoriously sensitive and challenging topic for discussion, by reducing disclosure risk and increasing feelings of communication efficacy, which may lead to increased rates of reporting or discussion of consent prior to sexual activity and may in turn lead to lower rates of sexual violence. Indeed, previous studies have demonstrated an association between self-efficacy for engaging in risk-reduction behaviors and rates of sexual victimization (Walsh & Foshee, 1998). One way to further understand the use and effects of these sexual violence mobile apps is through the use of an interpersonal communication theoretical framework that makes disclosure a central variable.

Revelation Risk Model

Numerous studies have demonstrated the positive health effects associated with revealing secrets, such as reduced stress and increased immune functioning (Frattaroli, 2006; Harvey, Orbuch, Chwalisz, & Garwood, 1991; Pennebaker & Francis, 1996), yet many individuals still conceal secrets from those closest to them (Finkenauer, Engels, & Meeus, 2002). Given the lack of reporting of sexual violence behaviors (DeMatteo, et al., 2015), experiences of sexual violence are often akin to keeping a secret, and the sharing of experiences of sexual violence (or even conversations discussing one's thoughts about sexual violence) can thus be considered a form of self-disclosure. Disclosure of experiences with sexual violence is an important aspect of recovery as it has the potential to provide victims with tools and support that facilitate healing and possibly prevent revictimization (Slatton & Richard, 2020; Tillman, Bryant-Davis, Smith, &

Marks, 2010). Increased disclosure is associated with an increased possibility of receiving help and support, which may mitigate the negative effects of sexual violence and lead to improved benefits for psychological and physical health (Slatton & Richard, 2020; Tillman, et al., 2010). The Revelation Risk Model (RRM; Afifi & Steuber, 2009) uses a risk assessment approach to determine and predict how individuals assess the severity of the risks involved in disclosing their secret or sensitive information to someone, as well as how they choose which strategies to use to disclose, and thus provides a valuable framework for understanding communication about sexual violence.

One way that individuals decide whether or not to disclose their secret is by considering how the other person will respond and the potential consequences of sharing this information (Afifi & Steuber, 2009; Vangelisti, Caughlin, & Timmerman, 2001). The RRM builds upon Communication Privacy Management Theory (Petronio, 1991, 2000, 2002), which suggests that because sharing sensitive and personal information with others, such as experiences with sexual violence, is risky and makes people feel vulnerable, individuals often create boundaries to regulate the amount and type of information they share with others. The more people trust others and believe that their information will be met with acceptance, support, and openness, the more likely they are to share more sensitive information with others; conversely, if they believe they will be met with a negative reaction from others, they are less likely to share their information (Afifi, Olson, & Armstrong, 2005; Afifi & Steuber, 2009; Vangelisti & Caughlin, 1997).

The RRM (Afifi & Steuber, 2009) identifies three types of risk that individuals may assess when determining whether or not to share information with others: 1) risk to the self (self-protection), 2) risk to the relationship (relationship-protection) and 3) risk to others (other-protection). Self-protection behaviors and motivations involve individuals not sharing the

information in order to protect themselves from judgment, ridicule, harm, embarrassment, or other risks to the self (Afifi & Guerrero, 2000). Relationship-protection behaviors and motivations involve individuals not sharing the information in order to preserve or protect their relationship with a particular person (Afifi & Schrodt, 2003). Other-protection behaviors and motivations involve individuals not sharing the information in order to protect others from getting hurt (Afifi & Steuber, 2009). The basis of the RRM is that the greater these risks are in relation to the disclosure of the information, the more likely individuals are to not disclose to others, whereas the fewer risks there are, the more likely individuals are to disclose the information (Afifi & Steuber, 2009).

Additionally, the valence of the information plays an important role in assessing risk. For example, sensitive information such as sexual violence has more of a negative valence than other types of information, which increases the risk level, which in turn makes individuals less likely to decide to disclose this information to others (Afifi & Steuber, 2009). The RRM (Afifi & Steuber, 2009) also proposes that individuals are more willing to reveal secrets or sensitive information, such as their experiences with sexual violence, under certain conditions such as if they believe it will reduce stress or be cathartic, if they believe that others need to know or have the right to know this information, if others are encouraging them to reveal this information, and if they feel they have communication efficacy or the ability to talk about the information.

Overall, the RRM (Afifi & Steuber, 2009) predicts that the valence of the information (positive or negative) predicts the degree of risk that individuals feel for 1) themselves, 2) their relationships, and 3) others such that more negative information will be associated with greater risk/stronger protection motives. In the case of experiences with or conversations about sexual violence, it is expected that the information is negatively valenced, and therefore victims of

sexual violence are likely to engage in greater risk and protection motives. As risk increases, the likelihood that individuals will be unwilling to disclose information also increases. Lastly, lower assessment of risks is associated with greater communication efficacy.

Applying the RRM (Afifi & Steuber, 2009) to a sexual violence context may help clarify the effect of sexual assault mobile apps on disclosure and discussion about sexual violence, as well as help determine whether such communication is associated with reduced stress, anxiety, and depression. For example, a person who experiences sexual violence would be likely to have a negative valence regarding the experience. This negative valence would then predict greater risk assessment, such that the person would be more likely to engage in stronger protection motives. In a sexual violence context, this may manifest in the person worrying how others would perceive them after finding out about their experience, that others would potentially use the information against them, or that the information may harm their relationship with others. These concerns would then make it less likely that the person would feel comfortable disclosing this information to others, either by not sharing their experiences with friends or by not reporting to authorities. Additionally, people with greater risk assessments would experience less communication efficacy, which again may result in the person not disclosing to others. It is also possible that a person who has not personally experienced sexual violence would still have a negative valence regarding discussing the topic in general due to stigma, beliefs surrounding the topic, and the sensitive nature of the topic, which would lead to greater protection motives and risk assessment, and result in the person not having communication efficacy regarding discussing sexual violence in general and not feeling comfortable to discuss the topic with others.

Both *Circle of 6* and *Hollaback!* mobile apps are designed to increase disclosure surrounding experiences of sexual violence, such that users may feel less risk and more

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communication efficacy, and thus experience more positive benefits of disclosure, such as increased perceived social support (discussed below) and fewer negative health effects. These benefits may also extend beyond individuals who have personally experienced sexual violence, to any individual who discusses sexual violence in general. For example, although previous studies have shown that these apps are not reducing actual instances of sexual violence, these mobile apps may provide a format to start larger conversations about sexual violence between individuals by reducing disclosure risk and increasing communication efficacy, which could help promote awareness and prevention of sexual violence behaviors.

Additional Variables to Consider

The RRM (Afifi & Steuber, 2009) identifies secret valence, risk assessment and protection motives, communication efficacy, and disclosure as key variables, but there are other important predictors and outcomes to consider in the context of sexual violence, such as general discussions of sexual violence, attitudes toward establishing consent, rape myth acceptance, perceived safety, perceived social support, and health outcomes such as stress, anxiety, and depression. The importance of disclosure of experiences with sexual violence has been noted, but the discussion of sexual violence in general, not just for those who have personally experienced it, is also an important variable. In previous studies, the majority of *Circle of 6* app users and *Hollaback!* users discussed their app use or sexual violence more broadly with members of their social network. Communication about sexual violence in general may lead to discussions of consent in relationships, in turn promoting more awareness surrounding issues of sexual violence and decreasing rates of these behaviors. It may also lead to more supportive responses to others who may disclose their own experiences with sexual violence, which can lead to increased rates of disclosure and reporting, which could also lead to more positive health benefits.

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The importance of perceived social support when it comes to rates of disclosure and health outcomes has been noted previously (Slatton & Richard, 2020), yet a recent content analysis of sexual assault mobile apps (Bivens & Hasinoff, 2018) found that the majority of apps do not use the strength of interpersonal relationships and social support to aid in preventing sexual assault (Bivens & Hasinoff, 2018). Social support has been broadly defined as resources provided by another person (Cohen & Syme, 1985). These resources can be emotional (e.g., expressions of empathy, love, trust, and caring), instrumental (e.g., tangible aid and service), informational (e.g., advice, suggestions, and information), and appraisal (e.g., information that is useful for self-evaluation) (Heaney & Israel, 2008). Emotional and informational resources are the most relevant components for this context, such as offering acceptance, openness, and advice to someone who is disclosing experiences with sexual violence. This study focuses on the variable of perceived social support, or the perception that social relationships will provide resources such as emotional support or information (Cohen, 1992). Indeed, individuals who used the *Hollaback!* app noted that they did not feel comfortable talking about their experiences with sexual violence with others for fear of them responding critically, but they felt comfortable disclosing anonymously on the app and found the experience to be cathartic (Dimond, et al., 2013). These stress-reducing, cathartic effects may translate to reduced feelings of anxiety and depression surrounding the experience of sexual violence in general (Pennebaker, Kiecolt-Glaser, & Glaser, 1988; Pennebaker & Susman, 1988) as well as increased perceptions of safety due to having a supportive social network.

One factor that may negatively impact perceptions of social support is problematic beliefs surrounding sexual violence, or rape myth acceptance. The same content analysis of sexual assault mobile apps (Bivens & Hasinoff, 2018) found that the majority of apps perpetuated

problematic beliefs surrounding rape myths, such as believing that a rape victim is responsible for the behavior based on what she was wearing at the time or that men can only be victims of sexual violence if they are homosexual. Belief in these rape myths, or fear that others believe in them, may then predict greater perceptions of the risks of discussing sexual violence, in turn predicting increased protection motives and lower rates of disclosure. Indeed, studies have shown that greater endorsement of rape myths is associated with hostile attitudes and behaviors toward women, as well as racism, heterosexism, classism, and ageism (Suarez & Gadalla, 2010). These beliefs can lead to less empathy and support for rape victims, which makes it even more difficult for victims, particularly women of color and LGBTQ individuals, to disclose or report their experiences (Langenderfer-Magruder, et al., 2014; Olive, 2012; Sorenson & Siegal, 1992; Stotzer, 2009), which can cause increased negative health effects (Pennebaker, Kiecolt-Glaser, & Glaser, 1988; Pennebaker & Susman, 1988).

Proposed Study and Hypotheses

Given the variables included in the RRM, and the additional variables discussed above as relevant to the sexual violence context, the present study includes the following as key outcomes of both sexual violence mobile apps: stress, anxiety, depression, social support, risk protection motives (relationship, other, and self), rape myth acceptance (male and female), sexual violence communication efficacy, sexual violence victimization, experiences with street harassment, perceived safety, and attitudes toward establishing consent.

First, an initial research question is proposed to determine whether any of the following outcomes will vary for users of *Circle of* 6 and *Hollaback!*:

R1: Is there a difference between *Circle of 6* and *Hollaback!* users on the key study outcomes?

Given that both *Hollaback!* and *Circle of* 6 apps encourage users to share and connect with others, and the cathartic nature of sharing experiences, the first set of hypotheses broadly proposes that the use of these sexual violence apps will be associated with lower levels of the negative mental outcomes noted above (i.e., stress, anxiety, and depression) and high levels of perceived social support. As such, the following hypotheses are put forth:

H1: (a) *Circle of 6* and (b) *Hollaback!* users will report less stress compared to the control group.

H2: (a) *Circle of 6* and (b) *Hollaback!* users will report less anxiety compared to the control group.

H3: (a) *Circle of 6* and (b) *Hollaback!* users will report less depression compared to the control group.

H4: (a) *Circle of 6* and (b) *Hollaback!* users will report more perceived social support compared to the control group.

Given the pathways identified in the RRM and the element of disclosure present in both apps (i.e., *Circle of 6* encourages users to add individuals to their "circle" in order to quickly contact them if they experience or believe they might experience sexual violence and *Hollaback!* encourages users to anonymously share their experiences with sexual violence and to support others who have anonymously disclosed), it is predicted that *Circle of 6* and/or *Hollaback!* users will report reduced assessments of the risks of discussing sexual violence. These reduced assessments of risk will be positively associated with willingness to disclose and communication efficacy, and in turn promote actual disclosure and discussion about sexual violence. Disclosing and/or discussing sexual violence should also be negatively associated with stress, given the cathartic effects of secret revelation. Furthermore, previous studies noted that participants were

more willing to discuss their experiences with sexual violence, or sexual violence in general after using the apps (Blayney, et al., 2018; Dimond, et al., 2013). Both previous studies and the current study included individuals who have and have not experienced sexual violence, therefore general discussions of sexual violence, as well as disclosures of personal experiences with sexual violence were measured. Taken together, the following hypotheses are proposed (and Figure 1 provides a visual depiction of hypotheses 5-9):

H5: (a) *Circle of 6* and (b) *Hollaback!* users will report reduced assessment of the risks of disclosing experiences of sexual violence compared to the control group.

H6: Risk assessment will be negatively associated with (a) willingness to disclose sexual violence experiences (real or imagined), (b) discussion of sexual violence in general, and (c) communication efficacy.

H7: Willingness to disclose sexual violence experiences (real or imagined) (a) and communication efficacy (b) will be positively associated with disclosing personal experiences of sexual violence and discussing sexual violence in general.

H8: Disclosing personal experiences of sexual violence or discussing sexual violence in general will be negatively associated with stress.

H9: An indirect positive association exists between sexual violence app use and disclosing personal experiences of sexual violence or discussing sexual violence in general, such that sexual violence app use is negatively associated with risk assessment, which in turn is associated with greater efficacy and willingness to disclose or discuss sexual violence, which subsequently predicts greater disclosure or discussion.

As noted above, previous research identified aspects of sexual violence apps that reinforce rape myth beliefs (Bivens & Hasinoff, 2018), but such research also indicated that the

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apps may help individuals have more communication efficacy regarding sexual violence, particularly a narrative collective resistance app such as *Hollaback!*. *Hollaback!* was also noted as one of the few apps that does not reinforce rape myth beliefs (Bivens & Hasinoff, 2018). Additionally, previous studies (Blayney, et al., 2018) failed to identify changes in rates of sexual victimization and perceived safety regarding sexual violence after using the apps, leaving questions as to whether app use can benefit these outcomes. Although most measures of sexual victimization include sexual assault and rape (Blayney, et al., 2018), street harassment is also a form of sexual violence that should be measured as an outcome of app use, especially given that *Hollaback!* was designed for a street harassment context specifically. Finally, previous research has yet to determine whether app use can promote positive attitudes toward establishing consent. As mentioned previously, communication about sexual violence in general and communication efficacy surrounding issues of sexual violence may lead to more positive attitudes toward establishing consent and further discussions of consent in relationships. Taken together, the following hypothesis and research questions are posed:

> *H10: Circle of 6* users will report increased acceptance of both male and female rape myths compared to the control group.
>
> *H11:* (a) *Circle of 6* and (b) *Hollaback!* users will report increased communication efficacy surrounding sexual violence compared to the control group.
>
> *RQ2:* Is (a) *Circle of 6* and (b) *Hollaback!* app use associated with rates of sexual victimization and street harassment?
>
> *RQ3:* Is (a) *Circle of 6* and (b) *Hollaback!* app use associated with perceived safety?
>
> *RQ4:* Is (a) *Circle of 6* and (b) *Hollaback!* app use associated with attitudes toward establishing consent?

Chapter Summary

As stated throughout the chapter, the goal of the present study is to further tease apart the mixed results of the two previous studies that focused on the apps *Circle of 6* (Blayney, et al., 2018) and *Hollaback!* (Dimond, et al., 2013), while expanding upon previous work by investigating interpersonal communication processes and variables that may help explain the effectiveness of these particular apps, such as disclosure and communication efficacy. The present study incorporates the Revelation Risk Model (Afifi & Steuber, 2009) as well as additional relevant variables that previous studies have failed to consider to determine the efficacy of *Circle of 6* and *Hollaback!* on numerous interpersonal and health outcomes.

Chapter 5: Methodology

The study hypotheses and research questions were tested using an experimental design with two treatment groups (*Circle of 6* and *Hollaback!*) and one control group. Given the relevancy of both mobile app use and sexual violence prevention efforts on college campuses, the study employed an undergraduate student population. Additional information regarding the study participants, procedures, and measures are detailed below.

Participants

Undergraduate students were recruited from two introductory communication courses at a large northeastern university in the United States. Participants were eligible to enroll in the study if they were students in either course and were over 18 years old. In one course, participants were able to select from an online list of available studies to complete for course credit. Students in this course were awarded course credit for their participation. In the other course, students were awarded extra credit for their participation.

There were 369 responses to the pretest survey and 240 responses to the posttest survey. In the pretest survey, participants were randomized into the *Circle of 6* condition ($n = 112$, 30.4%), the *Hollaback!* condition ($n = 97$, 26.3%), or the control group ($n = 121$, 32.8%). After removing cases with more than 60% missing data for the pretest ($n = 40$) and posttest ($n = 19$), removing cases with missing data for age for the pretest ($n = 5$), and removing cases where the data could not be linked between the pretest ($n = 116$) and posttest ($n = 11$), 208 total undergraduate participants were included in the analyses. The final sample included 65 participants (31%) in the *Circle of 6* group, 53 participants (26%) in the *Hollaback!* group, and 90 participants (43%) in the control group. There were 127 (61.1%) women, 80 (38.5%) men, and 1 (.5%) who identified as genderfluid. The average age for participants was 19.20 years (*SD*

= 1.22, range = 18–22). Participants identified as White (non-Hispanic) (n = 144; 69.2%), Asian

(n = 30; 14.4%), Hispanic (n = 16; 7.7%), Black or African American (n = 15; 7.2%), Pacific

Islander (n = 1; .5%), and other (n = 1; .5%). The majority of participants identified as

heterosexual (n = 190; 91.3%), followed by bisexual (n = 7; 3.4%) and gay (n = 7, 3.4%), other

(n = 2; 1%), and lesbian (n = 1, .5%).

Procedure

This study was conducted between February and April 2020 and used an experimental

design with two treatment groups and one control group. Study approval was obtained by the

Institutional Review Board at the University of Connecticut for compliance with standards for

the ethical treatment of human participants prior to data collection. After being presented with an

information sheet that described the study, explained the benefits and risks, explained the

confidentiality and privacy of the information, and provided the contact information of the

researcher, participants first completed the pretest survey that included the measures detailed

below using the online system, Qualtrics. Participants were then randomized into one of the three

conditions. In the first treatment group (n = 65, 31%), participants were asked to download and

use the *Circle of 6* sexual violence mobile app for a one-month time period. In the second

treatment group (n = 53, 26%), participants were asked to download and use the *Hollaback!*

sexual violence mobile app for a one-month time period. The control group (n = 90, 43%) were

not asked to download or use any mobile app. Within the pretest survey, participants were asked

to create unique codes that allowed data from the pre- and post-survey to be linked. Upon

completion of the pretest survey, participants were instructed to click on a link to another survey

where they entered their email address to receive the link to complete the posttest survey as well

as reminders to use the app. This was done to ensure that any identifiable information (e.g., email

addresses) were kept separate from the main survey data. Participants in the treatment conditions were emailed weekly reminders to use their assigned app. As per IRB requirements, participants had the option to opt out at any point during the study. After one month, participants were emailed a link to the posttest survey on Qualtrics. Upon completion of the posttest survey, participants were instructed to click on a link to another survey where they entered their name to receive course credit for participation in the study.

Measures

Appendix A contains the full survey items. Each measure used during the pretest survey asked participants to reflect on their experiences in general, whereas each measure used during the posttest survey asked participants to reflect on their experiences during the previous month (i.e., the timeframe of the experimental manipulation). For each section that used the terms *sexual violence*, *street harassment*, and *sexual consent*, these terms were defined for participants prior to the items. In sections that used the term *sexual violence*, the definition read: "Please note that the term sexual violence is used extensively throughout this section. Please use the definition of sexual violence below when answering the questions that follow. Sexual violence: the use of sexual actions and/or words that are unwanted by and/or harmful to another person. This can include sexual harassment, street harassment (e.g., catcalling), sexual assault (e.g., unwanted touching), or rape (e.g., unwanted penetration with a foreign object or body part)." In sections that used the term *street harassment*, the definition read: "Street harassment is defined as unwanted sexual attention by a stranger in a public space." In sections that used the term *sexual consent*, the definition read: Please note that the term sexual consent is used extensively throughout this section. "Please use the definition of sexual consent below when answering the

questions that follow. Sexual consent: the freely given verbal or nonverbal communication of a feeling of willingness to engage in sexual activity."

Risk Protection Motives. Risk protection motives were assessed using 23 items to measure if participants have self-protection (12 items), other-protection (6 items), or relationship-protection (5 items) motives (Afifi & Steuber, 2009; Vangelisti & Caughlin, 1997). The subscales were treated as separate variables to measure which motives participants scored higher in. Participants were asked to think about their closest confidant (e.g., friend, family member, significant other, etc.) that they are most likely to reveal experiences with sexual violence to and to indicate how likely they think that each behavior or action would happen if they shared their experience with sexual violence with that particular person. If they had already disclosed an experience with sexual violence already to this person, they were asked to indicate whether they had such concerns before disclosing. If they had not experienced sexual violence, they were asked to imagine how they might feel if they had such experiences. Items were assessed using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). Examples of items from the self-protection motives are "He/she would use the information against me" and "If I told him/her, he/she would tell other people." Examples of items from the other-protection motives are "Revealing the information would create stress for others" and "It would hurt his/her feelings if he/she knew the information." Examples of items from the relationship-protection motives are "If I revealed the information, my relationship with this person would never be as good as it is now" and "Other people would never trust me again if I told this person the information." The mean was calculated across the items and higher scores indicated higher levels of that protection motive. In general, participants reported low levels of self-protection motives at Time 1 ($M = 1.38$, $SD = $

.68; α = .95) and Time 2 (M = 1.38, SD = .64; α = .94); low levels of other-protection motives at Time 1 (M = 2.09, SD = 1.02; α = .88) and Time 2 (M = 2.05, SD = 1.00; α = .89); and low levels of relationship-protection motives at Time 1 (M = 1.40, SD = .78; α = .95) and Time 2 (M = 1.39, SD = .77; α = .93).

Willingness to Report. Willingness to report personal experiences with sexual violence to authority figures was assessed using 3 items created for this study. Participants were asked to indicate their agreement with each of the three items using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). If they had not experienced any form of sexual violence, they were told to skip this section. Example items include "I am willing to report my experiences with sexual violence to an authority figure" and "I am willing to report my experiences with sexual violence to campus police." The mean was calculated across the items and higher scores indicated higher levels of willingness to report sexual violence. In general, participants reported moderate levels of willingness to report sexual violence at Time 1 (M = 3.44, SD = 1.39; α = .97) and Time 2 (M = 3.53, SD = 1.29; α = .97).

Street Harassment Experiences. Frequency of experiencing street harassment was measured using a list of 28 possible street harassing behaviors modified from Sullivan (2011) to be gender-neutral when referencing the perpetrator of the harassment. The scale was designed to represent a broad range of street harassment experiences (e.g., mild, moderate, and severe behaviors). Participants were instructed to think about times when they were approached in public by individuals they had never met before. Participants indicated how often they had experienced the street harassment behaviors using 7-point scales (0 – *Never*, 1 – *Once in the past year*, 2 – *A few times in the past year*, 3 – *About once a month*, 4 – *A few times a month,* 5 – *Almost every day,* 6 – *Multiple times a day*). Sample items include: "A person made sexual

comments to you and then followed you as you walked," "A person stared at you in a sexual way as they walked past you on the street," and "A person made negative comments on your appearance." Scores were averaged across the 28 items such that higher scores indicate greater self-reported frequency of street harassment experiences. In general, most participants did not report experiencing high amounts of street harassment at Time 1 ($M = 1.63$, $SD = .75$; $\alpha = .96$) and Time 2 ($M = 1.58$, $SD = .68$; $\alpha = .96$).

Willingness to Disclose. Willingness to disclose personal experiences with sexual violence was measured using 26 items that considered participants' willingness to disclose under seven conditions: 1) they would never be willing to disclose (e.g., "There is no chance I would ever reveal the information to this person"), 2) if they felt they would be accepted and not judged for disclosing (e.g., "I would reveal the information to this person if he/she wouldn't disapprove of me after hearing it"), 3) if they felt the information was conversationally appropriate (e.g., "I would reveal the information to this person if it seemed to fit into the conversation"), 4) if they felt secure in their relationship with this person (e.g., "I would tell this person if I had a more intimate relationship with him/her"), 5) if they had an important reason to disclose to this person (e.g., "If a crisis arose that necessitated my revealing the information to this person, I would tell"), 6) if they had permission to share the information (e.g., "I would tell someone if my family members thought it was okay to tell", and 7) if the person was a member of their family (e.g., "I would reveal the information to someone if he/she was going to marry into my family") (Afifi & Steuber, 2009; Vangelisti, Caughlin, & Timmerman, 2001). In previous studies (e.g., Afifi & Steuber, 2009), the items loaded onto one latent construct (loadings of .51 - .88) and had high reliability ($\alpha = 92$), therefore the scale was used unidimensionally. Participants were asked to think about their closest confidant (e.g., friend, family member, significant other, etc.) that

they are most likely to reveal experiences with sexual violence to and to indicate how likely they think that each behavior or action would happen if they shared their experience with sexual violence with that particular person. If they had already disclosed an experience with sexual violence already to this person, they were asked to indicate whether they had such concerns before disclosing. If they had not experienced sexual violence, they were asked to imagine how they might feel if they had such experiences. Items were assessed using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). The mean was calculated across the items and higher scores indicated higher levels of willingness to disclose personal experiences with sexual violence. In general, participants reported moderate levels of willingness to disclose experiences with sexual violence at Time 1 ($M = 3.57$, $SD = .75$; $\alpha = .93$) and Time 2 ($M = 3.53$, $SD = .79$; $\alpha = .94$).

Social Support. Perceived social support was measured using the 12-item Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Farley, 1988). Participants were asked to think about their social network, including family, friends, romantic partners, etc. and indicate their agreement with each of the twelve items using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). Example items include "There is a special person/s who is around when I am in need" and "I get the emotional help and support I need from my family." The mean was calculated across the items and higher scores indicated higher levels of social support. In general, participants reported high levels of perceived social support at Time 1 ($M = 4.41$, $SD = .60$; $\alpha = .91$) and Time 2 ($M = 4.33$, $SD = .68$; $\alpha = .92$).

Communication Efficacy. Efficacy to discuss sexual violence was measured using 4 items modified from Afifi and Caughlin (2006). Participants were asked to indicate their

agreement with each of the items using a 5-point Likert scale (1 – *Strongly Disagree*, 2 –

Disagree, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). Example items

include "I wouldn't know what to say if I tried to talk to someone about sexual violence" and "I

wouldn't even know how to begin talking to someone about sexual violence." The mean was

calculated across the items and higher scores indicated higher levels of communication efficacy

regarding sexual violence. In general, participants reported moderate levels of communication

efficacy at Time 1 (M = 3.27, SD = 1.11; α = .94) and Time 2 (M = 3.46, SD = 1.07; α = .94).

Stress. Stress was measured using the 10-item Global Measure of Perceived Stress

(Cohen, Kamarck, & Mermelstein, 1983). Participants were asked to focus on the last 30 days

and to indicate how often they felt what was described in each item using a 5-point Likert scale

(1 – *Never*, 2 – *Sometimes*, 3 – *About half the time*, 4 – *Most of the time*, 5 – *Always*). Example

items include "In the last month, how often have you been upset because of something that

happened unexpectedly?" and "In the last month, how often have you felt that you were unable

to control the important things in your life?" The mean was calculated across the items and

higher scores indicated higher levels of stress. In general, participants reported low levels of

stress at Time 1 (M = 2.62, SD = .65; α = .86) and Time 2 (M = 2.63, SD = .68; α = .88).

Sexual Violence App Use. App use for both *Circle of 6* and *Hollaback!* were measured

using 9 items from Blayney and colleagues (2018). Participants were asked to indicate how often

they used each app over the one month period using a 5-point Likert scale (1 – *Never*, 2 – *Once*,

3 – *2-3 times*, 4 – *4-5 times*, 5 – *More than 5 times*). The mean was calculated across the items

and higher scores indicated higher levels of app use. For the *Circle of 6* condition (n = 65),

participants generally reported low levels of app use over the one month follow up, using the app

approximately one time over the follow up which is consistent with previous studies (Blayney, et

al., 2018) ($M = 2.05$, $SD = 1.02$). Participants were also asked how useful they found the app, if the app made them feel safety regarding sexual violence, and if they would recommend the app to a friend using 5-point Likert scales. *Circle of 6* users generally did not find the app to be useful ($M = 2.34$, $SD = 1.29$), and were mixed on if the app made them feel moderately safer regarding sexual violence ($M = 2.92$, $SD = 1.41$), and if they would recommend it to a friend ($M = 3.24$, $SD = 1.20$). Participants included approximately 4 others in their circle ($M = 3.89$, $SD = 1.93$) and did not generally discuss the app with others ($M = 1.69$, $SD = .76$).

For the *Hollaback!* condition ($n = 53$), participants generally reported moderate levels of app use over the one month follow up, using the app approximately 2-3 times over the follow up ($M = 3.06$, $SD = 1.15$). *Hollaback* users generally did not find the app to be useful ($M = 2.37$, $SD = 1.17$), and were mixed on if the app made them feel moderately safer regarding sexual violence ($M = 2.88$, $SD = 1.14$), and if they would recommend it to a friend ($M = 2.90$, $SD = 1.17$). Participants did not generally discuss the app with others ($M = 1.57$, $SD = .81$).

Discussion of Sexual Violence. General discussion of sexual violence was measured using the 4-item Discussion and Awareness subscale modified from the Revised Sexual Consent Scale (Humphreys, 2004) plus an additional item created for this study. Participants were asked to indicate how often they engaged in each behavior using a 5-point Likert scale (1 – *Never*, 2 – *Once or twice*, 3 – *Sometimes*, 4 – *Often*, 5 – *Very often*). Example items include "I have discussed sexual violence issues with a friend" and "I have discussed sexual violence issues with my current (or most recent) partner." The newly added item was the following: "I have discussed sexual violence issues with a family member." The mean was calculated across the items and higher scores indicated higher levels of discussion about sexual violence with others. In general,

participants reported low levels of discussing sexual violence issues at Time 1 ($M = 2.35$, $SD = .67$; $\alpha = .86$) and Time 2 ($M = 2.38$, $SD = .65$; $\alpha = .71$).

Disclosure of Experiences with Sexual Violence. Disclosure of personal experiences with sexual violence was measured using 3 items from the Discussion and Awareness subscale modified from the Revised Sexual Consent Scale (Humphreys, 2004) plus three additional items created for this study. Participants were asked to indicate how often they engaged in each behavior using a 5-point Likert scale (1 – *None at all*, 2 – *A little*, 3 – *A moderate amount*, 4 – *A lot*, 5 – *A great deal*). If they had not experienced any form of sexual violence, they were told to skip this section. Example items include "I have disclosed my experiences with sexual violence to a friend" and "I have disclosed my experiences with sexual violence with my current (or most recent) partner." The three newly added items were the following: "I have disclosed my experiences with sexual violence to a family member," "I have reported my experiences with sexual violence to campus police," and "I have reported my experiences with sexual violence to local police." The mean was calculated across the items and higher scores indicated higher levels of discussion about sexual violence with others. In general, participants reported low levels of disclosing their experiences with sexual violence at Time 1 ($M = 1.31$, $SD = .52$; $\alpha = .78$) and Time 2 ($M = 1.31$, $SD = .55$; $\alpha = .84$).

Attitude Towards Establishing Consent. Attitude towards establishing consent was measured using the 9-item Positive Attitude Towards Establishing Consent subscale of the Revised Sexual Consent Scale (Humphreys, 2004). Participants were asked to indicate their agreement with each of the items using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). Example items include "I feel that sexual consent should always be obtained before the start of any sexual

activity" and "I think it is equally important to obtain sexual consent in all relationships regardless of whether or not they have had sex before." The mean was calculated across the items and higher scores indicated more positive attitudes towards establishing consent. In general, participants reported very positive attitudes toward establishing consent at Time 1 ($M =$ 4.50, $SD = .64$; $\alpha = .91$) and Time 2 ($M = 4.62$, $SD = .55$; $\alpha = .90$).

Perceived Safety. Perceptions of safety regarding sexual violence was measured using 4 items modified from Maas and colleagues (Maas, Spreeuwenberg, Van Winsum-Westra, Verheij, Vries, & Groenewegen, 2009). Participants were asked to indicate how often they engaged in the behaviors listed using a 5-point Likert scale (1 – *Never*, 2 – *Sometimes*, 3 – *About half the time*, 4 – *Most of the time*, 5 – *Always*). Example items include "How often do you feel unsafe?" and "How often do you avoid places (e.g., Greek houses, certain areas on campus), because you think they are unsafe?" The items were reverse coded and the mean was calculated across the items. Higher scores indicated higher levels of safety perceptions regarding sexual violence. In general, participants reported high levels of perceptions of safety at Time 1 ($M = 4.07$, $SD = .83$; $\alpha = .75$) and Time 2 ($M = 4.09$, $SD = .85$; $\alpha = .79$).

Anxiety. Anxiety was measured using the 11-item State-Trait Anxiety Inventory (Spielberger, 1983). Participants were asked to focus on the last 30 days and to indicate their agreement with what was described in each item using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). Example items include "I was calm, cool, and collected" and "I worried too much over something that really doesn't matter." The mean was calculated across the items and higher scores indicated higher levels of anxiety. In general, participants reported low levels of anxiety at Time 1 ($M = 2.85$, $SD = .74$; $\alpha = .87$) and Time 2 ($M = 2.69$, $SD = .75$; $\alpha = .87$).

Depression. Depression was measured using the shortened 10-item depression scale (Zhang, et al., 2012). Participants were asked to focus on the last 30 days and to indicate their agreement with what was described in each item using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). Example items include "I felt depressed" and "I felt that everything I did was an effort." The mean was calculated across the items and higher scores indicated higher levels of depression. In general, participants reported low levels of depression at Time 1 ($M = 2.64$, $SD = .84$; $\alpha = .87$) and Time 2 ($M = 2.54$, $SD = .83$; $\alpha = .88$).

Sexual Violence Victimization. Sexual violence victimization was measured using the 11-item Sexual Experiences Survey (Testa, VanZile-Tamsen, Livingston, & Koss, 2004). Items were modified to be gender-neutral in perpetrator and victim language. Participants were asked to indicate if they have experienced any of the behaviors using a 5-point Likert scale (1 – *Definitely not*, 2 – *Probably not*, 3 – *Might or might not*, 4 – *Probably yes*, 5 – *Definitely yes*). Example items include "Have you ever been fondled, kissed, or touched sexually when you didn't want to because they used their position of authority (boss, teacher, camp counselor, supervisor) to make you?" and "Have you had sexual intercourse when you didn't want to because they made you intoxicated by giving you alcohol or drugs without your knowledge or consent?" The mean was calculated across the items and higher scores indicated higher levels of sexual victimization. In general, participants reported low levels of sexual victimization at Time 1 ($M = 1.24$, $SD = .48$; $\alpha = .85$) and Time 2 ($M = 1.28$, $SD = .52$; $\alpha = .86$).

Female Rape Myth Acceptance. Female rape myth acceptance was measured using McMahon & Farmer's (2011) 22-item scale that is an updated version of the Illinois Rape Myth Acceptance Scale (Payne, Lonsway, & Fitzgerald, 1999), which consists of a general rape myth

construct and includes the subscales She Asked For It (e.g., "If a girl is raped while she is drunk, she is at least somewhat responsible for letting things get out of control"), He Didn't Mean To (e.g., "Guys don't usually intend to force sex on a girl, but sometimes they get too sexually carried away"), It Wasn't Really Rape (e.g., "If a girl doesn't physically fight back, you can't really say it was rape"), and She Lied (e.g., "A lot of times, girls who say they were raped agreed to have sex and then regret it"). The original overall scale reliability has been reported at .93, with subscale alphas ranging from .74 to .84 (Payne, Lonsway, & Fitzgerald, 1999) and the updated version had an overall reliability of .87 (McMahon & Farmer, 2011), with an acceptable fit of the second-order factors model that contained the four first-order factors (CFI = .90, Tucker-Lewis index [TLI] = .97, RMSEA = .07) and statistically significant correlations among the factors, therefore the scale was used unidimensionally. Participants were asked to indicate their agreement with each of the items using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). The mean was calculated across the items and higher scores indicated higher beliefs in rape myths. In general, participants reported low levels of rape myth acceptance at Time 1 (*M* = 1.81, *SD* = .50; *α* = .87) and Time 2 (*M* = 1.70, *SD* = .50; *α* = .88).

Male Rape Myth Acceptance. Male rape myth acceptance was measured using 22 items from Melanson (1999). Participants were asked to indicate their agreement with each of the items using a 5-point Likert scale (1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neither Agree Nor Disagree*, 4 – *Agree*, 5 – *Strongly Agree*). Example items include "Male rape is more serious when the victim is heterosexual than when the victim is homosexual" and "I would have a hard time believing a man who told me that he was raped by a woman." The mean was calculated across the items and higher scores indicated higher beliefs in male rape myths. In general,

participants reported low levels of female rape myth acceptance at Time 1 ($M = 1.70$, $SD = .49$; α

$= .88$) and Time 2 ($M = 1.63$, $SD = .52$; $\alpha = .90$).

Chapter 6: Results

Preliminary Analyses

The hypotheses and research questions were addressed using bivariate correlations, ANCOVAs, and multiple linear regression analyses, therefore a priori power analyses were conducted for those three analyses using G*Power 3.1.9.4. For bivariate correlations with an expected effect size of .30 (medium effect size), an error probability of .05, and power of .80, the total sample size required is 64. For an ANCOVA, with an effect size of .25 (medium effect size), error probability of .05, power of .80, with 3 groups, and 2 covariates, the total sample size required is 158. For a multiple linear regression, with an effect size of .15 (medium effect size), error probability of .05, power of .80, with 3 predictors, the total sample size required is 76.

Pearson product-moment correlations were conducted to determine potential covariates to include in subsequent analyses, with a particular focus on gender, relationship status, and experiences with sexual violence and street harassment (see Table 1)

Table 1 Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1 Stress	**.65****	.71**	.70**	-.37**	-.16*	-.05	-.24**	-.04	-.07	.10	.14	.07	.05	-.15	-.13	.14	.09	.13	.21**	.15*	-.01	-.07	.07	-.10
2 Depression	.79**	**.72****	.76**	-.38**	-.21**	-.06	-.20**	-.04	-.05	.08	.10	.06	.08	-.12	-.07	.08	.16*	.08	.12	.17*	.12	-.05	-.07	-.02
3 Anxiety	.80**	.80**	**.75****	-.35**	-.23**	-.08	-.25**	-.07	-.11	.09	.13	.14	.03	-.20*	-.10	.11	.18*	.13	.26**	.20**	-.07	.01	.06	-.03
4 Social Support	-.35**	-.40**	-.32**	**.66****	-.06	.18*	.19**	-.12	-.11	-.10	-.12	-.07	.11	.17*	.15*	-.30**	-.22**	-.26**	.10	-.26**	.06	-.04	-.02	.03
5 Safety	-.18*	-.15*	-.17*	.02	**.71****	-.04	-.05	-.05	.00	-.16*	-.26**	-.23**	-.29**	-.03	-.07	-.07	-.08	-.07	-.43**	.15*	.04	.03	-.06	.06
6 Consent	.07	.06	.10	.06	-.10	**.50****	.15*	-.51**	-.54**	-.17*	-.19**	-.33**	-.04	.09	.19*	-.31**	-.19**	-.34**	.17*	-.16*	.02	-.02	.00	-.01
7 Comm Efficacy	-.15*	-.13	-.13	.15*	.06	-.04	**.66****	-.12	-.15*	.05	.04	.06	.24**	.15	.17*	-.17*	-.18**	-.16*	-.00	-.03	.07	.06	-.12	.12
8 Female RMA	-.18*	-.07	-.19**	-.05	.15*	-.37**	-.11	**.71****	.75**	.01	-.10	.04	-.09	.02	-.08	.23**	.14	.27**	-.28**	.11	.04	-.04	-.01	-.05
9 Male RMA	-.23**	-.16*	-.25**	-.06	.09	-.50**	-.12	.64**	**.67****	.01	-.03	.09	-.07	.03	-.14	.32**	.24**	.33**	-.29**	.08	.11	-.06	-.06	-.03
10 Sexual Victimization	.06	.06	.02	-.00	-.06	-.14*	.08	-.01	.03	**.68****	.47**	.44**	.20**	-.45**	-.20*	.36**	.30**	.32**	.14*	.01	-.09	.10	-.00	.10
11 Street Harassment	.21**	.13	.16*	-.03	-.31*	.12	.03	-.29**	-.25**	.23**	**.69****	.45**	.28**	-.25**	-.14	.36**	.24**	.31**	.29**	-.07	-.11	.05	.07	.09
12 SV Disclosure	.11	.19	.23*	-.01	-.06	-.04	.17	-.10	-.15	.44**	.27**	**.33****	.39**	-.22*	-.10	.33**	.31**	.38**	.29**	.03	-.15	-.02	.16	-.11
13 SV Discussion	.18**	.23**	.17*	-.06	-.28**	.01	.34**	-.17*	-.15*	.19**	.29**	.42**	**.65****	.00	.01	.08	.00	.09	.21**	-.16*	.00	.03	-.03	.08
14 Willingness to Report	-.24**	-.21*	-.22**	.10	.03	.02	.06	.09	.10	-.37**	-.11	-.17	-.09	**.61****	.32*	-.10	-.24**	-.07	-.12	-.20*	.07	-.06	-.01	-.12
15 Willingness to Disclose	-.12	-.07	-.05	.05	-.03	.16*	.00	-.11	-.23**	-.07	-.04	.12	.10	.28**	**.54****	-.18*	-.05	-.15*	.05	-.08	.05	.04	-.09	.05
16 Relationship Protection	.11	.01	-.02	-.09	.02	-.30**	-.10	.25**	.37**	.20**	.15*	.04	.03	-.10	-.15	**.59****	.65**	.85**	-.00	.11	-.04	-.03	.06	-.08
17 Other Protection	.13	.10	.06	-.17*	-.11	-.12	-.09	20**	.25**	.26**	.16*	.14	.11	-.22**	-.00	.54**	**.54****	.62**	.11	.04	-.02	.02	.01	-.00
18 Self Protection	.11	.06	-.00	-.17*	-.01	-.31**	-.03	.24**	.36**	.24**	.15*	.11	.05	-.10	-.14	.89**	.58**	**.51****	.02	.14	-.07	-.07	.13	-.13
19 Gender	.22**	.13	.25**	.10	-.48**	.22**	-.01	-.25**	-.29**	.15*	.40**	.27**	.19**	-.20*	-.03	-.02	.08	-.01	-	-.08	-.07	-.02	.08	-.09
20 Relationship Status	.16*	.22*	.17*	-.20**	.17*	-.10	.05	-.03	.02	-.05	.05	-.11	-.05	-.05	-.16*	.08	.04	.05	-.07	**.85****	-.08	.03	.05	-.09
21 Circle of 6	.06	.11	.00	.02	.05	.11	.06	.02	-.01	-.03	-.09	-.01	.06	-.13	-.11	.03	-.02	.00	-.07	-.06	-	-.39**	-.59**	.11
22 Hollaback!	-.04	-.10	-.04	-.01	-.05	-.10	-.01	.05	.01	.02	.06	.11	.05	.13	.11	-.04	.02	.00	-.02	.03	-.39**	-	-.51**	.61**
23 Combined App Condition	-.02	-.01	.03	-.01	-.09	-.02	-.05	-.06	.00	.01	.03	-.08	-.10	.01	.00	.00	.00	-.01	.08	.04	-.59**	-.51**	-	-.64**
24 Combined App Dosage	-.04	-.13	-.07	.03	.09	-.06	.06	.06	-.03	-.01	.00	.01	.08	.07	.02	-.01	-.03	-.01	-.09	-.07	.11	.61**	-.64**	-

***p < .001, **p < .01, *p < .05

Note: Values below the divider are at Time 1, values above the divider are at Time 2,
and values at the diagonal are correlations between Time 1 and Time 2.

Relevant covariates are noted for each hypothesis below. One participant identified as nonbinary, therefore analyses that included gender as a variable or covariate did not include this person so that differences between men and women could be assessed (i.e., correlations and ANCOVAs). Additionally, to control for baseline levels at the commencement of the study, the Time 1 score for each outcome variable was included as a covariate in subsequent analyses. Only one participant reported previous experience with the either app; therefore, prior app use was not included as a covariate in the models.

Hypothesis Testing

The first research question asked if there were differences between the *Circle of 6* and *Hollaback!* experimental conditions on any of the outcomes. Independent samples *t*-tests were conducted to determine if the main outcome variables (at Time 2) differed between the two experimental mobile app conditions. There were no significant differences for any of the outcome variables between the two app conditions: communication efficacy, $t(115) = -.02$, $p = .99$; safety, $t(116) = -.01$, $p = .99$; willingness to disclose, $t(110) = .06$, $p = .95$; consent, $t(114) = .41$, $p = .68$; depression, $t(113) = 1.41$, $p = .16$; female rape myth acceptance, $t(111) = .64$, $p = .52$; male rape myth acceptance, $t(114) = 1.34$, $p = .18$; sexual victimization, $t(115) = -1.53$, $p = .13$; anxiety, $t(116) = -.63$, $p = .53$; sexual violence disclosure, $t(72) = -1.03$, $p = .31$; sexual violence discussion, $t(115) = -.28$, $p = .78$; stress, $t(114) = .51$, $p = .61$; social support, $t(114) = .85$, $p = .40$; street harassment experiences, $t(113) = -1.24$, $p = .22$; willingness to report, $t(79) = .94$, $p = .35$; relationship protection motives, $t(113) = -.08$, $p = .94$; other protection motives, $t(112) = -.36$, $p = .72$; and self protection motives $t(112) = .18$, $p = .86$. Given the lack of differences between the experimental conditions, the two conditions were combined for subsequent analyses.

The first set of hypotheses (1 – 4) predicted that individuals who used the sexual violence apps would report lower levels of negative mental health outcomes (i.e., stress, anxiety, and depression) and higher levels of perceived social support compared to those in the control group. These hypotheses were tested using one-way ANCOVAs with treatment condition (app use or control group) as the independent variable, participants' Time 2 scores for stress, anxiety, depression, and perceived social support as the dependent variables, and Time 1 scores for each dependent variable as covariates. Gender, relationship status at Time 1, and experience with street harassment at Time 1 were also included as covariates for analyses regarding stress given the significant correlations among these variables (see Table 1). Gender and relationship status at Time 1 and Time 2 were included as covariates for analyses regarding anxiety. Relationship status at Time 2 was included as a covariate for analyses regarding depression. Relationship status at Time 1 and Time 2 were included as covariates for analyses regarding perceived social support. There were no significant differences between the treatment groups and control group at Time 2 in stress [$F(1, 187) = 1.21$, $p = .27$], anxiety [$F(1, 198) = .48$, $p = .49$], depression [$F(1, 197) = 1.70$, $p = .19$], or social support [$F(1, 198) = .01$, $p = .92$]. Therefore, hypotheses 1 – 4 were not supported (see Table 2 for mean comparisons).

Table 2 Mean Comparisons of Outcome Variables

	t-test	App				Control			
		Raw Mean	*SD*	*Estimated Marginal Mean*	*n*	*Raw Mean*	*SD*	*Estimated Marginal Mean*	*n*
Stress	$t(114) = .51, p = .61$	2.59	.67	2.59	110	2.67	.71	2.68	83
Anxiety	$t(116) = -.63, p = .53$	2.65	.75	2.67	117	2.74	.73	2.72	87
Depression	$t(113) = 1.41, p = .16$	2.60	.87	2.59	113	2.46	.77	2.48	88
Social Support	$t(114) = .85, p = .40$	4.33	.64	4.32	115	4.31	.73	4.32	88
Relationship Protection	$t(113) = -.08, p = .94$	1.35	.69	1.37	105	1.44	.87	1.43	78
Other Protection	$t(112) = -.36, p = .72$	2.06	1.03	2.07	106	2.08	.98	2.06	76
Self Protection	$t(112) = .18, p = .86$	1.30	.53	1.31	108	1.44	.71	1.44	77
Male RMA	$t(114) = 1.34, p = .18$	1.71	.49	1.71	106	1.67	.49	1.67	79
Female RMA	$t(111) = .64, p = .52$	1.64	.53	1.62	106	1.63	.54	1.67	82
SV Comm Efficacy	$t(115) = -.02, p = .99$	3.57	1.07	3.54	117	3.30	1.05	3.46	89
SV Victimization	$t(115) = -1.53, p = .13$	1.25	.51	1.28	108	1.28	.49	1.25	79
Street Harassment	$t(113) = -1.24, p = .22$	1.55	.72	1.56	108	1.63	.66	1.62	79
Safety	$t(116) = -.01, p = .99$	4.15	.84	4.11	110	4.03	.88	4.10	80
Consent	$t(114) = .41, p = .68$	4.64	.52	4.62	112	4.62	.60	4.63	81
Willingness to Disclose	$t(110) = .06, p = .95$	3.59	.77	3.59	112	3.46	.80	3.46	87
Willingness to Report	$t(79) = .94, p = .35$	3.54	1.31	3.54	81	3.51	1.29	3.51	67
SV Disclosure	$t(72) = -1.03, p = .31$	1.23	.41	1.23	74	1.41	.68	1.41	55
SV Discussion	$t(115) = -.28, p = .78$	2.39	.64	2.39	117	2.35	.67	2.36	88

The second set of hypotheses (5 – 9) used the Revelation Risk Model as the basis to predict that sexual violence app use would reduce risk assessment (i.e., the three protection motives), which would be positively associated with willingness to disclose and communication efficacy, and in turn promote disclosure and discussion about sexual violence. H5 was tested using a one-way ANCOVA with sexual victimization at Time 1 and Time 2 and street harassment experiences at Time 1 and Time 2 included as covariates for analyses regarding relationship protection and other protection motives. Sexual victimization at Time 1 and Time 2

and street harassment experiences only at Time 2 were included as covariates for analyses regarding self protection motives. There were no significant differences between the treatment group and control group at Time 2 in self protection motives [$F(1, 179) = 3.55$, $p = .06$], other protection motives [$F(1, 175) = .01$, $p = .94$] or relationship protection motives [$F(1, 176) = .50$, $p = .48$]. Therefore, hypothesis 5 was not supported.

Hypotheses 6 – 8 were tested using linear regression analyses and did not include covariates. For hypothesis 6, multiple regression analyses were carried out to investigate whether any of the three protection motives (relationship, self, and other) significantly predicted participants' willingness to disclose their personal experiences with sexual violence, discussion of sexual violence in general, and communication efficacy regarding sexual violence. The results of the regression regarding willingness to disclose indicated that the model explained 44% of the variance and that the model was a significant predictor of participants' willingness to disclose, $F(3, 189) = 2.90$, $p = .04$, however none of the protection motives significantly contributed to the model individually (See Table 3).

Table 3: Risk Assessment Motives Predicting Willingness to Disclose Experiences with Sexual Violence

IV	r	B	β	t	SE	p	F	Model p	Model R^2
Relationship	-.19*	-.24	-.24	-1.67	.14	.10			
Self	-.16*	-.05	-.04	-.28	.16	.78	(3, 189) = 2.90*	.04	.04
Other	-.05	.10	.13	1.39	.07	.15			

*$p < .05$, r = zero-order correlation

Note: Relationship, self, and other protection motives were tested individually as well as one model. Significance testing is based on individual model testing where each motive was included as the only IV.

The results of the regression regarding discussion of sexual violence indicated that the model explained 11.8% of the variance and that the model was a significant predictor of

participants' discussion of sexual violence in general, $F(3, 124) = 5.54$, $p = .001$; however, none

of the protection motives significantly contributed to the model individually (See Table 4).

Table 4: Risk Assessment Motives Predicting Discussion of Sexual Violence

IV	*r*	**B**	*ß*	*t*	*SE*	*p*	**F**	**Model *p***	**Model *R²***
Relationship	.07	.02	.03	.18	.12	.89			
Self	.09	.14	.23	.99	.14	.06	(3, 124) =	.001	.02
Other	-.00	-.07	-.11	-1.18	.06	.45	5.54**		

**p < .01, r = zero-order correlation

Note: Relationship, self, and other protection motives were tested individually as well as one model.

Significance testing is based on individual model testing where each motive was included as the only IV.

The results of the regression regarding communication efficacy indicated that the model

explained 19.6% of the variance and that the model was not a significant predictor of

participants' communication efficacy, $F(3, 195) = 2.93$, $p = .05$ and none of the protection

motives significantly contributed to the model individually (See Table 5).

Table 5: Risk Assessment Motives Predicting Communication Efficacy

IV	*r*	**B**	*ß*	*t*	*SE*	*p*	**F**	**Model *p***	**Model *R²***
Relationship	-.17*	-.09	-.06	-.46	.20	.63			
Self	-.16*	-.03	-.02	-.11	.23	.92	(3, 195) = 2.93	.05	.04
Other	-.19**	-.15	-.14	-1.52	.10	.15			

**p < .01, *p < .05, r = zero-order correlation

Note: Relationship, self, and other protection motives were tested individually as well as one model.

Significance testing is based on individual model testing where each motive was included as the only

IV.

Given issues of multi-collinearity between the three risk protection motives (see Table 1),

additional regression analyses were carried out to test each motive in separate models on the

outcome variables. The results of the regressions regarding the self protection motive indicated

that self protection was a significant predictor of participants' willingness to disclose personal

experiences with sexual violence, $B = -.15$, $p = .03$; model $F(1, 195) = 4.54$, $p = .03$, $R^2 = .02$, and participants' communication efficacy, $B = .12$, $p = .02$; model $F(1, 201) = 5.86$, $p = .02$; $R^2 = .03$, but not participants' discussion of sexual violence in general, $B = .09$, $p = .22$; model $F(1, 199) = 1.54$, $p = .22$, $R^2 = .01$. The results of the regressions regarding the relationship protection motive indicated that relationship protection was a significant predictor of participants' willingness to disclose personal experiences with sexual violence, $B = -.18$, $p = .01$; model $F(1, 196) = 6.60$, $p = .01$, $R^2 = .03$, and participants' communication efficacy, $B = -.17$, $p = .02$; model $F(1, 202) = 6.57$, $p = .02$, $R^2 = .03$, but not participants' discussion of sexual violence in general, $B = .07$, $p = .30$; model $F(1, 200) = 1.10$, $p = .30$, $R^2 = .01$. The results of the regression regarding the other protection motive indicated that other protection was a significant predictor of participants' communication efficacy, $B = -.19$, $p = .008$; model $F(1, 199) = 7.28$; $p = .008$, $R^2 = .04$, but not participants' willingness to disclose personal experiences with sexual violence, $B = -.05$, $p = .49$; model $F(1, 193) = .49$, $p = .49$, $R^2 = .003$ or discussion of sexual violence in general, $B = -.003$, $p = .97$; model $F(1, 197) = .001$, $p = .97$, $R^2 = .00$. Therefore, hypothesis 6 was partially supported.

For hypothesis 7, a multiple regression was carried out to investigate whether willingness to disclose experiences with sexual violence and communication efficacy could significantly predict participants' disclosure of personal experiences with sexual violence and discussion of sexual violence in general. The results of the regression regarding disclosure of personal experiences with sexual violence indicated that the model explained 44% of the variance and that willingness to disclose and communication efficacy were not significant predictors of participants' disclosure of experiences with sexual violence, and neither willingness to disclose nor communication efficacy significantly contributed to the model individually (See Table 6).

Table 6: Willingness to Disclose and Communication Efficacy Predicting Disclosure of Sexual Violence Experiences

IV	B	β	t	SE	p	F	Model p	Model R^2
Willingness to Disclose	-.06	-.08	-.89	.06	.23	(2, 120) = .98	.38	.02
Communication Efficacy	.06	.11	1.21	.05	.37			

The results of the regression regarding discussion of sexual violence in general indicated that the model explained 6.6% of the variance and that willingness to disclose and communication efficacy were significant predictors of participants' discussion of sexual violence, $F(2, 192) = 2.79$, $p = .001$. Communication efficacy contributed significantly to the model individually but willingness to disclose did not (See Table 7). Therefore, hypothesis 7 was partially supported.

Table 7: Willingness to Disclose and Communication Efficacy Predicting Discussion of Sexual Violence

IV	B	β	t	SE	p	F	Model p	Model R^2
Willingness to Disclose	-.03	-.03	-.46	.06	.63	(2, 192) = 2.79**	.001	.07
Communication Efficacy	.16	.26	3.73	.04	< .00			

$**p < .01$

For hypothesis 8, a multiple regression was carried out to investigate whether disclosing personal experiences with sexual violence and discussing sexual violence in general could significantly predict participants' stress levels. The results of the regression indicated that the model explained 6% of the variance and that disclosing personal experiences with sexual violence and discussing sexual violence in general were not significant predictors of participants' stress levels, $F(2, 122) = .36$, $p = .53$, and neither sexual violence disclosure nor discussing

sexual violence in general significantly contributed to the model individually (See Table 8).

Therefore, hypothesis 8 was not supported.

Table 8: Disclosure of Sexual Violence Experiences and Discussion of Sexual Violence Predicting Stress

	B	**β**	**t**	**SE**	**p**	**F**	**Model p**	**Model R^2**
Disclosure of SV	.11	.09	.95	.12	.34	(2, 122) = .36	.53	.01
Discussion of SV	.02	.02	.19	.10	.85			

Hypothesis 9 predicted an indirect relationship between condition (i.e., app use or control) and disclosing personal experiences of sexual violence and discussing sexual violence in general, with the three risk assessment motives, communication efficacy, and willingness to disclose as mediators. The hypothesized indirect effects were tested using the PROCESS macro (Hayes 2013). A total of 5000 bootstrap samples were generated for each analysis, resulting in 95% confidence intervals. If the range of the confidence interval is either entirely positive or entirely negative, the indirect effect is considered to be statistically significant. PROCESS Model 6 was used to test the two hypothesized mediation models, both of which included one independent variable, one dependent variable, and five parallel mediators. The results of a regression analysis indicated that there was not a significant total effect (i.e., without mediators) of app condition on disclosure of personal experiences with sexual violence ($B = .19$, SE $= .10$, $t(121) = 1.86$, $p = .06$, 95% CI [-.01, .39]) and there was not a significant indirect effect through the three risk assessment motives, communication efficacy, and willingness to disclose on disclosure of personal experiences with sexual violence ($B = .00$, SE $= .00$, 95% CI [-.0003, .0009]). A second model was run with the same independent variable and mediators on the outcome of discussion of sexual violence in general. The results of a regression analysis

indicated that there was not a significant total effect (i.e., without mediators) of app condition on

discussion of sexual violence (B = -.05, SE = .10, $t(189)$ = -.50, p = .62, 95% CI [-.24, .14]) and

there was not a significant indirect effect through the three risk assessment motives,

communication efficacy, and willingness to disclose on discussion of sexual violence (B = .00,

SE = .00, 95% CI [-.0001, .0001]).

Again, given issues of multi-collinearity between the three risk motives (see Table 1),

additional analyses were carried out to test each motive in separate models (see Table 9 and

Table 10).

Table 9: Relationship Between App/Control Condition and Disclosure of Sexual Violence Experiences Through Risk Assessment Motives, Communication Efficacy, and Willingness to Disclose

	Relationship	Self	Other
X → Y	B = .17	B = .14	B = .22
	SE = .10	SE = .10	SE = .10
	p = .08	p = .15	p = .03
Indirect Effect	B = .00	B = .00	B = .00
	SE = .00	SE = .00	SE = .00
	CI [-.00, .00]	CI [-.00, .00]	CI [-.00, .00]

Table 10: Relationship Between App/Control Condition and Discussion of Sexual Violence Through Risk Assessment Motives, Communication Efficacy, and Willingness to Disclose

	Relationship	Self	Other
X → Y	B = -.01	B = -.04	B = -.00
	SE = .09	SE = .09	SE = .09
	p = -.15	p = .70	p = .99
Indirect Effect	B = .00	B = .00	B = .00
	SE = .00	SE = .00	SE = .00
	CI [-.00, .00]	CI [-.00, .00]	CI [-.00, .00]

The results of a regression analysis with the self protection motive indicated that there

was not a significant total effect (i.e., without mediators) of app condition on disclosure of

personal experiences with sexual violence (B = .14, SE = .10, $t(124)$ = 1.44, p = .15, 95% CI [-

.05, .33]) and there was not a significant indirect effect through the self protection motive,

communication efficacy, and willingness to disclose on disclosure of personal experiences with sexual violence (B = .00, SE = .00, 95% CI [-.0007, .002]). A second model was run with the same independent variable and mediators on the outcome of discussion of sexual violence in general. The results of a regression analysis indicated that there was not a significant total effect (i.e., without mediators) of app condition on discussion of sexual violence (B = -.04, SE = .09, t(194) = -.38, p = .70, 95% CI [-.22, .15]) and there was not a significant indirect effect through the self protection motive, communication efficacy, and willingness to disclose on discussion of sexual violence (B = .00, SE = .00, 95% CI [-.0008, .0009]). The results of a regression analysis with the relationship protection motive indicated that there was not a significant total effect (i.e., without mediators) of app condition on disclosure of personal experiences with sexual violence (B = .17, SE = .10, t(124) = 1.79, p = .08, 95% CI [-.02, .36]) and there was not a significant indirect effect through the relationship protection motive, communication efficacy, and willingness to disclose on disclosure of personal experiences with sexual violence (B = .00, SE = .00, 95% CI [-.0004, .002]). A second model was run with the same independent variable and mediators on the outcome of discussion of sexual violence in general (see Table 10). The results of a regression analysis indicated that there was not a significant total effect (i.e., without mediators) of app condition on discussion of sexual violence (B = -.01, SE = .09, t(195) = -.15, p = .88, 95% CI [-.20, .17]) and there was not a significant indirect effect through the relationship protection motive, communication efficacy, and willingness to disclose on discussion of sexual violence (B = .00, SE = .00, 95% CI [-.0005, .0007]). The results of a regression analysis with the other protection motive indicated that there was a significant total effect (i.e., without mediators) of app condition on disclosure of personal experiences with sexual violence (B = .22, SE = .10, t(123) = 2.23, p = .03, 95% CI [.02, .41]) but there was not a significant indirect effect

through the other protection motive, communication efficacy, and willingness to disclose on

disclosure of personal experiences with sexual violence ($B = .00$, SE $= .00$, 95% CI [-.0009,

.0001]). A second model was run with the same independent variable and mediators on the

outcome of discussion of sexual violence in general. The results of a regression analysis

indicated that there was not a significant total effect (i.e., without mediators) of app condition on

discussion of sexual violence ($B = -.00$, SE $= .09$, $t(192) = -.01$, $p = .99$, 95% CI [-.19, .18]) and

there was not a significant indirect effect through the other protection motive, communication

efficacy, and willingness to disclose on discussion of sexual violence ($B = .00$, SE $= .00$, 95% CI

[-.0005, .0006]). Therefore, hypothesis 9 was not supported.

The final set of hypotheses (10 – 11) and research questions (2 – 4) used previous

research surrounding sexual violence apps in general as well as the two specific studies that

looked at *Circle of 6* and *Hollaback!* apps as a basis to predict that sexual violence app use

would increase rape myth acceptance and communication efficacy, and to understand the

relationship between sexual violence mobile apps and rates of sexual victimization and street

harassment, perceived safety, and attitudes toward establishing consent. These hypotheses and

research questions were tested using one-way ANCOVAs with gender and experience with street

harassment at Time 1 included as covariates for analyses regarding male and female rape myth

acceptance given the significant correlations among these variables (see Table 1). A series of

one-way ANCOVAs revealed no significant differences between the treatment group and control

group at Time 2 in female rape myth acceptance [$F(1, 183) = 1.08$, $p = .30$], male rape myth

acceptance [$F(1, 180) = .52$, $p = .47$], or communication efficacy [$F(1, 203) = 3.01$, $p = .08$].

Therefore, hypotheses 10 and 11 were not supported. In evaluating the research questions,

gender and experience with street harassment at Time 1 and Time 2 were included as covariates

for analyses regarding sexual victimization; gender and experiences with sexual victimization were included as covariates for analyses regarding street harassment; gender, sexual victimization at Time 2, relationship status at Time 2, and experience with street harassment at Time and Time 2 were included as covariates for analyses regarding perceived safety; and gender, relationship status at Time 2, sexual victimization at Time 2, and experience with street harassment at Time 2 were included as covariates in analyses regarding consent. There were no significant differences in rates of sexual victimization [$F(1, 181) = .28$, $p = .60$], rates of street harassment [$F(1, 187) = .66$, $p = .42$], perceived safety [$F(1, 182) = .01$, $p = .94$], and attitudes toward establishing consent [$F(1, 186) = .01$, $p = .91$], clarifying RQs 2 – 4.

Post Hoc Analyses

Given the lack of significance for many of the findings related to the app conditions, further analyses were conducted to understand the relationships between frequency of app use as well as the relationship between key variables at Time 1 (prior to app use and COVID-19 pandemic). Given that the key study variables were largely unaffected by app (non)use, these analyses are intended to provide greater clarity regarding the relationships between the study variables, regardless of the experimental conditions.

App Use Frequency. First, after finding that the average usage for both apps reported at follow-up was low, additional frequencies were run to determine how many participants in the app conditions did not use the app at all. Somewhat surprisingly, app use was low despite weekly reminders for the treatment groups. For the *Circle of 6* group, 25 (38%) out of the total 65 participants in the condition reported that they never used the app during the one month follow-up period, whereas 18 (28%) only used the app one time. For the *Hollaback!* group, 6 (11%) out of the total 53 participants in the condition reported that they never used the app, whereas 9

(17%) only used the app once. Given this finding, a new variable was created to understand the amount of app use (dosage) across conditions, instead of separating participants into conditions based on their assigned treatment or control group. This variable combined both app users as well as the control group to measure how frequently the app was used during the one month follow up period so that dosage could be analyzed alongside key variables, the idea being that higher dosage would result in stronger relationships among key variables. The variable used the original categories for the app groups (1 – *Never*, 2 – *Once*, 3 – *2-3 times*, 4 – *4-5 times*, 5 – *More than 5 times*). Since the control group was not asked to use either app, those participants were assigned 1 (*Never*) for this variable. Yet, this new variable was not significantly correlated with any of the key study variables. After removing participants who had reported never using either app and rerunning the analyses, the variable was still not significantly correlated with any of the key study variables. Given the lack of significance related to app usage and dosage, correlations between key variables at Time 1 were analyzed (see Table 1). Analyzing the study variables at Time 1 allows for the testing of relationships among key study variables (including those detailed in the RRM) prior to the experimental manipulation.

Gender. Given that sexual violence is a gendered context, it is important to understand the different experiences that men and women have regarding the key variables. Using bivariate correlations, women were significantly more likely than men to report higher levels of stress ($r = .22$, $p < .01$), anxiety ($r = .25$, $p < .01$), positive attitudes toward establishing consent ($r = .22$, $p < .01$), experiences with street harassment ($r = .40$, $p < .01$), experiences with sexual violence ($r = .15$, $p < .05$), disclosure with personal experiences of sexual violence ($r = .27$, $p < .01$), and discussion of sexual violence in general ($r = .19$, $p < .01$). Men were significantly more likely than women to report higher levels of female rape myth acceptance ($r = -.25$, $p < .01$), male rape

myth acceptance ($r = -.29$, $p < .01$), willingness to report experiences with sexual violence ($r = -.20$, $p < .05$), and perceived safety regarding sexual violence ($r = -.48$, $p < .01$).

Risk Protection Motives. Bivariate correlations revealed that all three protection motives were positively associated with acceptance of both male and female rape myths ($r = .20 – .37$, $p < .01$), such that individuals who perceived high levels of risk protection regarding sexual violence also believed in many male and female rape myths. Additionally, relationship protection ($r = -.30$, $p < .01$) and self protection motives ($r = -.31$, $p < .01$) were inversely associated with positive attitudes toward establishing consent, such that individuals with lower levels of risk assessment reported more positive attitudes toward establishing consent.

Social Support. Bivariate correlations revealed that perceived social support was negatively correlated with many health outcomes, including depression ($r = -.40$, $p < .01$), stress ($r = -.35$, $p < .01$), and anxiety ($r = -.32$, $p < .01$), such that the more perceived social support an individual reported, the less they reported experiencing depression, stress, and anxiety. Additionally, social support was significantly correlated with two of the three protection motives (self and other: $r = -.17$, $p < .05$), such that the more perceived social support an individual reported, the less risk for themselves and the other person they perceived to disclosing experiences with sexual violence.

Rape Myth Acceptance. Bivariate correlations revealed that both male ($r = -.50$, $p < .01$) and female rape myth acceptance ($r = -.37$, $p < .01$) were significantly associated with positive attitudes toward establishing consent, such that those who believed in male and female rape myths reported less positive attitudes toward establishing consent. Additionally, both male and female rape myth acceptance variables were significantly associated with each other ($r = .64$, $p <$

.01), such that those who reported high levels of male rape myth acceptance also reported high levels of female rape myth acceptance.

Disclosure and Discussion. Bivariate correlations revealed that discussion of sexual violence in general was significantly associated with perceived safety ($r = -.28$, $p < .01$), communication efficacy regarding sexual violence ($r = .34$, $p < .01$), and disclosure of personal experiences with sexual violence ($r = .42$, $p < .01$), such that those who discussed sexual violence in general reported more communication efficacy, more disclosure of their own experiences with sexual violence, and less perceived safety regarding sexual violence.

Willingness to Report. Bivariate correlations revealed that willingness to report sexual violence experiences (real or imagined) was significantly associated with experiences of sexual violence ($r = -.37$, $p < .01$) and health outcomes, including stress ($r = -.24$, $p < .01$), depression ($r = -.21$, $p < .05$), and anxiety ($r = -.22$, $p < .01$), such that those who reported they would be willing to report experiences with sexual violence also reported less personal experiences with sexual violence and less stress, depression, and anxiety.

Chapter 7: Discussion

The present study tested the efficacy of two sexual violence mobile apps (*Circle of* 6 and *Hollaback!*) on interpersonal interactions (e.g., social support, communication efficacy, risk assessment, disclosure, etc.) and health outcomes (e.g., anxiety, depression, stress). The Revelation Risk Model (RRM) was also applied in the new context of mobile apps and sexual violence. Preliminary analyses revealed that the *Circle of 6* and *Hollaback!* experimental conditions did not differ significantly on any of the key outcome variables; therefore, the two conditions were combined into one variable (app use) for subsequent analyses. Using a series of one-way ANCOVAs, results revealed no significant differences for the app use condition compared to the control condition on stress, anxiety, depression, perceived social support, female rape myth acceptance, male rape myth acceptance, communication efficacy regarding sexual violence, rates of sexual victimization, rates of street harassment, perceived safety, attitudes toward establishing consent, and any of the three risk protection motives (relationship, self, and other). Using a series of multiple linear regressions, results revealed that risk protection motives (self and relationship) significantly predicted willingness to disclose experiences with sexual violence (real or imagined) and communication efficacy regarding sexual violence (self, relationship, and other); however, none of the three motives significantly predicted participants' discussion of sexual violence in general. Additionally, willingness to disclose experiences with sexual violence and communication efficacy were significant predictors of discussion of sexual violence in general but not of disclosure of personal experiences with sexual violence; disclosing personal experiences with sexual violence and discussing sexual violence in general did not significantly predict stress levels. Using mediation modeling, results revealed no significant total or indirect effects for condition (app use) on disclosure of personal experiences with sexual

violence or discussion of sexual violence in general through the three risk assessment motives, communication efficacy, and willingness to disclose. Finally, post hoc analyses revealed significant associations between many of the outcome variables at Time 1, suggesting that there are important relationships beyond app use that should be further explored.

To contextualize the discussion below, it is important to note that the sample used consisted of undergraduate students that primarily identified as White and heterosexual (i.e., WEIRD), therefore, the results from this study cannot be generalized to marginalized communities. Knowing that experiences at the intersection of gender, race, sexual orientation, and socioeconomic status are distinct and important, and that research (the present study included) is biased toward White, educated, and heterosexual narratives, it is a limitation in this study design that these results cannot speak to other perspectives. The results detailed in the prior chapter are separated into three main findings (e.g., efficacy of the apps, Revelation Risk Model, and relationships among study variables at Time 1) and discussed further below, but future work aiming to understand the role of technology in preventing sexual violence should seek to test and replicate the present study findings in more diverse, inclusive, and non-WEIRD samples.

Efficacy of Sexual Violence Apps

The primary analyses focused on measuring the efficacy of the two sexual violence mobile apps that had been previously studied, *Circle of 6* (Blayney, et al., 2018) and *Hollaback!* (Dimond, et al., 2013), in terms of reducing sexual violence victimization as well as understanding their efficacy to promote positive interpersonal and health outcomes using an interpersonal communication framework. Unfortunately, there was no change in rates of sexual victimization or street harassment for participants who used either app over the one-month follow-up period. Given that previous studies have failed to demonstrate that these apps in

particular prevent sexual violence (e.g., Blayney, et al., 2018; Dimond, et al., 2013), as well as sexual violence interventions in general (Anderson & Whiston, 2005; DelGreco, McCullock, & Hamilton, 2018), it is disappointing but not surprising that the results from this study did not indicate a change in rates of sexual victimization and street harassment for participants who used either app over the one month follow up period.

One possible explanation for this finding is due to the use of a one-month follow-up period instead of two months. The original study design involved a two-month follow-up period to be consistent with previous study designs (Blayney, et al., 2018), but due to the ongoing COVID-19 pandemic (detailed in the limitations below), the follow-up period was reduced to one month. However, results from the previous study (Blayney, et al., 2018) that used a longer follow-up period also did not demonstrate changes in sexual victimization over the two-month period, therefore a two-month follow-up period likely would not have made a difference in these findings. Future researchers could test longer follow-up periods, but more importantly, participants need to be using the apps in order to test their efficacy. Therefore, understanding the motivations of individuals to download and use sexual violence apps is an important next step to determining if the apps are effective.

For both the current study and previous study (Blayney, et al., 2018) regarding the efficacy of sexual violence mobile apps, results indicated that app use was low over the follow-up period. For the current study, participants used the app that they were assigned to an average of one time over the one-month period, despite weekly reminders. This finding is consistent with the previous study that measured the efficacy of *Circle of 6* (Blayney, et al., 2018), which noted that participants also only used the app an average of one time over the two-month follow-up period. Possible explanations for low app usage are redundancy, accessibility, and motivation.

Blayney and colleagues (2018) asked participants their thoughts on the app and they indicated that 1) they saw it as redundant since they could use the same features on their phone instead of opening a separate app, 2) it was too difficult to use when they were intoxicated, which is when the majority of sexual violence incidents occur on college campuses (Abbey, 2002), and 3) they viewed it as an emergency-only resource. The problem with the perception of the apps being necessary only in the event of an emergency is that it requires users to recognize the risk early on in a sexual encounter, which is especially challenging when intoxicated (Blayney, et al., 2018). Indeed, many college students cannot clearly define consent even when sober (Burnett et al., 2009), which can make determining the point in a sexual encounter that crosses into sexual violence or an emergency even more challenging.

Participants were also asked to use the narrative collective resistance app, *Hollaback!*. Given the nature of this app, it is unlikely that participants viewed it as an emergency-only resource, however, usage over the follow-up period was also low for this app. Given that the primary focus of the app is to anonymously share personal experiences with sexual violence and read other anonymous users' experiences with sexual violence, it may be that individuals who have not experienced sexual violence may not see a need for the app or be motivated to use it. Additionally, individuals who have been traumatized by their experiences with sexual violence and do not want to relive it may also avoid using the app. Future researchers should explore motivations regarding participants voluntarily selecting and downloading sexual violence apps, as individuals who are motivated to use the app will likely have different experiences compared to those who were instructed to use an app that they may not have been interested in. App developers should also make sure that users can easily access the important features of the app, even when intoxicated, and that the features go beyond what is currently available on their

phone. Additionally, marketing for each app should be clearer so that users know when the app is meant to be used (i.e., is it an emergency only resource or can it be used during other times and contexts?).

Health Outcomes. Given the extensive documentation of the negative health effects of all forms of sexual violence (DelGreco & Christensen, 2020; Fairchild & Rudman, 2008; Kilpatrick, Resnick, Ruggiero, Conoscenti, & McCauley, 2007; Rape, Abuse, Incest National Network, 2019; Willness, Steel, & Lee, 2007), it was important to determine if using sexual violence mobile apps could have an impact on individuals' mental health. Yet, the present results did not reveal any changes in users' levels of stress, depression, or anxiety at Time 2 based on being assigned to the app condition or the control group. It is possible that the result differs from those in the study of Hollaback (Dimond, et al., 2013) due to methodological differences: the prior study used interview and focus group techniques to determine how users felt about the app but did not measure perceived catharsis or health outcomes quantitatively, whereas the current study asked users to rate their levels of each variable over the previous month in general, not just in relation to their app use.

Given that this is the first quantitative test of the relationship between sexual violence app use and mental health, the possibility of confounding variables related to the COVID-19 pandemic (detailed in the limitations below), and the low usage rates over follow-up, these lack of findings do not necessarily mean that the apps are ineffective at improving users' mental health. Unlike rates of victimization, which numerous studies have shown remain generally unchanged regardless of interventions (Anderson & Whiston, 2005; Blayney, et al., 2018; DelGreco, McCullock, & Hamilton, 2018), further research is needed to determine the associations between mobile app interventions and health outcomes.

Interpersonal Outcomes. It may also be the case that the apps do not directly impact mental health outcomes, but could be associated with other variables, such as interpersonal outcomes, that may indirectly improve users' health and wellbeing. Few previous studies have measured the efficacy of sexual violence mobile apps in general, and even fewer have taken into consideration the importance of interpersonal communication and social networks (Bivens & Hasinoff, 2018). Therefore, it was important to understand the relationship between app use and interpersonal outcomes and social perceptions such as perceived social support, communication efficacy, rape myth acceptance, perceived safety, and attitudes toward establishing consent. Although the results did not reveal any significant associations among these variables, they did both support and refute claims made in previous studies.

The finding that neither app improved users' perceived social support provides credence to the claim that the majority of apps do not use the strength of interpersonal relationships and social support (Bivens & Hasinoff, 2018). However, the previous study that analyzed the efficacy of *Hollaback!* (Dimond, et al., 2013) noted that users reported feeling supported by other anonymous users when they disclosed their experiences in the app. As with the health outcomes, it is possible that the present results differ because of the way the variables were measured (i.e., using quantitative scales). Further research is needed to determine how interpersonal relationships and social support may be used to increase sexual violence app efficacy, such as by exploring if efficacy on interpersonal outcomes increases when individuals use the apps with members of their social network compared to when they use the apps individually.

The current results show that neither app changed users' belief in rape myths, possibly because of low app usage reported at follow-up. This finding may refute the claim that the

majority of sexual violence apps perpetuate harmful rape myth beliefs, though *Hollaback!* was noted as an exception (Bivens & Hasinoff, 2018). Sexual violence interventions often measure how effective the intervention is at increasing knowledge and empathy for victims, and decreasing rape myth acceptance (Anderson & Whitson, 2005; DelGreco, McCullock, & Hamilton, 2018). These interventions are often not effective at changing behavior or increasing empathy, but they are generally effective at increasing knowledge surrounding sexual violence and decreasing acceptance of rape myth beliefs (Anderson & Whitson, 2005; DelGreco, McCullock, & Hamilton, 2018), therefore if sexual violence apps are not even meeting the minimum standard of sexual violence interventions, this begs the question of what is it that these apps *are* doing effectively and what can users expect from these apps? Further research is needed to determine if sexual violence mobile apps can even be considered an intervention, what is the goal of these apps, and what is a realistic measurement of efficacy when it comes to app usage, if not knowledge, behavior change, and attitude change.

Results from the present study indicated that app use did not change their perceptions of safety. Perceived safety was one of the few variables that was measured in a previous study on the efficacy of a sexual violence app (Blayney, et al., 2018), but results were mixed on whether users found that the app increased their perceptions of safety. It is possible that many individuals are unaware of their risk of experiencing sexual violence, and find that using apps that focus on reducing risk may actually increase their perceptions of risk and make them feel less safe than they did previously. Yet, by virtue of having downloaded a sexual violence app, users may feel that they have mitigated this risk and thus their perceptions of safety remain unchanged. Further research is needed to determine individuals' perceptions of safety as it relates to sexual violence,

and if there are other variables (e.g., gender, app use, etc.) that may impact users' perceptions of safety.

Revelation Risk Model

Given that previous studies regarding sexual violence apps failed to take into account interpersonal communication, the present study tested the pathways detailed in the Revelation Risk Model (RRM) (Afifi & Steuber, 2009) in the new contexts of mobile apps and sexual violence. Although it was expected that the apps would reduce assessments of the risks of discussing sexual violence and increase individuals' efficacy regarding communication about sexual violence, no effect was found. In addition, there were no significant indirect effects of app use on disclosure of personal experiences with sexual violence or discussion of sexual violence in general through the mediators of risk protection motives, communication efficacy, and willingness to disclose. As was discussed above with respect to other outcomes, it is difficult to tease out the potential reasons for the lack of effects, which may include poor app design, low app use, and irrelevance during the COVID-19 stay-at-home time period.

The RRM (Afifi & Steuber, 2009) predicts that lower risk assessment is associated with greater willingness to disclose and communication efficacy. The results generally indicated support for this prediction, such that two of the motives (self and relationship) predicted willingness to disclose experiences with sexual violence, and all three motives predicted communication efficacy regarding sexual violence. Additionally, the RRM predicts that lower willingness to disclose and communication efficacy will lead to increased disclosure: in this case, actual disclosure of sexual violence experiences as well as discussion about sexual violence in general. Results indicated that willingness to disclose experiences with sexual violence and communication efficacy were significant predictors of discussion of sexual violence in general

but not of disclosure of personal experiences with sexual violence, and none of the risk protection motives predicted discussion of sexual violence.

One possible explanation for these results is that there may be barriers that are unique to a sexual violence context that are preventing individuals from disclosing their experiences. Indeed, numerous scholars have noted possible reasons for individuals' lack of disclosure or reporting when it comes to sexual violence experiences, such as uncertainty regarding if there is sufficient evidence to prove that it happened, avoidance of further trauma and shame, not being sure if the incident would be considered a crime, the fear that the perpetrator will not be held accountable due to ineffective institutional policies and practices, and a rape culture that works on multiple levels to cause a breakdown in communication, confusion surrounding consent, and psychological and sociological pressures that lead to changes in self-concept, a lack of trust, and a cycle of silence (Burnett et al., 2009; DeMatteo, et al., 2015). Additionally, previous studies have found that there are other variables that predict individuals' actual disclosure, even when they report a willingness to disclose, such as how confirming and challenging they believed the recipient of their disclosure to be (Aldeis & Afifi, 2013). Although participants were instructed to think about the person they would be most likely to disclose experiences of sexual violence to when answering the items, these additional variables and concerns could cause victims to avoid disclosing their own experiences, as much as they may want to. Moving beyond victim experiences, the new variable of discussion of sexual violence in general extends the RRM to include not only disclosures of personal experiences, but also disclosures of thoughts and opinions surrounding sexual violence in general. Further discussion of a typically sensitive and stigmatized topic, such as sexual violence, could be an important step to gaining and understanding consent in sexual interactions, changing harmful beliefs in rape myths, and

potentially less blaming and more support for victims. Future research should continue to explore relational factors (e.g., relational ties, social support, etc.) that may be more meaningful in predicting disclosure and discussion than app use to showcase the importance of communication surrounding topics such as sexual violence not just for victims, but for anyone who desires healthier and happier interpersonal relationships.

Discussion of sexual violence in general was a new variable tested with the RRM and was included because in previous studies, the majority of *Circle of 6* app users and *Hollaback!* users discussed their app use or sexual violence more broadly with members of their social network, and it was thought that these discussions may lead to increased discussions of consent, disclosure of personal experiences of sexual violence, and positive health benefits. These findings indicate that app use is not increasing communication surrounding sexual violence, however, this could be due to the low usage rates over follow-up so further research is needed prior to ruling out communication processes, such as the RRM, as potential explanatory variables in the efficacy of these apps.

Health Effects. In terms of health effects, scholars have noted the positive health effects of disclosure, such as reduced stress (Frattaroli, 2006; Harvey, et al., 1991; Pennebaker & Francis, 1996). Although health variables are not included in the RRM, it would still be expected based on previous research that disclosure should promote positive health outcomes. Yet, the findings from this study revealed that neither disclosure of personal experiences nor discussion of sexual violence in general were associated with participants' stress levels. Due to the nature of the COVID-19 pandemic (detailed in the limitations below), it is possible that there were other more salient factors influencing participants' levels of stress at the time of the study, and that the findings are skewed as a result. It is also possible that some participants (e.g., those who sought

mental health counselling or pressed charges) had actively worked to confront their experiences with sexual violence, and may have already benefited from discussing and disclosing their experiences. For such individuals, their experiences may not have been weighing on them as heavily, causing as much stress, or be perceived as a negatively-valenced secret. Valence of the secret was not measured in this study because it was presumed that sexual violence would always be evaluated negatively, yet the fact that sexual violence is such a pervasive experience, particularly for college-aged women, and the lack of understanding surrounding consent and legal definitions (Burnett, et al., 2009), suggests that it is possible that some victims of sexual violence may unfortunately view their experience as an expected part of life. As such, they may feel comfortable communicating about the experience and/or reframe the experience in a way that is less cognitively taxing and not consistently weighing on them mentally.

Relationships Among Study Variables at Time 1

Given that the mobile app intervention was largely unsuccessful and the lack of significance for many of the findings, additional analyses were conducted between key variables at Time 1 (prior to app use and COVID-19 pandemic) to understand the relationship between these variables outside of the intervention. Some variables that had interesting associations included discussion of sexual violence and rape beliefs and attitudes (e.g., rape myth acceptance and attitudes towards sexual consent).

Discussion of Sexual Violence. Correlational analyses indicated that discussion of sexual violence is an important variable that is positively associated with communication efficacy and disclosure of personal experiences with sexual violence, such that those who discussed sexual violence in general reported more communication efficacy and more disclosure of their own experiences with sexual violence. Given that these findings are correlational, further research is

needed to explore additional variables that may predict discussion of sensitive and stigmatized topics, such as a sexual violence context, as well as possible positive causational outcomes of these conversations that may benefit individuals' health and/or interpersonal relationships. Taken together, the findings in support of the RRM and the positive correlations between discussion of sexual violence and other outcomes suggest that communication surrounding sexual violence is an important variable that may help individuals feel comfortable to disclose and report their experiences to others, which may have positive effects on their health and wellbeing.

Rape Myths and Attitudes Towards Sexual Consent. Rape myth acceptance is an important variable when it comes to sexual violence because it can make it even more difficult for victims to disclose or report their experiences and get the support that they need (Langenderfer-Magruder, et al., 2014; Olive, 2012; Sorenson & Siegal, 1992; Stotzer, 2009). Results indicated that all three risk protection motives detailed in the RRM were significantly associated with acceptance of both male and female rape myths, such that individuals who felt high levels of risk protection also reported high levels of believing in many male and female rape myths. Additionally, two out of the three protection motives were associated with positive attitudes toward establishing consent, such that individuals with low levels of risk assessment reported more positive attitudes toward establishing consent. Given that the broad definition of sexual violence is any form of sexual activity without freely given consent (Centers for Disease Control and Prevention, 2019), and the lack of understanding regarding consent for many individuals and college students (Burnett, et al., 2009), having a positive attitude toward establishing consent could go a long way in preventing sexual violence and increasing disclosure around such violations of consent. Future research should explore how harmful beliefs, such as

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beliefs in rape myths, and positive attitudes, such as attitudes toward establishing consent, can impact individuals' disclosure.

Limitations and Future Directions

Although the current study aimed to understand the efficacy of sexual violence mobile apps from an interpersonal perspective, there are limitations that should be noted. First, and most importantly, the Time 2 data for the study was collected during the COVID-19 global pandemic. The original study design involved a two-month follow-up period to be consistent with previous study designs (Blayney, et al., 2018), but due to the ongoing pandemic, the follow-up period was reduced to one month. At the time of the follow up data collection (March 2020), there were travel bans and stay at home orders both nationally and internationally. As a result, many colleges and universities were in the middle of deciding whether or not to resume in-person classes after spring break. Many students cancelled spring break travel plans, and instead returned home. While participants in this study were on spring break, the university made the decision to move the remainder of the semester to an online only context and students were instructed not to return to campus following spring break. Due to the travel bans, many students had difficulties returning home, and once home, were stuck isolated far from their family and friends. Due to stay at home and social distancing orders, many students were not able to retrieve their belongings, go to work, say goodbye to friends and faculty, or participate in many rites of passage, such as graduation ceremonies. Students were worried about their health, safety, and financial wellbeing as well as those of their loved ones, while adapting to an entirely new online format for their courses. This was an exceedingly frightening and stressful time for so many individuals, including the participants of the study. As a result, it is entirely possible that results were skewed due to heightened levels of stress, depression, and anxiety. Measures were taken to

mitigate these concerns by asking participants to focus their responses on the month *prior* to spring break, before the pandemic reached concerning levels in the state where the data was collected (Time 2 data was collected immediately following spring break), but it may have been difficult for participants to recall their feelings and behavior more than a week prior to completing the follow-up survey.

The lack of differences in the outcome variables between the treatment group and control group could be due to the low frequency of app usage. Despite weekly reminders to use the apps, many participants reported that they never used the app that they were assigned to. Again, this may be due to ongoing stresses and a lack of time with all that was going on from the pandemic and change to online courses. Another possibility for the low usage is due to participant motivation or disinterest. Participants who have not experienced sexual violence, are not concerned about their risk, or do not see a use for the apps may not have felt motivated to use the apps even though they were instructed to do so. Future researchers should use differently targeted population samples (i.e., individuals who have expressed an interest in using a sexual violence mobile app rather than undergraduate students completing a study for course credit) to determine the role that motivation plays in the efficacy of the apps. Future researchers should also avoid collecting data during a pandemic, when possible.

Beyond the issues with COVID-19, the study was limited by the undergraduate population that was used and the background of the researcher. Although a college sample was intentionally used because sexual violence is the most prevalent crime on college campuses, many college samples, the present included, are skewed towards White, cisgender, heterosexual, individuals between the ages of 18 and 22 years (i.e., WEIRD). Considering that women of color, and Black women in particular, experience higher rates of sexual violence and are less

likely to disclose and receive support than their White counterparts (Slatton & Richard, 2020), as well as the differences in experiences at the intersection of gender, race, sexual orientation, and socioeconomic status (Krebs, Lindquist & Barrick, 2011; West & Johnson, 2013), future research would benefit from including a more diverse sample. Additionally, as a cisgender, heterosexual, White woman, the present study is limited by my perspective and experiences.

Lastly, although groups were randomized into conditions, there were slightly unequal group distributions due to both study design and attrition. First, by way of study design, participants were randomized into their group condition at the end of the pretest survey. To maintain participant anonymity, they were then redirected to a separate survey to enter their email address to receive the link to the posttest survey, along with weekly reminders to use their assigned app. Because the pretest data was anonymous, participants had to answer a question in the email survey regarding which condition they were assigned to in order to determine which app reminder they would receive. It is possible that some participants either forgot which condition they were assigned to, or simply chose a different condition at this point. Indeed, it appears that there are discrepancies in the data from the condition assigned in the pretest to the conditions in the email survey. For example, in the pretest, there were 121 (32.8%) participants assigned to the control group. Yet, in the email survey immediately following the pretest, 136 (41.5%) participants reported that they were assigned to the control group (the item asked if they were asked to use *Circle of 6*, *Hollaback!*, or not asked to use any app throughout the study). Although anonymity was important due to the sensitive nature of this study, future researchers should do more to ensure accurate distribution across conditions. Another concern is that some participants may have had difficulties downloading and accessing the apps. During data collection, two participants contacted the principle researcher to state that they had difficulties

using the app *Hollaback!*. It is possible that other participants also had difficulties using the apps, particularly *Hollaback!*, and that may have led to uneven attrition rates across conditions. Future researchers may consider sacrificing anonymity and collect data directly from the apps to determine how often the app was accessed and used and if there were any technological issues that may have prevented them from receiving the full effects.

Implications and Future Directions for Sexual Violence Apps

Unfortunately, the findings from the present study reinforce previous claims that these apps and interventions do not get at the larger social issue that many acts of sexual violence are not recognized as unacceptable and the barriers that victims face when it comes to getting help and support. Although the current study only analyzed two sexual violence apps on the market out of hundreds, these findings speak to the larger concern with sexual violence apps and sexual violence interventions in general. The majority of sexual violence apps use a risk reduction approach that targets potential victims, which can support the rape myth that victims are responsible for preventing their own assaults and rapes, and supports findings that those who see themselves as potential victims are much more likely to download and use these apps than potential perpetrators (Bivens & Hasinoff, 2018). This victim-centered risk reduction approach in sexual violence prevention work and interventions has been shown repeatedly to be ineffective at reducing rates of victimization (Bivens & Hasinoff, 2018; Hall, 2004; Riger & Gordon, 1981).

However, measuring efficacy for sexual violence interventions goes way beyond rates of victimization, and can include many other variables that are important to this context. The present study included interpersonal communication processes and health outcomes as additional measures of efficacy, yet there are many others that should be included in future app designs and research. For example, there are many barriers that must be addressed when designing sexual

violence mobile app interventions, such as the lack of understanding regarding consent (Burnett, et al., 2009), the fact that both victims and perpetrators are unclear on what constitutes assault or rape (Edwards, Bradshaw, & Hinsz, 2014), the many challenges that victims face (particularly individuals of color, lower socioeconomic status, and LGBTQ individuals) when disclosing and reporting (Burnett et al., 2009; Slatton & Richard, 2020), and the differences in experiences at the intersection of gender, race, sexual orientation, and socioeconomic status (Krebs, Lindquist & Barrick, 2011; West & Johnson, 2013).

App developers would do well to address these barriers with the design and features of the app in order to have more effective outcomes. One way to begin this process is by broadening the demographic makeup of app developers which could lead to more effective and less biased sexual violence apps, given the majority of computer scientists are men (National Science Board, 2016) and that men are more likely to support rape myths (Suarez & Gadalla, 2010). Second, more interactive apps that offer training to overcome the social, emotional, and structural barriers (e.g., concerns related to retaliation, victim-blaming, lack of consequences for the perpetrator, emotional toll of reporting, etc.) related to identifying, resisting, and reporting sexual violence may be more useful than what is currently on the market (Bivens & Hasinoff, 2018). For example, an organizational-wide app that allows users to anonymously report their experiences to a database within the company and provides resources on their rights, company policies, and next steps in the process may be more useful (and likely to be used) than a reporting process that requires an employee to report their experiences in person to a superior. Third, apps aimed at bystanders may be more effective than targeting victims or perpetrators due to the value of community engagement and accountability to reduce the attitudes and social norms that allow and enable sexual violence (Bivens & Hasinoff, 2018). Lastly, given that the more effective

violence prevention programs are multimodal, start at younger ages, and work to change attitudes that tolerate and encourage sexual violence (DeGue, et al., 2014), a sexual violence app would be more effective if it was part of a broader sexual violence prevention program or a broader sexual health app, especially considering potential perpetrators are not likely to seek out a sexual violence app on their own (Bivens & Hasinoff, 2018). Indeed, there is interest from individuals in an app that could improve and manage their sexual health with the most desired features including period trackers, birth control reminders, and STI and pregnancy symptom checkers (Richman, Webb, Brinkley, & Martin). Given that many users viewed certain sexual violence apps as an emergency-only resource (Blayney, et al., 2018), and the lack of understanding of consent and laws surrounding sexual violence issues (Burnett, et al., 2009), app designers may do well to create an app that can encompass all aspects of sexual health to provide individuals with the information they want and need to have healthier and happier sexual and interpersonal relationships. Having an all-in-one app that can grow with the user over time, such as offering different information based on age, experiences, etc. may also be more effective. However, as mobile apps and technologies change rapidly and app features tend to quickly become outdated or standard to any phone, mobile apps may not be the most useful avenue to pursue when it comes to fighting and preventing sexual violence, and further research is needed to explore additional options (Blayney, et al., 2018).

Conclusion

Overall, the current study expanded upon previous work by investigating interpersonal communication processes and variables to help explain the effectiveness of two sexual violence mobile apps through the framework of the Revelation Risk Model (Afifi & Steuber, 2009). As with previous studies (Blayney et al., 2018), the present data were unable to demonstrate that

these apps are effective at preventing sexual violence or improving either interpersonal or health-related outcomes. However, by extending the RRM to the new context of sexual violence, and including a new variable of general discussion of sexual violence in the model alongside key variables of risk assessment, communication efficacy, and disclosure of experiences with sexual violence, the study was able to demonstrate some support for the RRM in that two of the motives (self and relationship) predicted willingness to disclose experiences with sexual violence, all three motives predicted communication efficacy regarding sexual violence, and willingness to disclose experiences with sexual violence and communication efficacy were significant predictors of discussion of sexual violence in general. The study also reinforces the fact that more work is needed to understand how and why discussion emerges around sensitive and stigmatized topics such as sexual violence.

The study findings should be of interest not only to researchers, but to any professionals who desire to understand the communication processes that affect interpersonal relationships, particularly in a sexual violence context. These findings can inform development of future programs aimed at reducing the harmful effects of sexual violence, whether it be technology-based in the form of mobile apps or interpersonal-based in the form of promoting the discussion and destigmatization of sensitive issues such as sexual violence. Identifying the modalities, forms, and features that best promote conversation about sexual violence may aid, in turn, in improving the health and wellbeing of individuals' interpersonal relationships, not just for victims, but for everyone.

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Appendices

Appendix A: Survey Items

How do you self-identify?

1. Man
2. Woman
3. Genderfluid/nonbinary
4. MTF
5. FTM

How old are you (in years)?

Please select the race/ethnicity you most identify with.

1. Asian
2. Hispanic
3. White (non Hispanic)
4. African American
5. Pacific Islander
6. Native American
7. Other

What is your sexual orientation?

1. Gay
2. Heterosexual
3. Lesbian
4. Bisexual
5. Other

What is your class year?

1. Freshman
2. Sophomore
3. Junior
4. Senior

What type of relationship are you currently involved in?

1. No relationship
2. Casually dating
3. Long-term relationship
4. Cohabitating relationship
5. Marriage
6. Friends with benefits
7. Open relationship

8. Other

Risk Protection Motives

Think about your closest confidant (e.g., friend, family member, significant other, etc.) that you are most likely to reveal experiences with sexual violence to. Indicate how likely you think that each behavior or action would happen if you shared your experience with sexual violence with that particular person.

What is the gender of the person you are thinking of?

1.   Man
2.   Woman
3.   Other

Self-Protection

1.   He/she would react to the information by blaming me.
2.   He/she would no longer like me if he/she knew the information.
3.   He/she would disapprove if he/she knew about the information.
4.   If I told him/her, he/she would tell other people.
5.   He/she would use the information against me.
6.   If he/she found out, it would disappoint him/her.
7.   He/she would take advantage of me if they knew the information.
8.   He/she would react by immediately withdrawing from me.
9.   Other people would be very angry at me if I disclosed the information.
10. Revealing the information would hurt our relationship.
11. He/she would violate my trust if I told him/her.
12. If my he/she found out the information, he/she might use it against me or someone in my family.

Other-Protection

1.   Revealing the information would create stress for others.
2.   He/she would have a hard time talking about the information.
3.   Telling him/her would put him/her in an awkward position.
4.   He/she wouldn't know what to say if I told him/her the information.
5.   It would hurt his/her feelings if he/she knew the information.
6.   If I disclosed the information, other people would be hurt.

Relationship-Protection

7.   I would lose a bond that I have with other people who know the information already.
8.   If I revealed the information, my relationship with this person would never be as good as it is now.
9.   Other people would never trust me again if I told this person the secret.
10. Telling the secret to this person would hurt my relationship with others.
11. Revealing the secret would do nothing but harm the good relationship we have now.

Willingness to Report

1.   I am willing to report my experiences with sexual violence to an authority figure.
2.   I am willing to report my experiences with sexual violence to campus police.
3.   I am willing to report my experiences with sexual violence to local police.

Willingness to Disclose

Think about your closest confidant (e.g., friend, family member, significant other, etc.) that you are most likely to reveal experiences with sexual violence to. Indicate your agreement with each item as it relates to your experience with sexual violence and your willingness to disclose those experiences to that particular person.

Never

1.   There is no chance I would ever reveal the information to someone.
2.   I would never tell someone.
3.   No matter what, I will keep the information to myself.
4.   There is nothing that would make me reveal the information.

Acceptance

5.   I would reveal the information to someone if he/she wouldn't disapprove of me after hearing it.
6.   If I knew they would still accept me after hearing the information, I would tell.
7.   If they wouldn't attack me about the information, I would tell.
8.   I would tell someone if I knew he/she wouldn't judge me.

Conversational Appropriateness

9.   I would reveal the information to someone if it seemed to fit into the conversation.
10.   If the information was an appropriate conversational topic, I would tell someone.
11.   I would tell the information to someone if we were discussing a subject related to the information.
12.   If the topic came up in conversation, I would tell the information to someone.

Relational Security

13.   If I trusted them more than I do now, I would reveal the information.
14.   I would tell someone if I had a more intimate relationship with him/her.
15.   If I felt much closer to them, I would tell the information.
16.   If I knew they wouldn't tell the information to others, I would tell him/her.

Important Reason

17.   If a crisis arose that necessitated my revealing the information to someone, I would tell.
18.   If there was a pressing need for someone to know the information, I would tell.
19.   I would reveal the information to someone if I thought it was essential for him/her to know.

20.   I would tell someone if I thought there was a really good reason for him/her to know the information.

Permission

21.   I would tell someone if my family members thought it was okay to tell.
22.   I would tell someone if someone in my family gave me permission to tell the information.
23.   If the person who is the focus of the information died, I would reveal the information to someone.
24.   I would feel okay telling someone once a certain person in my family died.

Family Membership

25.   I would reveal the information to someone if he/she was going to marry into my family.
26.   I would tell the information to someone if he/she somehow became a relative or family member.

Street Harassment Experiences

Think about when you were approached by a person you did not know in public (e.g., street, park, or public transportation). Think only about the first thing that a person you have never met before did or said to you in public. There are no right or wrong answers and all answers are anonymous. For each behavior, select the number that corresponds to how often you have experienced the behavior according to the following scale:

0 - Never, 1 - Once in the past year, 2 - A few times in the past year, 3 - About once a month, 4 - A few times a month, 5 - Almost every day, 6 - Multiple times a day

1. A person whistled, yelled, or honked at you from his/her car while you were walking/waiting for the bus/riding a bike
2. A person blew you kisses or made other romantic gestures to you on the street
3. A person told you to smile
4. A person made negative comments about your appearance as you walked by
5. A person offered you money for sex when you were either walking or standing and waiting for someone
6. A person asked you for your name
7. A person told you how attractive you were as you walked down the street and then repeated these comments louder, trying to get your attention
8. A person slowed down his/her car so that he/she could drive beside you as you walked and either watched you or spoke to you
9. A person made sexually explicit gestures to you as you walked
10. A person complimented your appearance
11. A person asked if you have a boyfriend/girlfriend or are married
12. A person commented on your weight saying that you are either too fat or too skinny
13. A person made sexual comments to you and then followed you as you walked
14. A person asked you for your phone number

15. A person yelled things like "hey sexy!" or "you're fine!" from a car while driving past you as you were walking or waiting for someone
16. A person walked past you and commented on your weight, saying that he/she approves of your size
17. A person touched you as you walked past them (e.g., brushing a hand against your breast or grabbing your hand)
18. A person called you insulting names as you walked past
19. A person approached the person you were walking or sitting with and complimented him/her on your appearance or on his/her successful conquest of you
20. A person yelled comments about your appearance at you while you were jogging
21. A person walked past and directed non-verbal sounds at you (cat calls, wolf whistles, etc.)
22. A person stared at you in a sexual way as he/she walked past you on the street (e.g. leering or eyeing you up and down)
23. Construction workers yelled comments to you about your appearance as you walked past their work site
24. A person made gestures and calls for you to come over to where he/she was standing
25. A person pulled his/her car over as you were walking and asked you to do sexually explicit things with him/her
26. A person called for your attention and when you ignored him/her begun shouting insults at you
27. A person showed you his/her genitals on the street
28. A person aggressively touched you as you walked past him/her (e.g. slapping your buttocks, punching you, tripping you, or poking you)

Social Support

1. There is a special person/s who is around when I am in need.
2. There is a special person/s with whom I can share my joys and sorrows.
3. My family really try to help me.
4. I get the emotional help and support I need from my family.
5. I have a special person/s who is a real source of comfort to me.
6. My friends really try to help me.
7. I can count on my friends when things go wrong.
8. I can talk about my problems with my family.
9. I have friends with whom I can share my joys and sorrows.
10. There is a special person/s in my life who cares about my feelings.
11. My family is willing to help me make decisions.
12. I can talk about my problems with my friends.

Communication Efficacy

1. I wouldn't know what to say if I tried to talk to someone about sexual violence.
2. I wouldn't even know how to begin talking to someone about sexual violence.
3. I can't think of any way to talk to someone about sexual violence.
4. I don't know how to even approach the issue of sexual violence with someone.

Stress

1.   In the last month, how often have you been upset because of something that happened unexpectedly?
2.   In the last month, how often have you felt that you were unable to control the important things in your life?
3.   In the last month, how often have you felt nervous and "stressed"?
4.   In the last month, how often have you felt confident about your ability to handle your personal problems?
5.   In the last month, how often have you felt that things were going your way?
6.   In the last month, how often have you found that you could not cope with all the things that you had to do?
7.   In the last month, how often have you been able to control irritations in your life?
8.   In the last month, how often have you felt that you were on top of things?
9.   In the last month, how often have you been angered because of things that were outside of your control?
10.   In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Sexual Violence App Use

1.   What time of day was the app typically used?
2.   What features of the app did you use most?
3.   Did you find the app to be useful?
4.   Did the app make you feel safer from sexual violence?
5.   Would you recommend the app to a friend?
6.   How often have you used the mobile app Circle of 6?
7.   How often have you used the mobile app Hollaback?
8.   Did you talk with friends about the app?
9.   How many friends did you discuss the app with?
10.   How many friends did you include in your safety circle?
11.   Did you inform your friends that they were included in the circle?
12.   If you did not use the app, why not? (open)
13.   Check all who were included in your circle
        1. Friends
        2. Family
        3. Romantic partner
        4. Coworker
        5. Acquaintance
        6. Casual partner
14.   How many people from circle of six are the same sex as you?
15.   In general, how much do you trust the people in the list?

Discussion of Sexual Violence

1. I have discussed sexual violence issues with a friend.
2. I have heard sexual violence issues being discussed by other students on campus.
3. I have discussed sexual violence issues with my current (or most recent) partner.
4. I have not given much thought to the topic of sexual violence.
5. I have discussed sexual violence issues with a family member.

Disclosure of Sexual Violence Experiences

1. I have disclosed my experiences with sexual violence to a friend.
2. I have disclosed my experiences with sexual violence with my current (or most recent) partner.
3. I have reported my experiences with sexual violence to an authority figure.
4. I have disclosed my experiences with sexual violence to a family member.
5. I have reported my experiences with sexual violence to campus police.
6. I have reported my experiences with sexual violence to local police.

Sexual Consent

Instructions: Please note that the term sexual consent is used extensively throughout this questionnaire. Please use the definition of sexual consent below when answering the questions that follow. Sexual consent: the freely given verbal or nonverbal communication of a feeling of willingness to engage in sexual activity.

1. I feel that sexual consent should always be obtained before the start of any sexual activity.
2. I think it is equally important to obtain sexual consent in all relationships regardless of whether or not they have had sex before.
3. I believe that asking for sexual consent is in my best interest because it reduces any misinterpretations that might arise.
4. I feel that verbally asking for sexual consent should occur before proceeding with any sexual activity.
5. When initiating sexual activity, I believe that one should always assume they do not have sexual consent.
6. I believe that it is just as necessary to obtain consent for genital fondling as it is for sexual intercourse.
7. I think that consent should be asked before any kind of sexual behavior, including kissing or petting.
8. I feel it is the responsibility of both partners to make sure sexual consent is established before sexual activity begins.
9. Before making sexual advances, I think that one should assume "no" until there is a clear indication to proceed.

Perceived Safety

Please think about how often you feel unsafe regarding sexual violence.

1. How often do you feel unsafe?
2. How often do you avoid places (e.g., Greek houses, certain areas on campus), because you think they are unsafe?
3. How often do you not open the door at night because you think it is unsafe?
4. How often do you make a detour to avoid unsafe places (e.g., Greek houses, certain areas on campus)?

Anxiety

1. I am calm, cool, and collected.
2. I feel pleasant.
3. I feel satisfied with myself.
4. I feel inadequate.
5. I feel secure.
6. I lack self-confidence.
7. I wish I could be as happy as others seem to be.
8. I tire quickly.
9. I worry too much over something that really doesn't matter.
10. Some unimportant thought runs through my mind and bothers me.
11. I am a steady person.

Depression

1. I was bothered by things that usually don't bother me.
2. I had trouble keeping my mind on what I was doing.
3. I felt depressed.
4. I felt that everything I did was an effort.
5. I felt hopeful about the future.
6. I felt fearful.
7. My sleep was restless.
8. I was happy.
9. I felt lonely.
10. I could not get ''going.''

Sexual Victimization

1. Have you ever been fondled, kissed, or touched sexually when you didn't want to because you were overwhelmed by their continual arguments and pressure?
2. Have you ever been fondled, kissed, or touched sexually when you didn't want to because they used their position of authority (boss, teacher, camp counselor, supervisor) to make you?
3. Have you ever been fondled, kissed, or touched sexually when you didn't want to because they threatened or used some degree of physical force (twisting your arm, holding you down, etc.) to make you?
4. Have you given in to sexual intercourse when you didn't want to because you were overwhelmed by their continual arguments and pressure?

5. Have you had sexual intercourse when you didn't want to because they used their position of authority (boss, teacher, camp counselor, supervisor) to make you?
6. Have you had someone attempt to have sex (but intercourse did not occur) when you didn't want them to by threatening or using some degree of force (twisting your arm, holding you down, etc.)?
7. Have you ever had someone attempt to have sex (but intercourse did not occur) when you didn't want them to by getting you intoxicated on alcohol or drugs without your knowledge or consent?
8. Have you had sexual intercourse when you didn't want to because they made you intoxicated by giving you alcohol or drugs without your knowledge or consent ?
9. Have you been in a situation in which you were incapacitated due to alcohol or drugs (that is, passed out or unaware of what was happening) and were not able to prevent unwanted sexual intercourse from taking place?
10. Have you had sexual intercourse when you didn't want to because they threatened or used some degree of physical force (twisting your arm, holding you down, etc.) to make you?
11. Have you had sex acts (anal or oral intercourse or penetration by objects other than a penis) when you didn't want to because they threatened or used some degree of physical force (twisting your arm, holding you down, etc.) to make you?

Did any of these experiences occur during spring break?

Where did these experiences occur?

1. UConn dorm

2. UConn other location

3. off-campus residence

4. Spring break destination

5. home from school

6. Workplace

7. Other

Male Rape Myth Acceptance

1. It is a terrible experience for a man to be raped by a woman
2. The extent of a man's resistance should be a major factor in determining if he was raped
3. Any healthy man can successfully resist a rapist if he really wants to
4. If a man obtained an erection while being raped it probably means that he started to enjoy it
5. A man can enjoy sex even if it is being forced on him
6. Most men who are raped by a woman are very upset by the incident

7. Many men claim rape if they have consented to homosexual relations but have changed their minds afterwards
8. Most men who are raped by a woman are somewhat to blame for not escaping or fighting off the woman
9. If a man engages in kissing and petting and he lets things get out of hand, it is his fault if his partner forces sex on him
10. Male rape is usually committed by homosexuals
11. Most men who are raped by a man are somewhat to blame for not escaping or fighting off the man
12. A man who has been raped has lost his manhood
13. Most men who are raped by a woman are somewhat to blame for not being more careful
14. If a man told me that he had been raped by another man, I would suspect that he is homosexual
15. Most men who have been raped have a history of promiscuity
16. No self-respecting man would admit to being raped
17. Women who rape men are sexually frustrated individuals
18. A man who allows himself to be raped by another man is probably homosexual
19. Most men would not enjoy being raped by a woman
20. Men who parade around nude in a changing room are asking for trouble
21. Male rape is more serious when the victim is heterosexual than when the victim is homosexual
22. I would have a hard time believing a man who told me that he was raped by a woman

Female Rape Myth Acceptance

She asked for it

1. If a girl is raped while she is drunk, she is at least somewhat responsible for letting things get out of control
2. When girls go to parties wearing slutty clothes, they are asking for trouble
3. If a girl goes to a room alone with a guy at a party, it is her own fault if she is raped
4. If a girl acts like a slut, eventually she is going to get into trouble
5. When girls are raped, it's often because the way they said "no" was unclear
6. If a girl initiates kissing or hooking up, she should not be surprised if a guy assumes she wants to have sex

He didn't mean to

7. When guy rapes, it is usually because of their strong desire for sex
8. Guys don't usually intend to force sex on a girl, but sometimes they get too sexually carried away
9. Rape happens when a guy's sex drive gets out of control
10. If a guy is drunk, he might rape someone unintentionally
11. It shouldn't be considered rape if a guy is drunk and didn't realize what he was doing
12. If both people are drunk, it can't be rape

It wasn't really rape

13.   If a girl doesn't physically resist sex – even if protesting verbally – it can't be considered rape
14.   If a girl doesn't physically fight back, you can't really say it was rape
15.   A rape probably didn't happen if the girl has no bruises or marks
16.   If the accused "rapist" doesn't have a weapon, you really can't call it a rape
17.   If a girl doesn't say "no" she can't claim rape

She lied

18.   A lot of times, girls who say they were raped agreed to have sex and then regret it
19.   Rape accusations are often used as a way of getting back at guys
20.   A lot of times, girl who say they were raped often led the guy on and then had regrets
21.   A lot of times, girls who claim they were raped just have emotional problems
22.   Girls who are caught cheating on their boyfriends sometimes claim that it was a rape

Figure 1. Proposed model of *H5-H9*.