

**UNDERSTANDING THE RELATIONSHIP BETWEEN VIOLENCE VICTIMIZATION,  
ALCOHOL USE, AND THE HEALTH PROMOTIVE ROLE OF RESILIENCE AMONG  
FEMALE SEX WORKERS IN PATTYA, THAILAND**

by

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## ABSTRACT

**Background:** Female sex workers (FSW) experience high levels of violence, trauma, and adversity that can contribute to negative mental health outcomes and substance use. The majority of FSW literature has focused on contributors to these poor health outcomes, with less attention to the protective role of FSW resilience in adverse environments. This dissertation: 1) examines the relationship between violence victimization and alcohol use, 2) describes the socioecological contributors to resilience, and 3) examines the buffering role of resilience against alcohol use among FSW in Pattaya, Thailand.

**Methods:** Dissertation analyses are secondary analyses of a quasi-experimental study designed to evaluate a safety-promotion intervention among FSW in Pattaya. Using proportional-to-venue-size sampling, 410 FSW were recruited for baseline survey in May 2017 and re-assessed after 14 weeks. Dissertation analyses use Generalized Structural Equation Modeling (GSEM), Hierarchical Linear Regression, and Logistic Regression with interaction to achieve study aims.

**Results:** Among 401 FSW, violence victimization by clients in the past three months (24%) and having sex with clients while inebriated (SWI) in the past three months (51%) were common. GSEM results showed that within both assessed time periods, client violence victimization was cross-sectionally associated with SWI (aOR<sub>baseline</sub> 1.87, 95% CI 1.04 – 3.37; aOR<sub>follow-up</sub> 2.52, 95% CI 1.24 – 5.10). In contrast, violence victimization at baseline did not prospectively predict SWI at follow-up (aOR 2.43, 95% CI 0.61 – 9.67).

FSW resilience (mean: 31.7; range 13-40) was measured on the Connor Davidson 10-item scale. Linear regression models showed resilience was associated with non-depression ( $\beta$  2.55, 95% CI 1.07, 4.03), higher self-efficacy for condom use ( $\beta$  1.64, 95% CI .66, 2.63), and increased community acceptance of sex work ( $\beta$  .65, 95% CI .22, 1.20).

Logistic regression interaction models showed that the relationship between client violence victimization at baseline and SWI at follow-up was significantly different depending on resilience level. Specifically, centered interaction models showed that violence-exposed FSW, with a minimum resilience score (13) had a significantly *increased* risk of SWI at follow-up (aOR 14.2, 95% CI 1.5, 131.2), while violence-exposed FSW at the highest level of resilience (40) had significantly *decreased* odds of SWI at follow-up (aOR 0.2, 95% CI: 0.1, 0.9).

**Conclusions:** Dissertation results highlight the violence-related risks of alcohol consumption in the venue environment and indicate the need for venue-level alcohol interventions to promote FSW safety. Novel dissertation results show that FSW resilience can function as a health promotion mechanism to buffer the negative alcohol-related consequences of violence exposure. Work to bolster FSW resilience through new or existing empowerment interventions is an untapped resource to improve FSW coping after violence and may offer more sustained health benefits for this population. Specifically, incorporating community-level approaches to FSW resilience building, such as increasing community acceptance of sex workers, are urgently needed.

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This dissertation is dedicated to female sex workers around the world fighting for equal access to health, rights, and protections under the law.

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# **CHAPTER ONE: INTRODUCTION**

## **I. Introduction and Specific Aims**

Female sex workers (FSW) are defined as women who exchange sex for money or goods either regularly or occasionally.<sup>1</sup> Globally, FSW are among the most vulnerable populations to violence victimization, human rights abuses, stigma, and discrimination.<sup>2</sup> FSW also suffer high rates of violence from clients (paying partners), non-paying partners, and police.<sup>3,4</sup> Like the general population, FSW survivors of violence suffer from an increased risk of numerous poor mental and physical health problems including depression, HIV and other sexually transmitted infections (STIs), and substance/alcohol abuse.<sup>5-8</sup> FSW survivors of violence may use alcohol as avoidance coping mechanism to dull or numb themselves to future triggering encounters with clients.<sup>6,8,9</sup> In turn, alcohol use before sex with clients can contribute to sexual health risks including condom non-use and increased likelihood of coercive or violence client encounters.<sup>10-13</sup> Research to understand these complex relationships between violence victimization and poor health outcomes, as well as opportunities to disrupt the pathways, are priorities for health promotion work among FSW.

Resilience is one health promotion mechanism that may improve FSW health outcomes after experiences of violence. Resilience is defined as one's ability to adapt well in the face of significant trauma or stress.<sup>14</sup> It is characterized by the ability to "bounce back" from trauma and not just maintaining good health in the absence of adversity.<sup>14</sup> Research on the role of resilience as a mechanism for health promotion among FSW is almost entirely absent. This is a missed opportunity to improve FSW health given that resilience is linked to positive health outcomes and coping in other populations experiencing extreme trauma.<sup>15-17</sup> Indeed a growing body of research on resilience has shown that resilience buffers the effects of trauma on later poor health outcomes

for adult survivors of violence.<sup>18,19</sup> This work has included research showing the link between resilience and decreased likelihood of substance use/abuse.<sup>20</sup>

This dissertation first examines the temporal relationship between violence victimization and FSW's alcohol use before sex with clients. Previous prospective studies examining violence and substance use among FSW are sparse.<sup>21,22</sup> Research designs which can confirm temporality of exposure and outcome are needed to examine the pathways linking FSW alcohol use and violence victimization. This dissertation then examines FSW resilience as a potential health promotion mechanism for this population. Dissertation analyses quantitatively examine the socioecological contributors/correlates of FSW resilience, with implications for comprehensive FSW resilience promotion. Dissertation analyses will then examine the modifying effect of resilience on alcohol use for FSW survivors of violence, thus becoming the first study to examine the buffering role of resilience for substance use in FSW.

This dissertation will conduct secondary data analyses using prospective data with three-month follow-up (May-September, 2017) among FSW in Pattaya, Thailand. Data are obtained from a community-based quasi experimental trial with a cohort of FSW in Pattaya. Dissertation analyses address three aims among FSW in Pattaya:

**Aim 1:** Examine the temporal relationship between experiencing client violence victimization and having sex with clients while inebriated.

**Aim 2:** Explore the socioecological correlates of resilience at the individual, work environment, and community level.

**Aim 3:** Examine the moderating role of resilience on the prospective relationship between client violence victimization and having sex with clients while inebriated.

## **II. Background and Significance**

### **a. Female sex workers: Environmental and social context**

FSW are defined as female “adults and young people who regularly or occasionally receive money or goods in exchange for sexual services.”<sup>1</sup> Reasons for entering sex work occur along a continuum of choice; primary reasons for entry are to meet an economic need such as supporting family members or paying a debt.<sup>23-25</sup> Some women enter sex work because of a preference over other job options or to meet a financially supportive partner.<sup>23</sup> Others are forced or coerced into sex work,<sup>24,25</sup> which constitutes human trafficking – itself a serious human rights violation. The public health and human rights communities differentiate between sex workers and trafficked individuals. Distinctions are also made between sex workers and exploited children under 18 years of age. The involvement of children under the age of 18 in sex work violates international human rights law.<sup>26</sup>

The formality of the sex work industry varies by country and setting. In more organized contexts, sex can be sold at dedicated establishments including brothels, bars, dance clubs, and massage parlors. In these settings, FSW often have more fixed work hours, a manager/boss who serves as an intermediary between FSW and clients or authorities, and are assigned other job functions including bartending or dancing.<sup>27</sup> Sex is also sold in less organized settings including parks, street sides, markets, truck stops, and other public venues. The locations in which sex is sold have implications for FSW health and safety, often with less formal settings offering comparatively less protection from violence victimization.<sup>28</sup>

Sex work is fully or partially criminalized in nearly every country in the world.<sup>29</sup> Criminalization, as well as discriminatory policies and regulations, drive sex workers underground and impede their access to justice and resources.<sup>2</sup> Indeed operating in criminalized contexts means that FSW interactions with police are often a source of abuse as opposed to protection. FSW are extorted for money or coerced/forced into providing sex to avoid arrest or fines by police.<sup>2,30,31</sup>

Criminalization can also impede the delivery of health services to FSW, as these laws and policies marginalize sex workers from more formal health and educational structures.<sup>32</sup>

In addition to enduring violence perpetration from state actors, FSW suffer high rates of violence from intimate partners, managers, and clients/paying partners.<sup>2,30</sup> FSW's illegal status, social marginalization, and exposure to unsafe work environments and multiple perpetrator types, make them a particularly vulnerable group for violence victimization.<sup>27</sup> Discrimination against FSW also comes from multiple sources such as family, friends, healthcare providers, and the general public.<sup>33-35</sup> Discrimination by healthcare workers in particular, results in poorer quality healthcare for FSW or total denial of services for FSW due to their profession.<sup>34,36</sup>

Operating in these stigmatizing and often violent environments can have serious mental and physical health consequences, including injury, high rates of depression, anxiety, and substance use/abuse.<sup>37-39</sup> Indeed estimates for depressive symptoms in FSW populations range from 30%-80%,<sup>37,39-41</sup> exceeding the global estimates for prevalence of depression among the general population of women (~14%).<sup>42</sup> Alcohol and drug use are also frequently reported forms of coping or "self-medication" for FSW.<sup>7,8,43</sup> The availability of mental health services and substance abuse treatment for FSW in low-and-middle-income settings is extremely limited, leaving immense unmet need.<sup>44,45</sup>

Of particular concern for FSW health are high rates of HIV, which are on average 13 times higher than rates among the general population of women in low- and middle-income countries.<sup>46</sup> FSW HIV risk is driven by a complex set of biological, social, structural, and gender factors that continue to challenge HIV prevention efforts.<sup>47,48</sup> International principles on the delivery of effective HIV prevention affirm that reducing FSW vulnerability to structural issues and violence victimization is necessary to address HIV in this population.<sup>27</sup>



Taken together, these data point to FSW as a key population at risk not only for HIV but for a broader set of health concerns that result from trauma and chronically stressful environments. To comprehensively meet FSW needs, the field requires more knowledge about how experiences of violence shape FSW health and well-being and on FSW coping and resilience in these difficult or violent environments. This dissertation advances the literature on these key outcomes, taking steps towards improving the lives and health of this high-risk population.

### **b. Violence against female sex workers**

Violence against women and girls is extremely pervasive. Conservative estimates indicate that one in three women globally will experience physical or sexual violence in her lifetime.<sup>49</sup> Intimate partner violence (IPV), defined as physical, sexual, verbal, or emotional abuse by an intimate partner, is among the most common and severe forms of violence against women.<sup>50,51</sup> It is well-recognized that IPV contributes to poor physical, sexual, and mental health outcomes that can persist throughout a survivor's life.<sup>52,53</sup> In addition to IPV, violence and sexual assault from non-intimate partners (i.e. friend, family, stranger) are also common. Estimates for the prevalence of non-partner sexual violence against women range from 5-13% depending on the region.<sup>49</sup> As with IPV, non-partner sexual violence is associated with poor outcomes among survivors, including depression, anxiety, and alcohol-use disorders.<sup>49</sup>

Marginalized groups of women, such as FSW, suffer disproportionately high rates of violence.<sup>2,30</sup> In a recent review of 800 studies of human rights violations and abuses against sex workers (SW), researchers found that 8-76% of SW reported physical or sexual violence by a client and 4-64% reported violence by a non-paying partner.<sup>2,30</sup> Male-perpetrated violence against women is rooted in gender power-inequities between women and men.<sup>51,54</sup> These existing power inequities are compounded for FSW, who have relatively less social and political power than other

women. FSW violence risk is further magnified by exposure to multiple types of sexual partners, including intimate non-paying partners and clients. As in the general population of women, violence against FSW can be severe, persistent, and lead to serious poor health outcomes.<sup>55-57</sup>

### *Client violence perpetration*

Clients are among the most common perpetrators of violence against FSW.<sup>56,58-60</sup> Client perpetrators are the focus of this dissertation. Client violence includes: physical violence, such as hitting or slapping; sexual violence, such as being forced to have sex; and verbal/emotional abuse, such as being yelled at, threatened, or insulted.<sup>54</sup> In addition to these internationally recognized forms of violence, client violence may include other forms of sexual abuse and mistreatment that occur within the context of a paid sexual encounter.<sup>61</sup> Client sexual violence can include bringing more people to have sex than was originally agreed, or only paying for sex once but demanding additional or different sexual acts.<sup>5,6,62,63</sup> These interactions with clients represent other non-consensual sexual contact and have been included in the measures of client violence in previous studies.<sup>6,63,64</sup> Specifically, clients “demanding” additional sexual services has been found to be associated with increased FSW alcohol use, warranting its inclusion in the measure of violence for this dissertation.<sup>6</sup> Power differentials between FSW and clients fuel these abusive client interactions and provide FSW with little recourse for justice.<sup>9,65</sup>

The majority of research on the impact of client violence against FSW has focused on the poor sexual and reproductive health (SRH) outcomes of violence, including injury, HIV/STIs,<sup>55,56,66</sup> and unintended pregnancy.<sup>55,57,67</sup> In some FSW samples, physical and sexual violence have been associated with increased likelihood of pregnancy loss<sup>23</sup> and history of miscarriage and stillbirths.<sup>57</sup> Previous experiences with physical and sexual violence are also

associated with avoidance of health services by FSW.<sup>58,68</sup> Delays in seeking healthcare can further exacerbate negative health outcomes for FSW.<sup>58,68</sup>

More recent evidence on the health impacts of client violence have shown the negative mental health implications of victimization for FSW.<sup>37,38,67</sup> Client violence is associated with increased FSW depressive symptoms<sup>37,38,67</sup> post-traumatic stress disorder (PTSD)<sup>69</sup>, and suicidal ideation.<sup>70</sup> Client violence is also associated with FSW substance and alcohol use, which can be used as a coping mechanism after victimization.<sup>7,8</sup> Still, FSW mental health and coping after violence are understudied. Longitudinal data from the general population of women indicate that IPV contributes to survivor's poor mental health outcomes and alcohol and drug use.<sup>52,53,71</sup> However, these pathways remain less defined for survivors of client violence in the sex work context. Given the pervasiveness and severity of client violence against FSW, research on FSW mental health and coping in the context of paying partner violence is of urgent interest for population health promotion.

### **c. Alcohol use among female sex workers**

Alcohol use is a common part of the sex work environment, especially for venue-based FSW who operate out of bars or clubs.<sup>13,72</sup> According to a recent review, 12-78% of FSW (median 33%) report consuming alcohol on a daily basis.<sup>7</sup> Indications of “problem drinking” including binge drinking or frequent inebriation are also common among FSW and their clients. Inebriation depends on sex, weight, genetics, and other factors, but it occurs at blood alcohol concentrations around 0.08g/dl (3-4 drinks for women) according to the National Institute on Alcohol Abuse and Alcoholism.<sup>73</sup> Depending on the context and measure, studies found 33-65% of FSW reported inebriation (over 3-4 alcoholic drinks in one sitting) at least one day in the past month.<sup>7,40,74</sup>

*Sex with clients while inebriated*

Alcohol is a known facilitator of sex work. FSW and clients frequently report using alcohol before sex, especially in venue-based settings.<sup>7</sup> Among FSW, estimates for alcohol use before sex range from 19-77% (median 50%).<sup>7</sup> As in the general population, FSW alcohol use increases with environmental and occupational factors that encourage its use. For venue-based FSW, who work in alcohol-serving venues, drinking alcohol with their clients may be an encouraged or mandatory part of the job. FSW may be pressured or incentivized to drink alcohol with clients,<sup>75,76</sup> or FSW may choose to drink alcohol before sex to decrease inhibitions, increase enjoyment, or “numb” themselves to sex with clients.<sup>10,77</sup> Alcohol use has also been reported as a coping mechanism for FSW to deal with the stressful environments and socioeconomic pressures associated with sex work.<sup>7,8</sup>

The health consequences of having sex while inebriated can be severe for FSW. Sex while under the influence of alcohol carries a known set of sexual risks, including condom non-use,<sup>5,11</sup> condom slippage/breakage,<sup>59</sup> and other high-risk sexual encounters, such as group sex<sup>10</sup> or anal sex.<sup>12</sup> Qualitative data support these associations, indicating increased difficulty negotiating or demanding condom-use during client sex, or lack of awareness when a condom was removed by the client.<sup>10,62,78</sup> Condom failure puts FSW at risk of unintended pregnancy, HIV, and other STIs. Longitudinal data on alcohol use and HIV infection among FSW is sparse; however, some studies have shown that FSW inebriated sex with clients was associated with current or history of STIs.<sup>5,13,79</sup> Research to clarify the contributors and contexts of alcohol use for FSW is important given the known health and safety concerns associated with sex while inebriated, especially in the sex work context.

#### **d. FSW violence victimization and sex while inebriated**

Violence victimization can be a consequence of and a contributor to alcohol use among survivors. Research finds both that alcohol use can contribute to higher risk of violence victimization and that violence victimization can increase survivor's future alcohol use.<sup>52,80-82</sup> This bidirectional relationship is defined through two primary pathways.

Firstly, alcohol use before sex can increase the risk of violence during that sexual encounter.<sup>13,21,70,82,83</sup> This is referred to in this dissertation as the *episodic pathway*. Qualitative research has shown that clients may encourage FSW to drink alcohol to point of inebriation or loss of consciousness, which leaves them vulnerable to rape.<sup>62,84</sup> Alcohol consumption can also decrease awareness and the ability to detect or escape a risky situation.<sup>5,7,9,77</sup> For venue-based FSW, who often meet their clients at an alcohol serving venue, drinking alcohol with clients is common.<sup>7</sup> Refusing to drink with clients can result in loss of client or employment.<sup>77</sup> In these environments, clients also frequently become inebriated before sex.<sup>7</sup> Given the known risk of alcohol for violence perpetration,<sup>85</sup> client inebriation also increases the risk of violence against FSW via the episodic pathway.

Secondly, experiencing violence may increase the likelihood of future alcohol use among survivors.<sup>52,80</sup> This is referred to in this dissertation as the *prospective pathway*. Longitudinal research from the general population has shown that women's risk of alcohol and drug use increased significantly after experiencing violence, even among women who did not have a history of violence victimization.<sup>52,80,86</sup> Prospective studies examining violence victimization and substance abuse among FSW populations are sparse.<sup>21,87</sup> These studies include a Kenyan cohort study tracking HIV viral suppression in FSW which found that FSW history of partner violence was associated with current alcohol abuse.<sup>87</sup> Conversely, a recent U.S.-based cohort study of FSW found that FSW daily drug injection contributed to risk of violence victimization.<sup>21</sup> More

commonly, prospective FSW studies include secondary measures related to alcohol use and violence victimization, but the primary study analyses are not designed to answer questions around FSW alcohol use after victimization.<sup>87-89</sup>

Cross-sectional studies among FSW have shown clear associations between violence victimization and alcohol use by both FSW and clients.<sup>5-7,90</sup> The direction of the association can occasionally be inferred due to context or study measures. For example, in a study to examine the contributors to hazardous alcohol use among FSW in Malawi, results show that experiences of GBV in the past 6 months were associated with frequent inebriation in the past month.<sup>90</sup> Results imply that FSW violence victimization may contribute to frequent inebriation, but directionality cannot be confirmed.

The mechanism which enables the prospective pathway is theorized to be through a survivor's approach to coping after trauma.<sup>91</sup> A survivor may use alcohol as an avoidance coping mechanism after victimization.<sup>92</sup> Avoidance coping is defined as the avoidance of anxiety-arousing stimuli or seeking distraction.<sup>93,94</sup> Avoidance coping may be protective in the short term, but these techniques are not thought to promote long-term adjustment.<sup>93,94</sup> A robust body of qualitative work shows that FSW may use alcohol to help cope with the anxiety, fear, and physical fatigue associated with violence victimization and other stressors within the sex work environment.<sup>8,9,77</sup> Qualitative data among FSW in India indicate that the primary reason women drank alcohol outside of social settings was for mental health or self-medication.<sup>8</sup> These studies, taken together with data from the general population of women, provide evidence that future alcohol use may increase among FSW survivors of violence as a form of coping. Prospective study designs, which have the primary purpose of examining alcohol use and violence victimization, are needed to advance the field's knowledge on FSW coping and substance use after violence.

Mental health factors play an important role in a survivor's coping and may also affect the prospective pathway from violence victimization to later substance use. Previous research from the general population of women has suggested that a survivor's later risk of alcohol abuse is mediated through their psychosocial factors, such as depression, or level of psychological distress related to the violent incident.<sup>95-98</sup> A path analysis among college-aged survivors of sexual assault showed that violence victimization contributed to later alcohol use via its effect on increasing women's levels of psychological distress.<sup>95</sup> Similarly, previous research on U.S adolescents found that depression mediated the effects of bullying victimization on substance use for adolescent females.<sup>97</sup> Comparable mediation analyses among FSW, using prospective data, are lacking. However, cross-sectional data show that FSW depression is associated with both violence exposure<sup>37,38,67</sup> and alcohol use,<sup>7</sup> making it a likely mediator of this prospective relationship in FSW. Research to examine the mental health factors which may mediate or modify the health outcomes related to violence against FSW is needed. These data are required to understand and ultimately disrupt the pathways from FSW violence victimization to later poor outcomes.

#### **e. Resilience**

One potentially modifying factor that may promote health in the face of violence is resilience. A growing body of literature has examined the trajectories of individuals who experience trauma and which factors can promote healthy development despite negative experiences. The term "resilience" is used by researchers and clinicians to refer to this trajectory of adaptability and "bounce back" from stressors throughout a person's life.<sup>14</sup> Resilience can help explain the variation in individuals' later health outcomes after adverse experiences, with resilience buffering against the later expected poor outcomes associated with trauma.<sup>99</sup> Research investigating resilience among FSW is nascent. Few resilience studies have examined the contributors to FSW

resilience<sup>100-103</sup> or examined the link between resilience and health outcomes in FSW.<sup>104</sup> Investigating resilience among FSW may have health promotive implications for this population beyond what could be achieved from a focus on risk-reduction alone.

### *Resilience definitions and history*

Resilience is formally defined as achieving a positive outcome in the context of risk or other factors that are known to be associated with poor outcomes.<sup>14</sup> It is not merely the absence of risk, but the presence of protective factors that contribute to positive outcomes despite risk. The World Health Organization (WHO) describes resilience as “positive adaptation and protective factors that moderate risk factors, thereby reducing the impact of risk on outcomes.”<sup>105</sup> The American Psychological Association uses the definition, “adapting well in the face of adversity, trauma, tragedy, threats or significant sources of stress.”<sup>106</sup> For the purpose of this dissertation, resilience will be defined as “the protective factors and mechanisms that contribute to a good outcome despite experiences with stressors that carry significant risk for health.”<sup>107</sup> This definition has been proposed and operationalized by multiple contemporary researchers focusing on the health impacts of resilience.<sup>107-109</sup>

The concept of resilience was first introduced in the 1970s.<sup>110</sup> At that time resilience was conceptualized as a stable personal characteristic that rendered some children “invulnerable.”<sup>110</sup> This model of resilience implied that a child’s ability to positively adapt was fixed. Early research focused on understanding the individual variations in children’s responses to adversity that led to positive adaptation and outcomes.<sup>111,112</sup> As the field evolved, researchers recognized that resilience is not a fixed characteristic but one that can change over time.<sup>113</sup> Researchers found that resilience was shaped by a child’s development, family interactions, and characteristics of the child’s social environment.<sup>113-115</sup>



Some researchers have warned that conceptualizing resilience as static ignores the role of the environment in shaping human characteristics and may contribute to blaming individuals for poor outcomes.<sup>109</sup> The extent to which individuals change their characteristics or behavioral patterns with changing environments or stimuli is known as human plasticity.<sup>116</sup> Plasticity is an important concept for understanding how an individual's resilience may change over time. Exemplifying this concept of human plasticity is work by Masten et al. Research showed that although childhood factors remained important to positive adaptation as an adult, protective factors in adolescents predicted positive adult outcomes even after adjusting for childhood circumstances.<sup>117</sup> It is now broadly recognized that positive adaptation is a "developmental progression" in which new strengths and vulnerabilities emerge with changing life circumstances.<sup>113,115</sup>

As the field of research on resilience continued to be refined, it became clear that the concept of resilience could not be thought of as global protection for all poor outcomes. Rather, resilience was specific to a certain sets of risks and outcomes.<sup>118</sup> Researchers noted for example that children could positively adapt in some areas, such as school performance, while suffer in other areas, such as depression.<sup>119</sup> Protective factors therefore could be more salient for certain groups and confer protection for certain poor outcomes. For example, several resilience studies noted age, racial, and gender differences in the types of factors which were most protective for certain outcomes.<sup>120-122</sup>

More recently, the concept of resilience has been applied to adult populations. Resilience research among adults recognizes the role of later-life adversity in shaping health and focuses on examining the health outcomes of adults who have undergone catastrophic events or other significant stress.<sup>123,124</sup> Research has found that resilience promotes healthy adaptive coping and

prevents the development of later poor health outcomes among adult survivors of trauma.<sup>15-17</sup> Research has also suggested that resilience may play a key role in reducing avoidance coping mechanisms such as substance/alcohol abuse among adults with a history of violence victimization.<sup>20,125</sup>

### *Resilience as a health promotive factor*

Resilience researchers have conceptualized and measured the role of resilience in improving health outcomes in a variety of ways. Some researchers have used a person-focused approach to compare the outcomes of people with a similar level of adversity to identify relevant resilience factors (i.e., people with high adversity and high competence versus high adversity and low competence).<sup>126</sup> Others have used a variable-focused approach, which relies on either main effect or interaction models, to measure the influence of resilience on health outcomes.<sup>18,19,127</sup> Commonly, resilience is modeled as a modifying variable between experiences of trauma and later poor health outcomes.<sup>17,19,99</sup> This mechanism, through which resilience alters the way an individual processes trauma to alleviate or mitigate the later expected effects of that trauma, is often referred to as the buffering model. Resilience scholars have argued that testing the buffering model through interaction of effects models is a defining feature of resilience research; however main effect findings can also be useful from an intervention perspective.<sup>128,129</sup>

The buffering model is widely supported by studies utilizing a variable-focused approach. Researchers find that resilience modifies the effects of trauma on later poor health outcomes for adult populations with cancer, HIV, and other chronic conditions.<sup>18,19,130,131</sup> For example, among women living with HIV (WLHIV) in the United States, resilience was found to modify the expected relationship between sexual violence victimization and lower antiretroviral (ARV) adherence.<sup>18</sup> Resilience-trauma interaction models showed that for women with a history of sexual

abuse, resilience was significantly associated with high antiretroviral (ARV) adherence compared to women with no history of abuse (OR=1.85, 95% CI 1.11–3.09, p=0.02).<sup>18</sup> Similarly, a longitudinal study among U.S. women living with, or at high risk of, HIV showed that resilience predicted lower levels of depression and higher health-related quality of life.<sup>19</sup> Resilience-abuse interaction models showed that resilience significantly reduced women’s likelihood of depression among those who had a history of childhood sexual abuse compared to those who did not ( $\beta = -0.16$ ,  $t = -2.73$ ,  $p = .01$ ,  $R^2 = .39$ ).<sup>19</sup>

Most commonly resilience research has focused on the protective effect of resilience for mental health outcomes such as depression and PTSD.<sup>127,132-134</sup> Evidence comes from a wide set of populations who have experienced adversity including veterans and survivors catastrophic events or violence.<sup>127,132,133,135</sup> For military combat veterans, resilience has been found both to be protective against PTSD (OR .97, 95% CI .95 - .99,  $p < .05$ ) and moderate the relationship between trauma and PTSD.<sup>132</sup> Similarly, among a sample of trauma-exposed primary care patients, resilience was found to be protective for PTSD (OR .93, 95% CI .91-.95,  $p < .001$ ).<sup>127</sup> Resilience has also been shown to be protective against depressive symptoms and psychological distress for populations who struggle with ongoing adverse conditions, such as refugees or survivors of natural disasters.<sup>17,135</sup> Still more research is required for these and other trauma-exposed populations to capture the full health benefits of resilience, especially as it relates to outcomes outside of mental health.

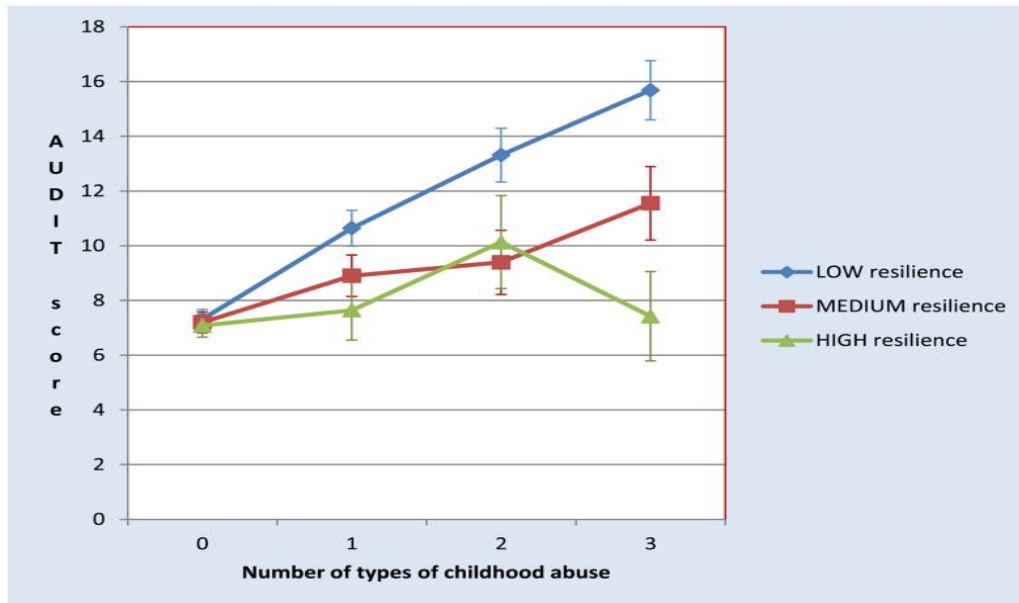
*i. Resilience and alcohol/substance use*

The relationship between resilience and alcohol/substance use has been investigated in several non-sex work samples from high-income settings. Recent research among a population of inner-city adults in the US found that, in main effect models, childhood abuse was significantly

associated with lifetime alcohol use disorder (OR 1.20, 95% CI 1.03-1.40). Main effect models also showed that resilience was negatively associated with alcohol use disorder (OR .95, 95% CI .93-.97).<sup>20</sup> In interaction and stratified models resilience was found to be a significant effect modifier between childhood abuse and lifetime alcohol use ( $\beta = -.06$ ,  $p=.01$ ) [Figure 1.1]. Similarly, resilience was found to be negatively associated with alcohol abuse in military veterans<sup>132</sup> and with nicotine dependence among adults who had been in the Canadian child welfare system.<sup>133</sup> Researchers concluded that resilient characteristics are “likely to mitigate the risks of developing substance use disorders” but that more research is needed.<sup>20</sup>

Given these previous indications of the protective effects of resilience for substance abuse disorders, researchers have proposed that resilience may be an important and sustainable approach for substance abuse prevention.<sup>125,136</sup> Work among military populations specifically has suggested that resilience contributes to more active coping styles as opposed to avoidance coping styles such as alcohol/substance use.<sup>137</sup> Resilience as a protective mechanism for alcohol/substance use holds equal promise for FSW populations, the potential effects of which have yet to be examined in published literature.

**Figure 1.1.** Interaction between resilience and childhood abuse on lifetime alcohol use among inner city men and women



Wingo AP, Ressler KJ, Bradley B. Resilience characteristics mitigate tendency for harmful alcohol and illicit drug use in adults with a history of childhood abuse: A cross-sectional study of 2024 inner-city men and women. *Journal of psychiatric research.* 2014;51:93-99.

*Resilience in FSW*

Research examining resilience among FSW is sparse. A recent U.S.-based study comparing cis and transgender sex workers found that resilience was associated with higher education, having housing, and increased food security.<sup>101</sup> Data from a randomized control trial to promote resilience in Chinese FSW found that resilience was enabled by self-efficacy, self-esteem, and increased coping flexibility.<sup>100</sup> Several qualitative studies have described FSW’s resilience and identified factors that women feel have helped them cope with adversity. These factors include staying optimistic, having belief in one’s abilities, benefitting from peer-support, and engaging in collective action.<sup>102,103</sup> Still, the contributors and health benefits of resilience in FSW are not well known. Questions remain as to which factors may support resilience in FSW and which factors may be most salient for health promotion.

FSW-specific research on the health benefits of resilience is also rare. Where studies do exist, research has focused on the mental and sexual health outcomes associated with FSW resilience.<sup>104,138</sup> Research by Yuen et. al. among FSW in China showed that a resilience-promotion intervention was successful in increasing FSW resilience, decreasing psychological distress, improving condom use, and increasing STI and HIV testing.<sup>104</sup> Researchers conclude that resilience promotion may have positive sexual health impacts for FSW including for condom promotion and STI/HIV testing. Research examining the potential benefits of resilience on other health outcomes or behaviors among FSW is absent. This dissertation will be the first to investigate the buffering effects of resilience on FSW alcohol use.

### **III. Theories and Conceptual Framework**

This study applies concepts from stress and coping theory,<sup>139</sup> resilience theory,<sup>140-142</sup> and the socioecological systems model<sup>143</sup> to characterize resilience in FSW and examine coping and resilience after violence in FSW.

The stress and coping theory, originally described by Lazarus & Folkman in 1984, proposes that the coping process is composed of several key elements related to how an individual appraises and responds to stress.<sup>139</sup> During the appraisal process, an individual will make an initial determination about whether an event is stressful, and if so, will make an assessment about what can be done manage that stressful event. In the coping process, an individual may use a variety of techniques to “master, tolerate, or reduce external and internal demands and conflicts” resulting from the event.<sup>144</sup> The theory has been applied extensively to research examining the variations in IPV survivor’s coping and health seeking strategies.<sup>145</sup> Avoidance coping strategies (such as alcohol use) are found to be predicted by experiences of threats/intimidation, increasing violence, and perceiving the situation as unchangeable or inevitable.<sup>145,146</sup> This dissertation draws on the

stress and coping theory to position and examine FSW alcohol use after experiences of violence as an avoidance coping mechanism.

Resilience theory, first introduced in the 1970s, provides a strength-based approach to understanding human development.<sup>110</sup> Central to resilience theory is the idea that there are positive contextual, social, and individual variables that disrupt the developmental trajectories from adverse experiences to later poor health outcomes.<sup>140-142</sup> Resilience theory includes several models which describe how resilience can work as a buffering or modifying factor that alters the expected trajectory between risk and poor outcomes.<sup>99,147</sup> The ability of resilience to buffer against poor health outcomes among survivors of trauma has been increasingly documented.<sup>18,19,130,131</sup> However, resilience has not before been tested as a buffering factor for FSW alcohol use. This dissertation draws heavily on resilience theory to position and test resilience as a modifying factor on the pathway from violence to later alcohol use. This approach is novel in its extension of theory and methods to its application for FSW health promotion.

Bronfenbrenner's socioecological systems model states that human development is shaped by continuous and reciprocal interactions between a person and her or his environment from the microsystem (family, peers, etc.) to the larger macrosystem (laws, policies, etc.), as well as by the relational connections between these various systems.<sup>143,139,140</sup> While the socioecological systems model was originally developed in consideration of child development, the model has played a significant role in expanding social scientists' understanding of the multiple environmental systems that influence resilience from individual factors to wider social ecological influences throughout the lifecourse.<sup>109,141,148-150</sup> Previous work has built on the socioecological systems model<sup>143</sup> to conceptualize resilience as an individual-level phenomenon with key influencing factors from the biological, individual, family, community, and societal levels.<sup>14</sup> Commonly, the

specific contributors to resilience will depend on the individual, population, setting, and relevant health outcome under investigation. However, several concept analyses of resilience have found some common defining attributes across samples.<sup>14,151,152</sup> These factors may be more salient for certain populations or stages of development, thus there is not a universal framework for resilience. Building on this previous research, this dissertation will apply a socioecological perspective to the examination of resilience for FSW.

#### **a. Resilience-enabling factors by socioecological level**

This section will outline the proposed resilience-enabling factors, by socioecological level, based on the literature generally. A discussion of resilience-enabling factors among FSW will follow.

##### *Sociopolitical environment*

Modern resilience researchers argue that not only is it beneficial, but necessary, to consider the role of the larger political environment to understand resilience.<sup>148</sup> The pathway to resilience is influenced by the enabling or inhibiting role of the social/political environment that impacts relationships, identity, the availability of resources, and access to social justice.<sup>148,153-155</sup> For example, policies concerning orphan-competent schools and child-friendly HIV services were shown to influence resilience among HIV positive children in sub-Saharan Africa through their effect on the availability of these resources.<sup>153</sup>

##### *Neighborhood and community environment*

Researchers increasingly recognize the impact of the wider social environment and access to community resources on resilience.<sup>148,153,155</sup> Access to healthcare or health services, employment opportunities, community resources, and involvement in prosocial activities (sports, religious groups, etc.) are associated with resilience.<sup>155-157</sup> Positive work and school environments are other important structures on which individuals rely for support and adaptive coping. Attributes of these



positive environments and structures may include supportive systems that alleviate an individual's stress or financial burden (e.g., employment benefits such as subsidized health or childcare).

#### *Family and peer factors*

At the family and peer level, relevant factors related to resilience include family and peer support systems, increased socio-economic resources, and social or financial capital.<sup>14,152,156</sup> In general, indicators of more positive family relationships, including higher stability and support from family, are associated with resilience.<sup>125,151,152,158</sup> For children and adolescents, higher-quality interaction with parents or caregivers is highly protective and carries long term advantages into adulthood. For adults, peer/friend support networks are also protective and have shown to aid in positive coping and resilience for adults experiencing trauma.<sup>159,160</sup>

#### *Individual factors*

Concept mappings of existing literature find common individual-level factors concerning a person's temperament and motivation to be important for resilience. Kobasa (1979),<sup>161</sup> Rutter (1985),<sup>162</sup> and Lyons (1991)<sup>163</sup> are among the key researchers to describe the individual characteristics of resilient people. Their work continues to be the basis of resilience scale development for children and adults.<sup>164,165</sup> They and other researchers describe several defining and central characteristics of resilience, including positive acceptance of change,<sup>161,162</sup> perception of stress as a challenge or opportunity,<sup>161,162</sup> recognition of limitations of control,<sup>161,162</sup> tolerance of negative experiences,<sup>163</sup> belief in one's ability to achieve a goal or outcome,<sup>162</sup> sense of humor,<sup>162</sup> and action-oriented approach to problems.<sup>162</sup>

In addition, a broad body of literature has shown several individual-level factors that are associated with resilience and thought to promote resilience. While these factors differ depending on study and context, several recent concept analyses<sup>14,151,152</sup> have cross-referenced these factors

across studies to find the factors that are consistently associated with resilience. These factors include high expectancy, self-determination (firmness of purpose or resolve), self-esteem (confidence in one's worth), self-efficacy (belief in one's abilities), and flexibility (being adaptable, cooperative, of easy temperament).<sup>110,115,140,142,166</sup>

These factors are partially but not fully overlapping constructs with resilience such that their presence can promote resilience. For example, self-efficacy is defined as “optimistic self-belief that one can perform novel or difficult tasks and attain a desired outcome”.<sup>167</sup> This “can-do” attitude is an important feature of resilience, and so self-efficacy is empirically closely related to resilience. However, self-efficacy differs from resilience in key ways. Resilience is a multi-faceted construct defined not only by belief in ability to accomplish goals but also a variety of other features that allow for rebound from adversity. In this way, resilience cannot exist in the absence of stressors whereas self-efficacy may be present anytime.<sup>168</sup> Similar distinctions are made between resilience and other related factors.

#### **b. FSW resilience: Enabling factors and domains of influence**

The below section outlines hypothesized resilience-enabling factors for FSW, by socioecological domain. While FSW-specific information on resilience is sparse, many factors that promote resilience in the general adult population and are also thought to also promote FSW resilience are included in this discussion. This section additionally includes factors that have been shown to promote FSW health generally and are thought to enable FSW resilience.

##### *Social/Political factors*

While this dissertation will only draw data from one setting, which will not allow for comparisons of policy-level factors, this discussion has been retained to acknowledge the influence of the wider social context on FSW resilience and health.

FSW are a nearly universal criminalized population, whose health and rights are subject to the often punitive policies governing their profession.<sup>2,48</sup> At the social/political level, research has shown that criminalization of sex work, or regulations which implement punitive or restrictive policies, force women into less safe working conditions and limit exposure to community HIV prevention initiatives.<sup>47,169</sup> This in turn increases stigma, discrimination and fear among FSW, and contributes to poor outcomes. Conversely, policies and interventions to empower sex worker communities and foster better interactions with police and legal systems have been successful in promoting FSW safety and may contribute to resilience.<sup>170,171</sup> Decriminalization of sex work may be of particular importance to FSW resilience given then known positive effects of decriminalization on reducing FSW exposure to violence, police harassment, and contributing to safer work environments.<sup>48</sup>

Broader social factors, such as a nation's level of security and stability, impact the availability of resources and population safety. Highly unstable environments (e.g. during wartime or conflict states) are theorized to poorly affect population resilience.<sup>172,173</sup> Additionally, societal norms around gender and sexuality (i.e. expectations for appropriate sexual behavior) can impact societal acceptance of the sex work industry and treatment of FSW broadly. These factors may play a role in population resilience.

### *Community factors*

Positive community environments and relationships are theorized to enable resilience among FSW in much the same way that they do for the general population. Where positive relationships with friends and family exist, these relationships can be a source of social support for FSW and positive friend/family relationships are associated with improved health outcomes.<sup>174,175</sup> While FSW relationships with police can be negative and coercive,<sup>2</sup> in contexts where police are a trusted

source of support, these positive relationships with police may also enable FSW resilience. Discrimination against FSW is a known contributor to poor health,<sup>176</sup> conversely FSW feelings of acceptance by their community may contribute to good outcomes and enable resilience.

Positive community structures, such as the availability of health services for sex workers and sex-work specific drop-in spaces, have been shown to promote social cohesion and reduce sexual health risk.<sup>177-179</sup> These positive community structures may also play a role in resilience promotion for this population

### *Work environment factors*

The work environment may be especially important for FSW resilience, as positive work spaces can be a source of social support,<sup>175,180</sup> and negative work environments are a frequent source of violence and rights violations.<sup>181</sup> Work environment factors, such as having a supportive manager and supportive peers/co-workers, have shown to be important contributors to sexual health promotion and may contribute to resilience among this population.<sup>174,179,182-187</sup> Peer and co-worker networks may be particularly important for FSW, as they consist of friends with whom FSW can be more open about their profession, contributing to feelings of solidarity, unity, and empowerment.<sup>188</sup>

Work setting characteristics, such as the type of venue or the number of clients that a woman serves per week, are defining features of her work place and may have implications for resilience. Venue policies that support the health and rights of FSW, such as supporting condom distribution or sexual health outreach, are indicators of more supportive work environments and contribute to health access among FSW.<sup>184</sup> These supportive workplace policies for FSW health may enable resilience in sex work settings. Financial stability is protective for FSW, allowing for improved recovery from hardships, and may additionally assist in population resilience.<sup>23,189-191</sup>

### *Individual*

Many of the same psychosocial factors that are associated with resilience in the general population are theorized to promote resilience in FSW including self-efficacy, self-esteem, self-worth and flexibility.<sup>151</sup> These are related but distinct concepts from resilience in that they can be present at any time and are not defined in relation to adversity/stressors. A recent conceptual framework for a resilience-promotion intervention among FSW in China theorized that self-esteem, self-efficacy, and coping flexibility (the ability to implement alternative coping strategies)<sup>192</sup> are the primary individual factors that contribute to population resilience.<sup>193</sup> Several other studies have pointed to self-worth and self-efficacy as key predictors of positive sexual health outcomes among FSW, lending evidence to their potential association with resilience.<sup>194-197</sup> Additionally, lack of depressive symptoms has been shown to be associated with resilience in multiple studies;<sup>134</sup> this will be examined in this dissertation as another potential correlate of resilience.

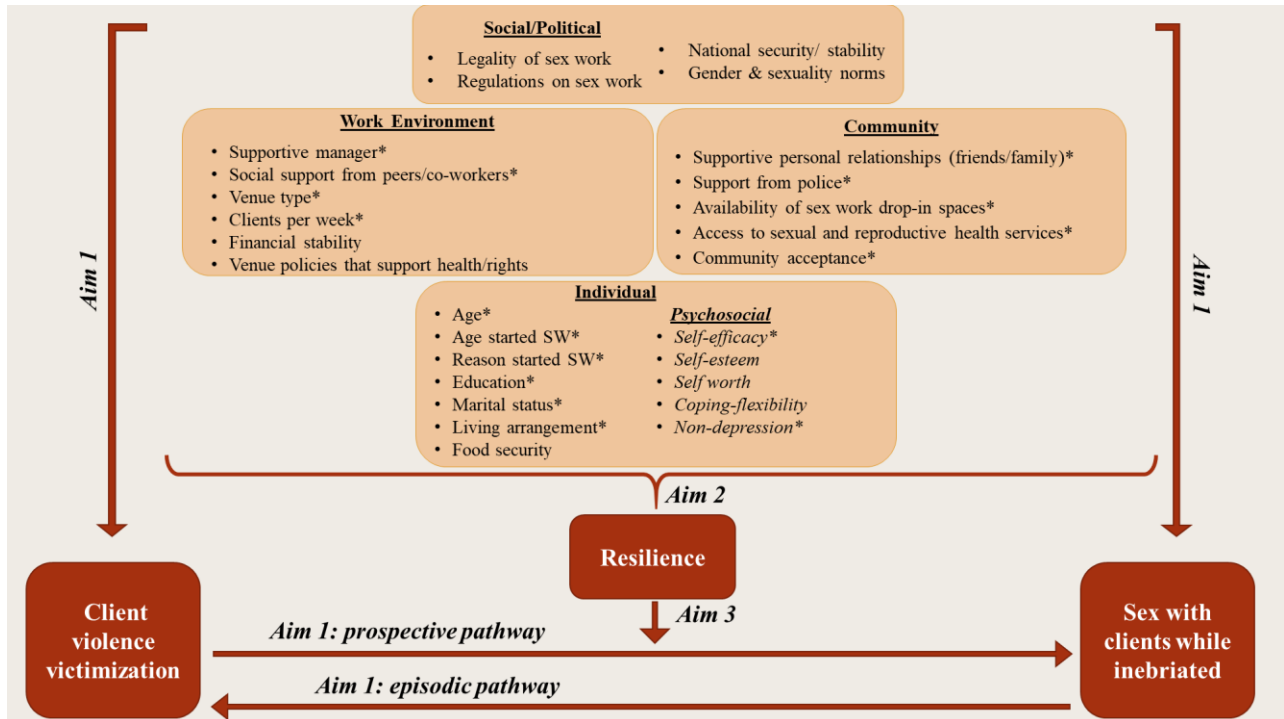
Demographic characteristics such as a woman's age, education level, living arrangement and marital status have implications for a variety of health outcomes, warranting their examination in this analysis for their potential association with resilience. Recent evidence specifically found that resilience was associated with higher education, more secure housing, and food security among U.S.-based transgender sex workers.<sup>101</sup>

Additionally, characteristics defining the timing and context of initiating sex work have important implications for sex workers' health generally, with research indicating that women/girls who entered the industry at a younger age or under coercive circumstances are at higher risk for a variety of poor outcomes.<sup>198,199</sup> Examining factors including a woman's age and reason that she initiated sex work will be of additional value to understanding the sex work context with potential applications for FSW resilience.

### c. Conceptual framework

The conceptual framework designed for this research draws on the previously-discussed theories from public health and nursing literature, including research on trauma, coping, and resilience.<sup>92,93,106,122,126,137,141,148-151,166</sup> Bronfenbrenner’s socio-ecological systems model<sup>143</sup> is used to map the factors that are thought to affect FSW resilience and relate to FSW violence exposure and inebriation before sex with clients at various levels of the socioecological framework [Figure 1.2]. Factors that are measured in this dissertation are denoted with an asterisk.

Figure 1.2: Conceptual Framework



\*Measured in this analysis

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## **CHAPTER TWO: METHODS**

## I. Thailand Context

This study was conducted in Pattaya, Thailand. Sex work is officially illegal in Thailand under the Prevention and Suppression of Prostitution Act, B.E. 2539 (1996). “Entertainment venues” such as massage parlors, karaoke bars and a-go-gos are officially required to register with the government under the Act on Entertainment Places, B.E. 2509 (1966). The sex work industry in Thailand is thriving – fueled by urbanization, income inequality, immigration, and government promotion of tourism. Compared to many other countries, the sex work industry within Thai venues (bars, clubs, a-go-gos, massage parlors etc.) is fairly formalized, with women working set hours, reporting to a bar manager (*mamasang*), and performing other job functions in addition to selling sex, such as selling drinks or dancing.<sup>1</sup> Alcohol is a common part of the venue-based sex work environment, with some bars encouraging women to drink with their clients.<sup>2</sup> Non venue-based sex work is also common, with women working street corners, beaches, and parks to find clients.<sup>1</sup>

As it is in most settings, HIV prevalence among FSW in Thailand varies substantially between groups. The highest HIV rates observed are in some groups of non-venue based FSW (20 – 45%).<sup>3,4</sup> Estimates from the most recent HIV surveillance among FSW (2019) report an average national HIV prevalence of 2.8%.<sup>5</sup> However, studies based on Respondent Driven Sampling – a method which is shown to better capture hidden, and potentially more risky, populations<sup>6,7</sup> – find average HIV prevalence among FSW to be 5%.<sup>8</sup> In response to the HIV epidemic among FSW, the Thai government launched the “100% Condom Campaign” in 1989, which focused on increasing support for condom provision in sex-work establishments, to address the barriers to condom use created by bar managers and, to some extent, clients. National increases in condom use during commercial sex rose from 14% to 94% by 1994; however, reduction in HIV/STIs for

FSW could not be attributed to this increase.<sup>9</sup> While reported condom use with clients remains high, HIV still persists among FSW, driven in some cases by social and structural factors that are not within FSW's control.

As with sex workers in other settings, Thai FSW face poverty, discrimination, gender inequality, and violence at the hands of partners, police and clients.<sup>10-13</sup> In Thailand, estimates of past-week physical or sexual violence against venue-based FSW are 15% - 20% and 29% for those working outside of venues.<sup>12</sup> Recent estimates of past-year condom coercion by clients, which includes experiences of condom refusal, removal, and clients offering to pay more money for condom-less sex, were as high as 47%.<sup>14</sup> National HIV testing coverage for FSW is estimated to be 53%.<sup>8</sup>

Thai FSW commonly access healthcare from government run clinics or through other NGO services. FSW who are Thai citizens may be covered under one of the three insurance schemes: The Universal Coverage Scheme (UCS), the Civil Servant Medical Benefit Scheme, or the Social Security Scheme. The UCS is the most common form of coverage and has been effective in increasing access to both preventative and emergency health care.<sup>15</sup> However, the UCS restricts coverage to the area in which the individual was originally registered. This means that migration (even internally within Thailand) can create gaps in coverage if an individual does not, or cannot, update her or his registration. Restricted coverage is a particular barrier for sex worker populations who are highly mobile, often working in multiple different provinces from where they originate or previously registered.

**a. Local study partner: SWING**

This study partnered with local NGO Service Workers in Group Foundation (SWING) to design and implement data collection. SWING is Thailand's longest-operating community-based

organization serving the country's sex workers. SWING operates a clinic out of Pattaya as well as other sex work hot spots, including Bangkok and Chiang Mai. The organization offers sex worker-friendly health services, including HIV testing, pre-exposure prophylaxis (PrEP), and referrals to other services offered in public facilities. SWING provides English classes, support groups for clients, police sensitivity trainings, and conducts regular outreach to venue and non-venue-based sex worker populations to provide information and services. SWING has engaged for many years in targeted outreach and sensitization trainings with police forces in Pattaya and Bangkok. Outreach initiatives aim to build community trust of police officers by coupling SWING staff with police volunteers to distribute condoms and information about services. These efforts have slowly brought about more positive relationships between Pattaya police and sex worker communities. However, these positive interactions are far from universal, and the threat of violence or exploitation by police remains high. FSW violence victimization in Pattaya is rarely reported to or prosecuted by police forces.

As the primary community-based partner on this study, SWING was fully involved in the design and implementation of the research plan. Previous to this study, SWING conducted mapping of all sex work venues in Pattaya to help inform outreach efforts and population size estimates. The primary research team responsible for this study used SWING's pre-existing maps to design the sampling frame for the current study—enabling researchers to benefit from a much more rigorous sampling methodology.



## **b. Study site: Pattaya, Thailand**

This study was conducted in Pattaya, Thailand. Pattaya is an urban beach town located on the gulf of Thailand with a population of more than 320,000 people. Pattaya is a popular tourist destination year-round with many resort style hotels, shopping malls, beer bars, and dance and strip clubs (a-go-gos). Sex tourism is a popular reason to visit Pattaya. Pattaya is considered to be one of the largest sex work hot spots in Thailand for female, male, and transgender sex workers. Violence and HIV exposure remain significant risks for FSW in Pattaya: 23% of FSW report past-year forced-sex by clients,<sup>16</sup> and 15% report experiencing any violence in the past week.<sup>12</sup> HIV prevalence among direct FSW (women whose primary form of income is sex work) in Pattaya is estimated to be between 6-10%, measured through routine surveillance data collected in 2013.<sup>17</sup>

## **II. Parent Study Overview**

### **a. Study design and intervention**

This dissertation research is a secondary data analysis of an existing study led by the student's adviser, Dr. Michele Decker. Data were collected May through September 2017 using proportional-to-size-venue-based sampling to recruit a sample of n=401 FSW from Pattaya, as part of a quasi-experimental pre/post study to evaluate the effects of a safety-promotion intervention. The parent study compared participant outcomes between baseline and three-month follow-up in the safety-promotion intervention arm (n=201) with those in an unexposed control arm (n=200). Intervention and control sites were located in separate areas within the city of Pattaya and were selected based on similar characteristics (i.e., size, density) and input from community partners.

The community-based safety promotion intervention was implemented by SWING peer-educators in the intervention zone starting in May 2017 with follow-up in September 2017. The intervention consisted of weekly semi-structured conversations between peer-educators and FSW

on a variety of health and safety topics, lasting on average 10 minutes. Specific discussions focused on workplace safety strategies, such as client negotiation, condom use, and monitoring alcohol intake, and on empowerment strategies, such as combatting rape-myths, mitigating self-blame, and providing resources for violence-related support. Peer-educators distributed a discreet wallet-sized safety card that reinforced key safety messages and provided contact information for local FSW-friendly services.

### **b. Sampling**

FSW were recruited via proportional-to-size venue-based sampling. This study's sampling frame included every known venue (beer bars & dance clubs known as a-go-gos) in Pattaya (n=142). Venue locations and sizes were previously mapped by local study partner SWING. Based on previously-reported venue size, between 2 and 6 FSW were sampled from each venue. Target enrollment for smaller beer bars (~10 employees) was capped at 2 participants and enrollment from larger dance clubs (50+ employees) was capped at 6 participants. All previously-mapped sex work venues in the control and intervention sites were visited between 6:00pm and 10:00pm, based on operating hours of the venue. Within venues, consenting participants were selected based on availability and eligibility criteria. Participants were eligible if they were born female, were 18 years or older, spoke Thai, and had sold or exchanged sex for money or goods in the past three months.

### **c. Baseline data collection**

Baseline surveys were conducted among consenting venue-based FSW (n=401) in May 2017. Data collectors were research staff from Mahidol University, Thailand. Data collectors were members of the lesbian, gay, bisexual, transgender (LGBT) rights community who have a long track-record of successful collaboration with SWING. Data were collected face-to-face using electronic tablets

and lasted approximately 15-20 minutes. All baseline surveys were conducted in a private space at the venue (beer bar or dance club) where the participant worked. As part of baseline data collection, all participants were asked for their contact information so that they could be contacted for an additional survey at three-month follow-up.

#### **d. Follow-up data collection**

Follow-up surveys were conducted by Mahidol data collectors in September 2017, approximately three months post-baseline assessment. Participants were contacted for a follow-up survey through a mixture of calls, texts, and in-person visits to the participant's venue. Data collectors scheduled follow-up data collection at a time and location that was most convenient for the participants, including at bars, hotels, restaurants, or by phone. Participants were re-assessed on all baseline measures.

#### **e. Study retention**

Of the 401 FSW enrolled at baseline, data collectors were able to locate 232 (58%) of participants at follow-up. The primary reason for loss to follow-up (LTFU) was that the participant had moved at some point during the study period and was no longer working in Pattaya, which highlights the high mobility of this population. At follow-up, the 169 participants who could not be found were replaced with different participants who met eligibility criteria and who worked at the same venue as the original participant. Replacement participants were sought to satisfy the goals of the parent study and maintain appropriate power to test the effect of the intervention, however they will not be used in dissertation analyses.

#### **f. Analytic sample**

This dissertation will use the full study sample at baseline (n=401) for cross-sectional analyses in Aim 2 and retained study participants (n=232) for prospective analyses in Aims 1 and 3.



Prospective aims, which will compare participant-level outcomes over time, require that only retained participants be used in analyses.

### **III. Role of Dissertation Research in Parent Study**

The parent study was designed to answer questions about the effectiveness of a safety promotion intervention to improve FSW knowledge of violence services and increase safety and health behaviors. Parent study analyses were completed to examine the effects of the intervention on these primary intervention endpoints. This dissertation extends beyond the scope of the parent study to include an in-depth examination of FSW resilience, coping, and violence victimization. Specifically, this dissertation includes work to characterize the socioecological contributors of resilience and examine the role of resilience to buffer FSW alcohol use after violence victimization. These research questions were not considered in parent study analyses.

#### **a. Student researcher role in parent study**

As a member of the Johns Hopkins study team for the parent study, I was actively involved in the development and implementation of the research for this dissertation. This involvement included helping to write the research protocol, outline the sampling strategy, and set participant follow-up procedures. In consultation with community and academic partner teams, I also helped to design the study's survey tools to balance academic rigor with questionnaire length. I oversaw data collection in Thailand including conducting trainings for data collectors on violence sensitivity in research. I spent time in the field during baseline and follow-up data collection to verify adherence to the sampling plan and remotely monitored intervention roll-out with in-country partners.

### **IV. Ethical Approval and Considerations**

The collaborative study team was led by Mahidol University, with technical support from Johns Hopkins University, and practitioner collaborator SWING. Study procedures approved by the

Institutional Review Board (IRB) at Mahidol University in Bangkok. The Johns Hopkins School of Public Health IRB provided a determination of non-human subject's research, reflecting Johns Hopkins's role as a technical support partner, without direct participant engagement.

Data collectors were selected by Mahidol University based on past research experience with the target population and underwent extensive training in human subject's protection including consent procedures. Verbal consent was obtained from all participants. To maximize safety, study procedures followed WHO ethical guidelines for gender-based violence research.<sup>18</sup> These guidelines included conducting research in private areas of the bars, describing the study as a study on HIV and health (not violence) to other non-participants such as bar owners, and having data collectors travel in pairs with SWING outreach team members who know the setting and gatekeepers. Data collectors provided service referrals to all participants who disclosed violence or health issues that required medical attention. Referrals were made to local community-based organizations offering support for FSW or to public hospitals or clinics identified by the community as being "FSW friendly".

All data were stored on password-protected devices and were deleted from all tablets used for data collection once uploaded to the secured study laptop. Personal identifying information was kept separately from the rest of the data, only linked by a personal identification code. All personal identifying information and contact details were deleted by the Mahidol-supervised data collection team after follow-up data collection was completed.

I completed the CITI human subject's research certification and upheld all ethical research standards related to data collection and management during the study. This dissertation involves secondary analysis of de-identified data, for which additional IRB approval was not necessary.

## **V. Measures**

All measures in this dissertation were self-reported. Survey topics included demographic information, experiences in sex trade, sexual risk with clients and partners, health access, violence risk with clients and partners, recognition of human rights, use of safety strategies, knowledge of resources, social support systems, resilience, and depressive symptoms. Survey questions were drafted in English, translated and pre-tested in Thai by bi-lingual study investigators, and back translated to ensure consistency of question meanings across languages. The below section details the primary variables of interest by aim and then provides a table of all variables used in the dissertation organized by their use in the dissertation.

### **a. Primary measures: Aim 1**

The primary outcome of interest for Aim 1 is having sex with clients while inebriated (SWI) in the past three months at follow up (T2). Participants were considered to have had SWI if they reported “always,” “often,” or “sometimes” having “3 or more alcoholic drinks before having sex with a client in the past three months.” Participants were not considered to not have had SWI if they reported “rarely” or “never” drinking 3 or more alcoholic drinks before sex with clients. Inebriation depends on sex, weight, genetics, and other factors, but it occurs at blood alcohol concentrations around 0.08g/dl (3-4 drinks for women) according to the National Institute on Alcohol Abuse and Alcoholism.<sup>19</sup>

The primary exposure of interest in Aim 1 is experiencing client violence victimization in the past three months at baseline (T1). This survey measured the major types of violence against FSW, including verbal, emotional, physical, and sexual violence.<sup>20</sup> This study’s measure of violence additionally includes items for forms of sexual violence by clients that occur in the context of a paid sexual encounter.<sup>21</sup> These include other non-consensual or threatening sexual

acts by clients such as bringing more people to have sex than was agreed upon or only paying for sex once but demanding additional or different sexual acts.<sup>22-25</sup> These items have been included in the definition of violence against sex workers generated by the World Health Organization<sup>21</sup> and have been included in the measures of client violence in previous studies.<sup>22,25,26</sup> In this study, participants were considered to have experienced client violence if they responded “yes” to having “a client do any of the following things to you” in the past three months: “yelled at you,” “made you feel bad about yourself,” “hit, punched, slapped or otherwise physically hurt you,” “used violence, force, or threats to have sex or sex acts that you did not want,” “only paid for sex once, but then demanded to have sex multiple times,” or “brought more people to have sex with you than was agreed upon.” Response options are modeled after the well-tested revised Conflict Tactics Scale,<sup>20</sup> and sex work specific items were taken from previous literature describing violence against FSW.<sup>22-24</sup>

The primary mediator in Aim 1 is depressive symptoms in the past two weeks at baseline (T1). Depressive symptoms are measured by the two-question Patient Health Questionnaire (PHQ-2) depression screen.<sup>27</sup> FSW with PHQ-2 scale score  $\geq 3$  will be considered to have depressive symptoms, as recommended as the optimal cut point for screening purposes.<sup>27</sup> [Table 2.1]

#### **b. Primary measures: Aim 2**

The outcome for Aim 2 is resilience at baseline (T1), measured continuously using the Connor Davidson 10-item Resilience Scale (CD-10). The CD-10 was created and validated from the original 25-item scale in 2007.<sup>28</sup> Previous scale validation work has shown that the 10-item scale is unidimensional and demonstrated good internal consistency and external construct validity.<sup>28</sup> The CD-10 has been used in various populations of healthy adults<sup>29,30</sup> and survivors of trauma.<sup>31,32</sup> The scale has also been used in two studies of sex worker populations in the U.S.<sup>33</sup> and in China,

where the scale showed good internal consistency (Cronbach's alpha .89).<sup>34</sup> A set of hypothesized socioecological correlates of resilience at baseline (T1) will be tested as the primary predictive variables for Aim 2. These variables will also be tested as potential confounders for Aims 1 and 3 [Table 2.1].

**c. Primary measures: Aim 3**

The goal of Aim 3 is to test the modifying effect of resilience on the relationship between client violence victimization (T1) and later sex with clients while inebriated (T2). Here the primary outcome is SWI (T2), the primary exposure is client violence victimization (T1), and resilience (T1) will be examined as an effect modifier. These variables will be measured and operationalized as in other aims. [Table 2.1]

Table 2.1. Measures by Aim and Use

Variable (Time period)	Use (Aim)	Variable description
<b>Primary outcomes and exposures</b>		
<b>Sex with clients while inebriated (T2)</b>	Primary Outcome (1, 3) & Exposure (1)	Participant’s self-reported frequency of having 3 or more alcoholic drinks before having sex with a client in the past three months at follow-up. The variable is binary, defined as 1 for women who responded “always,” “often,” or “sometimes” and a 0 for those who responded “rarely” or “never.”
<b>Sex with clients while inebriated (T1)</b>	Exposure (1)	Participant’s self-reported frequency of having 3 or more alcoholic drinks before having sex with a client in the past three months at baseline. The variable is binary, defined as 1 for women who responded “always,” “often,” or “sometimes” and a 0 for those who responded “rarely” or “never.”
<b>Client violence Victimization (T1)</b>	Primary Exposure (1, 3) & Outcome (1)	Participant’s self-reported experiences with any of the following acts of violence from clients in the past three months at baseline. Variable is binary, defined as 1 for “yes” any experience and 0 for “no” experience: <ul style="list-style-type: none"> <li>▪ Yelled at you</li> <li>▪ Made you feel bad about yourself</li> <li>▪ Hit, punched, slapped or otherwise physically hurt you</li> <li>▪ Used violence, force, or threats to have sex or sex acts that you did not want</li> <li>▪ Only paid for sex once, but then demanded to have sex multiple times</li> <li>▪ Brought more people to have sex with you than was agreed upon</li> </ul>
<b>Client violence Victimization (T2)</b>	Outcome (1)	Participant’s self-reported experiences with any of the acts of violence (described above) from clients in the past three months at follow-up. Variable is binary, defined as 1 for “yes” any experience and 0 for “no” experience.
<b>Resilience (T1)</b>	Primary Outcome (2) Effect Modifier (3)	Participant continuous scores on the Connor Davidson resilience 10 item scale (range 0 – 40). <sup>28</sup> Participants were asked to respond to the following statements, on a scale from 0 (not true at all) to 4 (true nearly all the time): <ol style="list-style-type: none"> <li>1) I am able to adapt to change</li> <li>2) I can deal with whatever comes to me</li> <li>3) I try to see the funny side of problems</li> <li>4) Coping with stress can strengthen me</li> <li>5) I tend to bounce back quickly from hardship</li> <li>6) I can achieve my goals and overcome hurdles</li> <li>7) I can stay focused under pressure</li> <li>8) I am not easily discouraged by failure</li> <li>9) I think of myself as a strong person</li> <li>10) I can handle unpleasant feelings</li> </ol>
<b>Individual level correlates: Demographics</b>		
<b>Education (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant self-reported highest level of education completed. Variable is ordinal from 0 “no formal education” to 5 “Bachelor’s degree or higher” and will be examined as a categorical variable.
<b>Age (T1)</b>	Predictive variable (2)	Participant self-reported age in years measured and included as a continuous variable.

	& Potential confounder (1 & 3)	
<b>Marital status (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's self-reported marital status. Variable will be examined as a categorical variable with reference category "single" or "dating" compared with women who are "married" or "cohabitating" and with women who are "widowed."
<b>Individual level correlates: Sex work characteristics</b>		
<b>Age started sex work (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant self-reported age (in years) when she first sold sex measured continuously in years.
<b>Reason started sex work (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's self-reported main reason she first started selling sex. Variable will be examined as a categorical variable with reference category "I thought I would enjoy it" or "to meet a foreign partner," and categories for women who "entered to meet a basic need" or "pay a debt" and women who entered under "force, pressure, deception, or coercion."
<b>Living arrangement (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's primary type of living arrangement during the past 3 months. Variable will be examined as a categorical variable with reference category "rent or own" compared to "staying at family or partners house" and "living at the bar."
<b>Individual level correlates: Psychosocial factors</b>		
<b>Self-efficacy for safety (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's self-reported agreement to the question; "I am confident in my ability to stay safe during sex work". Variable is categorical from 1 to 5 on an ordinal likert scale, where 1 is "strongly disagree" and 5 is "strongly agree."
<b>Self-efficacy for condom use (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's self-reported agreement to the question "I am confident in my ability to negotiate condoms with clients". Variable is categorical from 1 to 5 on an ordinal likert scale, where 1 is "strongly disagree" and 5 is "strongly agree."
<b>Depressive symptoms (T1)</b>	Mediator (1) & Predictive variable (2) & Potential confounder (3)	Participants score on the PHQ-2 (range 0-6). Participants reported how often they experienced the following in the past two weeks from 0 (not at all) to 3 (nearly every day). Variable is binary, defined as 1 for scores $\geq 3$ and 0 scores $< 3$ . 1. Little interest or pleasure in doing things 2. Feeling down, depressed or hopeless
<b>Work environment correlates</b>		
<b>Post-violence support from manager (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's self-reported agreement to the question; "I could seek help from my bar manager if I experienced violence." Variable is categorical from 1 to 5 on an ordinal likert scale, where 1 is "strongly disagree" and 5 is "strongly agree."

<b>Social support from peer/coworker (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's continuous score on an abridged social cohesion scale from Kerrigan et al. <sup>35,36</sup> (range 2-10). Participants were asked to rank their agreement from 1 (strongly disagree) to 5 (strongly agree) on the following: <ul style="list-style-type: none"> <li>I can count on other sex workers if I need to borrow money</li> <li>I can count on other sex workers if I need to talk about my problems</li> </ul>
<b>Venue type (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's primary type of venue that she worked in during the past 3 months. Variable is dichotomous with reference category "beer bar" compared with women working in "a-go-gos".
<b>Clients per week (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Continuous measure for average clients per week in the past three months.
<b>Community level correlates</b>		
<b>Post-violence support from friends/ family (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's self-reported agreement to the question "I could seek help from my family or friends if I experienced violence." Variable is categorical from 1 to 5 on an ordinal likert scale, where 1 is "strongly disagree" and 5 is "strongly agree."
<b>Post-violence support from police (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's self-reported agreement to the question "I could seek help from the police if I experienced violence." Variable is categorical from 1 to 5 on an ordinal likert scale, where 1 is "strongly disagree" and 5 is "strongly agree."
<b>Availability of sex work drop-in spaces (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant knowledge of any organizations that provide health services specifically for FSU. Variable is binary assigned a 1 for "yes, knows any organization" and 0 "no" does not know of an organization
<b>Access to sexual health services (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participant's self-reported receipt of an HIV or STI test in the past 3 months. Variable will be examined as a binary variable assigned a 1 for "yes" received a HIV or STI test in the past 3 months vs. "no."
<b>Community acceptance (T1)</b>	Predictive variable (2) & Potential confounder (1 & 3)	Participants self-reported agreement to the question "If I told people I was a sex worker they would treat me differently." Variable is reverse coded on a categorical ordinal likert scale (range 1-5), where 1 is "strongly agree" and 5 is "strongly disagree."
<b>Other potential confounders</b>		
<b>Intervention group (T1)</b>	Potential confounder (1 & 3)	Participant intervention group, binary 1 for intervention 0 for control group.



## VI. Data Analysis

The distributions and missingness of all variables were assessed. The distribution of all binary and categorical variables was assessed via tabulation, and the distribution of continuous variables was assessed for range, skewedness, and central tendency through plots and summary statistics. Overall, there was a low level of missingness in variables (<5%), except in the SWI at T1 (9.4% missing). Other variables with missingness included support from peers (2.6% missing), support from family (0.9% missing), support from police (4.3% missing), and resilience (1.3% missing). Of the 1% of participants with incomplete resilience scores (n=3), each was missing one item of the 10-item CD-10 scale score. All variables with missing data were imputed at the sample mean for that item. While there is no established cutoff for the acceptable proportion of missing data, some statisticians assert that <5% missingness are not consequential to statistical inferences.<sup>37,38</sup> Analyses in Aim 1, which included variables with high levels of missingness (>5%), are run with and without imputed data as a sensitivity analysis.

Attrition analyses were conducted to assess baseline characteristics of participants who were loss to follow-up (LTFU) compared with those who were ultimately retained. Attrition analyses inform how the analytic samples for prospective aims, which used only retained participants, may differ from the full sample or population. Attrition analysis showed that at baseline, participants who were LTFU were overall similar to those retained in the study. However, participants who were LTFU were more likely to have experienced client sexual or physical violence in the past three months ( $p<.05$ ). They were also marginally more likely ( $p<.10$ ) to have had depressive symptoms in the past two weeks, and be in the control group, than participants who were retained [Table 2.2]. In addition, participants at follow-up had fewer clients in the past three months compared to baseline participants (average 1 client per week vs. 2.2 at baseline,  $p<001$ ). These differences may reflect temporal trends in tourism in Thailand during the study period.

**Table 2.2.** Attrition analysis: Participant characteristics of retained versus. LTFU at baseline

	Baseline (T1)			
	Full sample (n=401)	Retained (n=232)	Lost to follow-up (n=169)	P value <sup>^</sup>
<b>Participant characteristics</b>				
Age, mean (sd)	33.5 (8.0)	33.8 (8.1)	33.0 (8.0)	.40
Age start sex work, mean (sd)	28.7 (7.6)	28.9 (7.8)	28.4 (7.4)	.62
Marital status, n (%):				
Single/dating	27.2 (109)	25.0 (58)	30.2 (51)	.63
Married/cohab	13.0 (52)	12.5 (29)	13.6 (23)	
Divorce/widow	58.1 (233)	60.8 (141)	54.4 (92)	
Education:				
Primary or <	41.1 (165)	42.2 (98)	39.7 (67)	.88
Secondary	29.2 (117)	28.0 (65)	30.8 (52)	
High school or >	29.7 (119)	29.7 (69)	29.6 (50)	
Living arrangement:				
Rent or own	86.8 (348)	87.1 (202)	86.4 (146)	.99
Live w/someone	5.2 (21)	5.2 (12)	5.3 (9)	
Live at bar	8.0 (32)	7.8 (18)	8.3 (14)	
Control group, % (n)	49.9 (200)	46.6 (108)	54.4 (92)	.09*
<b>Psychosocial variables</b>				
Self-efficacy for safety: mean (sd)	3.8 (1.1)	3.9 (1.0)	3.8 (1.2)	.47
Self-efficacy condom use: mean (sd)	4.6 (0.6)	4.6 (0.6)	4.6 (0.5)	.48
Depressive symptoms, % (n)	12.7 (52)	10.3 (24)	16.0 (27)	.06*
<b>Sex work variables</b>				
Venue type:				
Beer bar	72.8 (292)	70.7 (164)	75.7 (128)	.69
A-go-go	25.7 (103)	27.2 (63)	23.7 (40)	
Client number: mean (sd)	2.1 (1.6)	2.0 (1.4)	2.2 (1.7)	.25
<b>Support systems</b>				
Manager support: mean (sd)	4.3 (0.8)	4.3 (0.7)	4.3 (0.8)	.78
Peer support: mean (sd)	8.1 (1.6)	8.1 (1.4)	8.0 (1.7)	.31
Family support: mean (sd)	4.1 (0.9)	4.2 (0.8)	4.1 (0.9)	.32
Police support: mean (sd)	3.6 (1.0)	3.7 (1.0)	3.5 (1.1)	.28
<b>Alcohol use</b>				
SWI, % (n)	51.4 (206)	50.0 (116)	53.3 (90)	.52
<b>Violence exposure<sup>+</sup></b>				
Client violence, % (n)	23.9 (96)	25.0 (58)	22.5 (38)	.56
Sexual or physical violence, % (n)	4.0 (15)	2.2 (5)	5.9 (10)	.05**
Verbal or emotional violence, % (n)	11.0 (44)	11.2 (26)	10.7 (18)	.86
Sexual threats/ aggression, % (n)	18.0 (72)	19.0 (44)	16.6 (28)	.54

<sup>^</sup>cluster-adjusted chi squared test or ttest

+ Sexual/physical violence = forced sex or hit, punched, slapped; Verbal/emotional = yelled at or made to feel bad, Sexual threats= brought more people to have sex than agreed or demanded sex multiple times

\* Significant p<.10 ; \*\*Significant p<.05

Analyses were conducted in STATA 15 (StataCorp, College Station, TX). Significance level  $\alpha$  was set at 0.05 for all analyses. Significance tests that result in  $p < .10$  are reported as trending towards significance. All regression models were adjusted for venue-level clustering using the ‘cluster’ option in STATA, which assumes a random cluster (venue) effect and includes robust standard errors based on the Huber formula.<sup>39,40</sup> Cluster adjusting accounts for nonindependence within venues; specifically, FSW are more likely to be similar in their covariate and outcome values to FSW who work in their same venue compared with FSW who work in other venues. The below sections will describe the descriptive, main, and sensitivity analyses by aim.

**a. Data analysis aim 1: Client violence and SWI**

Aim 1 examines the bi-directional relationship between client violence victimization and sex with clients while inebriated (SWI) using structural equation modeling across two time points.

*Aim 1: Analytic sample*

Aim 1 uses data from retained participants who have data from both baseline (T1) and follow-up (T2),  $n=232$ . This sample includes 124 participants from the intervention group and 108 participants from the control group. Aim 1 will compare participant-level outcomes over time, which requires that only retained participants be used.

*Aim 1: Variable missingness*

Overall, there was a low level of missingness across variables used in Aim 1 ( $<5\%$ ), except in SWI at T1 (9.4% missing). SWI at T1 (range 0 – 4; mean =1.6) was imputed at the sample mean and rounded to the nearest integer (2) in order to make the variable binary for analysis. The binary variable for SWI includes all individuals with scores  $\geq 2$  as reporting SWI, therefore counting imputing individuals as having SWI for modeling. Models were run with both the imputed and non-imputed SWI variable in sensitivity analyses.

*Aim 1: Descriptive analysis*

All potentially confounding demographic, psychosocial and other socioecological variables pertaining to the sex work and community environment were assessed for their association with client violence at T1 and SWI at T2, using clustered t-tests or chi squared tests.<sup>41</sup> Clusters were defined at the venue-level. Variables that were associated with either client violence at T1 or SWI at T2, at the  $p < .05$  level, were considered potential confounders and included as adjustment variables in the final structural equation model.

*Aim 1: Main analysis – generalized structural equation model*

Generalized structural equation models (GSEMs) were built to assess the temporal relationships between SWI and client violence during two time periods. GSEMs represent a generalization of structural equation models (SEMs) that allow the use of discrete variables and non-Gaussian endogenous variable distributions. The current GSEMs are estimated with maximum likelihood, Bernoulli distribution of endogenous variables, and logit link specified. The regression models include robust standard errors adjusted for venue-level clustering.

First, a basic GSEM was built with only key exposure and outcome variables (client violence and SWI) to assess these relationships before adjustment (see Figure in Appendix 1). Adjustment variables were then added to the GSEM (see Figure in Appendix 1). Adjustment variables were included if they were associated with either client violence or SWI in preliminary analysis. These variables include participant age, age of starting sex work, self-efficacy for condom use, client number, and intervention group. Finally, depression was added as a mediator on the pathway from violence (T1) and SWI (T2). Depression has been previously demonstrated to be a mediator between violence and later alcohol/substance use.<sup>42-44</sup> The final GSEM included a system of equations to assess the relationship of client violence and SWI across two time points,

adjusted for other variables in the system [Figure 2.1]. This approach also allows the proportion of the relationship between client violence and SWI that is mediated by depressive symptoms to be calculated (mediated proportion = indirect effect via depression / total effect).<sup>45</sup>

The final GSEM examining SWI and client violence victimization is implemented by the following system of regression equations. In the below, SWI<sub>(T2)</sub>, Depression<sub>(T1)</sub>, Violence<sub>(T2)</sub>, Violence<sub>(T1)</sub>, and SWI<sub>(T1)</sub> represent the estimated log odds of the endogenous/outcome variable given the system of regression equations,  $\lambda_{1-n}$  are path coefficients representing the difference in log odds of a given endogenous variable per unit increase in the covariate adjusting for other variables in the system, and  $\epsilon$  represents subject residuals. Of primary interest,  $\lambda_1$  represents the difference in log odds of SWI at T2 comparing those exposed to violence versus not exposed at T1 after adjusting for other variables in the system. Additionally,  $\lambda_7$  and  $\lambda_5$  represent the difference in log odds of experiencing violence at T1 and T2 comparing those that reported SWI at T1 and T2 respectively.

$$\text{SWI}_{(T2)} = \lambda_1 (\text{Violence}_{T1}) + \lambda_2 (\text{SWI}_{T1}) + \lambda_3 (\text{Depression}_{T1}) + \epsilon$$

$$\text{Depression}_{(T1)} = \lambda_4 (\text{Violence}_{T1}) + \epsilon$$

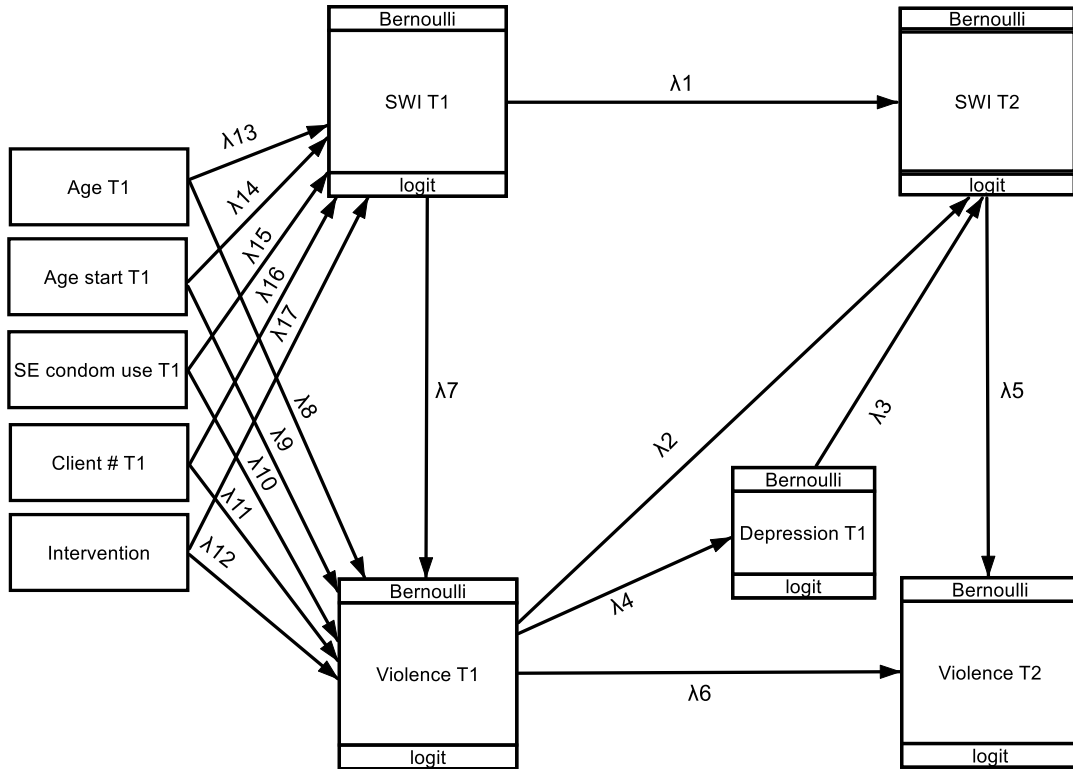
$$\text{Violence}_{(T2)} = \lambda_5 (\text{SWI}_{T2}) + \lambda_6 (\text{Violence}_{T1}) + \epsilon$$

$$\begin{aligned} \text{Violence}_{(T1)} = & \lambda_7 (\text{SWI}_{T1}) + \lambda_8 (\text{Age}_{T1}) + \lambda_9 (\text{Age start SW}_{T1}) + \lambda_{10} (\text{self-efficacy condom use}_{T1}) \\ & + \lambda_{11} (\text{Client\#}_{T1}) + \lambda_{12} (\text{Treatment}_{T1}) + \epsilon \end{aligned}$$

$$\begin{aligned} \text{SWI}_{(T1)} = & \lambda_{13} (\text{Age}_{T1}) + \lambda_{14} (\text{Age start SW}_{T1}) + \lambda_{15} (\text{self-efficacy condom use}_{T1}) + \lambda_{16} (\text{Client\#}_{T1}) \\ & + \lambda_{17} (\text{Treatment}_{T1}) + \epsilon \end{aligned}$$

**Figure 2.1:** Structural equation model diagram of the relationship between experiencing client violence and having sex with clients while inebriated in two timepoints (n=232)

In diagram, SE = self-efficacy



*Aim 1: Sensitivity analyses*

Non-imputed model

For a sensitivity analysis, the final GSEM described above was re-run with non-imputed data of SWI at T1, dropping the sample size from n=232 to n=210 in imputed models (see Figure in Appendix 2). All other aspects of model specification remained the same.

### GSEM reversing direction of cross-sectional pathways between violence and SWI

Additionally, because the directionality of the association between SWI and violence exposure within a time period is unknown, the GSEM model was re-run with the direction of the cross-sectional association between violence and SWI reversed at both timepoints. Specifically, violence victimization was modeled as the exposure variable and SWI was modeled as the outcome variable within each time period. This model is implemented by the following system of regression equations. In the below, SWI<sub>(T2)</sub>, Depression<sub>(T1)</sub>, Violence<sub>(T2)</sub>, Violence<sub>(T1)</sub>, and SWI<sub>(T1)</sub> represent the estimated log odds of the endogenous/outcome variable given the system of regression equations,  $\lambda_{1-n}$  are path coefficients representing the difference in log odds of a given endogenous variable per unit increase in the covariate adjusting for other variables in the system, and  $\epsilon$  represents subject residuals (see Figure in Appendix 3).

$$\text{SWI}_{(T2)} = \lambda_1 (\text{Violence}_{T1}) + \lambda_2 (\text{SWI}_{T1}) + \lambda_3 (\text{Depression}_{T1}) + \lambda_4 (\text{Violence}_{T2}) + \epsilon$$

$$\text{Depression}_{(T1)} = \lambda_5 (\text{Violence}_{T1}) + \epsilon$$

$$\text{Violence}_{(T2)} = \lambda_6 (\text{Violence}_{T1}) + \epsilon$$

$$\begin{aligned} \text{Violence}_{(T1)} = & \lambda_7 (\text{Age}_{T1}) + \lambda_8 (\text{Age start SW}_{T1}) + \lambda_9 (\text{self-efficacy condom use}_{T1}) \\ & + \lambda_{10} (\text{Client\#}_{T1}) + \lambda_{11} (\text{Treatment}_{T1}) + \epsilon \end{aligned}$$

$$\begin{aligned} \text{SWI}_{(T1)} = & \lambda_{12} (\text{Violence}_{T1}) + \lambda_{13} (\text{Age}_{T1}) + \lambda_{14} (\text{Age start SW}_{T1}) + \lambda_{15} (\text{self-efficacy condom use}_{T1}) \\ & + \lambda_{16} (\text{Client\#}_{T1}) + \lambda_{17} (\text{Treatment}_{T1}) + \epsilon \end{aligned}$$

### **b. Data analysis aim 2: Correlates of resilience**

Aim 2 quantitatively examines the correlates of resilience among participants at baseline (n=401). Correlates are examined by multivariable linear regression for each socioecological level, including the individual, work, and community environment.

#### *Aim 2: Analytic sample*

Aim 2 uses survey data from participants at baseline (n=401). This cross-sectional sample includes participants from every known venue within the two sex work hotspot zones (201 participants from the intervention zone and 200 participants from the control zone). Baseline data were collected before all intervention activities.

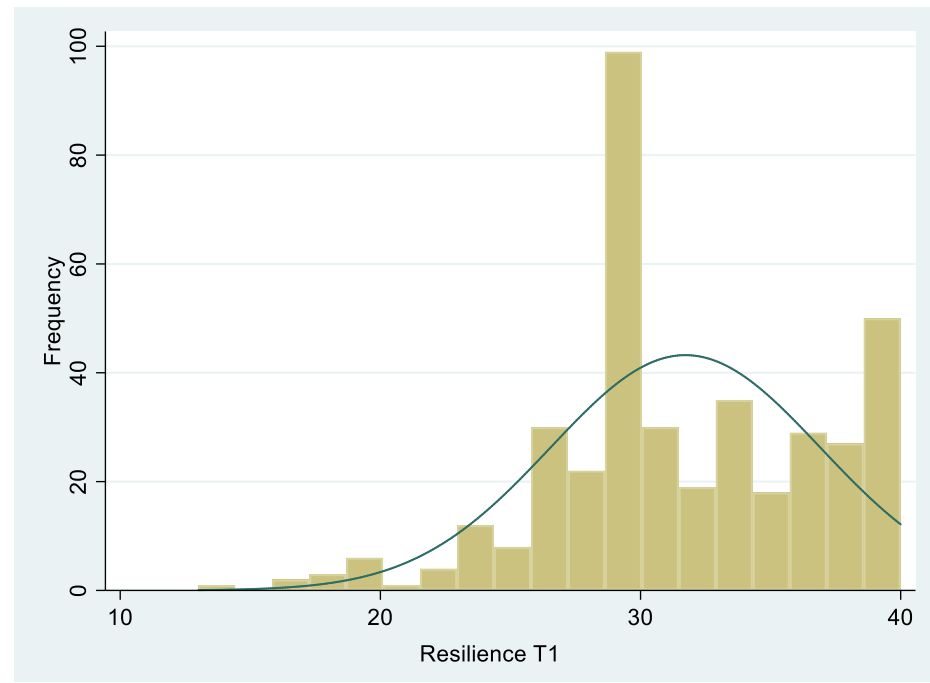
#### *Aim 2: Variable missingness and distribution*

There were low levels of missingness across variables used in Aim 2 (<4%). Of the 401 participant responses, 396 (~99%) had full scores on the CD-10 resilience scale at baseline. Of the five participants with incomplete scales, four participants were missing only one item from the scale, and one participant was missing two items. All variables with missingness were imputed at the sample mean for that item.

The distribution of resilience scale scores was assessed for range, skewedness, and central tendency through plots and summary statistics. The mean CD-10 score was 31.7 (range 13 to 40). The scale mode was 30 and the overall distribution was right skewed (Figure 2.2).



Figure 2.2: Distribution of FSW CD-10 scale scores at baseline (n=401)



### *Aim 2: Psychometric analysis*

As part of Aim 2, the psychometric properties of the CD-10 scale were examined. The internal consistency of the full 10- item scale was measured through Cronbach's alpha (global alpha = .88). Next, each item was removed separately from the scale and the Cronbach alpha scores of each 9- item scale were re-examined [Table 2.3]. This approach assesses the scale's inter-item correlation and examines whether there is evidence to drop any scale items that do not correlate well with the rest of the scale. This analysis showed that all alphas from the 9-item scales ranged from .86 to .87, which are lower than the global alpha for the full 10-item scale (.88). There was therefore no evidence which indicated that any items of the CD-10 should be removed for analysis.

Table 2.3. Assessment of internal consistency of CD-10 in participants at baseline (n=401)

<b>Resilience item</b>	<b>Item-test correlation</b>	<b>alpha excluding row item</b>
1. I am able to adapt to change	.62	.87
2. I can deal with whatever comes to me	.72	.86
3. I try to see the funny side of problems	.63	.87
4. Coping with stress can strengthen me	.68	.87
5. I tend to bounce back quickly from hardship	.69	.87
6. I can achieve my goals and overcome hurdles	.72	.86
7. I can stay focused under pressure	.70	.87
8. I am not easily discouraged by failure	.72	.86
9. I think of myself as a strong person	.69	.87
10. I can handle unpleasant feelings	.76	.86
<b>Total Scale alpha</b>		<b>.88</b>

*Aim 2: Descriptive analysis*

The characteristics of the full sample, and those of high and low resilience groups (defined as in the top and bottom quartile for resilience scores respectively), were reported by socioecological level. The group mean was reported for all continuous variables, and the percent of participants with the variable of interest was reported for all categorical variables. These descriptive analyses were completed to describe the characteristics of the total sample as well as the characteristics of highly resilient individuals, as defined by being in the top quartile of resilience scores for the sample.

*Aim 2: Main analysis – hierarchal linear regression*

Hierarchal linear regression modelling was used to examine the relationship between resilience and hypothesized correlates of resilience from various socioecological levels. All regression models include robust standard errors adjusted for venue-level clustering.<sup>39,40</sup>

Firstly, all predictive variables were tested for their unadjusted association with resilience in bivariate linear regression models. Next, single block models were built separately for individual, work/venue, and community domains. Within the individual domain, separate models were built for demographic and psychosocial variables to assess the individual contribution of these blocks during hierarchical regression modeling. Models were as follows, where  $Resilience_{(T1)}$  is the average estimated resilience score at T1 given the prediction model and  $\beta_1, \beta_2 \dots \beta_n$  are a set of covariates, described above, representing mean change in resilience per unit increase in covariate holding other covariates constant. Subject residuals are represented by  $\varepsilon$ .

### 1. Resilience predictors: Individual domain models

#### a. Demographic model

$$Resilience_{(T1)} = \beta_0 + \beta_1 age + \beta_2 age-start + \beta_3 reason-start + \beta_4 marital + \beta_5 education + \beta_6 living-arrangement$$

#### b. Psychosocial model

$$Resilience_{(T1)} = \beta_0 + \beta_1 self-efficacy safety + \beta_2 self-efficacy condom use + \beta_3 non-depression + \varepsilon$$

### 2. Resilience predictors: Work/Venue domain model

$$Resilience_{(T1)} = \beta_0 + \beta_1 venue + \beta_2 client\# + \beta_3 manager-support + \beta_4 peer-support + \varepsilon$$

### 3. Resilience predictors: Community domain model

$$Resilience_{(T1)} = \beta_0 + \beta_1 family-support + \beta_2 police-support + \beta_3 sexual health access + \beta_4 FSW drop-in space + \beta_5 community acceptance + \varepsilon$$

Variables that were associated with resilience ( $p < .10$ ) in single block models were combined in hierarchical regression models by socioecological level as seen below. Specifically, four models were built: 1) A model containing significant resilience predictors from the demographic block ( $p < .10$ ); 2) A model containing significant resilience predictors from the

demographic and psychosocial blocks ( $p < .10$ ); 3) A model containing significant resilience predictors from the demographic, psychosocial, and work blocks ( $p < .10$ ); and 4) A model containing significant resilience predictors from the demographic, psychosocial, work, and community blocks ( $p < .10$ ). This approach allows the independent examination of potential predictors of resilience from these domains separately and then examines how the addition of significantly associated variables across domains affects the model. Ultimately this approach informs which factors are associated with FSW resilience by socioecological domain and if adding factors pertaining to the work and community environment better predicts resilience beyond individual-level factors alone.

The final regression model included all predictive variables from the individual, work, and community domains that were associated with resilience in single block models at the  $p < .10$  level. Models were examined for high collinearity, defined as variance inflation factor ( $vif > 10$ ). Overall,  $vif$  scores were low ( $< 5$ ) and all predictive variables were retained in the final model. Model fit was assessed by R-squared ( $R^2$ ) and F statistics across models. F-tests for overall significance were run for each model and incremental/ partial F-tests<sup>46</sup> for joint-significance were run to assess if subsequent hierarchical regression models significantly contributed to the explanation of the outcome (resilience).

**Single-block models:**

Resilience = Intercept + Individual domain (demographic variables)

Resilience = Intercept + Individual domain (psychosocial variables)

Resilience = Intercept + Work domain

Resilience = Intercept + Community domain

### **Hierarchical regression models:**

Resilience = Intercept + Individual domain (demographic)

Resilience = Intercept + Individual domain (demographic) + Individual domain (psychosocial)

Resilience = Intercept + Individual domain (demographic) + Individual domain (psychosocial) +  
Work domain

Resilience = Intercept + Individual domain (demographic) + Individual domain (psychosocial) +  
Work domain + Community domain

### **c. Data analysis aim 3: Resilience as an effect modifier**

Aim 3 examines the potential modifying effect of resilience on the proposed pathway from client violence victimization during T1 to SWI during T2 through regression and interaction analysis.

#### *Aim 3: Analytic sample*

This analysis will only use data from retained participants who have data from both baseline and follow-up timepoints (n=232). This sample includes 124 participants from the intervention and 108 participants from the control group. Aim 3 will compare participant-level outcomes over time, which requires that only retained participants be used.

#### *Aim 3: Variable missingness and distribution*

Distribution and missingness assessments for Aim 3 build off of other aims and have been previously reported. Specific to Aim 3, the level of missingness and distribution of participant resilience scale scores among retained participants at baseline was additionally examined. Among retained participants, three participants had with incomplete resilience scores at baseline, each was missing one item of the 10-item CD-10 scale score. Missing items were imputed at the sample mean for that CD-10 item at T1. Retained participants' mean CD-10 score was 32.0 (range 16 to 40). The scale mode was 30, and the overall distribution was right skewed.

*Aim 3: Descriptive analysis*

Descriptive analyses to assess all variables' association with both the primary exposure (client violence at T1) and primary outcome (SWI at T2) were previously conducted as part of Aim 1. Aim 3 will use the results of this descriptive analysis to identify potential confounders for inclusion as adjustment variables in multivariable models. As in Aim 1, all variables that were associated with either client violence at T1 or SWI at T2, at the  $p < .05$  level, were included as adjustment variables in Aim 3 multivariable models.

*Aim 3: Main analysis – effect modification in logistic regression*

Assessing the prospective relationship between client violence (T1) and SWI (T2)

Aim 1 modeled the prospective relationship between client violence (T1) and SWI (T2) as part of a larger system of equations with multiple outcomes in a GSEM. Aim 3 will specifically be testing the prospective pathway between client violence (T1) and SWI (T2) and then adding an effect modifier to that pathway. Aim 3 analyses must therefore first establish the relationship between client violence (T1) and SWI (T2) through multivariable regression and then add resilience as modifier to assess effect modification.

Firstly, bivariate and multivariable logistic regression models were built to assess the prospective relationship between client violence victimization at T1 and SWI at T2. All models were adjusted for venue-level clustering.<sup>39,40</sup>

The prospective bivariate model is as follows, where  $SWI(T2)$  is the estimated log odds of SWI at follow-up given the prediction model,  $\beta_1$  is the difference in log odds of SWI at follow-up comparing violence exposed to unexposed at baseline, and  $\varepsilon$  represents subject residuals:

$$SWI(T2) = \beta_0 + \beta_1 \text{ violence}(T1) + \varepsilon$$

The prospective multivariable model was adjusted for variables that were associated with either client violence or SWI in preliminary bivariate analysis. These variables included age, age of starting sex work, clients per week, depressive symptoms, and self-efficacy for condom use. Additionally, multivariable models will be adjusted for previous SWI (T1), because of the likelihood that previous drinking impacts future drinking, and the participant's intervention group assignment, given the potential for the intervention to impact alcohol use over time.

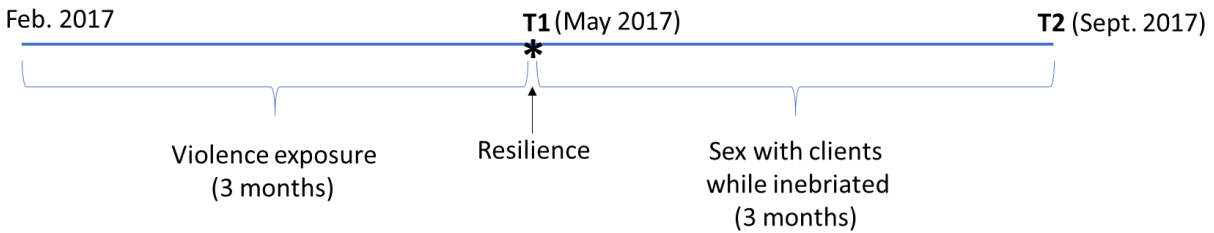
The multivariable model is as follows, where  $SWI(T2)$  is the estimated log odds of SWI at follow-up given the prediction model,  $\beta_1$  is the adjusted difference in log odds of SWI at follow-up comparing violence exposed to unexposed at baseline,  $\beta_2, \beta_3 \dots \beta_8$  are a set of covariates listed above representing the difference in log odds of SWI at T2 per unit increase in covariate holding other covariates constant, and  $\varepsilon$  represents subject residuals:

$$SWI(T2) = \beta_0 + \beta_1 violence(T1) + \beta_2 SWI(T1) + \beta_3 age(T1) + \beta_4 agestart(T1) + \beta_5 client\#(T1) + \beta_6 intervention + \beta_7 depress(T1) + \beta_8 SEcond(T1) + \varepsilon$$

#### Effect modification analysis: Resilience and violence interaction

The potential modifying effect of resilience on the relationship between client violence and later SWI will then be assessed using an interaction model that generates and adds a resilience times violence interaction term to the previously-described prospective model. Participant resilience at T1 will be examined as the modifier between violence exposure in the previous three-months and SWI during the following three months (Figure 2.3).

Figure 2.3: Timeline of violence exposure, SWI, and resilience



The primary interaction model will be as follows, where  $SWI(T2)$  is the estimated log odds of SWI at T2 given the model. Resilience is centered at the minimum participant score (16) such that  $\beta_1$  represents the difference in log odds of SWI at follow-up comparing violence exposed to unexposed at baseline for FSW with resilience 16, adjusting for other covariates.  $\beta_{10}$  represents the difference in the difference in log odds of SWI for violence exposed versus unexposed per unit increase in resilience.  $\beta_2 - \beta_9$  represents the difference in log odds of SWI per unit increase in that covariate holding other covariates constant, and  $\varepsilon$  represents subject residuals.

$$\begin{aligned}
 SWI(T2) = & \beta_0 + \beta_1 violence(T1) + \beta_2 SWI(T1) + \beta_3 resilience(T1) + \beta_4 age(T1) \\
 & + \beta_5 agestart(T1) + \beta_6 client\#(T1) + \beta_7 intervention + \beta_8 depress(T1) \\
 & + \beta_9 SEcond(T1) + \beta_{10} resilience * violence(T1) + \varepsilon
 \end{aligned}$$

Of primary interest will be coefficient, confidence interval, and p-value for  $\beta_1$ , which will characterize the relationship between violence at T1 and SWI at T2 at resilience level 16 as well as various other levels of resilience. In addition, the coefficient and associated confidence interval will be of interest for  $\beta_{10}$ , which will indicate if (and by how much) the relationship between violence and SWI changes by each unit increase in resilience.

In the primary interaction model, resilience will be centered at the minimum sample value (CD-10 score =16) for interpretability. This allows the model to be interpreted for people who are



at the minimum conceivable resilience given the sample. In addition, resilience will be centered at all other values on the CD-10 scale, and the interaction model will be re-run. This will not affect the interaction term, but it will additionally allow the examination of the relationship between client violence and SWI at other resilience levels.

## VII. Sample Size and Power Calculations

For the purposes of this dissertation, the total sample size (n=401) and retained sample size (n=232) were fixed, however, they are sufficient to undertake study aims.

### a. Aim 1: Client violence and SWI

*(Retained sample size, n=232; Effective sample size, n=220)*

Power calculations for Aim 1 are based off of the ability of these analyses to detect a significant difference in the proportion of FSW reporting SWI in the violence exposed versus unexposed group. Calculations use known study parameters to estimate power at various levels of alpha.

The non-cluster adjusted sample size for Aim 1 is n=232. The effective sample size (ESS) for the retained sample is adjusted for clustering using known cluster/venue number (k=109) and average cluster size/ FSW per venue (m=2.1). Rho, a measure of intra-cluster correlation, was calculated as the correlation in SWI by cluster/venue (p=.05), using known study parameters. The ESS for the retained was calculated as below:

$$\begin{aligned} \text{ESS} &= (m \times k) / 1 + p (m-1)^2 \\ &= (2.13 \times 109) / 1 + .05(2.1-1) \\ &= 220 \end{aligned}$$

Given the ESS of the retained participants (ESS=220) and proportion of FSW violence exposure (24%), the following sample sizes were generated: violence exposed (n<sub>1v</sub> =53) and violence unexposed (n<sub>2</sub> =167). The below table calculates power for various differences in

proportion of SWI between violence exposed and unexposed groups ( $p_{1v} - p_2$ ). Reasonable differences in the proportion of SWI by violence group were estimated based on the portion of SWI in the full sample (44%). With  $ESS=220$ , this study can detect a .22 difference in proportions of women reporting SWI between violence exposure groups at  $\alpha = .05$  and maintain a well-powered study (>80%) [Table 2.4].

Table 2.4. Power calculations varying the differences in proportions of SWI between violence exposed and unexposed groups ( $p_{1v} - p_2$ ) at two levels of alpha.

	$p_{1v} - p_2$		
$\alpha$ ( $Z_{1-\alpha/2}$ )	<b>.20</b>	<b>.22</b>	<b>.24</b>
5% (1.96)	.68	.81	.84
10% (1.64)	.78	.88	.91

$p_{1v}$ = the proportion of SWI in the violence exposed group  
 $p_2$ = the proportion of SWI in the violence unexposed group

**b. Aim 2: Correlates of resilience**

*(Baseline data,  $n=401$ , Effective sample size  $n=380$ )*

Power calculations for Aim 2 are based off of the ability of this analysis to estimate the population average resilience score within a useful margin.

Previously reported resilience score data from all available published studies using the CD-10 were averaged and used to estimate the population mean of 31.07 and standard deviation (sd) of 4.27. These studies were conducted across a broad range of healthy population samples and those experiencing extreme stress. The  $ESS$  at baseline ( $n=380$ ) was calculated based on known number of clusters/venues ( $k=142$ ), average cluster size/number of FSW per venue ( $m=2.8$ ), and  $\rho$ , the calculated correlation in resilience score by venue ( $\rho=.03$ ) as previously described.

Given an ESS of  $n=380$  at baseline, Aim 2 analyses can estimate the mean resilience score of FSW in Pattaya Thailand, with 95% confidence, to an accuracy of  $\pm .43$  points on the CD-10 resilience scale. Calculations are as follows:

$$\text{Margin of Error (ME)} = t (sd/\sqrt{n})$$

$$\text{ME} = 1.966 (4.27/\sqrt{380})$$

ME:  $\pm .43$  points on the resilience scale

**c. Aim 3: Resilience as an effect modifier**

*(Retained sample size,  $n=232$ ; Effective sample size,  $n=55$ )*

Simulation studies have shown that roughly four times the sample size is required to detect an interaction effect compared to a main effect, given the same model specifications.<sup>47</sup> Building off of power calculations in Aim 1, Aim 3 calculations are re-run assuming the ESS is reduced by four times. This adjustment reduces the ESS for Aim 3 analyses to  $n=55$  (Cluster-adjusted ESS =  $220 / 4$ ). Given known study parameters and an ESS of  $n=55$ , it is estimated that this study is powered to detect an interaction effect between client violence and SWI at a main effect difference of proportions of .42 ( $\alpha = .05$ ,  $1-\beta = .80$ ).

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## **CHAPTER THREE: MANUSCRIPT ONE**

## **Unpacking the Temporal Relationship between Violence Victimization and Alcohol Use among Venue-based Female Sex Workers in Pattaya, Thailand**

### **Abstract**

#### *Background*

Research among women finds both that alcohol use can contribute to higher risk of violence victimization in the same event and that violence victimization can increase survivor's future alcohol consumption as a coping mechanism. Cross-sectional studies among female sex workers (FSW) have shown a clear association between violence victimization and FSW alcohol use. However, the direction of this association remains unclear. This study will examine the cross-sectional and prospective relationships between client violence victimization and FSW alcohol use to better respond to these overlapping health issues in the sex work context.

#### *Methods*

Using proportional-to-venue-size sampling, 410 FSW were recruited for a baseline survey in May 2017 and re-assessed after 14-week follow-up (~ 3 months). Participants retained across both time points (n=232/401; 58%) were included in analyses. Generalized structural equation modeling (GSEM) was used to simultaneously assess if experiencing client violence and having sex with clients while inebriated (SWI) in the past three months were cross-sectionally associated, and/or if experiencing client violence at baseline was prospectively associated with SWI during follow-up. SWI was defined as a binary variable for always or often having three or more alcoholic drinks before having sex with clients.



*Results:*

In adjusted GSEM results, FSW having SWI and experiencing client violence were cross-sectionally associated within the same time period at both baseline (aOR 1.87, 95% CI 1.04 – 3.37) and follow-up (aOR 2.52, 95% CI 1.24 – 5.10). Conversely, model results showed that client violence victimization at baseline was not associated with SWI at follow-up (aOR 2.43, 95% CI 0.61 – 9.67).

*Conclusion:*

FSW client violence victimization and SWI were cross-sectionally, but not prospectively, associated. These results suggest that SWI and violence victimization may be co-occurring in the same episodes in the Pattaya sex work environment. Findings highlight the need for integrated interventions addressing alcohol use and violence by clients in sex work venues. Alcohol interventions which focus on FSW's work environments by targeting venue managers or improving venue alcohol or safety policies could be effective violence prevention, and are a priority to improve FSW safety at work.

## Introduction

Female sex workers (FSW) are defined as women who regularly or occasionally receive money or goods in exchange for sexual services.<sup>1</sup> The environments in which sex is sold are often characterized by high exposure to violence from clients (paying partners), human rights abuses from police, and frequent substance/alcohol use.<sup>2,3</sup> Though alcohol use is often considered to be an individual behavior, in the sex work context, FSW alcohol use is shaped by features of the work environment. For FSW working in alcohol-serving venues such as bars or clubs, drinking alcohol with clients may be an encouraged or mandatory part of the job. FSW may be pressured or incentivized to drink alcohol with clients,<sup>4,5</sup> or may choose to drink alcohol before sex to decrease inhibitions, increase enjoyment, or “numb” themselves to sex with clients.<sup>6,7</sup> In these settings, FSW alcohol use and violence victimization are common and overlapping health risks. Yet, prospective research to characterize the relationship between violence and alcohol use in the sex work context is sparse.<sup>8,9</sup> Research designs that can confirm temporality of exposure and outcome are needed to inform alcohol and violence prevention programming in sex work settings.

Violence victimization can be a consequence of, and a contributor to, alcohol use among survivors.<sup>10-13</sup> This bidirectional relationship is defined through two primary pathways. Firstly, there is the *episodic pathway*, in which alcohol use before sex can increase the risk of violence during that sexual encounter.<sup>13-17</sup> Secondly, is the *prospective pathway*, in which experiencing violence may increase the likelihood of future alcohol use among survivors.<sup>10,11</sup>

In the episodic pathway, alcohol can enable violence by decreasing awareness and the ability to detect or escape a risky situation.<sup>3,7,18,19</sup> Qualitative research has shown that clients may also encourage FSW to drink alcohol to point of inebriation or loss of consciousness, which leaves them vulnerable to rape.<sup>20,21</sup> Additionally, for venue-based FSW, who often meet their clients at an alcohol serving venue, drinking alcohol with clients is common.<sup>3</sup> In these environments, clients

also frequently become inebriated before sex.<sup>3</sup> Given the known risk of alcohol for violence perpetration,<sup>22</sup> client inebriation also increases the risk of violence against FSW via the episodic pathway.

In the prospective pathway, violence enables alcohol use through a survivor's approach to coping, in which a survivor may use alcohol as an avoidance coping mechanism after victimization.<sup>23,24</sup> Longitudinal research from the general population has shown that women's risk of alcohol and drug use increased significantly after experiencing violence, even among women who did not have a prior history of violence victimization.<sup>10,11,25</sup> Prospective studies examining violence victimization and substance use among FSW populations are less common.<sup>8,17</sup> These studies include a Kenyan cohort study, which tracked HIV viral suppression in FSW and found that FSW history of partner violence was associated with current alcohol abuse.<sup>8</sup> Conversely, a recent U.S.-based cohort study of FSW found that FSW daily drug injection contributed to risk of violence victimization.<sup>17</sup>

More commonly, FSW studies are cross-sectional and show a clear, but non-directional, association between violence victimization and FSW alcohol.<sup>3,19,26,27</sup> Occasionally the direction of the association in cross-sectional studies can be inferred due to context or study measures. For example, in a study to examine the contributors to hazardous alcohol use among FSW in Malawi, results show that experiences of GBV in the past 6 months were associated with frequent inebriation in the past month.<sup>27</sup> Results imply that FSW violence victimization may contribute to frequent inebriation, but directionality cannot be confirmed. Prospective studies to examine the temporality of violence victimization and FSW alcohol use are valuable to unpacking this widely observed but undefined relationship.

Mental health factors play an important role in a survivor's coping process and can affect the prospective pathway from violence victimization to alcohol use. Previous research from the general population of women has suggested that a survivor's later risk of alcohol abuse is mediated by psychosocial factors, such as depression levels, or psychological distress related to the violent incident.<sup>28-31</sup> A path analysis among college-aged survivors of sexual assault showed that violence victimization contributed to later alcohol use via its effect on increasing women's levels of psychological distress.<sup>28</sup> Similarly, previous research on U.S adolescents found that depression mediated the effects of bullying victimization on substance use for adolescent females.<sup>30</sup> Comparable mediation analyses among FSW, using prospective data, are lacking. However, cross-sectional data show that FSW depression is associated with both violence exposure<sup>32-34</sup> and alcohol use,<sup>3</sup> making it a probable mediator of this prospective relationship in FSW. Research to examine the mental health factors that may mediate or modify the health outcomes related to violence against FSW are needed.

This study will examine the temporal relationship between client violence victimization and FSW alcohol use before sex with clients using a prospective data set from Pattaya, Thailand. Specifically, this analysis will test the cross-sectional and prospective relationship between violence and alcohol use before sex using structural equation modeling across two time points. This design informs the context of FSW alcohol use as a contributor and/or consequence of violence victimization, with implications for addressing these pressing and intersecting health issues in the Thai sex work environment.

## **Methods**

### *Study design: parent study*

The data for this secondary analysis come from a quasi-experimental study designed to evaluate a safety promotion intervention among FSW in Pattaya, Thailand. The parent study recruited 401 FSW from two sex work zones/hotspots in Pattaya assigned to be the intervention and control areas. Women recruited from the intervention zone (n=201) were exposed to specially trained outreach teams that provided semi-scripted messages on health and safety topics including workplace safety strategies, empowerment, and resources for violence-related support. Women recruited from the control zone (n=200) were not exposed to the intervention. All participants were assessed by survey at baseline (May 2017) and then post-intervention after 14 weeks of follow-up (September 2017). The collaborative study team was led by Mahidol University, with technical support from Johns Hopkins University, and practitioner collaborator SWING. Study procedures were led by the Mahidol University team, and approved by the Institutional Review Board at Mahidol University in Bangkok. The Johns Hopkins School of Public Health IRB provided a determination of non-human subject's research, reflecting Johns Hopkins's role as a technical support partner, without direct participant engagement.

### *Sampling and data collection: parent study*

FSW were recruited via proportional-to-size venue-based sampling. This study's sampling frame included every known venue (beer bars & dance clubs known as a-go-gos) in Pattaya (n=142). Based on venue size, between 2 and 6 FSW were sampled from each venue. Target enrollment for smaller beer bars (~10 employees) was capped at 2 participants and enrollment from larger dance clubs (50+ employees) was capped at 6 participants. All venues were visited between 6:00pm and 10:00pm, based on operating hours of the venue. Within venues, consenting participants were

selected based on availability and eligibility criteria. Participants were eligible if they were born female, were 18 years or older, spoke Thai, and had sold or exchanged sex for money or goods in the past three months.

#### *Baseline data collection (T1)*

Baseline surveys were conducted among consenting venue-based FSW (n=401) in May 2017. Data collectors were research staff from Mahidol University who have a long track-record of successful collaboration with the sex work community. Data were collected face-to-face using electronic tablets and surveys lasted approximately 15-20 minutes. All baseline surveys were conducted in a private space at the venue where the participant worked. As part of baseline data collection, all participants were asked for their contact information so that they may be contacted for an additional survey at three-month follow-up.

#### *Follow-up data collection (T2)*

Follow-up surveys were conducted by Mahidol data collectors in September 2017, approximately three months post-baseline assessment. Participants were contacted for a follow-up survey through a mixture of calls, texts, and in-person visits to the participant's venue. Data collectors scheduled follow-up data collection at a time and location that was most convenient for the participants, including at bars, hotels, restaurants, or by phone. Participants were re-assessed on all baseline measures. Of the 401 FSW enrolled at baseline, data collectors were able to locate 232 (58%) of participants at follow-up. The primary reason for loss to follow-up (LTFU) was that the participant had moved at some point during the study period and was no longer working in Pattaya.

#### *Analytic sample*

This analysis used data from retained participants who have data from both baseline and follow-up timepoints (n=232). This sample includes 124 participants from the intervention and 108

participants from the control group. This analysis compares participant-level outcomes over time, which requires that only retained participants be used.

### *Measures*

All measures in this study are self-reported. Survey questions were drafted in English, translated and pre-tested in Thai by bi-lingual study investigators, and back translated to ensure consistency of question meanings across languages.

### Primary variables

A primary variable of interest in this study's model is FSW sex with clients while inebriated (SWI) in the past three months at baseline (T1) and follow-up (T2). SWI is measured as a participant having three or more alcoholic drinks before having sex with a client in the past three months. The variable is operationalized as binary, where participants who reported "always," "often," or "sometimes" having three or more drinks before having sex with clients were defined as experiencing SWI and participants who reported "never" or "rarely" were defined as not experiencing SWI. Inebriation depends on sex, weight, genetics, and other factors, but occurs at blood alcohol concentrations around 0.08g/dl (3-4 drinks for women) according to the National Institute on Alcohol Abuse and Alcoholism.<sup>35</sup>

The second primary variable is FSW experiences of client violence victimization in the past three months at baseline (T1) and follow-up (T2). This survey measured the major types of client violence against FSW including verbal, emotional, physical, and sexual violence.<sup>36</sup> This study's measure of violence additionally includes other non-consensual or threatening sexual acts by clients, such as bringing more people to have sex than was agreed upon or only paying for sex once but demanding additional or different sexual acts.<sup>19,21,26,37</sup> These items have been included in the definition of violence against sex workers generated by the World Health Organization<sup>38</sup> and

have been included in the measures of client violence in previous studies.<sup>26,37,39</sup> Participants were considered to have experienced client violence if they responded “yes” to having “a client do any of the following things to you” in the past three months: “yelled at you,” “made you feel bad about yourself,” “hit, punched, slapped or otherwise physically hurt you,” “used violence, force, or threats to have sex or sex acts that you did not want,” “only paid for sex once, but then demanded to have sex multiple times,” or “brought more people to have sex with you than was agreed upon.” Response options are modeled after the well-tested revised Conflict Tactics Scale,<sup>36</sup> and sex work specific items were taken from previous literature describing violence against FSW.<sup>19,21,26</sup>

FSW depressive symptoms at T1 were measured by the two-question Patient Health Questionnaire (PHQ-2) depression screen (range 0-6)<sup>40</sup>, with optimal depression cut point for screening purposes  $\geq 3$ .<sup>40</sup> The variable is operationalized as binary, where participants who reported PHQ-2 score  $\geq 3$  were defined as having depressive symptoms and PHQ-2 scores  $< 3$  were defined as not having depressive symptoms.

### Adjustment variables

Potential confounders include demographic, psychosocial, social, and community environment variables measured at T1, that may be associated with the primary variables of interest in the model. Demographic variables included age, age of when the participant first sold sex, the primary reason why a woman entered sex work (e.g., coercion, enjoyment, to meet a need), marital status, education level, venue type (beer bar or a-go-go), primary living arrangement in the past three months (e.g., renting, living with partner etc.), and average client number per week. Psychosocial variables included FSW self-efficacy related to condom use and safety. Each measured as a participant’s agreement to the statements “I am confidence in my ability to negotiate condoms” or “stay safe during sex work” on a 5-point Likert scale (1 [strongly disagree] to 5 [strongly agree]).



Social and community environment variables included FSW social support from co-workers, measured through a two-item abridged social cohesion scale from Kerrigan et.al. (range 2 – 10).<sup>41,42</sup> Participants indicated their agreement on a Likert scale (1 [strongly disagree] to 5 [strongly agree]) to two statements assessing if FSW felt they could “count on other sex workers” if they needed to talk about their problems or “borrow money.” FSW post-violence support from venue managers and police were each measured through FSW agreement on a Likert scale (1 [strongly disagree] to 5 [strongly agree]) with the statements “If I experienced violence, I could get help from my bar manager,” or “from the police” respectively. Lastly, participants intervention group in the parent study was included and defined as a binary variable for intervention or control group.

*Data analysis:*

All analyses were conducted in STATA 15.0.<sup>43</sup> Significance level  $\alpha$  was set at 0.05. Significance tests that result in  $p < .10$  are reported as trending towards significance. Clusters are defined at the venue level and all analyses are adjusted for venue-level clustering to account for likely non-independence of participants.<sup>44,45</sup>

Assessment of missingness showed that, overall, missingness was low (<5%), except in SWI at baseline (9.4% missing). All variables with missingness were imputed at the sample mean. SWI at baseline (range 0 – 4; mean =1.6) was imputed at the sample mean and rounded to the nearest integer (2) in order to make the variable binary for analysis. The binary variable for SWI includes all individuals with scores  $\geq 2$  as reporting SWI, therefore counting imputing individuals as having SWI for modeling. Models were run with both the imputed and non-imputed SWI variable in sensitivity analyses.

### Attrition analysis

Attrition analyses were conducted to assess baseline characteristics of participants who were lost to follow-up (LTFU) compared to those who were retained via cluster chi squared tests.<sup>46</sup> Participants were similar on all tested demographic variables including age, years in sex work, educational level, marital status etc. However, participants who were LTFU were more likely to have experienced client physical or sexual violence (5.9% vs. 2.2%,  $p=.05$ ) and reported higher depressive symptoms (16.0% vs. 10.3%,  $p=.06$ ) in the past three months at baseline than participants who were retained. In addition, participants at follow-up had fewer clients in the past three months compared to baseline participants (average 1 client per week vs. 2.2 at baseline  $p<001$ ).

### Preliminary analysis

All potentially confounding demographic, psychosocial, social, and environmental variables were assessed for association with client violence at T1 and SWI at T2 using clustered t-tests or chi squared tests.<sup>46</sup> Variables that were associated with either client violence at T1 or SWI at T2, at the  $p<.05$  level, were included as adjustment variables in structural equation models.

### Main analysis: Generalized structural equation modeling

Generalized structural equation models (GSEM) were built to assess the temporal relationships between SWI and client violence during two time periods of baseline (T1) and follow-up (T2). GSEM represent a generalization of structural equation models (SEM), which allow the use of discrete variables and non-Gaussian endogenous variable distributions. The current GSEM models are estimated with maximum likelihood, Bernoulli distribution of endogenous variables, and logit link specified. The regression models include robust standard errors adjusted for venue-level clustering.

First, a basic GSEM was built with only key exposure and outcome variables (client violence and SWI) at both timepoints to assess these relationships before adjustment (see Figure in Appendix 1). Adjustment variables were then added to the GSEM (see Figure in Appendix 1). Adjustment variables were included if they were associated with either client violence or SWI in preliminary analysis. These variables include participant age, age of starting sex work, self-efficacy for condom use, client number, and intervention group. Finally, depression was added as a mediator on the pathway from client violence (T1) and SWI (T2). Depression has been previously demonstrated to be a mediator between violence and later alcohol/substance use.<sup>29-31</sup> The final GSEM includes a system of equations to assess relationship of client violence and SWI across two time points, adjusted for other variables in the system [Figure 3.1]. This approach also allows for the calculation of the proportion of the relationship between client violence and SWI that is mediated by depressive symptoms (mediated proportion = indirect effect via depression/ total effect).<sup>47</sup>

The final GSEM examining SWI and client violence victimization is implemented by the following system of regression equations. In the below,  $SWI_{(T2)}$ ,  $Depression_{(T1)}$ ,  $Violence_{(T2)}$ ,  $Violence_{(T1)}$ , and  $SWI_{(T1)}$  represent the estimated log odds of the endogenous/outcome variable given the system of regression equations,  $\lambda_{1-n}$  are path coefficients representing the difference in log odds of a given endogenous variable per unit increase in the covariate adjusting for other variables in the system, and  $\epsilon$  represents subject residuals. Of primary interest,  $\lambda_1$  represents the difference in log odds of SWI at T2 comparing those exposed to violence versus not exposed at T1 after adjusting for other variables in the system. Additionally,  $\lambda_7$  and  $\lambda_5$  represent the difference in log odds of experiencing violence at T1 and T2 comparing those that reported SWI at T1 and T2 respectively.

$$\text{SWI}_{(T2)} = \lambda_1 (\text{Violence}_{T1}) + \lambda_2 (\text{SWI}_{T1}) + \lambda_3 (\text{Depression}_{T1}) + \varepsilon$$

$$\text{Depression}_{(T1)} = \lambda_4 (\text{Violence}_{T1}) + \varepsilon$$

$$\text{Violence}_{(T2)} = \lambda_5 (\text{SWI}_{T2}) + \lambda_6 (\text{Violence}_{T1}) + \varepsilon$$

$$\begin{aligned} \text{Violence}_{(T1)} = & \lambda_7 (\text{SWI}_{T1}) + \lambda_8 (\text{Age}_{T1}) + \lambda_9 (\text{Age start SW}_{T1}) + \lambda_{10} (\text{SE condom use}_{T1}) \\ & + \lambda_{11} (\text{Client\#}_{T1}) + \lambda_{12} (\text{Treatment}_{T1}) + \varepsilon \end{aligned}$$

$$\begin{aligned} \text{SWI}_{(T1)} = & \lambda_{13} (\text{Age}_{T1}) + \lambda_{14} (\text{Age start SW}_{T1}) + \lambda_{15} (\text{SE condom use}_{T1}) + \lambda_{16} (\text{Client\#}_{T1}) \\ & + \lambda_{17} (\text{Treatment}_{T1}) + \varepsilon \end{aligned}$$

### Sensitivity analyses

For a sensitivity analysis, the final GSEM was re-run with non-imputed data of SWI at T1, dropping the sample size from n=232 to n=210 in imputed models (see Figure in Appendix 2). All other aspects of model specification remained the same. Additionally, because the directionality of the association between SWI and violence exposure within a time period is unknown, the GSEM was re-run with the direction of the cross-sectional association between violence and SWI reversed at both timepoints. Specifically, violence victimization was modeled as the exposure variable and SWI was modeled as the outcome variable within each time period (See Figure in Appendix 3).

### **Results**

FSW in this sample were an average of 33.8 years old, had started sex work at the age of 28.9, and had an average of 2 clients per week. The majority (62.5%) entered sex work to meet a basic need, were divorced or widowed (60.8%), worked at a beer-bar (70.7%), and lived in a place they were renting or owned (87.1%). Participants had a mix of educational attainment, with about a third completing primary school or less (34.1%), secondary school (31.5%), and high school or more

(34.5%). Overall self-efficacy for condom use (4.6, range 1-5) was higher than self-efficacy for safety (3.9, range 1-5). Post-violence support from bar managers (4.3, range 1-5) and family/friends (4.2, range 1-5) was higher than post-violence support from police (3.7, range 1-5) [Table 3.1].

FSW who had experienced client violence in the past three months at T1 (n=58, 25%) were younger (31.4 years vs. 34.7 years,  $p<.05$ ) and had started sex work at an earlier age (26.0 years old vs. 29.9 years old,  $p<.01$ ). Women who experienced client violence at T1 were also more likely to have depressive symptoms (19.0% vs. 7.5%,  $p<.05$ ) and had higher self-efficacy for condom use (4.8 vs. 4.5,  $p<.05$ ) at T1. FSW who experienced SWI in the past three months at T2 (n=118, 51%) were more likely to have depressive symptoms (14.4% vs. 6.1%,  $p<.05$ ), and had higher average numbers of clients per week (2.2 vs. 1.8,  $p<.05$ ) at T1 [Table 3.1].

#### *Generalized structural equation model results*

Final GSEM results show the adjusted relationship between client violence and SWI with clients through the episodic and prospective pathways. In the episodic pathway, examining the cross-sectional relationship SWI and client violence, GSEM results show that, within time period, at both T1 and T2, SWI was significantly associated with client violence. FSW who reported SWI with clients in the past three months were more likely to have experienced violence by clients during this same time period both at baseline (aOR 1.87, 95% CI 1.04 – 3.37), and at follow-up (aOR 2.52, 95% CI 1.24 – 5.10). In the prospective pathway, examining the prospective relationship between client violence at T1 and SWI at T2, model results show client violence at T1 was not associated with SWI at T2 (total effect aOR 2.43, 95% CI 0.61 – 9.67) [Figure 3.1 & Table 3.2].

Along the prospective pathway, depressive symptoms were modeled as a mediator between client violence victimization at T1 and SWI with clients at T2. Model results show that there was no direct relationship between violence at T1 and SWI at T2 (aOR 1.0, 95% CI 0.50 – 1.99), nor was there a significant indirect relationship between these variables via depressive symptoms (aOR 2.42, 95% CI 0.60 – 9.72) [Figure 3.1 & Table 3.2]. While no pathway was statistically significant, the observed relationship between client violence at T1 and SWI at T2 was almost fully mediated by FSW depressive symptoms (mediated proportion = 99%).

Other significant associations in the final GSEM showed that FSW who had SWI with clients at T1 were more likely to have SWI at T2 (aOR 2.06, 95% CI 1.23 – 3.46) and FSW violence victimization at T1 trended towards significance with violence victimization at T2 (aOR 1.86, 95% CI 0.95, 3.62). At T1, higher self-efficacy for condom use was associated with violence exposure (aOR 2.21, 95% CI 0.99 – 4.55), and higher number of clients per week was associated with SWI (aOR 1.25, 95% CI 1.03 – 1.51) [Table 3.2].

### *Sensitivity analyses*

In the GSEM using non-imputed data for SWI at T1 (n=210), all interpretations of path coefficients remained the same compared to the imputed model. Additionally, in the GSEM that reversed the direction of the association between violence and SWI (regressing violence on SWI at T1 and T2), all interpretation of path coefficients remained the same as the reported model.

## **Discussion**

This study is among the first to prospectively examine the relationship between alcohol use and violence victimization in the sex work context. Results support an episodic relationship between alcohol use and violence victimization rather than a prospective relationship between previous violence and later alcohol use. Findings emphasize that the sex work venue environment is a risky

setting for client violence that may be further facilitated by inebriation before sexual encounters. Venues can enable or prevent violence against FSW depending on their alcohol and safety policies and practices. For example, venues which require or incentive FSW to drink alcohol with clients may be enabling violence. Conversely, venues can promote FSW safety by instituting strong alcohol safety policies which allow women to stop drinking alcohol if they desire and put in safety plans for women who will be leaving the bar inebriated to serve clients.

These results extend past work examining violence victimization and alcohol use among FSW, which has left unanswered questions about temporality of the relationship.<sup>3,19,26,27</sup> Our study supports the interpretation that alcohol use is a risk factor for client violence and implies that alcohol interventions may help prevent client violence in sex work settings. Our results build off a randomized controlled intervention trial among FSW in Kenya, which tested the effects of a brief alcohol intervention on sexual risk factors.<sup>9</sup> This study showed that an alcohol-reduction intervention significantly reduced FSW alcohol use and sexual violence from clients over a 12-month period. Researchers interpreted the reduction in client sexual violence to be a result of decreased alcohol use.<sup>9</sup> Dissimilar to the Kenyan study, which measured “harmful” alcohol-use in general,<sup>9</sup> our study measures alcohol use before sex with clients in the venue setting. Our results add to the literature to show that the sex work venue environment is a risky and important setting for implementing alcohol and safety-promotion interventions.

In Pattaya, and other venue-based sex work settings, alcohol interventions could be designed based on internationally recognized alcohol messaging<sup>48</sup> and adapted based on community-generated messaging and safety strategies. Individual-level counseling sessions have previously shown promise in reducing FSW alcohol use.<sup>9,49</sup> However, given the complexity of factors contributing to alcohol consumption in the sex work environment, community and venue-level

alcohol programming would likely be more effective than individual-level interventions alone. For example, interventions could target venue managers with alcohol messaging and techniques to support the health and safety of their staff. Alcohol-serving venues could support FSW who want to stop drinking in the face of client pressure and put safety plans in place for women who are inebriated after leaving the venue. To date, the majority of alcohol programming among FSW is focused on FSW reducing their individual consumption.<sup>3,49</sup> This study highlights the violence-related risks of alcohol consumption in the venue environment and supports the development of venue-level alcohol interventions for FSW.

This study does not find a significant prospective association between client violence and later SWI with clients. These findings suggest that overall FSW alcohol use as a form of coping did not increase after victimization. However, a coping pathway from violence to increased alcohol use may still exist for some individuals based on other psychosocial or mental health factors not measured in this study. Indeed, previous literature has shown that alcohol use increased post-victimization for survivors who had higher levels of psychological distress related to the incident.<sup>28</sup> Our models showed that depressive symptoms were a near full mediator of the relationship from violence victimization to SWI, despite the pathway remaining statistically non-significant. It follows that FSW mental health and psychological response to trauma are likely determining the relationship between violence victimization and later alcohol use. Future studies on the alcohol-related consequences of violence should examine the influence of other psychological factors, beyond depressive symptoms, that are related to FSW coping after trauma.

Our null findings on the prospective pathway contrast with existing data from the general population of women showing that experiencing intimate partner violence (IPV) increases a survivor's future alcohol use.<sup>10,11,25,50,51</sup> However, dissimilar to our study, these previous studies



have focused on the impact IPV on alcohol use. IPV may constitute a more sustained or frequent exposure to violence compared to client violence. In comparison, our measure of client violence was fairly short-term (past three months) and does not encompass a woman's more frequent or longer-term exposure to client violence or that from other types of perpetrators. It may be that the alcohol-related consequences of violence are more likely to occur in the contexts of IPV or more sustained exposures to violence. Future studies on the impact of violence victimization on FSW alcohol use may consider measuring different lengths, frequencies, and severity of violence perpetration by clients.

### *Limitations*

This study has several limitations in study design and measures. In design, the study was limited to two time points, three months apart. Longer follow-up periods with more follow-up points may have provided more information on the trajectory of the relationship between violence and alcohol use over time. This study also had a high LTFU (42%) between follow-up time points. LTFU analyses from the parent study showed that FSW who were LTFU had higher depressive symptoms and increased exposure to client physical or sexual violence at baseline. It follows that the analytic sample for this study may be relatively healthy compared to the average FSW in Pattaya. The results of this analysis may therefore be most applicable to lower-risk venue-based FSW, with less generalizability to other groups.

There are also several limitations to the measures in this analysis. Firstly, all measures are self-reported by FSW. Self-reported alcohol use specifically may be mis-reported if women who drank alcohol more frequently were less likely to accurately remember the number of drinks that they consumed compared with those who consumed fewer alcoholic drinks. Secondly, this study did not include any client variables about violence perpetration or alcohol use. This is a major

limitation as client's alcohol use is a known contributor to violence perpetration<sup>22</sup> and is a likely confounder between FSW alcohol use and violence victimization. Thirdly, this analysis measures violence exposure as any client violence in the past three months, inclusive of verbal and emotional indicators of violence. Restricting this analysis to only those who experienced physical or sexual violence (n=5) was not possible due to sample size but may have yielded different results. Additionally, this measure of violence does not record a woman's full history of abuse over her life, or violence from other types of perpetrators including non-paying intimate partners, which may be unmeasured confounders affecting FSW's SWI. However, in this FSW sample, few women (1.7%) reported experiencing violence from non-paying partners. A binary measure of client violence also means that all FSW, whether experiencing one or multiple types of violence at multiple times, were coded into the same category. The analysis is therefore unable to examine if the relationship between violence and SWI differs with FSW's range or intensity of violence exposure.

Finally, this study is limited by lack of event-level data. Cross-sectional data analysis shows the clear association between violence and SWI within the same time period, but we cannot determine if violence and FSW SWI occurred within the same episode. Within the GSEM model, regression pathways were drawn from SWI to violence during the same time period, but the true direction of that association is not known. However, in sensitivity analyses, which reversed the direction of regression pathway, there was no change in the interpretation of the path coefficients.

## **Conclusion**

This study provides greater clarity on the nature and timing of the relationship between alcohol and violence and informs prevention programming in the sex work context. Study results highlight the violence-related risks of FSW alcohol consumption before sex with clients. Alcohol

interventions that target FSW's work environments could be effective violence prevention in these risky settings. Given the social and environmental contributors to FSW alcohol use, alcohol interventions that target venue managers and improve venue policies on alcohol safety are likely to be more effective than those targeting FSW behavior alone. Scaling up interventions to improve the safety of FSW's work environments is a priority to uphold the health and human rights of this vulnerable population.

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Table 3.1. Sample characteristics of FSW by violence exposure and SWI group (n=232)

Variable: Column % (n)	Total sample: n=232	Non-violence exposed T1: n=174, 75%	Violence exposed T1: n=58, 25%	p- value	Rarely/never SWI T2: n=114, 49%	Frequent SWI T2: n=118, 51%	p- value
<b>Demographic variables</b>							
Age T1: mean (sd)	33.8 (.53)	34.7 (.62)	31.4 (1.06)	.01*	34.5 (.79)	33.3 (.77)	.27
Age start sex work T1: mean (sd)	28.9 (.57)	29.9 (.66)	26.0 (1.11)	<.01*	29.3 (.84)	28.5 (.81)	.50
Reason sex work T1:							
Forced/coerced	5.2 (12)	4.6 (8)	6.9 (4)		5.3 (6)	5.1 (6)	
Basic need	62.5 (145)	59.8 (104)	70.7 (41)		58.7 (67)	66.1 (78)	
Extra money	18.5 (43)	20.7 (36)	12.1 (7)	.14	21.9 (25)	15.3 (18)	.70
Meet partner	7.8 (18)	9.8 (17)	1.7 (1)		7.0 (8)	8.5 (10)	
Enjoy it	6.0 (14)	5.2 (9)	8.6 (5)		7.0 (8)	5.1 (6)	
Marital status T1:							
Single/dating	25.9 (60)	23.0 (40)	25.9 (20)		24.6 (28)	27.1 (32)	
Married/cohab	12.5 (29)	10.9 (19)	17.2 (10)	.14	11.4 (13)	13.6 (16)	.50
Divorce/widow	60.8 (141)	64.9 (113)	48.3 (28)		62.3 (71)	59.3 (70)	
Female partner	0.9 (2)	1.2 (2)	0.0 (0)		1.8 (2)	0.0 (0)	
Education T1:							
Primary or <	34.1 (79)	36.2 (63)	27.6 (16)		39.5 (45)	28.8 (34)	
Secondary	31.5 (73)	27.6 (48)	43.1 (25)	.12	28.9 (33)	33.9 (40)	.28
High school or >	34.5 (80)	36.2 (63)	29.3 (17)		31.6 (36)	37.3 (44)	
Venue type T1:							
Beer bar	70.7 (164)	72.4 (126)	65.5 (38)	.74	72.8 (83)	68.6 (81)	.89
A-go-go	27.2 (63)	25.3 (44)	32.8 (19)		25.4 (29)	28.8 (34)	
Living arrangement T1:							
Rent or own	87.1 (202)	86.2 (150)	87.1 (52)		87.9 (102)	86.2 (100)	
Live w/someone	5.2 (12)	4.6 (8)	5.2 (4)	.52	4.3 (5)	6.0 (7)	.91
Live at bar	7.8 (18)	9.2 (16)	7.8 (2)		7.8 (9)	7.8 (9)	
Client number T1: mean (sd)	2.0 (.08)	1.9 (.13)	2.3 (.21)	.10	1.8 (.16)	2.2 (.16)	.05*
Client number T2 <sup>+</sup> : mean (sd)	0.6 (.08)	0.7 (.09)	0.6 (.15)	.77	0.5 (.11)	0.7 (.11)	.16
<b>Psychosocial variables</b>							
Depressed T1	10.3 (24)	7.5 (13)	19.0 (11)	.03 <sup>^</sup>	6.1 (7)	14.4 (17)	.04 <sup>^</sup>
Self-efficacy for safety T1: mean (sd)	3.9 (.08)	3.9 (.10)	3.8 (.16)	.76	4.0 (.12)	3.9 (.11)	.54
Self-efficacy for condom use T1: mean (sd)	4.6 (.05)	4.5 (.05)	4.8 (.09)	.02*	4.6 (.06)	4.6 (.06)	.94

<b>Social &amp; Environmental variables</b>							
Manager support T1: <i>mean (sd)</i>	4.3 (.06)	4.30 (.06)	4.2 (.11)	.64	4.2 (.08)	4.3 (.08)	.61
Family support T1: <i>mean (sd)</i>	4.2 (.06)	4.2 (.07)	4.2 (.12)	.98	4.2 (.08)	4.1 (.08)	.61
Police support T1: <i>mean (sd)</i>	3.7 (.07)	3.7 (.08)	3.6 (.14)	.97	3.7 (.11)	3.6 (.10)	.22
Peer support T1: <i>mean (sd)</i>	8.1 (.10)	8.1 (.11)	8.1 (.19)	.94	8.1 (.13)	8.2 (.13)	.65

\* Significant p<.05 clustered ttest

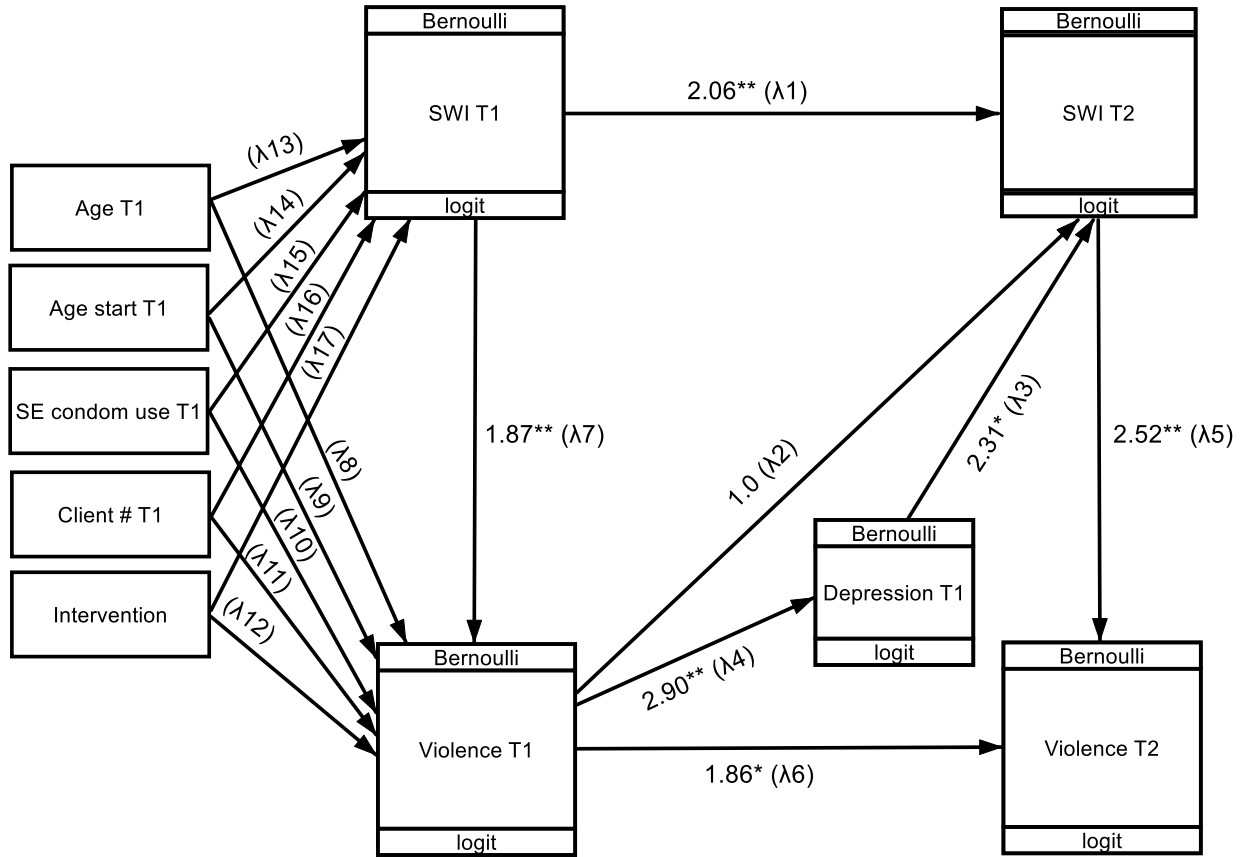
^ Significant p<.05 clustered chi squared test

+Tested because client number is time known to be time varying between time points



Figure 3.1. Structural equation model diagram of the relationship between experiencing client violence and having sex with clients while inebriated in two timepoints.

(Generalized structural equation model, n=232)



Path coefficients are exponentiated log odds ratios from GSEM results where endogenous variables follow a Bernoulli distribution.

SE = Self-efficacy

\*\*p< .05

\*p<.10

$\lambda_n$  represent the path coefficient to be cross-referenced with model description and table

Table 3.2. GSEM model results (n=232)

Variables (time period)	Path coefficients	GSEM	
		aOR (95% CI)	P
<b>SWI (T2)</b>			
SWI (T1)	$\lambda_1$	2.06 (1.23, 3.46)	.01**
Violence (T1)	$\lambda_2$	1.0 (0.50, 1.99)	.99
Depression (T1)	$\lambda_3$	2.31 (0.84, 6.32)	.10
<b>Depression (T1)</b>			
Violence (T1)	$\lambda_4$	2.90 (1.30, 6.48)	.01**
<b>Violence (T2)</b>			
SWI (T2)	$\lambda_5$	2.52 (1.24, 5.10)	.01**
Violence (T1)	$\lambda_6$	1.86 (0.95, 3.62)	.07*
<b>Violence (T1)</b>			
SWI (T1)	$\lambda_7$	1.87 (1.04, 3.37)	.04**
Age (T1)	$\lambda_8$	1.0 (0.94, 1.06)	.92
Age start SW (T1)	$\lambda_9$	0.96 (0.90, 1.02)	.16
Self-efficacy condom use (T1)	$\lambda_{10}$	2.12 (0.99, 4.55)	.05*
Clients per week (T1)	$\lambda_{11}$	1.09 (0.88, 1.36)	.42
Treatment group (T1)	$\lambda_{12}$	1.30 (0.62, 2.71)	.49
<b>SWI (T1)</b>			
Age (T1)	$\lambda_{13}$	1.04 (0.99, 1.10)	.12
Age start SW (T1)	$\lambda_{14}$	0.97 (0.92, 1.02)	.27
Self-efficacy condom use (T1)	$\lambda_{15}$	1.38 (0.79, 2.40)	.26
Clients per week (T1)	$\lambda_{16}$	1.25 (1.03, 1.51)	.03**
Treatment group (T1)	$\lambda_{17}$	2.00 (1.09, 3.70)	.03**
<b>Mediation analysis</b>			
Direct effect: violence (T1) on SWI (T2)	$\lambda_2$	1.0 (0.50, 1.99)	.99
Indirect effect: violence (T1) on SWI (T2) via depression	$\lambda_4 * \lambda_3$	2.42 (0.60, 9.72)	.21
Total effect: violence (T1) on SWI (T2)	$\lambda_2 + (\lambda_4 * \lambda_3)$	2.43 (0.61, 9.67)	.21

\*\*Significant at p < .05 level

\*Significant at p < .10 level

## **CHAPTER FOUR: MANUSCRIPT TWO**

# **Socioecological Contributors to Resilience among Female Sex Workers in Pattaya Thailand**

## **Abstract**

### *Background*

Resilience refers to one's ability to adapt well and bounce back from adversity. In some adult populations, resilience has been shown to buffer against the negative consequences of traumatic events. Female sex workers (FSW) are at high risk for trauma, yet research to understand and characterize their resilience is sparse. Using a socioecological perspective, this analysis will examine the correlates of resilience among FSW in Pattaya Thailand, with implications for designing sex worker-centered interventions and bolstering resilience.

### *Methods*

A cross-sectional sample of 401 venue-based FSW were recruited via proportional-to-size venue-based sampling in Pattaya Thailand for an in-person survey (May, 2017). The survey assessed participant resilience, via the Connor-Davidson 10-item Resilience scale (range 0-40), and other demographic, psychosocial, and socioecological variables pertaining to the sex work and community environments. Hierarchical linear regression modeling was used to examine correlates of resilience from three socioecological domains (individual, work/venue, and community environments) separately and in conjunction.

### *Results*

FSW resilience scores averaged 31.72 (range 13-40). In the final adjusted model, positive correlates of FSW resilience from the individual domain were age ( $\beta$  0.08, 95% CI 0.01, 0.15), self-efficacy for condom use ( $\beta$  1.67, 95% CI 0.85, 2.50), and non-depression ( $\beta$  2.22, 95% CI 0.85, 3.59). From the community domain, FSW resilience was associated higher community

acceptance of sex workers ( $\beta$  0.60, 95% CI 0.12, 1.17). In bivariate models, a non-significant trend ( $p < 0.10$ ) linked resilience with higher manager support ( $\beta$  0.54, 95% CI -0.18, 1.26). Models which included socioecological variables from the community domain, significantly improved explanation of resilience in FSW compared to individual level only models ( $\Delta R^2 = .02$ ;  $\Delta F_{1,3} = 5.25$ ,  $p = .02$ ).

### *Conclusion*

Results support a socioecological approach to resilience promotion in FSW and highlight specific intervention targets for supporting FSW mental health and fostering resilience. Increasing community acceptance of sex workers should be a programmatic priority, not only to directly combat the impacts of stigma, but as a way to bolster resilience and thus potentially guard against negative health consequences from other risk factors that FSW face. Similarly, increasing FSW self-efficacy and treating depression have direct health benefits but may also build resilience, offering more global protection for this vulnerable population.

## **Introduction**

Globally, female sex workers (FSW) are among the most vulnerable populations to violence victimization, discrimination, and human rights abuses.<sup>1-4</sup> Societal stigma, and the near universal criminalization of sex work, serves to marginalize FSW and impede their access to justice and resources.<sup>2</sup> Operating in these stigmatizing and often violent environments can have serious mental and physical health consequences, including injury, high rates of depression, substance use/abuse, and sexually transmitted infections.<sup>5-7</sup> At the same time, FSW are a diverse population who adapt and persevere despite working and living in these chronically stressful environments. The majority of public health literature has focused on describing the factors that put FSW at risk for poor outcomes, and has placed much less attention on understanding the factors that help them cope and thrive.<sup>8</sup>

Of interest to the field of FSW health-promotion is research to identify the factors that help FSW stay healthy in these harsh work environments. The term “resilience” refers to the ability to bounce-back or achieve a positive outcome in the context of risk.<sup>9</sup> Resilience can help explain the variation in outcomes among people who have experienced similar levels of trauma, with higher resilience often resulting in protective health behaviors.<sup>10-13</sup> Resilience can function as a buffering mechanism that lessens the expected impacts of a traumatic event on one’s health and functioning.<sup>14-17</sup> Specifically, resilience has shown to buffer against depression and post-traumatic stress disorder (PTSD) among survivors of traumatic events<sup>10,11,18,19</sup> and encourage later pro-health behaviors.<sup>15</sup> Research to describe resilience in FSW may inform intervention design and improve FSW health beyond what could be accomplished by focusing on risk reduction alone.

Previous work to understand resilience has built on the well-established socioecological systems model<sup>20</sup> to conceptualize resilience as an protective phenomenon; key factors that

influence resilience emerge from the biological, individual, family, community, and societal levels/domains.<sup>9</sup> In this way, resilience is an individual characteristic that be modified by one's family and peer interactions, community factors, and the broader social environment.<sup>21-23</sup> Research to characterize resilience in FSW specifically is sparse. Previous U.S.-based studies have found that FSW resilience was associated with higher education, having housing, increased social support, and increased food security.<sup>24,25</sup> Data from a randomized control trial to promote resilience in Chinese FSW found that resilience was enabled by self-efficacy, self-esteem, and increased coping flexibility.<sup>26</sup> Several qualitative studies have described FSW's resilience and identified factors that women feel have helped them cope with adversity, including staying optimistic, having belief in one's abilities, benefitting from peer-support, and engaging in collective action.<sup>27,28</sup> Still, the contributors and health benefits of resilience in FSW are not well known. Questions remain as to which factors may support resilience in FSW and which factors may be most salient for health promotion.

The current study will use the socioecological model<sup>20</sup> to examine the potential correlates/predictors of resilience among FSW in Pattaya, Thailand, across three socioecological domains. FSW resilience is measured through the well-validated Connor-Davidson 10-item resilience scale.<sup>29</sup> Specifically, this study examines the potential correlates of FSW resilience from the individual, work/venue environment, and community domains (Figure 4.1). Understanding the determinants of resilience requires explanation at multiple levels of the socioecological framework. A discussion of hypothesized resilience-promotion factors from the social/political domain are included, however were not measured as part of this study.

## *Hypothesized predictors of FSW resilience by socioecological domain*

### Individual domain

Many of the factors that are associated with resilience in the general population are theorized to also promote resilience in FSW; some of these factors include self-efficacy, self-esteem, self-worth and flexibility.<sup>30</sup> These are related but distinct concepts from resilience in that factors like self-efficacy and self-esteem can be present at any time and are not defined in relation to adversity or stressors. However, these factors are theorized to enable or promote resilience. A recent conceptual framework for resilience among FSW in China theorized that self-esteem, self-efficacy, and coping flexibility (the ability to implement alternative coping strategies)<sup>31</sup> are the primary psychosocial factors that contribute to population resilience.<sup>32</sup> This analysis will examine several individual factors related to the psychosocial domain, including self-efficacy and depressive symptoms. In addition, this analysis will examine a set of demographic variables that include participant age, education level, living arrangement, reason for starting sex work, and marital status. These are important factors related to FSW health that warrant examination in relation to resilience.

### Work/Venue domain

The work environment may be important for FSW resilience. Positive work environments can be a source of social support for FSW,<sup>33,34</sup> while negative work environments are a frequent source of violence and rights violations.<sup>35</sup> Factors such as having a supportive manager and supportive peers/co-workers have shown to be important contributors to sexual health promotion and to have contributed to resilience in some sex worker populations.<sup>24,36-43</sup> Venue policies that encourage health and safety, such as venue-supported condom distribution or sexual health outreach, may also FSW contribute to resilience.<sup>39</sup> Financial stability is protective for FSW, allowing for



improved recovery from hardships, and may additionally assist in population resilience.<sup>44-47</sup> Other factors, including the type of venue in which a woman works, or the number of clients that a woman serves per week, are important for her health and safety and will additionally be examined as resilience-correlates in this analysis.

### Community domain

Positive community environments and relationships are theorized to enable resilience among FSW based on previous resilience research.<sup>30,48-50</sup> These may include affirming relationships with family and friends, who can serve as a source of social support, which contribute to both improved health outcomes and resilience.<sup>33,43</sup> In contexts where police are a trusted source of support, these positive relationships with police may also enable FSW resilience. Discrimination against FSW is a known contributor to poor health;<sup>51</sup> conversely, FSW's feelings of acceptance by their community may contribute to good outcomes and enable resilience. As it in the general population, increased access to health resources may also play a role in supporting FSW resilience. These resources may include access to drop-in spaces for FSW, which have been shown to promote social cohesion and reduce FSW sexual health risk.<sup>38,52,53</sup>

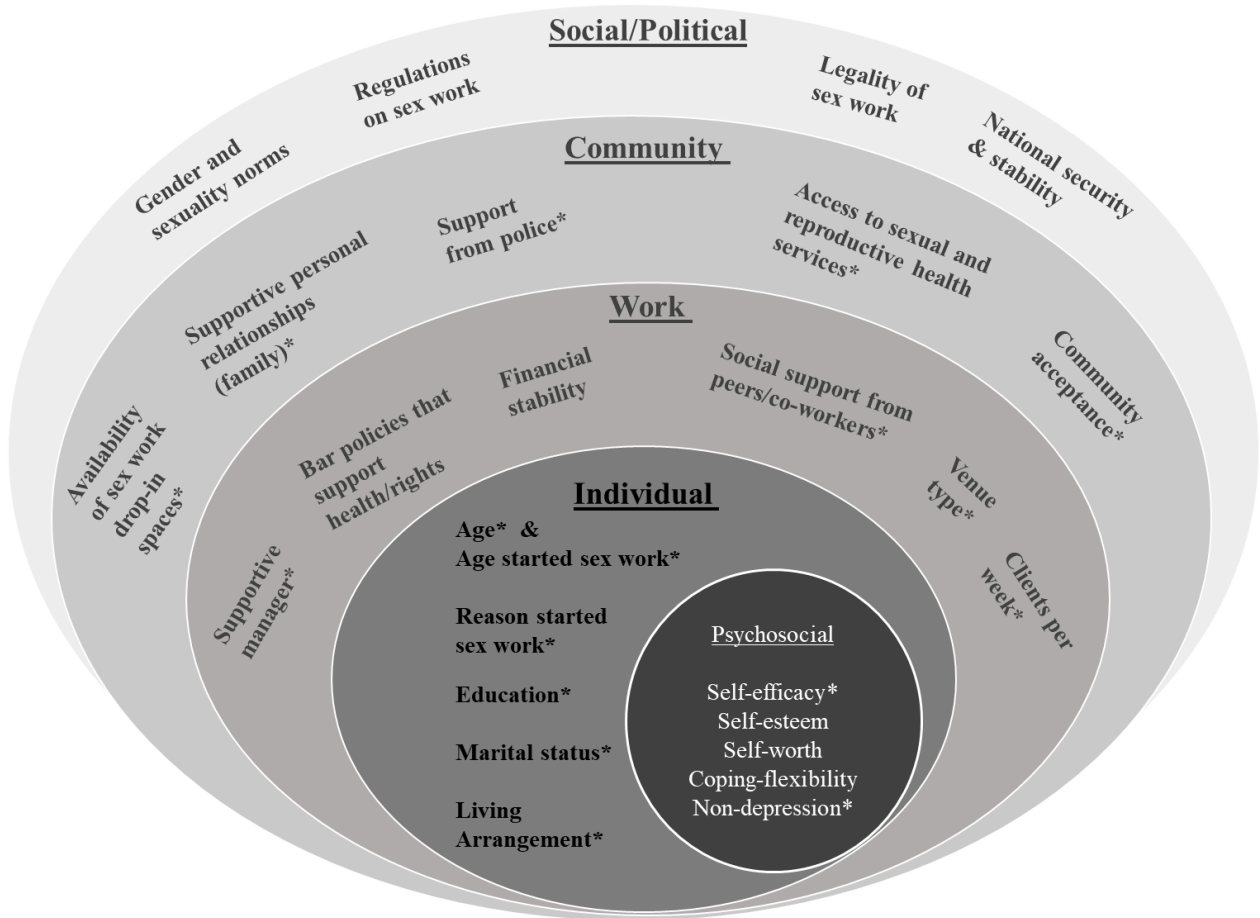
### Social/political domain

Research has shown that criminalizing sex work, or implementing punitive or sex work policies, can destabilize work contexts, force women into less safe working conditions, and limit exposure to community health initiatives.<sup>54,55</sup> Conversely, policies and interventions to empower sex worker communities and foster better interactions with police have been successful in promoting FSW safety and may contribute to resilience.<sup>56,57</sup> Broader social factors related to a nation's level of security and stability are theorized to affect population resilience.<sup>58,59</sup> Societal norms around gender and sexuality, which dictate expectations for appropriate sexual behavior, can impact

societal acceptance and treatment of sex workers broadly. These societal norms and may additionally shape FSW resilience.

Figure 4.1. Socioecological framework for resilience applied to FSW

\*Measured in this study



## **Methods**

### *Study design: parent study*

This study is a secondary data analysis of baseline data from a quasi-experimental pre/post-test study designed to evaluate a safety promotion intervention among FSW in Pattaya, Thailand. At baseline, 401 venue-based FSW were recruited from two sex work zones/hotspots in Pattaya, which were non-randomly assigned to be the intervention and control areas for the intervention. Women recruited from the intervention zone (n=201) received messages on health topics, safety strategies, empowerment, and resources for violence-related support from specially trained outreach teams. Women recruited from the control zone (n=200) were not exposed to the intervention. All participants were assessed by survey at baseline (May, 2017) and then post-intervention after 14 weeks of follow-up (September, 2017). The collaborative study team was led by Mahidol University, with technical support from Johns Hopkins University, and practitioner collaborator SWING. Study procedures were led by the Mahidol University team, and were approved by the Institutional Review Board at Mahidol University in Bangkok. The Johns Hopkins School of Public Health IRB provided a determination of non-human subject's research, reflecting Johns Hopkins's role as a technical support partner, without direct participant engagement.

### *Sampling and data collection: parent study*

FSW were recruited via proportional-to-size venue-based sampling. This study's sampling frame included every known venue (beer bars & dance clubs known as a-go-gos) in Pattaya (n=142). Based on venue size, between 2 and 6 FSW were sampled from each venue. Target enrollment for smaller beer bars (~10 employees) was capped at 2 participants and enrollment from larger dance clubs (50+ employees) was capped at 6 participants. All venues were visited between 6:00pm and 10:00pm, based on operating hours of the venue. Within venues, consenting participants were

selected based on availability and eligibility criteria. Participants were eligible if they were born female, were 18 years or older, spoke Thai, and had sold or exchanged sex for money or goods in the past three months.

#### *Baseline data collection*

Baseline surveys were conducted among consenting venue-based FSW (n=401) in May 2017. Data collectors were research staff from Mahidol University in Thailand who have a long track-record of successful collaboration with the sex work community. Data were collected face-to-face using electronic tablets and surveys lasted approximately 15-20 minutes. All baseline surveys were conducted in a private space at the venue where the participant worked. As part of baseline data collection, all participants were asked for their contact information so that they could be contacted for an additional survey at three-month follow-up.

#### *Analytic sample*

This analysis uses baseline survey data (n=401). This sample includes participants from every known venue within the two sex work hotspot zones (201 participants from the intervention zone and 200 participants from the control zone). Baseline data were collected before all intervention activities

#### *Measures*

All measures in this study are self-reported. Survey questions were drafted in English, translated and pre-tested in Thai by bi-lingual study investigators, and back translated to ensure consistency of question meanings across languages.

Resilience, the outcome of interest, is measured continuously using the Connor Davidson 10-item Resilience Scale (CD-10; range 0 – 40).<sup>29</sup> The CD-10 measures participant's responses (from 0 [not true at all] to 4 [true all of the time]) on 10 statements related to coping, rebound and

flexibility. For example, statements included; “I tend to bounce back quickly from hardship”, “Coping with stress can strengthen me”, and “I try to see the funny side of problems” etc. The CD-10 has been previously validated and used in multiple populations of healthy adults,<sup>60,61</sup> survivors of trauma,<sup>15,62</sup> and sex workers.<sup>24</sup>

Primary predictors of interest were organized into individual, work, and community level factors based on the domains in the socioecological framework. Within the individual level, demographic variables included age, age of when the participant first sold sex, education level, living arrangement, marital status, and the primary reason why a woman entered sex work (e.g., coercion, enjoyment, to meet a need, etc.). Psychosocial variables included FSW self-efficacy related to condom use and safety, and each was measured as a function of participants’ agreement to the statements “I am confident in my ability to negotiate condoms” or to “stay safe during sex work” on a 5-point Likert scale (1 [strongly disagree] to 5 [strongly agree]). Participant depressive symptoms were measured by the two-question Patient Health Questionnaire depression screen (PHQ-2; range 0 – 6).<sup>63</sup> Non-depression was operationalized as a binary variable defined by the recommended cut-off of PHQ-2 score < 3.<sup>63</sup>

Predicting variables related to the work (venue) environment included FSW venue type (beer bar or a-go-go) and average client number per week. FSW social support from co-workers was measured through a two-item abridged social cohesion scale from Kerrigan et.al. (range 2 – 10)<sup>64,65</sup> Participants indicated their agreement on a Likert scale (1 [strongly disagree] to 5 [strongly agree]) to two statements assessing if FSW felt they could “count on other sex workers” if they needed to talk about their problems or borrow money. Support from venue managers for violence was measured through FSW agreement on a Likert scale (1 [strongly disagree] to 5 [strongly agree]) with the statement “If I experienced violence, I could get help from my bar manager.”

In the community domain, post-violence support from family and friends, and post-violence support from police, were each measured with a one-item Likert scale (1 [strongly disagree] to 5 [strongly agree]). Likert scales measured a participant's agreement that she could "seek help from family and friends" or "seek help from police" if she experienced violence. The availability of sex work drop-in spaces was measured as binary yes/no variable for a participant's knowledge of any organizations that provides health services specifically for FSW. Access to sexual health services was measured as binary yes/no variable for a participant receiving an HIV test in the past three months. Perceived community acceptance was measured through a one-item Likert scale (reverse coded: 1 [strongly agree] to 5 [strongly disagree]) measuring agreement with the statement; "If I told people I was a sex worker, they would treat me differently."

#### *Data analysis*

All analyses were conducted in STATA 15.0.<sup>66</sup> Significance level  $\alpha$  was set at 0.05. Significance tests that resulted in  $p < .10$  are reported as trending towards significance. Overall, there was a low level of missingness across variables (<4%). Variables with missingness including resilience (1% missing), support from peers (2.2% missing), support from family (0.5% missing), support from police (3.4% missing), and community acceptance for sex work (2.2% missing), were imputed at the sample mean for that item.

#### Psychometric analysis: Connor-Davison 10-item scale

The Connor-Davison 10-item scale (CD-10) was assessed for internal consistency and unidimensionality via Cronbach's alpha<sup>32</sup> scores for the full 10-item, and all possible 9-item, scales. The overall alpha for each 9-item scale were compared to determine whether the inclusion of any items lowered the scale's global alpha.

### Descriptive analysis: Describing sample characteristics

The characteristics of the full sample, and those of high and low resilience groups, were described by socioecological domain. High and low resilience groups were defined as being in the top and bottom quartile for the sample's resilience scores respectively. The group mean was reported for all continuous variables, and the percent of participants with the variable of interest was reported for all categorical variables.

### Main analysis: Hierarchical regression

Hierarchical linear regression modelling was used to examine the relationship between resilience and hypothesized correlates of resilience from three socioecological domains. All models are cluster-adjusted using the 'cluster' option in STATA, which assumes a random cluster (venue) effect and includes robust standard errors based on the Huber formula.<sup>67,68</sup>

Firstly, all predictive variables were tested for their unadjusted association with resilience in bivariate linear regression models. Next, single block models were built separately for individual, work/venue, and community domains. Within the individual domain, separate models were built for demographic and psychosocial variables to assess the individual contribution of these blocks. Models were as follows, where  $Resilience_{(T1)}$  is the average estimated resilience score at T1 given the prediction model and  $\beta_1, \beta_2 \dots \beta_n$  are a set of covariates described above representing mean change in resilience per unit increase in covariate, holding other covariates constant. Subject residuals are represented by  $\varepsilon$ .

#### **4. Resilience predictors: Individual domain models**

##### **a. Demographic model**

$$Resilience_{(T1)} = \beta_0 + \beta_1 age + \beta_2 age-start + \beta_3 reason-start + \beta_4 marital + \beta_5 education + \beta_6 living-arrangement$$

### **b. Psychosocial model**

$$Resilience_{(TI)} = \beta_0 + \beta_1 \text{ self-efficacy safety} + \beta_2 \text{ self-efficacy condom use} + \beta_3 \text{ non-depression} + \varepsilon$$

### **5. Resilience predictors: Work/Venue domain model**

$$Resilience_{(TI)} = \beta_0 + \beta_1 \text{ venue} + \beta_2 \text{ client\#} + \beta_3 \text{ manager-support} + \beta_4 \text{ peer-support} + \varepsilon$$

### **6. Resilience predictors: Community domain model**

$$Resilience_{(TI)} = \beta_0 + \beta_1 \text{ family-support} + \beta_2 \text{ police-support} + \beta_3 \text{ sexual health access} + \beta_4 \text{ FSW drop-in space} + \beta_5 \text{ community acceptance} + \varepsilon$$

Variables that were associated with resilience ( $p < .10$ ) in single block models were combined in hierarchical regression models by socioecological level as seen below. Specifically, four models were built: 1) A model containing significant resilience predictors from the demographic block ( $p < .10$ ); 2) A model containing significant resilience predictors from the demographic and psychosocial blocks ( $p < .10$ ); 3) A model containing significant resilience predictors from the demographic, psychosocial, and work blocks ( $p < .10$ ); and 4) A model containing significant resilience predictors from the demographic, psychosocial, work, and community blocks ( $p < .10$ ). The final regression model included all predictive variables from the individual, work, and community domains that were associated with resilience in single block models at the  $p < .10$  level. Models were examined for high collinearity, defined as variance inflation factor ( $vif$ )  $> 10$ . Overall,  $vif$  scores were low ( $< 5$ ) and all predictive variables were retained in the final model. Model fit was assessed by R-squared ( $R^2$ ) and F statistics across models. F-tests for overall significance were run for each model and incremental/ partial F-tests<sup>69</sup> for joint-significance were run to assess if subsequent hierarchical regression models significantly contributed to the explanation of the outcome (resilience).



### **Single block models:**

Resilience = Intercept + Individual domain (demographic variables)

Resilience = Intercept + Individual domain (psychosocial variables)

Resilience = Intercept + Work domain

Resilience = Intercept + Community domain

### **Hierarchical regression models:**

Resilience = Intercept + Individual domain (demographic)

Resilience = Intercept + Individual domain (demographic) + Individual domain (psychosocial)

Resilience = Intercept + Individual domain (demographic) + Individual domain (psychosocial) +  
Work domain

Resilience = Intercept + Individual domain (demographic) + Individual domain (psychosocial) +  
Work domain + Community domain

## **Results**

FSW resilience scores averaged 31.7 (sd 5.19, range 13-40). Psychometric scale analysis showed high internal consistency for the full 10-item scale (alpha .88) with no evidence to remove any items. Across the full sample, the average participant age was 33.5 years old, with average age of starting sex work at 28.7 years old. The majority of the sample entered sex work to meet a basic need (63.6%), were divorced/widowed (58.1%), were living in a place they were renting or owned (86.8%), and worked in a beer-bar (72.8%). The vast majority had an HIV test in the past three months (90.3%), but the minority were aware of any FSW-specific drop-in services (19.4%).

Overall, FSW self-efficacy for condom-use was high (4.6, range 1-5), relative to FSW self-efficacy for safety (3.8, range 1-5) and feelings of community acceptance (2.7, range 1-5). High resilience FSW (top quartile), were on average older (35.3 years old), and started sex work at a later age (29.4 years old) than the lower resilience group (bottom quartile). High resilience FSW had lower level of depressive symptoms compared to lower-resilience FSW (10.4% vs. 20.3%).

High resilience FSW also reported greater feelings of acceptance by their community (3.0 vs. 2.5) [Table 4.1].

Single block regression models showed that within the individual domain, resilience was significantly associated with non-depression ( $\beta$  2.24, 95% CI .83, 3.66), higher self-efficacy for condom use ( $\beta$  1.85, 95% CI .94, 2.76), and lower self-efficacy for safety ( $\beta$  -.72, 95% CI -1.29, -.15). For demographic variables, higher FSW age trended towards significance ( $\beta$  .09, 95% CI -.03, .20). Within the work/venue domain, higher manager support for FSW post-violence trended towards significant association with resilience ( $\beta$  .61, 95% CI -.24, 1.46). In the community domain, resilience was associated with feelings of increased community acceptance ( $\beta$  .74, 95% CI .23, 1.27) [Table 4.2].

Hierarchical regression modeling showed that there was significant improvement in model fit with the addition of demographic ( $\Delta F_{1,0} = 4.76$ ,  $p = .03$ ), psychosocial ( $\Delta F_{3,1} = 12.06$ ,  $p < .001$ ), and community variables ( $\Delta F_{1,3} = 5.25$ ,  $p = .02$ ) in comparison to the model fit of previous blocks. In the final adjusted multi-domain model ( $R^2 .10$ ), resilience remained positively associated with non-depression ( $\beta$  2.22, 95% CI .85, 3.59), higher self-efficacy for condom use ( $\beta$  1.67, 95% CI .84, 2.50), higher age ( $\beta$  .08, 95% CI .01, .15), and feelings of increased community acceptance of sex work ( $\beta$  .60, 95% CI .08, 1.12) [Table 4.3].

## **Discussion**

This study is among the first to take a socioecological approach to the investigation of resilience in FSW. We find that resilience is best explained by a combination of individual and community domain factors. Specifically, that increased community acceptance of sex work was a significant predictor of resilience beyond the expected psychosocial factors related to mental health. In this

context, building greater community acceptance of FSW and combatting discrimination would help promote FSW health and may be an avenue to support resilience.

Estimates of resilience from other sex worker populations, using the CD-10 scale, include FSW in Hong Kong (23.1)<sup>70</sup> and the U.S. (24.2).<sup>24</sup> Comparatively, FSW resilience in our sample (mean = 31.7) was much higher, and more similar to scores from community samples in high-income settings (29.0 – 33.5).<sup>60,61,71,72</sup> Overall, FSW in the current sample had relatively high access to outreach services and about 12% prevalence of depressive symptoms. This estimate for depressive symptoms is lower than past depression estimates for most FSW populations (30% - 80%).<sup>5,7,73,74</sup> It follows that this sample may be comparably healthy for a FSW population with low depression rates and high resilience.

Our work advances the investigation of resilience in FSW populations in a few key ways. Firstly, this work reinforces some previously-identified resilience-enabling factors, and secondly, brings forward new factors that may be linked to FSW resilience. Our work builds on that of Yuen et. al., showing that self-efficacy, self-esteem, and coping-flexibly were important resilience-enabling factors for FSW.<sup>26</sup> Their work showed that FSW resilience could be built through a relatively short-term intervention designed to improve these resilience-enabling factors.<sup>70</sup> Our study specifically measures self-efficacy related to the ability “to use condoms” and “stay safe during sex work,” rather than a generalized self-efficacy scale.<sup>75</sup> Existing interventions to promote FSW condom use often work through improving FSW knowledge, condom access, or removing barriers to use.<sup>76</sup> However, existing interventions do not always address underlying issues related to FSW’s structural vulnerabilities such as poverty, trauma, discrimination, and the mental health consequences of living in these realities.<sup>77</sup> This omission can mean that intervention effects are short lived.<sup>77</sup> Developing more empowerment-based condom promotion interventions that build

self-efficacy may encourage FSW resilience and create more sustainable HIV prevention programs.

A surprising result from this analysis was that self-efficacy for safety was inversely related to resilience, such that women with lower self-efficacy related to their ability to “stay safe” reported higher resilience. It is not clear from these findings or previous literature why this might be the case. Additional research is needed to explore the relationship between resilience, trauma, safety strategies, and self-efficacy regarding safety.

As expected from previous resilience literature,<sup>13,18,19</sup> depressive symptoms were inversely related to FSW resilience in this study. Depression presents known challenges to pro-health behaviors.<sup>78,79</sup> FSW depressive symptoms have been associated with higher risk sexual behaviors, such as lower condom use; and decreased use of health service, such HIV prevention services.<sup>73,80</sup> FSW sexual health programming that focuses on harm reduction alone, without an emphasis on empowerment to address underlying mental health concerns of FSW may be less effective.<sup>81</sup> Current FSW health programming that explicitly addresses mental health is lacking and urgently needed. In a recent systematic review (2020) of research on FSW mental health, no studies were found that described a mental health intervention for FSW.<sup>82</sup> Our results reiterate the call for interventions that address FSW mental health. Specifically, our results imply that combatting depression is an important factor in promoting longer-term FSW recovery to health and improved coping through resilience.

Beyond identifying psychosocial factors that promote resilience, this study finds that building community acceptance of sex workers is an important community-level factor for FSW resilience. Two previous U.S.-based studies have shown that socioecological factors are associated with FSW resilience; those factors include higher education, having housing, higher food security

and increased social support.<sup>24,25</sup> Neither study explicitly examined “community acceptance” as a resilience predictor, but they did find that adverse experiences such as violence victimization or abuse by police were negatively associated with resilience.<sup>24</sup> The idea that stigma and discrimination can have serious mental health implications is not new. Numerous studies have described the negative impacts of stigma on FSW’s mental and psychological health.<sup>51,83-85</sup> However, this study additionally links FSW resilience to increased community acceptance. Results suggest that FSW resilience can be built at the community level and that work to increase community acceptance of sex workers may have benefits for FSW resilience.

Community-level interventions to address stigma against FSW are increasing, mostly focused on HIV-related stigma.<sup>86</sup> However, the majority of stigma-reduction interventions still focus at the individual-level and researchers have noted gaps in existing interventions that attempted to change community-level attitudes and social norms.<sup>86</sup> Community-level work to increase FSW acceptance could be done in the form of community sex work sensitization interventions, trainings for health care professionals or police, and/or targeted messaging campaigns. Scholars have noted that these empowerment-based health interventions for FSW that involve the larger community, are often more successful than those focused on risk-reduction alone.<sup>87</sup> Current community-level anti-discrimination work should be expanded as an avenue to sustainably promote FSW health and foster FSW resilience.

Explicit resilience promotion interventions for FSW are sparse. One recent intervention among Chinese FSW, called the Personal Resilience and Enrichment Programme (PREP), was designed and evaluated on its ability to reduce sexual risk and improve psychological outcomes through resilience promotion.<sup>32</sup> The intervention, which addressed psychological well-being, self-efficacy, self-esteem, and adaptive coping through weekly sessions, showed significant

improvements in participant resilience scores and decreased psychological distress.<sup>26</sup> PREP builds off of the field's best knowledge on how to promote resilience in adults and shows positive initial indications that resilience promotion interventions can be effective in FSW. However, the intervention was fully focused on the individual, and future initiatives could be expanded to include work at the community or venue level to address FSW resilience promotion more comprehensively.

### *Limitations*

This study has several limitations. This study does not include all of the potential variables identified in the literature that could be contributing to resilience. Specifically, this study does not include measures for FSW financial stability, food security, or venue-level variables related to workplace safety or health policies. Additionally, many of the measures in this study were abbreviated to accommodate time and feasibility constraints with venue-based data collection. Specifically, this study includes abbreviated measures for self-efficacy specifically related to condom use and safety and shortened scales for social support from specific sources rather than full validated scales. These abbreviated measures have been used in previous FSW research,<sup>88,89</sup> however they have not been independently evaluated. This analysis is cross-sectional, limiting the ability to assert the direction of influence between resilience and its correlates. Finally, the sample consists of only venue-based FSW from Pattaya Thailand, such that findings may not be generalizable to other FSW populations who work in less formal or structured settings.

### **Conclusion**

Despite high rates of trauma, adversity, and poor health outcomes among FSW, research on FSW's resilience remains sparse. This is a missed opportunity to identify factors that may help promote FSW rebound and coping in the face of adverse conditions. Increasing community acceptance of

sex workers should be a programmatic priority, not only to directly combat the impacts of stigma, but as a way to bolster resilience and thus potentially guard against negative health consequences from other risk factors that FSW face. Similarly, increasing FSW self-efficacy for condom use and treating depression have direct health benefits but may also build resilience, offering more sustained protection for this vulnerable population.

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Table 4.1: Sample characteristics overall and by resilience group comparing highly resilient (top quartile) versus lower resilience (bottom quartile) groups at baseline (n=401)

Variable: Column % (n)	Total sample (n=401)	High resilience group ≥ 36 (n=106)	Low resilience group ≤ 29 (n=118)
<b>Individual domain:</b>			
<i>Demographic variables</i>			
Age: mean (sd)	33.5 (.40)	35.3 (.86)	32.3 (.84)
Age start sex work: mean (sd)	28.7 (.38)	29.4 (.84)	27.6 (.83)
Reason sex work:			
Forced/coerced	21 (5.24)	5 (4.72)	9 (7.63)
Basic need	255 (63.59)	69 (65.09)	72 (61.02)
Extra money	72 (17.96)	18 (16.98)	22 (18.64)
Meet partner	29 (7.23)	9 (8.49)	6 (5.08)
Enjoy it	24 (5.99)	5 (4.72)	9 (7.63)
Marital status:			
Single/dating	113 (28.18)	30 (28.30)	38 (32.20)
Married/cohab	52 (12.97)	14 (13.21)	18 (15.25)
Divorce/widow	233 (58.10)	61 (57.55)	61 (51.69)
Female partner	3 (.75)	1 (.94)	1 (.85)
Education:			
Primary or <	131 (32.67)	40 (37.74)	33 (27.97)
Secondary	134 (33.42)	32 (30.19)	49 (41.53)
High school or >	136 (33.92)	34 (32.08)	36 (30.51)
Living arrangement:			
Rent or own	348 (86.78)	93 (87.74)	100 (84.75)
Live w/someone	21 (5.24)	5 (4.72)	8 (6.78)
Live at bar	32 (7.98)	8 (7.55)	10 (8.47)
<i>Psychosocial variables</i>			
Self-efficacy for safety: mean (sd)	3.8 (.05)	3.7 (.11)	3.9 (.11)
Self-efficacy condom use: mean (sd)	4.6 (.03)	4.7 (.06)	4.5 (.06)
Non-depressed	350 (87.28)	95 (89.62)	94 (79.66)
<b>Work domain</b>			
Venue type:			
Beer bar	292 (72.82)	84 (79.25)	81 (68.64)
A-go-go	109 (27.18)	22 (20.75)	37 (31.36)
Client number: mean (sd)	2.10 (.08)	1.85 (.16)	2.08 (.16)
Manager support: mean (sd)	4.25 (.04)	4.3 (.09)	4.1 (.09)
Peer support: mean (sd)	8.06 (.08)	8.0 (.15)	7.9 (.15)
<b>Community domain</b>			
Family support: mean (sd)	4.1 (.04)	4.1 (.10)	4.1 (.10)
Police support: mean (sd)	3.6 (.05)	3.5 (.10)	3.5 (.10)
HIV test past 3 months	362 (90.27)	97 (91.51)	107 (90.68)
Available sex work drop-in	78 (19.45)	26 (24.53)	21 (17.8)
Community acceptance sex work: mean (sd)	2.7 (.05)	3.0 (.11)	2.5 (.11)

Table 4.2: Bivariate and single block multivariable linear regression models of resilience predictors by socioecological domain (n=401)

	Bivariate $\beta$ (95% CI)	Demographic block $\beta$ (95% CI)	Psychosocial block $\beta$ (95% CI)	Work/Venue block $\beta$ (95% CI)	Community block $\beta$ (95% CI)
<b>Individual domain</b>					
<i>Demographic variables</i>					
Age	.08 (.01, .15) **	.09 (-.03, .20) *			
Age started sex work	.06 (-.01, .13)	-.01 (-.12, .11)			
Reason sex work					
Forced/coerced (ref)	1.00	1.00			
Basic need	1.81 (-1.07, 4.68)	1.69 (-1.19, 4.70)			
Extra money	1.16 (-2.08, 4.41)	1.21 (-2.06, 4.90)			
Meet partner	2.64 (-.65, 5.93)	2.42 (-.86, 5.70)			
Enjoy it	2.03 (-1.36, 5.44)	1.12 (-1.34, 5.59)			
Marital status					
Single/dating (ref)	1.00	1.00			
Married/cohabitate	.89 (-.82, 2.54)	1.01 (-.87, 2.87)			
Divorce/widow	.81 (-.46, 2.07)	.37 (-.88, 1.62)			
Education					
Primary or <	1.00	1.00			
Secondary	-.60 (-1.84, .63)	.04 (-1.33, 1.42)			
High school or >	-.15 (-1.40, 1.09)	.42 (-.89, 1.73)			
Living arrangement					
Rent/own (ref)	1.00	1.00			
Live w/someone	-.59 (-2.83, 1.64)	-.57 (-3.18, 2.04)			
Live at bar	-1.02 (-2.97, .93)	-.93 (-2.92, 1.06)			
<i>Psychosocial variables</i>					
Self-efficacy for safety	-.39 (-.86, .07)		-.72 (-1.29, -.15) **		
Self-efficacy for condom use	1.50 (.59, 2.40) **		1.85 (.94, 2.76) **		
Non-depressed	1.77 (.19, 3.34) **		2.24 (.83, 3.66) **		
<b>Work domain</b>					
Venue type					
A-go-go (ref)	1.00			1.00	
Beer bar	-.64 (-1.85, .57)			-.64 (-1.86, .58)	
Client number	-.20 (-.53, .13)			-.16 (-.48, .16)	
Manager support	.54 (-.18, 1.26) *			.61 (-.24, 1.46) *	
Peer support	.06 (-.34, .46)			-.07 (-.50, .36)	
<b>Community</b>					
Family support	.25 (-.51, 1.02)				.29 (-.46, 1.04)
Police support	-.15 (-.68, .39)				-.27 (-.74, .31)
HIV test in past 3 months	.88 (-1.02, 2.78)				.72 (-1.28, 2.72)
Available FSW drop-in	.97 (-.29, 2.23)				.94 (-.28, 2.17)
Community acceptance of sex work	.72 (.20, 1.24) **				.74 (.23, 1.27) **

\* Significant  $p < .10$ ; \*\* Significant  $p < .05$

Table 4.3. Hierarchical linear regression analysis of resilience predictors by socioecological block (n=401)

		<b>Demographic Block<sup>a</sup></b> <b>β (95% CI)</b>	<b>(+) Psychosocial Block<sup>b</sup></b> <b>β (95% CI)</b>	<b>(+) Work/Venue Block<sup>c</sup></b> <b>β (95% CI)</b>	<b>(+) Community Block<sup>d</sup></b> <b>β (95% CI)</b>
<b>Individual</b>	Age	<b>.08 (.01, .15) **</b>	<b>.09 (.02, .15) **</b>	<b>.09 (.02, .16) **</b>	<b>.08 (.01, .15) **</b>
	Self-efficacy for condom use		<b>1.91 (.95, 3.75) **</b>	<b>1.70 (.85, 2.56) **</b>	<b>1.67 (.84, 2.50) **</b>
	Self-efficacy for safety		<b>-.74 (-1.30, -.19) **</b>	<b>-.86 (-1.44, -.29) **</b>	<b>-.82 (-1.38, -.26) **</b>
	Non-depressed		<b>2.35 (.94, 3.75) **</b>	<b>2.31 (.91, 2.56) **</b>	<b>2.22 (.85, 3.59) **</b>
<b>Work</b>	Manager support			<b>.56 (-.23, 1.35)</b>	<b>.62 (-.16, 1.39)</b>
<b>Community</b>	Community acceptance sex work				<b>.60 (.08, 1.12) **</b>
<b>Model fit</b>	R <sup>2</sup>	.01	.08	.08	.10
	Δ R <sup>2</sup>	--	.06	< .01	.01
	Δ F	<b>4.76**</b>	<b>12.06**</b>	1.97	<b>5.25**</b>

a Model contains significant resilience predictors from the demographic block (p<.10)

b Model contains significant resilience predictors from the demographic and psychosocial blocks (p<.10)

c Model contains significant resilience predictors from the demographic, psychosocial, and work blocks (p<.10)

d Model contains significant resilience predictors from the demographic, psychosocial, work, and community blocks (p<.10)

\* Significant p<.10

\*\*Significant p<.05

## CHAPTER FIVE: MANUSCRIPT THREE



## **The Buffering Role of Resilience against Alcohol Use for Female Sex Worker Survivors of Violence in Pattaya, Thailand**

### **Abstract**

#### *Background*

Resilience refers to the ability to cope adaptively after trauma and can buffer against the expected negative health outcomes of traumatic events. A common consequence of experiencing trauma is increased alcohol or substance use. There are, however, limited data on the buffering role of resilience against alcohol use, and a total lack of data for survivors of violence who are female sex workers (FSW). This analysis will prospectively examine the buffering role of resilience against alcohol use for FSW with high exposure to violence in Pattaya, Thailand.

#### *Methods*

Prospective cohort data of venue-based FSW from Pattaya, Thailand (n=232) were used to compare risk of violence victimization by clients at baseline (May 2017) to risk of having sex with clients while inebriated (SWI) at three-month follow-up (September 2017). FSW resilience was assessed at baseline using the Connor-Davidson 10-item Resilience Scale (CD-10; range 0-40). Multivariable logistic regression models were built to assess the prospective relationship between violence victimization and SWI without adjustment for resilience and then assess the relationship in resilience-violence interaction models. Interaction models centered resilience at all CD-10 values to illustrate the relationship between violence and SWI at each level of resilience.

#### *Results*

In main effect models, FSW who reported client violence in the past three months at baseline were on average no more likely to report SWI in the past three months at follow-up (aOR 0.9, 95% CI

0.5 – 1.9). In resilience-violence interaction models, resilience was shown to significantly modify the relationship between client violence and later SWI (aOR for interaction term; 0.8, 95% CI: 0.7 – 0.9). At the sample minimum resilience (CD-10 = 16), there was a significant increase in the odds of SWI for FSW who had experienced violence (aOR 14.2, 95% CI 1.5, 131.2). At the sample median resilience (CD-10 = 31) there was no association between violence and SWI. At the sample maximum resilience (CD-10 = 40) there was a significant decrease in the odds of SWI for those that had experienced violence versus not (aOR 0.2, 95% CI: 0.1, 0.9).

### *Conclusion*

This study is the first to show the buffering effects of resilience against alcohol use for FSW survivors of violence. Results highlight that the benefits of resilience in FSW can extend beyond improved mental health outcomes to include alcohol-related health behaviors. Supporting FSW resilience and coping after trauma may be an effective strategy to reduce trauma-related alcohol use and avert the negative health consequences associated with having sex with clients while inebriated.

## **Introduction**

Exposure to violence and other traumatic experiences can increase a survivor's risk of poor mental health and substance use disorders.<sup>1-3</sup> Longitudinal research has shown that both previous abuses and new violent assaults increase women's risk of alcohol and drug abuse.<sup>1,3</sup> Survivors may use alcohol or other substances as an avoidance coping mechanism to deal with the negative thoughts, emotions, or social consequences of having experienced trauma.<sup>4,5</sup> Despite the increased health risks associated with experiencing traumatic events, survivors continue to adapt, cope, heal, and sometimes thrive, illustrating the concept of resilience.

Resilience refers to the ability to cope adaptively or "bounce back" after trauma or adversity.<sup>6</sup> It has been conceptualized as a complex phenomenon, influenced by personal characteristics and fostered by supportive social and environmental factors.<sup>6,7</sup> Resilience is associated with more active coping strategies among survivors of trauma.<sup>8</sup> These include coping strategies directed at problem solving, reframing issues, or seeking help.<sup>5</sup> Perhaps through encouraging more active coping strategies or seeking external support, resilience has also been shown to prevent the development of later poor health outcomes among survivors of violence.<sup>9-11</sup> The mechanism by which resilience alters the way an individual processes trauma to alleviate or mitigate the later expected effects of that trauma is commonly referred to as the buffering model.<sup>12</sup>

A smaller body of literature has shown that highly resilient individuals are less likely to develop substance or alcohol abuse disorders after trauma.<sup>13-15</sup> This includes research among a population of inner-city adults in the United States, showing that resilience significantly buffered the effects of childhood abuse on the risk of lifetime alcohol use.<sup>13</sup> Similarly, resilience was found to be negatively associated with alcohol abuse in military veterans.<sup>14</sup> However, studies on the

buffering effects of resilience on alcohol use are limited, and are non-existent for sex workers populations.

Female sex workers (FSW) are defined as women who exchange sex for money or goods.<sup>16</sup> FSW are among the world's most vulnerable populations to violence victimization and human rights abuses.<sup>17</sup> Additionally, FSW experience high rates of depression,<sup>18,19</sup> HIV,<sup>20</sup> and substance use.<sup>21</sup> FSW who experience violence are at even higher risk for these poor outcomes.<sup>21-24</sup> FSW survivors of violence may use alcohol to decrease inhibitions, increase enjoyment, or “numb” themselves to sex with clients.<sup>25,26</sup> Alcohol use has also been reported as a form of “self-medication” or coping mechanism for FSW to deal with previous traumas or the stressful environments and socioeconomic pressures associated with sex work in general.<sup>21,24</sup> In these contexts, resilience may be an important protective or buffering mechanism for trauma-associated alcohol use among FSW.

This study will be the first to examine resilience as a buffering mechanism for alcohol use among FSW. Specifically, this analysis will test if resilience modifies the relationship between experiences of violence for clients (paying partners) and later FSW alcohol use before sex with clients, using a prospective data set from Pattaya, Thailand. In Thailand, violence victimization, and other human rights abuses against sex workers, remains a significant health and safety risk for FSW.<sup>27-29</sup> Previous estimates from Pattaya show rates of past week FSW violence victimization at 15%.<sup>29</sup> In Pattaya, venue-based sex work (operating from within bars/clubs/massage parlors etc.) is common, and these venues frequently sell alcohol. Resilience research in these settings may hold promise for FSW health promotion, with specific implications for supporting FSW survivors of violence and preventing trauma-related alcohol use.

## **Methods**

### *Study design: parent study*

This study is a secondary analysis of data from a quasi-experimental pre/post-test study designed to evaluate a safety promotion intervention among FSW in Pattaya, Thailand. The parent study recruited 401 FSW from two sex work zones/hotspots in Pattaya, assigned to be the intervention and control areas. Women recruited from the intervention zone (n=201) received messages on health topics, safety strategies, empowerment, and resources for violence-related support from specially trained outreach teams. Women recruited from the control zone (n=200) were not exposed to the intervention. All participants were assessed by survey at baseline (May 2017) and then post-intervention after 14 weeks of follow-up (September 2017). The collaborative study team was led by Mahidol University, with technical support from Johns Hopkins University, and practitioner collaborator SWING. Study procedures were led by the Mahidol University team, and were approved by the Institutional Review Board at Mahidol University in Bangkok. The Johns Hopkins School of Public Health IRB provided a determination of non-human subject's research, reflecting Johns Hopkins's role as a technical support partner, without direct participant engagement.

### *Sampling and data collection: parent study*

FSW were recruited via proportional-to-size venue-based sampling. This study's sampling frame included every known venue (beer bars & dance clubs known as a-go-gos) in Pattaya (n=142). Based on venue size, between 2 and 6 FSW were sampled from each venue. Target enrollment for smaller beer bars (~10 employees) was capped at 2 participants and enrollment from larger dance clubs (50+ employees) was capped at 6 participants. All venues were visited between 6:00pm and 10:00pm, based on operating hours of the venue. Within venues, consenting participants were

selected based on availability and eligibility criteria. Participants were eligible if they were born female, were 18 years or older, spoke Thai, and had sold or exchanged sex for money or goods in the past three months.

#### *Baseline data collection (T1)*

Baseline surveys were conducted among consenting venue-based FSW (n=401) in May 2017. Data collectors were research staff from Mahidol University who have a long track-record of successful collaboration with the sex work community. Data were collected face-to-face using electronic tablets and surveys lasted approximately 15-20 minutes. All baseline surveys were conducted in a private space at the venue where the participant worked. As part of baseline data collection, all participants were asked for their contact information so that they could be contacted for an additional survey at three-month follow-up.

#### *Follow-up data collection (T2)*

Follow-up surveys were conducted by Mahidol data collectors in September 2017, approximately three months post-baseline assessment. Participants were contacted for a follow-up survey through a mixture of calls, texts, and in-person visits to the participant's venue. Data collectors scheduled follow-up data collection at a time and location that was most convenient for the participants, including at bars, hotels, restaurants, or by phone. Participants were re-assessed on all baseline measures. Of the 401 FSW enrolled at baseline, data collectors were able to locate 232 (58%) of participants at follow-up. The primary reason for loss to follow-up (LTFU) was that the participant had moved at some point during the study period and was no longer working in Pattaya.

#### *Analytic sample*

This analysis used data from retained participants who have data from both baseline and follow-up timepoints (n=232). This sample includes 124 participants from the intervention and 108

participants from the control group. This analysis compares participant-level outcomes over time, which requires that only retained participants be used.

### *Measures*

All measures in this study are self-reported. Survey questions were drafted in English, translated and pre-tested in Thai by bi-lingual study investigators, and back translated to ensure consistency of question meanings across languages.

The primary outcome of interest is FSW sex with clients while inebriated (SWI) at follow-up (T2). SWI is measured as a participant having three or more alcoholic drinks before having sex with a client in the past three months. The variable is operationalized as binary, where participants who reported “always,” “often,” or “sometimes” having three or more drinks before having sex with clients were defined as experiencing SWI and participants who reported “never” or “rarely” were defined as not experiencing SWI. Inebriation depends on sex, weight, genetics, and other factors, but occurs at blood alcohol concentrations around 0.08g/dl (3-4 drinks for women) according to the National Institute on Alcohol Abuse and Alcoholism.<sup>30</sup>

The primary exposure of interest is having experienced client violence victimization in the past three months at baseline (T1). This survey measured the major types of client violence against FSW including verbal, emotional, physical, and sexual violence.<sup>31</sup> This study’s measure of violence additionally includes other non-consensual or threatening sexual acts by clients, such as bringing more people to have sex than was agreed upon or only paying for sex once but demanding additional or different sexual acts.<sup>22,23,32,33</sup> These items have been included in the definition of violence against sex workers generated by the World Health Organization<sup>34</sup> and have been included in the measures of client violence in previous studies.<sup>23,33,35</sup> Participants were considered to have experienced client violence if they responded “yes” to having “a client do any of the

following things to you” in the past three months: “yelled at you,” “made you feel bad about yourself,” “hit, punched, slapped or otherwise physically hurt you,” “used violence, force, or threats to have sex or sex acts that you did not want,” “only paid for sex once, but then demanded to have sex multiple times,” or “brought more people to have sex with you than was agreed upon.” Response options are modeled after the well-tested revised Conflict Tactics Scale,<sup>31</sup> and sex work specific items were taken from previous literature describing violence against FSW.<sup>22,23,32</sup>

Resilience was examined as an effect modifier. Resilience is measured continuously using the Connor Davidson 10-item Resilience Scale (CD-10; range 0 – 40 ).<sup>36</sup> The CD-10 measures participant’s responses (from 0 [not true at all] to 4 [true all of the time]) on 10 statements related to coping, rebound and flexibility. For example, statements included; “I tend to bounce back quickly from hardship,” “Coping with stress can strengthen me,” and “I try to see the funny side of problems,” etc. The CD-10 has been previously validated and used in multiple populations of healthy adults,<sup>37,38</sup> survivors of trauma,<sup>9,39</sup> and sex workers.<sup>40</sup>

Other variables/ potential confounders were measured at baseline (T1). These include a set of demographic, psychosocial, and sociological variables that may be associated with either the primary outcome or exposure. Demographic variables included age, age of when the participant first sold sex, the primary reason why a woman entered sex work (e.g., coercion, enjoyment, to meet a need), marital status, education level, venue type (beer bar or a-go-go), primary living arrangement in the past three months (e.g., renting, living with partner etc.), and average client number per week. Psychosocial variables included participant depressive symptoms, defined as a scale score of  $\geq 3$  on the two-question Patient Health Questionnaire depression screen (PHQ-2; range 0 – 6).<sup>41</sup> Additionally, FSW self-efficacy related to condom use and safety were each measured as a participant’s agreement to the statements; “I am confidence in my ability to



negotiate condoms” or “stay safe during sex work” on a 5 point Likert scale (1 [strongly disagree] to 5 [strongly agree]).

Other potential confounders include FSW social support from co-workers, measured through a two-item abridged social cohesion scale from Kerrigan, et.al. (range 2 – 10).<sup>42,43</sup> Participants indicated their agreement on a Likert scale (1 [strongly disagree] to 5 [strongly agree]) to two statements assessing if FSW felt they could “count on other sex workers” if they needed to talk about their problems or “borrow money.” FSW post-violence support from venue managers and police were each measured through FSW agreement on a Likert scale (1 [strongly disagree] to 5 [strongly agree]) with the statements “If I experienced violence, I could get help from my bar manager,” or “from the police” respectively. Lastly, participants’ intervention group in the parent study was defined as a binary variable for intervention or control group.

### *Data analysis*

All analyses were conducted in STATA 15.0.<sup>44</sup> Significance level  $\alpha$  was set at 0.05. Significance tests that result in  $p < .10$  are reported as trending towards significance. Clusters are defined at the venue level and all analyses are adjusted for venue-level clustering to account for likely non-independence of participants.<sup>45,46</sup>

Assessment of missingness showed that, overall, missingness was low (<5%). Variables with missingness included support from peers (2.6% missing), support from family (0.9% missing), support from police (4.3% missing), and resilience (1.3% missing). These variables were imputed at the sample mean for that item. The Connor-Davison 10-item resilience scale (CD-10) was assessed for internal consistency and uni-dimensionality via Cronbach’s alpha<sup>47</sup> scores for the 10-item and all possible 9-item scales. The overall alpha for each 9-item scale were compared to determine if the inclusion of any items lowered the scale’s global alpha.

### Attrition analysis

Attrition analyses were conducted to assess baseline characteristics of participants who were loss to follow-up (LTFU) compared with those who were retained via cluster chi squared tests.<sup>48</sup> Participants were similar on all tested demographic variables including age, years in sex work, educational level, marital status etc. However, participants who were LTFU were more likely to have experienced client physical or sexual violence (5.9% vs. 2.2%,  $p=.05$ ) and reported higher depressive symptoms (16.0% vs. 10.3%,  $p=.06$ ) in the past three months at baseline than participants who were retained. In addition, participants at follow-up had fewer clients in the past three months compared to baseline participants (average 1 client per week vs. 2.2 at baseline  $p<001$ ).

### Descriptive analysis

All potential confounders were assessed for their association with both the primary exposure (client violence at T1) and primary outcome (SWI at T2), using clustered t-tests or chi squared tests for continuous and categorical or binary variables respectively.<sup>48</sup> Variables that were associated with either client violence at T1 or SWI at T2, at the  $p<.05$  level were included as adjustment variables in multivariable models.

### Assessing the prospective relationship between client violence (T1) and SWI (T2)

This analysis establishes the prospective relationship between client violence (T1) and SWI (T2) through bivariate and multivariable logistic regression and then add resilience as modifier to assess effect modification. All models were adjusted for clustering by venue using the ‘cluster’ option in STATA, which assumes a random cluster (venue) effect to provide robust standard errors based on the Huber formula.<sup>45,46</sup>

The prospective bivariate model is as follows, where  $SWI (T2)$  is the estimated log odds of SWI at follow-up given the prediction model,  $\beta_1$  is the difference in log odds of SWI at follow-up comparing violence exposed to unexposed at baseline, and  $\varepsilon$  represents subject residuals:

$$SWI (T2) = \beta_0 + \beta_1 violence(T1) + \varepsilon$$

The prospective multivariable model was adjusted for variables that were associated with either client violence or SWI in preliminary bivariate analysis. These variables included age, age starting sex work, clients per week, depressive symptoms, and self-efficacy for condom use. Additionally, multivariable models were adjusted for previous SWI (T1) due to the likelihood that previous drinking impacts future drinking, and the participant's intervention group assignment, given the potential for the intervention to impact alcohol use over time. The multivariable model is as follows, where  $SWI (T2)$  is the estimated log odds of SWI at follow-up given the prediction model,  $\beta_1$  is the adjusted difference in log odds of SWI at follow-up comparing violence exposed to unexposed at baseline,  $\beta_2, \beta_3 \dots \beta_8$  are a set of covariates listed above representing the difference in log odds of SWI at T2 per unit increase in covariate holding other covariates constant, and  $\varepsilon$  represents subject residuals.

$$SWI (T2) = \beta_0 + \beta_1 violence(T1) + \beta_2 SWI(T1) + \beta_3 age (T1) + \beta_4 agestart (T1) + \beta_5 client\# (T1) + \beta_6 intervention + \beta_7 depress (T1) + \beta_8 SEcond (T1) + \varepsilon$$

#### Effect modification analysis: resilience and violence interaction

The potential modifying effect of resilience on the relationship between client violence and later SWI will be assessed using an interaction model which generates and adds a resilience times violence interaction term to the previously described multivariable model. Participant resilience at

T1 will be examined as the modifier between violence exposure in the previous three-months and SWI during the following three months (Figure 5.1).

The primary interaction model will be as follows, where  $SWI(T2)$  is the estimated log odds of SWI at T2 given the model. Resilience is centered at the minimum participant score (16) such that  $\beta_1$  represents the difference in log odds of SWI at follow-up comparing violence exposed to unexposed at baseline for FSW with resilience 16, adjusting for other covariates.  $\beta_{10}$  represents the difference in the difference in log odds of SWI for violence exposed versus unexposed per unit increase in resilience.  $\beta_2 - \beta_9$  represents the difference in log odds of SWI per unit increase in that covariate holding other covariates constant, and  $\varepsilon$  represents subject residuals.

$$\begin{aligned} SWI(T2) = & \beta_0 + \beta_1 \text{violence}(T1) + \beta_2 SWI(T1) + \beta_3 \text{resilience}(T1) + \beta_4 \text{age}(T1) \\ & + \beta_5 \text{agestart}(T1) + \beta_6 \text{client\#}(T1) + \beta_7 \text{intervention} + \beta_8 \text{depress}(T1) \\ & + \beta_9 SEcond(T1) + \beta_{10} \text{resilience} * \text{violence}(T1) + \varepsilon \end{aligned}$$

The primary interaction model, with resilience centered at CD-10 score =16, characterizes the relationship between violence at T1 and SWI at T2 for people who are at the minimum conceivable resilience given the sample. In addition, resilience will be centered at all other values on the CD-10 scale, and the interaction model will be re-run to specify the effect estimate across all resilience levels.

## Results

FSW in this sample were an average of 33.8 years old, had started sex work at the age of 28.9, and had an average of 2 clients per week. The majority (62.5%) entered sex work to meet a basic need, were divorced or widowed (60.8%), worked at a beer-bar (70.7%), and lived in a place they were renting or owned (87.1%). Participants had a mix of educational attainment, with about a third

completing primary school or less (34.1%), secondary school (31.5%), and high school or more (34.5%). Overall self-efficacy for condom use (4.6, range 1-5) was higher than self-efficacy for safety (3.9, range 1-5). FSW support from managers (4.3, range 1-5) and family/friends (4.2, range 1-5) was higher than support from police (3.7, range 1-5). FSW who had experienced client violence were on average younger (31.4 vs. 34.7,  $p = .01$ ), had started sex work at a younger age (26.0 vs. 29.9,  $p < .01$ ), reported higher levels of depressive symptoms (19.0% vs. 7.5%,  $p = .03$ ), and had higher self-efficacy for condom use (4.8 vs. 4.5,  $p = .02$ ). FSW who experienced SWI in the past three months at T2 ( $n = 118$ , 51%) were more likely to have depressive symptoms (14.4% vs. 6.1%,  $p < .05$ ), and had higher average numbers of clients per week (2.2 vs. 1.8,  $p < .05$ ) at T1 [Table 5.1].

FSW resilience scores averaged 32.0 (sd 5.05, median 31, range 16-40). The distribution of FSW scores were right-skewed, with the majority of the sample reporting higher levels of resilience. Psychometric scale analysis showed high internal consistency for the full 10-item scale ( $\alpha .88$ ) with no evidence to remove any items.

In non-interaction models, FSW who reported violence at T1 were on average no more likely to report SWI at T2 (aOR 0.9, 95% CI 0.5 – 1.9). FSW who reported SWI at T1 were more likely to report SWI at T2 (aOR 2.0, 95% CI 1.2 – 3.5) and FSW depressive symptoms at T1 trended towards association with SWI at T2 (aOR 2.6, 95% CI 0.9 – 7.0) [Table 5.2]. In interaction models, which introduced a violence times resilience interaction term, resilience was shown to significantly modify the relationship between client violence and later SWI. FSW resilience (T1) had no direct effect on the odds of SWI at T2 (aOR 1.0, 95% CI 0.9, 1.1). However, the violence times resilience interaction term showed that there was a significant decrease in the odds of SWI

for FSW who experienced violence versus not, per unit increase in resilience (aOR 0.8, 95% CI: 0.7 – 0.9) [Table 5.3].

Centered interaction models showed that the effect estimate of violence on SWI varied depending on resilience score. At the sample median resilience value (CD-10 score = 31) there was no significant difference in the odds of SWI for those that experienced violence versus those that did not (aOR 1.1, 95% CI 0.5, 2.5). At the sample minimum resilience value (CD score = 16) there was a significant increase in the odds of SWI at T2 for FSW who had experienced violence at T1 compared to those who did not (aOR 14.2, 95% CI 1.5, 131.2). At the sample maximum resilience value (CD score = 40) there was a significant decrease in the odds of SWI at T2 for those that had experienced violence at T1 compared to those who had not (aOR 0.2, 95% CI: 0.1, 0.9) [Figure 5.2]. Figure 5.2 shows the relationship between client violence and SWI at each level of FSW resilience in the sample and overlays the sample size of participants at each level to illustrate the distribution of resilience across the sample.

## **Discussion**

This study is the first to show evidence of resilience as a buffering mechanism against FSW alcohol use, using a well-validated resilience scale and prospective data. We find that resilience buffers the effects of client violence victimization on later alcohol use before sex with clients. Results highlight that resilience is relevant not only for FSW mental health and coping, but also has implications for FSW alcohol-related health behaviors. Dissimilar to other studies on resilience and alcohol use,<sup>13</sup> we did not find that resilience was independently associated with SWI. However, we did find that resilience reduced the risk of SWI in violence-resilience interaction models. These results align with resilience theory,<sup>49-51</sup> which understands resilience in relation to

previous traumatic experiences. It follows that the protective effects of resilience may not be observed or measurable without the presence of a specific stressor.

Centered interaction models provided a deeper understanding of the relationship between violence and SWI across various levels of participant resilience. For the majority of the sample with resilience scores close to the median (CD-10 scores 27-36; n=150, 64%) there was no relationship between violence victimization and SWI. It follows that in main effect models, which record averages changes in coefficients for the full sample, there was no observed relationship between violence and SWI. However, interaction models show that for FSW at extreme ends of the CD-10 scale that there is a significant relationship between violence and later SWI. Lower resilience FSW (CD-10 < 25; n=14, 6%) experienced significant greater risk of SWI after violence. At the highest levels of resilience (CD-10 = 40), resilience had a protective effect, where those who experienced violence at T1 were significantly less likely to have SWI at T2 than their non-violence exposed counterparts. The minority of the sample (9%, n=22/232) was at the maximum resilience level, which did not allow for a well-powered sub-analysis of these individuals. However, more research among “exceptionally high” resilience individuals may help to uncover other health benefits of maximum resilience and would be of interest to the field.

Of note when interpreting these results, FSW resilience scores in this sample (mean 32) are higher than those from previous samples of FSW in Asia (23.1 – 26.3)<sup>52</sup> and populations exposed to trauma (22.7 – 29.9).<sup>53-55</sup> The mean resilience score recorded in this FSW study is most similar to estimates from the general population in high-income settings (29.0 – 33.5).<sup>37,38,56,57</sup> Our sample was comprised of only venue-based FSW with relatively high access to services and lower prevalence of depressive symptoms (12%) than most previous estimates among FSW populations (30% - 80%).<sup>18,19,58,59</sup> It follows that this sample may be comparably healthy for a FSW population

with low depression rates and high resilience. The relationships observed here between violence and later alcohol use may be different in lower resilience groups or groups with a different distribution of resilience.

Results have several implications for FSW health programming and intervention design. Firstly, this study expands the evidence base on the health benefits of resilience for FSW and suggests that interventions to build their resilience would have broad benefits. Specifically, FSW resilience interventions may reduce trauma-related alcohol use and help avert the known sexual health risks of SWI including condom non-use<sup>22,60</sup> and condom slippage/breakage.<sup>61</sup> Current resilience-promotion interventions that have shown promise in FSW,<sup>62</sup> or other trauma survivors,<sup>63</sup> could be an avenue to sustainably promote FSW mental and sexual health. Additionally, current FSW empowerment interventions that focus on reducing stigma or increasing FSW's social support networks may have additional benefits for FSW resilience promotion. These existing interventions could additionally be assessed on outcomes related to FSW resilience.

Secondly, our findings suggest that for lower-resilience FSW, a portion of FSW's alcohol use before sex with clients is related to previous trauma. Interventions to address alcohol use in sex work settings should recognize that past trauma may be a contributing factor. FSW mental health, depression, and resilience levels may play a role in how they respond to trauma and whether or not trauma is impacting their alcohol use. Standard alcohol safety messaging may not be appropriate in these sex work settings and additional work to make interventions culturally competent may be required. This could include integrating mental health aspects into alcohol interventions that focus on improved coping or response to trauma.



### *Limitations*

This analysis has several limitations including small sample sizes at the extreme ends of the resilience scale, which resulted in large confidence intervals and imprecise estimates. More research among FSW populations with differing resilience distributions would be important to continue to examine the outcomes assessed in this study.

This analysis measures violence exposure as any client violence in the past three months, inclusive of verbal and emotional indicators of violence. Sample size constraints limited our ability to restrict this analysis to only those who experienced more egregious forms of abuse like physical or sexual violence (n=5). Additionally, this measure of violence does not record a woman's full history of abuse over her life, or violence from other types of perpetrators including non-paying intimate partners, which may be unmeasured confounders affecting FSW's SWI. However, in this FSW sample, few women (1.7%) reported experiencing violence from non-paying partners. This analysis was therefore restricted to examine violence and alcohol use specifically within the paid client setting. Similarly, alcohol patterns for FSW while at work may be different from her alcohol behaviors outside of work. FSW's general alcohol use while away from work was outside the scope of this study; however, may be related to violence victimization, and would warrant examination in future studies.

Additionally, there may be variables that confounded the relationship between client violence and SWI that were not measured in this study. These include client-level variables such as a measure of client alcohol consumption, which is a known associate of violence perpetration.<sup>21</sup> These also include venue-level variables such as a venue's policy on alcohol use; for example if a venue required or incentivized FSW to drink alcohol with their client.

## **Conclusion**

Our findings add to a nascent body of literature showing that resilience can mitigate the effects of adversity on later alcohol use. This study is the first to examine the resilience buffering hypothesis on alcohol-related health behaviors in FSW, expanding the known benefits of resilience for this population. Results suggest that supporting FSW resilience may be an important health promotion mechanism to avert the poor health outcomes associated with violence exposure. Work to bolster FSW resilience may include expanding resilience-promotion interventions that have shown promise in trauma survivors, or greater investment in current FSW empowerment interventions that may have value for enhancing resilience. While we must continue the important work to prevent violence against FSW and uphold their human rights, results show the simultaneous value of promoting resilience to mitigate the impact of those abuses in this vulnerable population.

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Figure 5.1. Timeline of violence exposure, SWI, and resilience

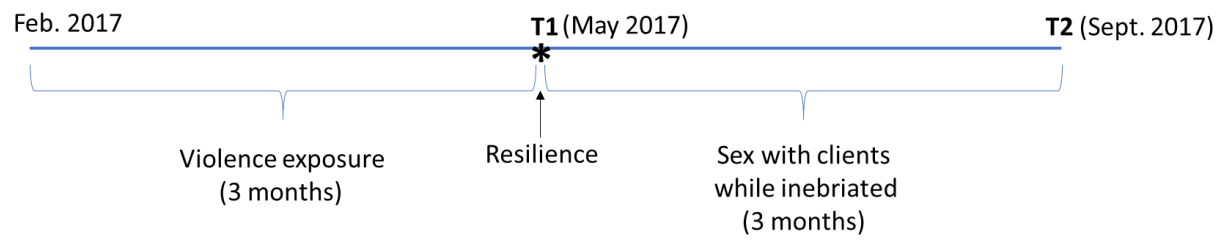


Table 5.1. Sample characteristics of FSW by violence exposure and SWI group (n=232)

Variable: Column % (n)	Total sample: n=232	Non-violence exposed T1: n=174, 75%	Violence exposed T1: n=58, 25%	p- value	Rarely/never SWI T2: n=114, 49%	Frequent SWI T2: n=118, 51%	p- value
<b>Demographic variables</b>							
Age T1: mean (sd)	33.8 (.53)	34.7 (.62)	31.4 (1.06)	.01*	34.5 (.79)	33.3 (.77)	.27
Age start sex work T1: mean (sd)	28.9 (.57)	29.9 (.66)	26.0 (1.11)	<.01*	29.3 (.84)	28.5 (.81)	.50
Reason sex work T1:							
Forced/coerced	5.2 (12)	4.6 (8)	6.9 (4)		5.3 (6)	5.1 (6)	
Basic need	62.5 (145)	59.8 (104)	70.7 (41)		58.7 (67)	66.1 (78)	
Extra money	18.5 (43)	20.7 (36)	12.1 (7)	.14	21.9 (25)	15.3 (18)	.70
Meet partner	7.8 (18)	9.8 (17)	1.7 (1)		7.0 (8)	8.5 (10)	
Enjoy it	6.0 (14)	5.2 (9)	8.6 (5)		7.0 (8)	5.1 (6)	
Marital status T1:							
Single/dating	25.9 (60)	23.0 (40)	25.9 (20)		24.6 (28)	27.1 (32)	
Married/cohab	12.5 (29)	10.9 (19)	17.2 (10)	.14	11.4 (13)	13.6 (16)	.50
Divorce/widow	60.8 (141)	64.9 (113)	48.3 (28)		62.3 (71)	59.3 (70)	
Female partner	0.9 (2)	1.2 (2)	0.0 (0)		1.8 (2)	0.0 (0)	
Education T1:							
Primary or <	34.1 (79)	36.2 (63)	27.6 (16)	.12	39.5 (45)	28.8 (34)	.28
Secondary	31.5 (73)	27.6 (48)	43.1 (25)		28.9 (33)	33.9 (40)	
High school or >	34.5 (80)	36.2 (63)	29.3 (17)		31.6 (36)	37.3 (44)	
Venue type T1:							
Beer bar	70.7 (164)	72.4 (126)	65.5 (38)	.74	72.8 (83)	68.6 (81)	.89
A-go-go	27.2 (63)	25.3 (44)	32.8 (19)		25.4 (29)	28.8 (34)	
Living arrangement T1:							
Rent or own	87.1 (202)	86.2 (150)	87.1 (52)		87.9 (102)	86.2 (100)	
Live w/someone	5.2 (12)	4.6 (8)	5.2 (4)	.52	4.3 (5)	6.0 (7)	.91
Live at bar	7.8 (18)	9.2 (16)	7.8 (2)		7.8 (9)	7.8 (9)	
Client number T1: mean (sd)	2.0 (.08)	1.9 (.13)	2.3 (.21)	.10	1.8 (.16)	2.2 (.16)	.05*
Client number T2 <sup>+</sup> : mean (sd)	0.6 (.08)	0.7 (.09)	0.6 (.15)	.77	0.5 (.11)	0.7 (.11)	.16
<b>Psychosocial variables</b>							
Depressed T1	10.3 (24)	7.5 (13)	19.0 (11)	.03 <sup>^</sup>	6.1 (7)	14.4 (17)	.04 <sup>^</sup>
Self-efficacy for safety T1: mean (sd)	3.9 (.08)	3.9 (.10)	3.8 (.16)	.76	4.0 (.12)	3.9 (.11)	.54
Self-efficacy for condom use T1: mean (sd)	4.6 (.05)	4.5 (.05)	4.8 (.09)	.02*	4.6 (.06)	4.6 (.06)	.94



<b>Sociological variables</b>							
Manager support T1: <i>mean (sd)</i>	4.3 (.06)	4.30 (.06)	4.2 (.11)	.64	4.2 (.08)	4.3 (.08)	.61
Family support T1: <i>mean (sd)</i>	4.2 (.06)	4.2 (.07)	4.2 (.12)	.98	4.2 (.08)	4.1 (.08)	.61
Police support T1: <i>mean (sd)</i>	3.7 (.07)	3.7 (.08)	3.6 (.14)	.97	3.7 (.11)	3.6 (.10)	.22
Peer support T1: <i>mean (sd)</i>	8.1 (.10)	8.1 (.11)	8.1 (.19)	.94	8.1 (.13)	8.2 (.13)	.65

\* Significant  $p < .05$  clustered ttest

^ Significant  $p < .05$  clustered chi squared test

+Tested because client number is time known to be time varying between time points

**Table 5.2.** Prospective relationship between client violence victimization at baseline (T1) and sex with clients while inebriated at follow-up (T2), n=232

	Prevalence SWI (T2), % (n)	Bivariate analysis		Multivariate analysis <sup>§</sup>	
		OR (95% CI)	p-value	aOR (95% CI)	p-value
<i>Primary exposure</i>					
<b>Violence (T1)</b>					
Non-exposed: n=174 (75%)	49.4 (86/174)	1.0	.48	1.0	.87
Exposed: n=58 (25%)	55.2 (32/58)	1.3 (0.7 – 2.4)		0.9 (0.5 – 1.9)	
<i>Covariates</i>					
<b>SWI (T1)</b>					
No: n=116 (50%)	41.4 (48/116)	1.0	<.01**	1.0	.01**
Yes: n=116 (50%)	60.3 (70/116)	2.2 (1.3 – 3.5)		2.0 (1.2 – 3.5)	
<b>Age (T1) ^</b>					
≤ 34 years: n=124 (53%)	54.0 (67/124)				
>34 years: n=108 (47%)	47.2 (51/108)	1.0 (0.9 – 1.0)	.20	1.0 (0.9 – 1.0)	.22
<b>Age start sex work (T1) ^</b>					
≤18 years: n=16 (7%)	68.8 (11/16)				
>18 & ≤ 28: n=98 (42%)	52.0 (51/98)	1.0 (0.9 – 1.0)	.43	1.0 (1.0 – 1.1)	.47
>28 years: n=118 (51%)	47.5 (56/118)				
<b>Clients per week (T1) ^</b>					
≤ 2 per week: n=170 (73%)	47.1 (80/170)	1.2 (1.0 – 1.4)	.05*	1.1 (0.9 – 1.4)	.24
>2 per week: n=62 (27%)	61.3 (38/62)				
<b>Intervention group (T1)</b>					
Control: n=108 (47%)	48.2 (52/108)	1.0	.49	1.0	.99
Intervention: n=124 (53%)	53.2 (66/124)	1.2 (0.7 – 2.2)		1.0 (0.5 – 1.9)	
<b>Depressive symptoms (T1)</b>					
Non-depressed: n=208 (90%)	48.6 (101/208)	1.0	.05*	1.0	.06*
Depressed: 24 (10%)	70.8 (17/24)	2.6 (1.0 – 6.7)		2.6 (0.9 – 7.0)	
<b>Self-efficacy condom negotiation (T1) ^</b>					
Strongly agree: n=142 (61%)	50.1 (72/142)	1.0 (0.6 – 1.6)	.94	0.9 (0.6 – 1.5)	.85
Less than strongly agree: n=90 (39%)	51.1 (46/90)				

<sup>§</sup> Adjusted for SWI (T1), intervention group (T1), depressive symptoms (T1), clients per week (T1), age (T1), age start SW (T1), self-efficacy for condom negotiation (T1)

\*\* p<.05; \* p<.10

^ measured continuously in regression

**Table 5.3.** Prospective relationship between client violence victimization at baseline (T1) and sex with clients while inebriated at follow-up (T2) with resilience interaction term centered at minimum (T1), n=232

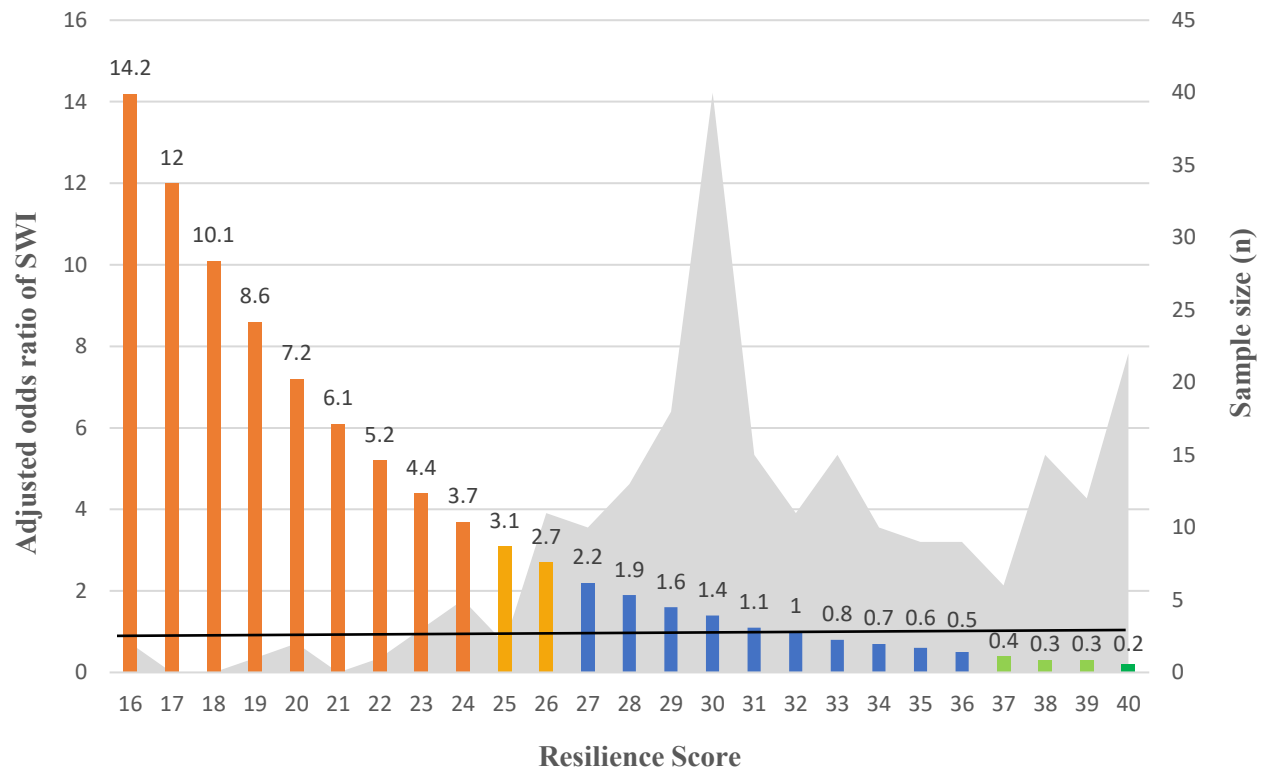
	Prevalence SWI (T2), % (n)	Interaction model <sup>^</sup>		Adjusted interaction model <sup>§</sup>	
		OR (95% CI)	p-value	aOR (95% CI)	p-value
<i>Primary exposures</i>					
<b>Violence (T1)</b>					
Non-exposed: n=174 (75%)	49.4 (86/174)	1.0	.01**	1.0	.02**
Exposed: n=58 (25%)	55.2 (32/58)	20.4 (2.1 – 196.2)		14.2 (1.5 – 131.2)	
<b>Resilience (T1) <sup>^</sup></b>	---	1.0 (0.9, 1.1)	.83	1.0 (0.9, 1.1)	.89
<i>Interaction term</i>					
<b>Resilience at min. * violence (T1)</b>	---	0.8 (0.7 – 1.0)	.01**	0.8 (0.7 – 1.0)	.01**
<i>Covariates</i>					
<b>SWI (T1)</b>					
No: n=116 (50%)	41.4 (48/116)			1.0	.02**
Yes: n=116 (50%)	60.3 (70/116)			2.0 (1.1 – 3.4)	
<b>Age (T1) <sup>^</sup></b>	---			1.0 (0.9 – 1.0)	.26
<b>Age start sex work (T1) <sup>^</sup></b>	---			1.0 (1.0 – 1.1)	.55
<b>Clients per week (T1) <sup>^</sup></b>	---			1.1 (0.9 – 1.4)	.18
<b>Intervention group (T1)</b>					
Control: n=108 (47%)	48.2 (52/108)			1.0	.99
Intervention: n=124 (53%)	53.2 (66/124)			1.0 (0.5 – 1.9)	
<b>Depressive symptoms (T1)</b>					
Non-depressed: n=208 (90%)	48.6 (101/208)			1.0	.15
Depressed: 24 (10%)	70.8 (17/24)			2.2 (0.8 – 6.1)	
<b>Self-efficacy condom negotiation (T1)</b>	---			1.0 (0.6 – 1.6)	.98

<sup>§</sup> Adjusted for SWI (T1), intervention group (T1), depressive symptoms (T1), clients per week (T1), age (T1), age start SW (T1), self-efficacy for condom negotiation (T1)

\*\* p<.05; \* p<.10

<sup>^</sup> measured continuously in regression

**Figure 5.2. Adjusted odds ratio of SWI comparing violence exposed versus unexposed by resilience level**



**Key:**

- OR is significantly greater than 1 ( $p < .05$ )
- OR is greater than 1 ( $p < .10$ )
- OR is not statistically significant
- OR is less than 1 ( $p < .10$ )
- OR is significantly less than 1 ( $p < .05$ )

## **CHAPTER SIX: DISCUSSION**

## **I. Discussion**

FSW resilience in the face of trauma is not new. Many women working in difficult sex work environments have employed strategies to cope and thrive despite frequent experiences with adverse conditions.<sup>1-3</sup> However, public health research has not historically prioritized understanding or fostering FSW resilience as a means for health promotion. The majority of FSW literature to date has focused on FSW's sexual health and HIV risks, sometimes describing FSW as threats to public health or "vectors of disease."<sup>4,5</sup> A new sex worker-centered wave of research and interventions has developed in response to calls from sex worker and global communities.<sup>6-8</sup> Evidence has emerged that empowerment-based FSW interventions are not just ethical but more effective.<sup>9,10</sup> Preventing and responding to violence against FSW has risen to the level of international attention as a human rights priority and good public health practice.<sup>11-13</sup> The now famous saying, "nothing about us without us" resonates from the sex worker community emphasizing the need for sex workers to be integral in the design and implementation of all sex work interventions.<sup>14</sup>

In line with growing trends to emphasize FSW agency and assets in research, this dissertation pushes the field forward by focusing on FSW resilience and highlighting the positive attributes of FSW characteristics and environments to promote health. At the same time, public health research and interventions must also work to address the adverse social and structural conditions that necessitate sex worker resilience. Taken together, this dissertation urges greater attention to FSW mental health and coping after trauma, not only to improve recovery but to promote future health behaviors. Results point to the continued need to address violence against sex workers to fulfill their health and rights and highlight the additional opportunity to promote FSW health by fostering

resilience. Work to build FSW resilience must be implemented in conjunction with work to improve the safety of sex worker's communities and work environments in general.

**a. Summary of findings**

In Aim 1 (Chapter 3), we showed that client violence victimization in the past three months (25%) and having sex with clients while inebriated (SWI) in the past three months (51%) were common in Pattaya venue-based settings. Given the potential bidirectional relationship of alcohol use and violence victimization, structural equation modeling was used to assess these key variables across two time points. This manuscript is among the first to prospectively examine the relationship between alcohol use and violence victimization in the sex work setting.<sup>15,16</sup> We found that FSW who reported SWI with clients in the past three months were more likely to have experienced violence by clients during this same time period both at baseline (aOR 1.87, 95% CI 1.04 – 3.37), and at follow-up (aOR 2.52, 95% CI 1.24 – 5.10). Conversely, there was not a significant relationship between experiencing client violence at baseline and increased odds of SWI at follow-up (total effect aOR 2.43, 95% CI 0.61 – 9.67). Similarly, we did not find a significant indirect relationship between violence and SWI via depressive symptoms (aOR 2.42, 95% CI 0.60 – 9.72). However, the observed relationship between client violence at T1 and SWI at T2 was almost fully mediated by FSW depressive symptoms (mediated proportion = 99%). Results strongly suggest that FSW mental health factors are influencing their alcohol use after violence. Aim 1 results motivate further analysis of other psychological factors that may influence FSW coping and alcohol use after traumatic experiences.

In Aim 2 (Chapter 4) we use a socioecological lens and the well-validated Connor Davidson 10-item resilience scale<sup>17</sup> to examine the correlates of FSW resilience from several socioecological domains. This manuscript builds off a small number resilience studies in FSW<sup>2,18,19</sup> to outline

specific intervention targets to support FSW mental health and foster resilience. We find FSW resilience scores averaged 31.7 (sd 5.19, range 13-40), well above the mean of other FSW samples from Hong Kong (23.1)<sup>19</sup> and the U.S. (24.2).<sup>18</sup> Positive predictors of FSW resilience were non-depression ( $\beta$  2.22, 95% CI .85, 3.59), higher self-efficacy for condom use ( $\beta$  1.67, 95% CI .84, 2.50), higher age ( $\beta$  .08, 95% CI .01, .15), and feelings of increased community acceptance of sex work ( $\beta$  .60, 95% CI .08, 1.12). Assessment of resilience-prediction models showed that resilience is best explained by a combination of individual and community domain factors. Specifically, higher community acceptance of sex work was a significant predictor of resilience beyond the expected psychosocial factors related to mental health.

Aim 3 (Chapter 5) was a novel study examining the buffering role of FSW resilience to mitigate the effects of client violence victimization on later SWI with clients. Interaction models showed that while FSW resilience had no direct effect on the odds of SWI (aOR 1.0, 95% CI 0.9, 1.1), there was a significant decrease in the odds of SWI for FSW who experienced violence compared to those who did not per unit increase in resilience (aOR 0.8, 95% CI: 0.7 – 0.9). There was wide variety in FSW's risk of SWI after violence depending on resilience level. At the sample median resilience value (CD-10 score = 31) there was no significant difference in the odds of SWI for those that experienced violence versus not (aOR 1.1, 95% CI 0.5, 2.5). At the sample minimum resilience value (CD score = 16) there was a significant increase in the odds of SWI for FSW who had experienced violence compared to those who did not (aOR 14.2, 95% CI 1.5, 131.2). At the sample maximum resilience value (CD score = 40) there was a significant decrease in the odds of SWI for those that had experienced violence compared to those who had not (aOR 0.2, 95% CI: 0.1, 0.9). Results show that at the highest levels, not only did resilience mitigate FSW's risk of



SWI, but it was protective, such that those who experienced violence were significantly less likely to have SWI than their non-violence exposed counterparts.

## **b. Study implications**

### *Integrated alcohol and violence prevention programming*

This study shows the overlapping risks of alcohol use and violence victimization in the sex work context, and calls for integrated alcohol and violence prevention interventions to promote FSW safety. We find both that alcohol before sex with clients is a risk factor for client violence and that violence victimization can contribute to future alcohol use for lower-resilience FSW. Venue-level interventions which address the violence-related risks of alcohol use and recognize the potential role of alcohol as a FSW coping mechanism are urgently needed in the sex work context.

Aim 1 findings suggest that in the sex work venue setting violence prevention programming should integrate alcohol safety messaging for FSW and venue managers. Venue-based sex work settings are characterized by frequent alcohol use by both FSW and their clients.<sup>20</sup> Some venues may require or incentive FSW to drink with clients, or FSW may lose clients if they refuse to drink alcohol with them.<sup>21</sup> Some clients may encourage FSW to drink alcohol to point of inebriation or loss of consciousness, which leaves FSW vulnerable to rape.<sup>22,23</sup> Venue managers and bartenders should be aware of the coercive dynamics that can occur between clients and FSW around alcohol and help women limit their alcohol consumption if desired. Specifically, venue and bar managers could include continue to serve FSW non-alcoholic drinks without the client's knowledge, or refuse to sell more alcohol to clients who are visibly inebriated or aggressive. Given the safety concerns with alcohol use before sex, venues should never require alcohol consumption from their employees before serving clients. To date, the majority of alcohol programming among FSW is focused on reducing individual consumption.<sup>20,24</sup> More effective alcohol programming for

FSW could be designed to target venue managers, staff, and change venue alcohol policies to promote FSW safety.

In Aim 3, we find that client violence victimization is a risk for later SWI among lower resilience FSW. Findings suggest that for some FSW, exposure to client violence is playing a role in their future alcohol use before sex with clients. Current alcohol programming does not often take into account participants' past or current experiences with trauma, an omission that can lead to less effective programming and re-traumatize participants.<sup>25,26</sup> Interventions to address alcohol use in sex work settings should recognize that past trauma may be a contributing factor to alcohol consumption. FSW mental health factors, depression, and resilience levels play a role in how they respond to trauma and whether or not trauma is impacting their alcohol use. Standard alcohol safety messaging may not be appropriate in these sex work settings and additional work to make interventions culturally competent may be required. This could include integrating mental health aspects into alcohol interventions that focus on improved coping or response to trauma.

Taken together, the dissertation calls for trauma-informed and integrated interventions for FSW to address alcohol use and violence risk in venue settings. Given the structural factors that influence both FSW alcohol use and risk of violence victimization, these interventions should target clients and venues in addition to FSW.

#### *Resilience as a health promotive mechanism in FSW*

This dissertation finds that resilience is not only relevant for supporting FSW mental health but also has implications for improving FSW alcohol-related health behaviors. It is the first study to show the buffering effect of resilience for a health behavioral outcome among FSW. Specifically, we find that resilience can mitigate the effects of violence victimization on later FSW alcohol use. Results suggest that high resilience FSW may be employing more adaptive coping strategies after

violence that have positive health implications. Promoting FSW resilience is a worthwhile health promotion technique and may offer more sustained health benefits for this vulnerable population.

This dissertation offers initial indications that resilience is functioning as an important health promotive mechanism for FSW, however more research on other health behaviors and outcomes associated with resilience is needed. The majority of resilience research shows the benefits of resilience for averting poor mental health outcomes after trauma such as depression or post-traumatic stress disorder (PTSD).<sup>27-30</sup> A small but growing body of research has demonstrated some of the other health benefits of resilience, including to improve quality of life<sup>31</sup> and decrease substance use/abuse in some populations.<sup>28,32</sup> Research from other populations has also shown the HIV-related benefits of resilience to increase ARV adherence for women living with HIV, who had a history of sexual assault,<sup>33</sup> and improve condom use in men who have sex with men.<sup>34,35</sup> FSW are among the world's most vulnerable populations to HIV infection.<sup>36</sup> The HIV-related benefits of resilience should be examined in FSW as a potentially important avenue to improve HIV outcomes in this population.

Aim 3 results show that resilience was not associated with SWI in main effect models and was only protective to SWI at maximum resilience levels (CD-10 = 40) in interaction models. These findings are in line with resilience theory,<sup>37-39</sup> which understands resilience in relation to previous traumatic experiences. It follows that the protective effects of resilience may not be observed or measurable without the presence of a specific stressor. This is important for resilience research and measurement as the field continues to refine ways to measure and study resilience. It also follows that resilience may only be fully protective to alcohol use at very high levels and/or may vary in its protective effect depending on the outcome of interest. However, building FSW

resilience is still worthwhile to avert the expected negative consequences of trauma, even if achieving maximum resilience for all individuals cannot be reached.

### *Building FSW resilience*

This dissertation demonstrates the value of a continued socioecological approach to the study and promotion of resilience. Specifically, analyses show that FSW resilience was enabled by higher age, higher self-efficacy for condom use, lower depression, and increased community acceptance of sex work. Models that included community acceptance of sex work as a resilience predictor significantly improved model fit compared with those that only included individual-domain variables. Results suggest that multi-level interventions targeting both the individual and community are needed for maximum impact. Increasing community acceptance of sex workers specifically may be a high-impact intervention which works to fight stigma against sex workers, protect their human rights, and build resilience.

Dissertation findings advance the field's knowledge on resilience-promotion factors for FSW. We find that improving self-efficacy related to condom use may have implications for supporting FSW resilience. Existing condom-promotion interventions for FSW often work by improving FSW knowledge, condom access, or removing barriers to use.<sup>40</sup> Our results suggest that implementing more empowerment-based condom promotion interventions that build self-efficacy may encourage FSW resilience and create more sustainable HIV prevention programs. Additionally, we find that non-depression was a significant predictor of FSW resilience. Depression in of itself is a poor health outcome, and current FSW health programming that explicitly addresses mental health is lacking and urgently needed.<sup>41</sup> Our results reiterate the call for interventions that address FSW mental health. Specifically, our results imply that combatting

depression is an important factor in promoting longer-term FSW recovery to health and improved coping through resilience.

Importantly, we find that increased community acceptance of sex workers is a significant community-level resilience-promotion factor for FSW. Numerous studies have described the negative impacts of stigma on FSW's mental and psychological health.<sup>42-45</sup> This study additionally links community acceptance of sex workers to FSW resilience. Results suggest that interventions to combat discrimination against sex workers and build greater community acceptance of FSW are valuable in their own right and are an avenue to foster more long-term population resilience. Work to build FSW resilience at the community-level could include launching community sex work sensitization campaigns, trainings for health care professionals, and/or disseminating targeted messaging towards venue managers and clients. These efforts may improve the friendliness of FSW's environments and have an effect on FSW resilience.

The health benefits of building FSW resilience have not been fully explored. Some research has shown that FSW resilience is linked to more adaptive coping after trauma, which carries health benefits.<sup>46</sup> Results from Aim 3 of this dissertation additionally show the benefits of resilience related to alcohol use for FSW survivors of violence. Taken together with results from other populations showing the health benefits of resilience,<sup>31,33,47,48</sup> there is strong evidence that building resilience in FSW would have important health promotive benefits. Currently the majority of resources for FSW health programming focus on HIV treatment and prevention efforts.<sup>49</sup> While HIV interventions are critical and continue to be needed, additional components to FSW programming that help to build FSW resilience, improve community acceptance of sex workers, or increase access to other social and/or tangible resources may prove to be additionally effective for sexual health promotion. Government research and funding for FSW services should not be

limited to HIV education and clinical services, but also take a wider approach to promoting FSW health to achieve more sustainable change. The development of these FSW empowerment and anti-stigma interventions must be in full collaboration with the FSW community to ensure cultural competency and efficacy.

### **c. Strengths and limitations**

#### *Strengths*

The sampling frame for this study consisted of every previously mapped FSW venue in Pattaya. During data collection FSW were recruited from all venues in accordance with the study protocol, such that the final sample is highly representative of Pattaya's venue-based FSW population. Previous mapping work by community-based partner SWING allowed for more rigorous sampling procedures that would not have been possible without their collaboration. The involvement of SWING throughout the study design and implementation was a major strength, contributing to higher quality data collection and community-relevant results.

Collecting data in FSW venues is a difficult study environment with multiple barriers including gatekeepers, clients, and police. Despite these constraints, the highly skilled study team was able to gain access to the venues, maintain rapport with the participants, and complete the interviews to achieve the desired study sample size. Additionally, because the study was community-designed, results are highly relevant to the community and can be used quickly to inform programming and advocacy.

A further strength of the study is that it is prospective, which allowed for temporality to be established between violence exposure and FSW alcohol use. The majority of non-clinical studies among FSW are cross-sectional, giving this study a distinct advantage in that the dataset can be used to assert the direction of key associations. The prospective nature of the dataset also meant

that Aim 1 dissertation models could be adjusted for participant baseline alcohol use, which is an omission that has been named as a significant limitation in the current body of evidence examining the effects of trauma on later alcohol use.<sup>50</sup>

Overall, the available measures in this dataset were rich and well-suited to undertake resilience research. Measures for key exposure, outcome, and modifying variables largely came from validated scales, including the CD-10 resilience scale for FSW resilience, the PHQ-2 for depressive symptoms, and a modified version of the validated AUDIT-C scale for alcohol use before sex with clients. Measures were available not only on FSW risk behaviors but on mental health, support systems, self-efficacy, and safety. All of these variables hold potential importance for understanding FSW resilience.

In general, research on FSW coping post-trauma is sparse and resilience research is particularly rare. This work begins to address these gaps by examining resilience and identifying its potential health benefits for this structurally vulnerable and underserved population.

### *Limitations*

The research aims for this dissertation were not the primary purpose of the parent study. While the necessary variables to test the dissertation aims were included, many of the questionnaire items were abbreviated due to space and time concerns raised by the field team. For example, measures for both self-efficacy and social support were abbreviated from past validated scales. Scales were abbreviated based on community input. These abbreviated measures have been used in FSW research,<sup>51,52</sup> however they have not been independently evaluated. This study does not include a measure of financial security, which based on previous literature, may be relevant for FSW resilience. This study also does not include data from FSW clients or intimate partners. This is a key limitation for Aim 1 analyses because client alcohol use is a likely confounder of the

relationship between FSW alcohol use and risk of client violence victimization. Additionally, this analysis measures violence exposure as any client violence in the past three months, inclusive of verbal and emotional indicators of violence. Therefore, the analysis cannot provide information on the impact of certain types of violence, violence from non-client perpetrators, or the cumulative effects of multiple violence experiences.

A further limitation is that surveys were generally conducted at participants' venues during operating hours. This may have caused participants to feel rushed or distracted while answering survey questions. While this approach allowed the study team to reach a large sample of FSW, the venue-based data collection environment may have led to underreporting of violence or other sensitive information. Indeed, violence prevalence, depressive symptoms, and other indicators of poor health are lower in this study than most previous FSW research.<sup>53-57</sup> This may indicate that this sample represents a fairly healthy group of venue-based FSW, and/or it could be indicative of under-reporting of sensitive information.

Additionally, 42% of the sample could not be found at follow-up (T2), which limited the sample size of participants for prospective analyses in Aim 1 and 3 (n=232). While a higher retention rate would be ideal, a retention of rate of >50% is respectable for a highly mobile FSW sample. Previous studies among FSW have maintained retention rates around 60-65% after three months of follow-up.<sup>58</sup> Loss to follow-up (LTFU) was non-random. Attrition analyses indicate that participants who were retained in the study were a healthier sub-sample than the full baseline sample. Findings from this study may therefore differ for other higher-risk FSW groups. Finally, this sample consists of only venue-based FSW from Pattaya, such that findings may not be generalizable to other FSW populations who work in less formal or structured settings.



#### **d. Future research**

Future studies on FSW coping and resilience should include survey measures on other mental health aspects beyond depressive symptoms (e.g., anxiety, psychological distress, PTSD), violence from other perpetrators (e.g., non-paying partners, family, police), and other forms of trauma or adversity (e.g., discrimination, witnessing violence against other FSW). Longitudinal studies with more than two assessment points would be helpful to further define the prospective pathways from trauma to health outcomes. Longitudinal studies may also be useful in examining a “dose-response” between trauma and health outcomes. Future studies could examine if multiple traumatic experiences had a cumulative effect on alcohol use or other poor FSW health outcomes. Studies with larger sample sizes would help improve statistical power, especially when modeling complex variable relationships such as mediation and effect modification.

Resilience may be an important health promotion factor for a variety of health outcomes and behaviors beyond SWI. Future resilience research among FSW could examine other relevant sexual health behaviors (e.g., ARV adherence, condom use) or outcomes (e.g., STI or HIV infection). While many potentially resilience-enabling variables were tested in this study, more research is needed to examine these and other factors that may promote resilience such as financial stability, family support, and self-esteem. More comprehensive measures of FSW’s work, community, and family environments should be examined.

Research on FSW resilience-enabling factors has implications for designing and adapting health promotion interventions. This work is needed, especially for FSW and other populations experiencing trauma in low-and-middle-income settings.

## **II. Conclusion**

Individuals' ability to bounce-back from hardship has captured researchers' attention for decades. The "ingredients" for what helps some people adapt well in the face of extreme difficulty is a question that has the potential to sustainably improve health outcomes across a variety of areas. This dissertation brings FSW to the fore, highlighting the importance of addressing violence against FSW and showing the health promotive role of resilience for this population. Investments in multi-level resilience-promotion interventions, which are attentive to the structural vulnerabilities of FSW, are urgently needed. Simultaneously, work to improve the adverse social and structural factors that necessitate FSW resilience must continue and accelerate. This means a real policy effort to improve the safety of sex work environments and scale up of programming to combat discrimination and human rights abuses against sex workers. The way forward is holistic FSW programming which builds FSW's resilience and resources, while working to make the world a safer place to be a sex worker.

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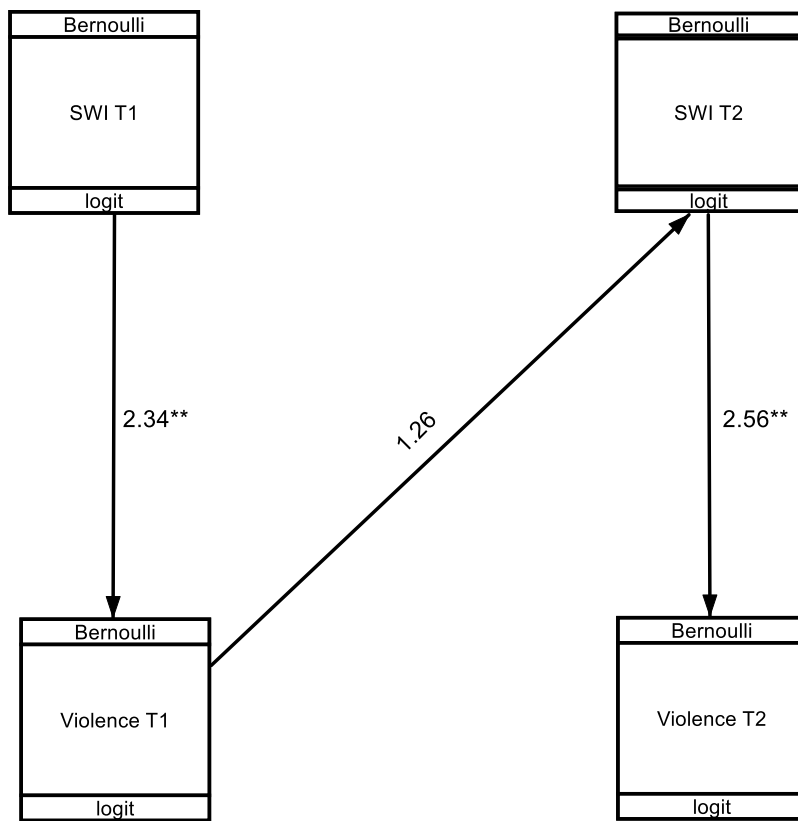
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APPENDICES

Appendix 1: Progressive GSEM models

1) Unadjusted relationship between client violence and SWI at two time points

**Figure 1.1A:** Unadjusted structural equation model diagram of the relationship between experiencing client violence and having sex with clients while inebriated in two timepoints (n=232)



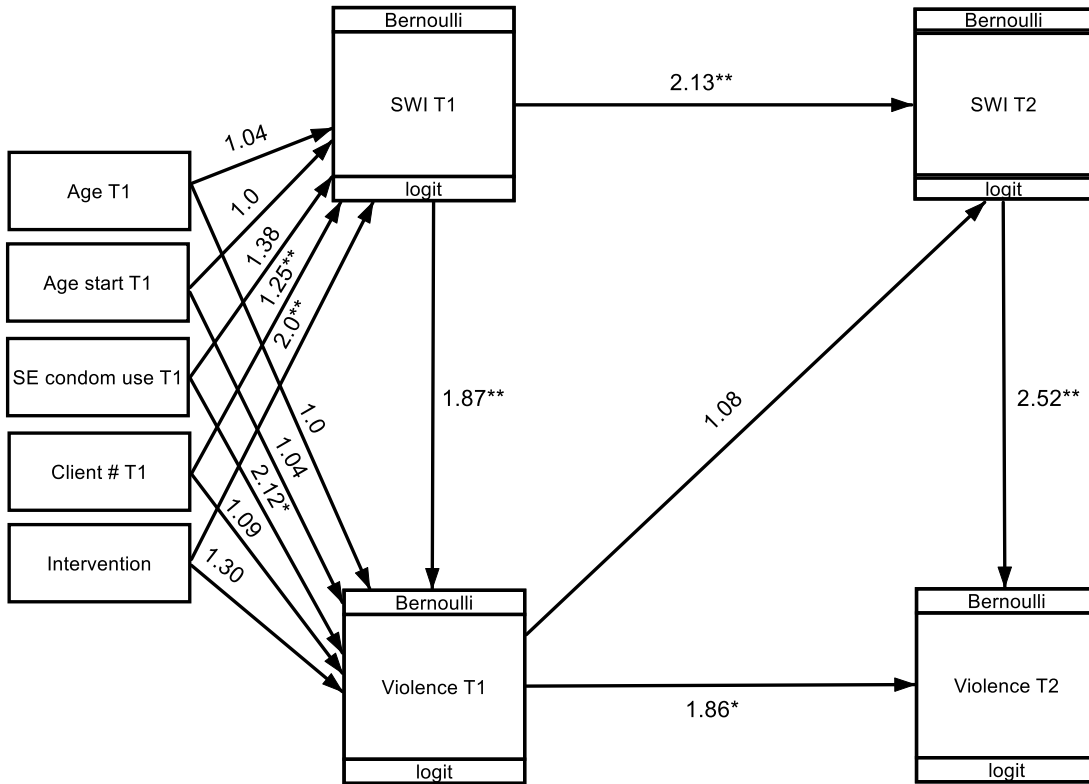
Path coefficients are exponentiated coefficients (aORs)

\*\* p <.05

\* p <.10

2) Adjusted relationship between client violence and SWI at two time points

**Figure 1.2A:** Adjusted structural equation model diagram of the relationship between experiencing client violence and having sex with clients while inebriated in two timepoints (n=232)



Path coefficients are exponentiated coefficients (aORs)

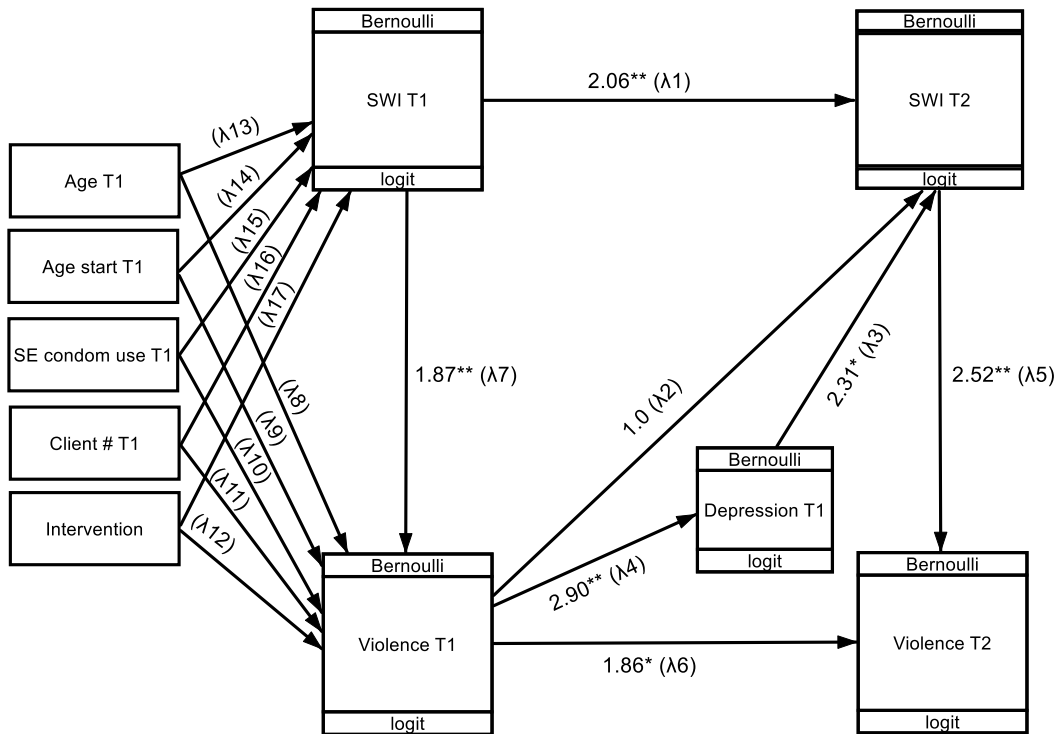
\*\* p < .05

\* p < .10



3) Adjusted and mediated relationship between client violence and SWI at two time points

**Figure 1.3A:** Final adjusted and mediated structural equation model diagram of the relationship between experiencing client violence and having sex with clients while inebriated in two timepoints (n=232)



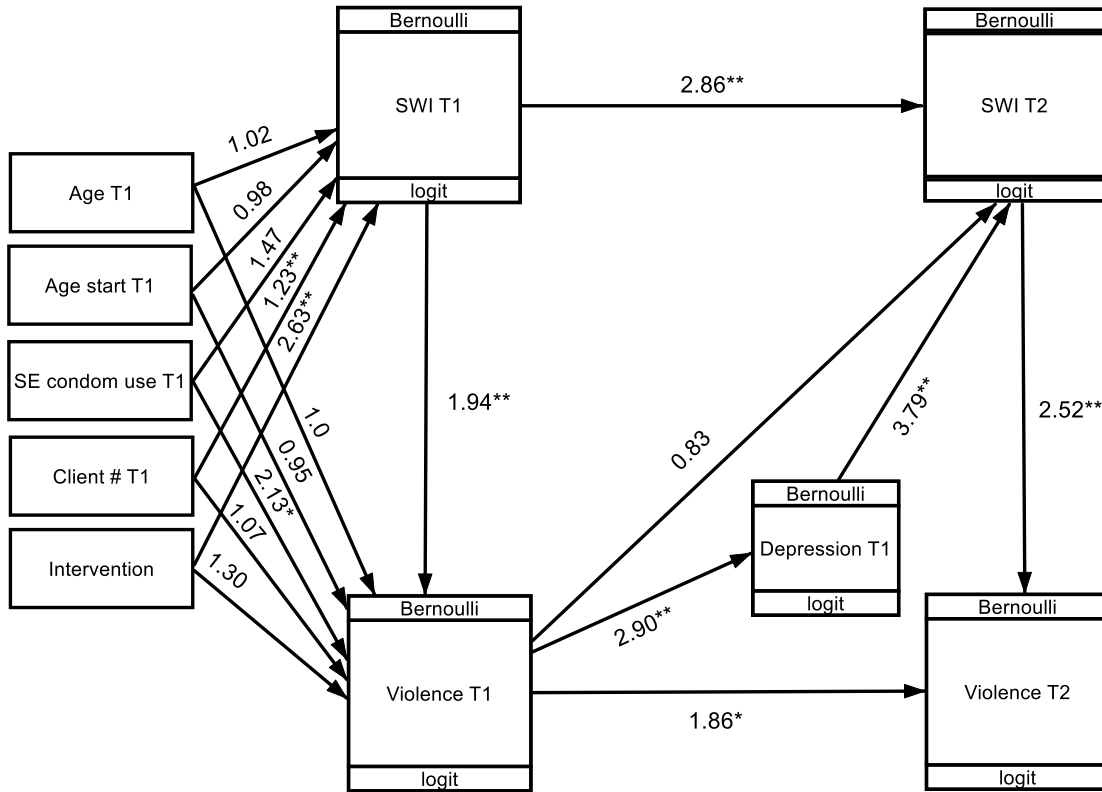
Path coefficients are exponentiated coefficients (aORs)

\*\* p <.05

\* p <.10

Appendix 2: GSEM sensitivity analysis non-imputed data

**Figure 2.1A.** Final GSEM model was re-run with non-imputed data for SWI (T1). Non-imputed sample size n=210



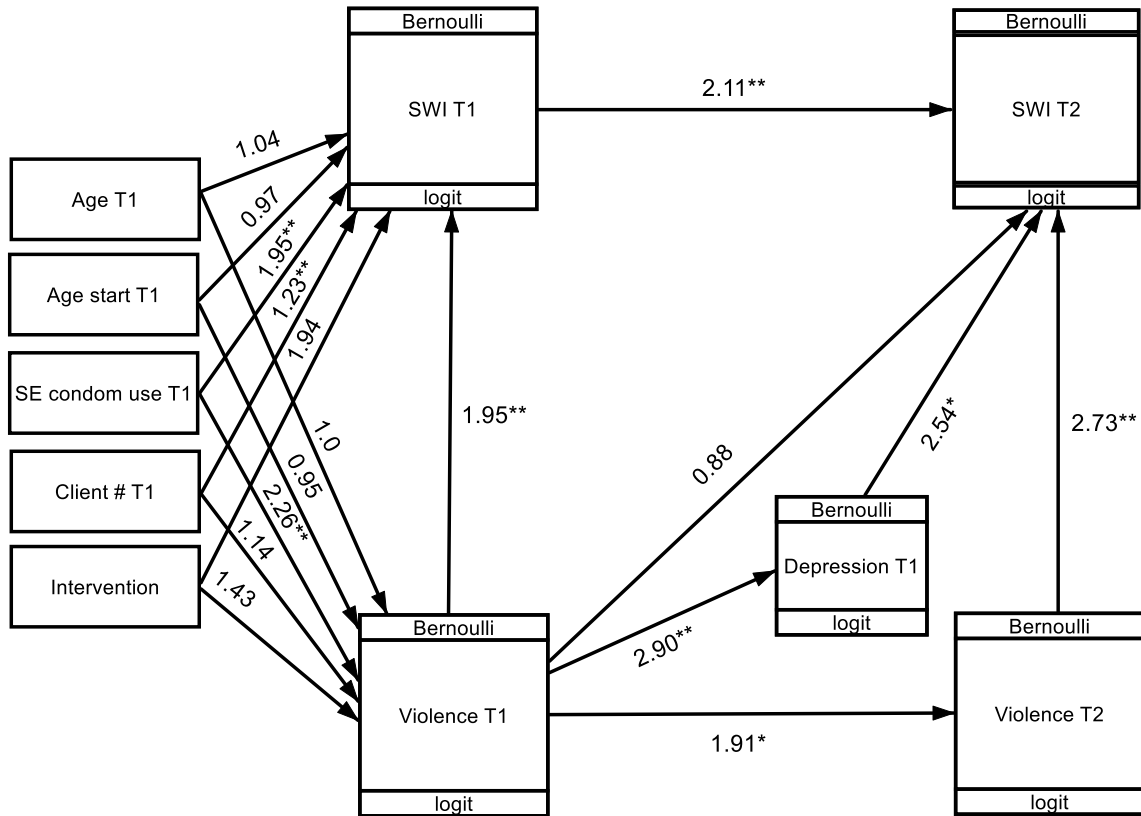
Path coefficients are exponentiated coefficients (aORs)

\*\* p < .05

\* p < .10

Appendix 3: GSEM sensitivity analysis reverse directionality

**Figure 3.1A.** Final GSEM model was re-run with the direction of the regression pathways reversed for the cross-sectional association between violence and SWI reversed at both timepoints. Specifically, violence victimization was modeled as the exposure variable and SWI was modeled as the outcome variable within each time period.



Path coefficients are exponentiated coefficients (aORs)

\*\* p < .05

\* p < .10

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## EDUCATION

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2016 – present	<b>Johns Hopkins Bloomberg School of Public Health, Baltimore MD</b> Department of Population, Family & Reproductive Health <u>Advisor:</u> Michele Decker, ScD <u>Dissertation:</u> Understanding the relationship between violence victimization, alcohol use, and the health promotive role of resilience among female sex workers in Pattaya, Thailand.	PhD Candidate
2012 – 2014	<b>Johns Hopkins Bloomberg School of Public Health, Baltimore MD</b> Department of Population, Family & Reproductive Health <u>Advisor(s):</u> Donna Strobino, PhD & Michele Decker, ScD <u>Thesis:</u> Sexual violence against female sex workers in The Gambia: a cross-sectional examination of the associations between victimization and reproductive, sexual and mental health	MSPH
2007 - 2011	<b>Rollins College, Winter Park FL</b> Department of Anthropology and Gender Studies <u>Awards:</u> Zora Neale Hurston award for community-based research (2011) Sojourner Truth award for combined academic and activist work (2011)	BA

## RESEARCH INTERESTS

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Sexual & Reproductive Health and Rights, HIV Prevention & Care

Gender Equity, Key Populations, LGBTQ Health

Violence Prevention, Social and Structural Determinants, Health Policy

## RESEARCH EXPERIENCE

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2020-2021	<b><i>Principle Investigator</i></b> Elton John AIDS Foundation <u>Project:</u> Increasing Transgender Inclusion in National Strategic Plans for HIV/AIDS <u>Co-Investigator:</u> Erika Castellanos	Global
2018	<b><i>Principle Investigator</i></b> UN Women <u>Project:</u> A qualitative inquiry in Eswatini, South Africa, and Zambia: Lessons to increase the gender-responsiveness of HIV/AIDS National Strategic Plans <u>Co-PI:</u> Bergen Cooper, MPH	Eswatini, South Africa, Zambia

2017- 2019	<p><b><i>Principle Investigator</i></b>  Open Society Foundations  <u>Project:</u> The impact of the expanded Mexico City Policy on HIV outcomes in PEPFAR-supported countries  <u>Co-investigators:</u> Greg Millett, MPH &amp; Michele Decker, ScD</p>	Global
2015-2017	<p><b><i>Co-Investigator</i></b>  World Bank, Sexual Violence Research Initiative  <u>Project:</u> Trauma-informed, community-engaged violence prevention for Female Sex Workers in Thailand  <u>PI(s):</u> Michele Decker, ScD &amp; Dusita Phuengsamran, PhD</p>	Pattaya, Thailand
2016-2017	<p><b><i>Co-Investigator</i></b>  amfAR, The Foundation for AIDS Research  <u>Project:</u> Situation Assessment: PrEP/ Combination HIV Prevention Needs and Knowledge Among Female Sex Workers in Thailand  <u>PI(s):</u> Michele Decker, ScD &amp; Dusita Phuengsamran, PhD</p>	Bangkok, Thailand
2013-2015	<p><b><i>Graduate Research Assistant</i></b>  The Global Fund to fight AIDS, tuberculosis, and malaria  <u>Project:</u>  Biological and Behavioral Study of HIV and Syphilis in Men Who Have Sex with Men and Female Sex Workers in Abidjan  <u>PI:</u> Stefan Baral, MD PhD</p>	Abidjan, Cote d'Ivoire
2012-2014	<p><b><i>Graduate Research Assistant</i></b>  CDC 1H25PS003796 &amp; the Secretary's Minority AIDS Initiative  <u>Project:</u>  Environmental scan: Youth friendly HIV services for young men who have sex with men of color in Baltimore city  <u>PI:</u> Arik Marcell, PhD</p>	Baltimore, MD

## WORK EXPERIENCE

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2014-present	<p><b><i>Policy Manager, amfAR the Foundation for AIDS Research</i></b>  <u>Description:</u> Leading the development of amfAR's policy-related project portfolio in the areas of gender, women's health, and the sexual and reproductive health of key populations. Projects include both creation and translation of research to inform decision-makers creation of evidence-based HIV policy.</p>	Washington DC
2011-2012	<p><b><i>Violence Prevention Coordinator, Harbor House of Central Florida</i></b>  <u>Description:</u> Designed and implemented dating violence prevention curricula among young people, including LGBT students, those who homeless/unstably-housed, pregnant/parenting, and in prison-diversion programs, aimed at preventing intimate partner violence and encouraging healthy relationships</p>	Orlando, FL

## TEACHING EXPERIENCE

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2020	<b><i>Instructor, amfAR online course: HIV data for Advocacy</i></b> <u>Modules:</u> (1) Gender responsive HIV data collection & programming (2) Community-Led Monitoring: Tools and design (3) Community-Led Monitoring: Data for advocacy	Online
2012-2014, 2016	<b><i>Graduate Teaching Assistant, Johns Hopkins School of Public Health</i></b> <u>Courses:</u> (1) Women's Health (2) International Perspectives on Women, Gender, and Health (3) Life Course Perspectives on Health <u>Instructors:</u> Michele Decker, ScD, Michele Hindin PhD, Mary-Elizabeth Hughes, PhD, Robert Blum, MD PhD	Baltimore, MD
2010-2011	<b><i>Health Educator, Beta Center for pregnant and parenting teens</i></b> <u>Courses:</u> (1) Healthy and unhealthy relationships (2) Violence prevention and bystander intervention	Orlando, FL

## PUBLICATIONS

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- (1) **Sherwood, J.** Lankiewicz, E., Roose-Snyder, B., Cooper, B., Jones, A., & Honermann, B. (2021). The role of contraception in preventing HIV-positive births: global estimates and projections. *BMC public health*, 21(1), 1-10.
- (2) **Sherwood, J.** Roemer, M., Honermann, B., Jones, A., Millett, G., Decker, M. (2020). Restrictions On US Global Health Assistance Reduce Key Health Services In Supported Countries. *Health Affairs*, 39(9)
- (3) Restar, A. J., **Sherwood, J.**, Edeza, A., Collins, C., & Operario, D. (2020). Expanding Gender-Based Health Equity Framework for Transgender Populations. *Transgender Health*.
- (4) Restar, A. J., Jin, H., Ogunbajo, A., Goedel, W. C., Millett, G., **Sherwood, J.**, ... & Mimiaga, M. J. (2020). Prevalence and Risk Factors of Nonmedical Prescription Opioid Use Among Transgender Girls and Young Women. *JAMA network open*, 3(3), e201015-e201015.
- (5) Viswasam, N., Lyons, C. E., MacAllister, J., Millett, G., **Sherwood, J.**, Rao, A., ... & Global. HIV Research Group. (2020). The uptake of population size estimation studies for key populations in guiding HIV responses on the African continent. *Plos one*, 15(2), e0228634.
- (6) Kates, J., Millett, G., Dawson, L., Honermann, B., Jones, A., **Sherwood, J.**, ... & Kuenzle, K. (2020). The Broader Context of "Ending the HIV Epidemic: A Plan for America" Initiative.
- (7) **Sherwood, J.**, Sharp, A., Honermann, B., Horrigan, C., Chatterjee, M., Jones, A., ... & Millett, G. (2018). Mapping the impact of the expanded Mexico City Policy for HIV/family planning service integration in PEPFAR-supported countries: a risk index. *BMC public health*, 18(1), 1116.
- (8) Sharp, A., Jones, A., **Sherwood, J.**, Kutsa, O., Honermann, B., & Millett, G. (2018). Impact of Medicaid Expansion on Access to Opioid Analgesic Medications and Medication-Assisted Treatment. *American journal of public health*, 108(5), 642-648.

- (9) Honermann, B., Sharp, A., **Sherwood, J.**, Kshetry, P., Jones, A., O'Hagan, R., ... & Millett, G. (2018). Calculating indirect costs from international PEPFAR implementing partners. *PloS one*, 13(10), e0206425.
- (10) **Sherwood, J.**, Sharp, A., Cooper, B., Roose-Snyder, B., & Blumenthal, S. (2017). HIV/AIDS National Strategic Plans of Sub-Saharan African countries: an analysis for gender equality and sex-disaggregated HIV targets. *Health policy and planning*, 32(10), 1361-1367.
- (11) Horn, T., **Sherwood, J.**, Remien, R. H., Nash, D., Auerbach, J. D., & Treatment Action Group and Foundation for Aids Research HIV Prevention Continuum Working Group. (2016). Towards an integrated primary and secondary HIV prevention continuum for the United States: a cyclical process model. *Journal of the International AIDS Society*, 19(1), 21263.
- (12) MacAllister, J., **Sherwood, J.**, Galjour, J., Robbins, S., Zhao, J., Dam, K., ... & Baral, S. D. (2015). A comprehensive review of available epidemiologic and HIV service data for female sex workers, men who have sex with men, and people who inject drugs in select West and Central African countries. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 68, S83-S90.
- (13) **Sherwood, J.**, Grosso, A., Decker, M.R., Peitzmeier, S., Papworth, E., Diouf, D., Drame, F.M., Ceesay, N. and Baral, S., 2015. Sexual violence against female sex workers in The Gambia: a cross-sectional examination of the associations between victimization and reproductive, sexual and mental health. *BMC public health*, 15(1), p.270.
- (14) Pilgrim, N., **Sherwood, J.**, Dittus, P. J., Loosier, P., Jennings, J., Page, K. R., ... & Marcell, A. V. (2014). Developing a Sexual and Reproductive Healthcare Guide: The Voices of Young Urban Minority Males Aged 15-24. *Journal of Adolescent Health*, 54(2), S9-S10.

#### Articles in Preparation:

- (1) **Sherwood, J.**, Sharp, A., Honermann, B., Decker, M., Millett, G. (in preparation) HIV Risk Factors and Associated Health Outcomes Among Sexual Minority Women in the United States: 2015-2017 National Survey of Family Growth
- (2) **Sherwood, J.**, Castellanos, E., Lankiewicz, E., Restar A., (in preparation). A systematic review of transgender inclusion in National Strategic Plans for HIV/AIDS.

#### **PRESENTATIONS**

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- (1) **Sherwood, J.** Capturing the full impact of HIV on women. Oral presentation: 23rd International AIDS Conference (AIDS 2020), 2020 July 6-10; Virtual.
- (2) **Sherwood, J.**, Phuengsamran, D., Darawuttimaprakorn, N., Janyam, S., Decker, MR. Contributors to resilience for HIV prevention among female sex workers in Pattaya Thailand. Poster presented: 23rd International AIDS Conference (AIDS 2020), 2020 July 6-10; Virtual.
- (3) **Sherwood, J.**, Roemer, M., Honermann, B., Sharp, A., Decker, M., Millett, G. Tracking the Impact of the Expanded Mexico City Policy on PEPFAR Implementing Partners. Poster session presented at: HIV Research for Prevention 2018; 2018, October 21-25; Madrid, Spain.
- (4) **Sherwood, J.**, Sharp, A., Honermann, B., Horrigan, C., Chatterjee, M., Jones, A., ... & Millett, G. Mapping the impact of the expanded Mexico City Policy for HIV/family planning service integration in PEPFAR-supported countries: a risk index. Poster session presented at: International AIDS Society 2018; July 23-27; Amsterdam, Netherlands.

- (5) **Sherwood, J.** Phuengsamran, D., Koenig, L., Wirtz, A., Janyam, S., Decker, M. Violence perpetration against female sex workers in Thailand: Contextual data for intervention development and trauma-informed delivery of health services. Poster presented at: 5th Annual Sexual Violence Research Initiative Forum; 2017 Sept. 18-21; Rio de Janeiro, Brazil.
- (6) **Sherwood, J.** Sharp, A., Honermann, B., Blumenthal, S., Millett, G. HIV Risk Factors and Associated Health Outcomes Among Sexual Minority Women in the United States. Poster presented: 9th IAS Conference on HIV Science (IAS 2017), 2017 July 23-26; Paris, France.
- (7) **Sherwood, J.** Lazar L., Honermann B., MacAllister J., Blumenthal, S., Lindsey, K., Millett, G. Does Funding Match the Burden? Tracking PEPFAR COP Expenditures in HIV Programming for Female Sex Workers from 2013 to 2015. Poster presented at: 21st International AIDS Conference (AIDS 2016), 2016 July 18-22; Durban, South Africa.
- (8) **Sherwood, J.** Cooper, B., Honermann, B., Roose-Synder, B., Blumenthal, S., MacAllister, J., Millett, G. HIV prevalence trends among young women and men in Sub-Saharan Africa from 2000-2013 – Evidence to inform gender-specific HIV targets and indicators in generalized HIV epidemics. Oral presentation: 18th International Conference on AIDS and STIs in Africa (ICASA 2015), Harare, Zimbabwe, 29 November - 4 December 2015.

#### RESEARCH TRAINING GRANTS / SCHOLARSHIPS

---

2017-2018	Family Planning Fellowship	Department of Population Family & Reproductive Health, JHSPH
2016-2017	Dr. Michael Koenig Memorial Fund Scholarship	Department of Population Family & Reproductive Health, JHSPH
2012-2014	Maternal and Child Health Training Grant Recipient	Maternal and Child Health Bureau
2013-2014	Public Health Service Training Grant Recipient	Human Resource and Service Administration

#### TECHNICAL SKILLS/ LANGUAGES

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<b>Certifications:</b>	Court advocate for survivors of violence CITI human subjects research	Orlando, FL Online
<b>Data collection:</b>	Qualtrics, CommCare, ODK	
<b>Analysis:</b>	STATA, basic R, EpiData Manager, Dedoose	
<b>Language:</b>	Professional French	
<b>Other:</b>	Microsoft Office, Endnote, Pubmed	